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2025

KANSAS
WILDLIFE ACTION PLAN





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Kansas Department of Wildlife and Parks

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Executive Summary

The 2025 Kansas State Wildlife Action Plan (SWAP) revises and replaces the 2022 Kansas Wildlife Action Plan as the principle document guiding conservation of Kansas' rich wildlife diversity. This plan is not a compilation of specific management plans but was developed to be a dynamic, adaptive document that will guide Kansas Department of Wildlife and Parks (KDWP) and conservation partners in planning and implementation of conservation measures to address priority issues and actions as identified herein. The plan also highlights past projects and success stories implemented through State Wildlife Grants since the initial plan was developed.

The SWAP is built upon eight required elements identified by Congress, with an overall focus as a habitat-based plan that began with the consideration of species. The plan is based on the best available information in accord with the intent established by Congress and echoed by the U.S. Fish and Wildlife Service and the Association of Fish and Wildlife Agencies (AFWA). Information provided through projects implemented as a result of the original plan and data from conservation partners helped to fill in important pieces of missing data for this revision.

All fish, wildlife, and now plants in Kansas were re-evaluated using selection criteria, resulting in the identification of 431 Species of Greatest Conservation Need (SGCN). There are 10 habitats identified as priority for the survival and health of the SGCN.

Geographically explicit areas in which to address conservation were established in a previous edition. These Ecological Focus Areas (EFA) represent landscapes where conservation actions can be applied for maximum benefits to Kansas wildlife (summary map found below). For each EFA, a suite of SGCN, priority habitats, and a unique set of conservation actions designed to address the specific resource concerns, have been provided in the plan. Due to data differences between ecosystems, EFAs have been separated into aquatic and terrestrial species and habitats.

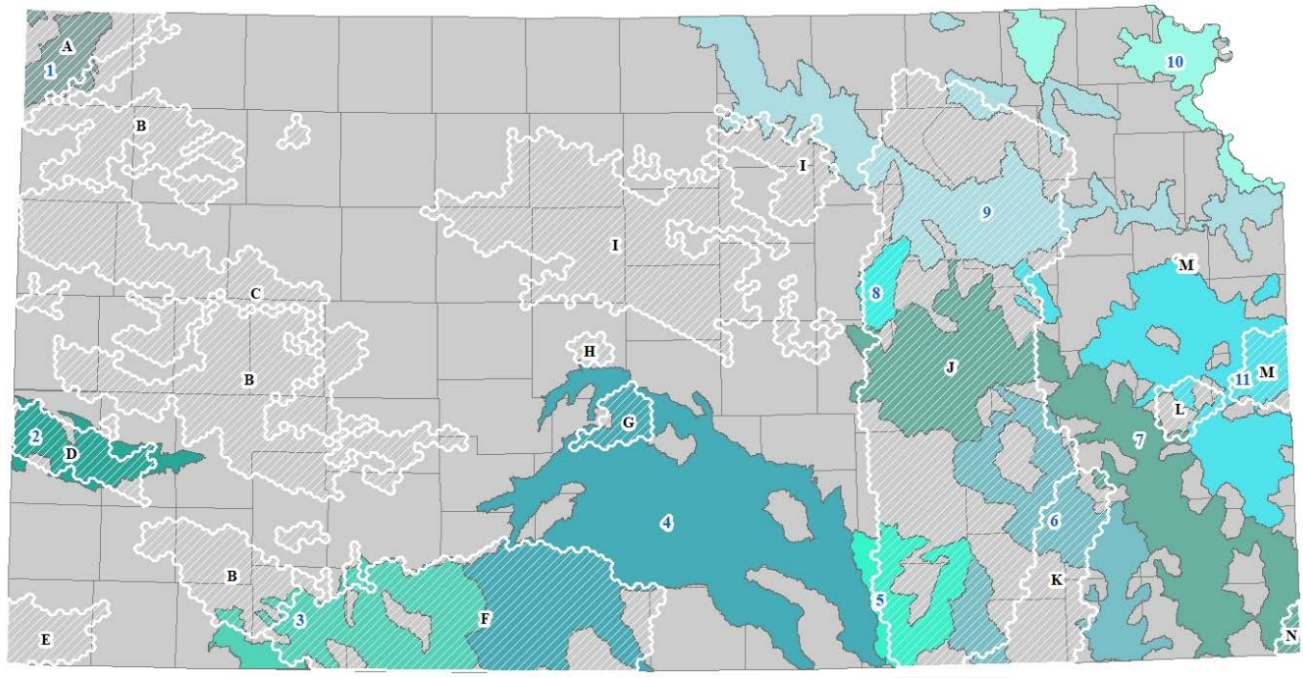
Many issues affecting biodiversity occur across the entire state and are not specific to individual EFAs. The statewide conservation issues have been identified as: (1) residential and commercial development, (2) agriculture (farming and ranching), (3) energy production, (4) natural systems modification, (5) invasive species, (6) pollution, (7) climate change, and (8) compliance and enforcement of wildlife laws and regulation. Other issues that occur statewide but are not considered direct threats to biodiversity are: (9) existing data gaps and lack of knowledge, (10) inadequate coordination between government agencies, (11) lack of outreach and education, and (12) shift in landowner types.

Building on the structure from previous editions, KDWP continues to collaborate with our conservation partners in academia, non-governmental organizations (NGOs), and other state/federal agencies. The feedback and assistance from these groups, their willingness to participate in all aspects of the plan revision, and overall support is outstanding. Also of critical importance, is the support from Kansas residents for various programs and issues surrounding the protection and management of sensitive species as shown in the survey "Kansas Resident's Attitudes Regarding Threatened and Endangered Wildlife" (Duda 2021). The survey showed that an overwhelming majority of Kansas residents (94%) agree that KDWP should continue to identify and protect habitat critical to the existence of threatened and endangered wildlife.

The purpose of the SWAP is not to produce a plan – it is to implement actions and to improve fish and wildlife conservation in the future. It identifies broad priorities on species, habitats, issues, and by inference, strategies and conservation actions. New funding will be focused on the priorities identified in this plan. Monitoring of new information and conservation progress will identify changes that need to be made to the SWAP, as well as changes made towards conservation efforts. KDWP will continue its on-going commitment, communication and coordination with all conservation stakeholders. Kansas' SWAP will remain a vital, adaptive template for future fish and wildlife conservation efforts in the state.

The development of Kansas' SWAP is based upon the guidance provided by the U.S. Fish and Wildlife Service, Assocation of Fish and Wildlife Agencies (AFWA), and many colleagues from other state fish and wildlife agencies. It is funded in part by the State Wildlife Grant T-67-C-01 Kansas State Wildlife Action Plan 10-yr Comprehensive Revision.

Ecological Focus Areas



Terrestrial

A-Arikaree Breaks
B-Playa Landscape
C-Western River Breaks
D-Arkansas River Sandsage Prairie
E-Cimarron Grasslands
F-Red Hills
G-Quivira
H-Cheyenne Bottoms
I-Smoky Hills
J-Flint Hills
K-Chautauqua Hills
L-Eastern Tallgrass Prairies
M-Eastern Forests
N-Ozark Plateau

Aquatic

1-Upper Republican
2-Upper Arkansas
3-Cimarron
4-Lower Arkansas
5-Walnut
6-Verdigris
7-Neosho
8-Smoky Hill
9-Lower Republican
10-Missouri
11-Marais des Cygnes

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Chapter 1- Introduction and Purpose

Purpose and Need

For years, fish and wildlife conservation in Kansas – and nationally – had been funded primarily by hunters and anglers. That funding was mainly through two sources: first, revenue from the sale of fishing, hunting, and other licenses; second, federal excise tax revenue from sales of fishing and hunting equipment, apportioned back to States through the U.S. Fish and Wildlife Service according to set formulas (through the Pittman/Robertson, Dingell/Johnson, and Wallop/Breaux Acts). This system was very effective at funding conservation for game species, those that are hunted or fished. Through the Endangered Species Act, limited funding for conservation of federally endangered and threatened species had also been possible. There had been little federal funding specifically designated for nongame species with a few exceptions for forage and prey species. Although in the past, benefits to nongame species had been accrued from projects and actions carried out for the benefit of game and T&E species. Federal funding sources for nongame species were not available until recently and those funds were relatively small compared to those available for game species. The State of Kansas does have a small nongame fund, financed through a checkoff on state income taxes to address the approximately 80% of species that are neither hunted, fished, endangered, nor threatened but there was no comparable federal funding mechanism to match or supplement these funds.

To address this recognized inequity in funding, the Commerce, Justice and State Appropriations Act of Fiscal Year 2001, Title IX, Public Law 106-553 created the Wildlife Conservation and Restoration Program. Although this act provided only one year's appropriation of funds for fish and wildlife conservation, it identified the elements required to be included in the "wildlife conservation plan" that States committed to develop by October 2005. A second act, the Department of the Interior and Related Agencies Appropriations Act of 2002, Public Law 107-63, Title 1, created a "State Wildlife Grants Program" and required the states to develop "comprehensive wildlife conservation plans" by October 2005. To remain eligible for State Wildlife Grant funding, states were required to update their original plan every 10 years.

This 2025 revision was that required revision. It focuses on addressing emerging conservation challenges and incorporating new data in relation to species, habitats, threats and actions. This revision is evidence that this plan is dynamic and adaptive to new biological information and technical tools that allow better assessments of wildlife habitat and population trends. It is funded in part by the State Wildlife Grants program and meets the requirements of both Federal acts.

A 2022 minor revision was completed to incorporate new species information and address emerging issues affecting Kansas' biodiversity. This version was an improvement and refinement of the original plan that aimed State Wildlife Grant funding to target Species of Greatest Conservation Need (SGCN) within pre-identified wildlife habitats landscapes, termed Ecological Focus Areas (EFA).

The 2015 planning effort titled “Kansas’ State Wildlife Action Plan”, was the first revision of the plan implemented in 2005 titled “A Future for Kansas Wildlife, Kansas’ Comprehensive Wildlife Conservation Strategy” (Wasson et al., 2005). The revision occurred a decade after the original plan was adopted to guide State Wildlife Grant funding. It incorporated updated species information, a new climate change section with vulnerability analysis, and the development of priority landscapes (EFAs). It was the result of a huge effort involving virtually all of Kansas’ conservation agencies and organizations and coordinated by the Kansas Department of Wildlife and Parks.

Eight Required Elements of State Wildlife Action Plan

The enabling legislation, along with regulations governing the State Wildlife Grants and related programs requires that the wildlife conservation plans include the following elements:

1. Information on the distribution and abundance of species of wildlife, including low and declining populations as the State fish and wildlife agency deems appropriate, that are indicative of the diversity and health of Kansas’ wildlife; and,
2. Descriptions of locations and relative condition of key habitats and community types essential to conservation of species identified in (1); and,
3. Descriptions of problems which may adversely affect species identified in (1) or their habitats, and priority research and survey efforts needed to identify factors which may assist in restoration and improved conservation of these species and habitats; and,
4. Descriptions of conservation actions proposed to conserve the identified species and habitats and priorities for implementing such actions; and,
5. Proposed plans for monitoring species identified in (1) and their habitats, for monitoring the effectiveness of the conservation actions proposed in (4), and for adapting these conservation actions to respond appropriately to new information or changing conditions; and,
6. Descriptions of procedures to review the plan at intervals not to exceed 10 years; and,
7. Plans for coordinating the development, implementation, review, and revision of the plan with Federal, State, and local agencies and Indian tribes that manage significant land and water areas within the State or administer programs that significantly affect the conservation of identified species and habitats; and,
8. Provisions to ensure public participation in the development, revision, and implementation of projects and programs. Congress has affirmed that broad public participation is an essential element of this process.

This plan is the result of a process specifically designed to meet the above required elements.

Value of a State Wildlife Action Plan to Kansas

For years, forward-thinking ecologists and others have encouraged conservation plans to emphasize habitat focused conservation actions. The condition of habitat quality highly influences species ability to persist and is why the habitat-based approach was used to develop this Wildlife Action Plan. SGCN were identified, but only for purposes of linking sets of species to key habitats and priority conservation areas, termed Ecological Focus Areas (EFA), around the state. Issues and actions relate directly to those focus areas within regions, and indirectly to SGCN which occupy those areas.

This is a strategic plan that identifies broad priorities for conservation of wildlife in the state. It is expected that projects will be developed that address actions aimed at the priority species, habitats, and issues identified in this plan and that these projects will be implemented by teams comprised of individuals representing diverse agencies and organizations with funding provided by multiple sources.

Approval of this plan allows cost-shared federal funding via State Wildlife Grants for projects that address issues and actions identified in the plan. State Wildlife Grants have been used to fund 71 projects focused on research, recovery, habitat improvements, species surveys, and regulatory work. All these projects have provided information to Kansans regarding the population status and best management of habitats for the wildlife community.

This intensive planning effort, with input from numerous conservation partners, compliments the mission statement of Kansas Department of Wildlife and Parks. Within the mission statement there is one sentence that epitomizes the role of this strategic plan. It is: *"To conserve and enhance Kansas' natural heritage, its wildlife and its habitats to ensure future generations appreciate and enjoy these living resources and associated recreation."*

Partner Involvement

Partner input for this revision of the SWAP was encouraged through multiple outlets. A series of meetings were held, four meetings each for external partners and internal partners to provide comment. Many participants were involved in the development of earlier editions of the SWAP. Participants were asked to review the current edition of the SWAP and discuss new and emerging conservation issues relevant to the priority species and habitats identified within the SWAP. Considering the level of turnover that inevitably happens within agencies and NGOs, these meetings also served as an introduction to the plan for newer members to the conservation community in Kansas.

Public Involvement

[Will be updated after public comment period]

Public participation was invited through news releases, email lists of interested parties, email lists of experts, social media, exposure through Commission meetings, and presentations at society meetings. KDWP's website (http://ksoutdoors.com/Services/Kansas-SWAP) will continue to serve as the primary communication tool for providing information about the SWAP with the general public.

How to Use this Plan: Interpretation

The Kansas SWAP is organized around the "Eight Required Elements:" Elements 1 and 2 and are combined in Chapter 3 "Priority Species and Habitats"; Element 3 is addressed in Chapter 2 "Statewide and Regional Perspective" as well as each individual EFA chapter (Chapters 5-29). Element 4 is addressed in each individual EFA chapter. Elements 5, 6, and 7 are combined in Chapter 30 "Plan to Review and Revise." Element 8 is addressed in Chapter 1 "Introduction and Purpose."
To orient the user to the physiographic regions and history of the Kansas landscape as well as share about its wildlife resources and recreational opportunities, a summary is provided in Chapter 2 "Statewide and Regional Perspective."
Each EFA chapter was written to be a stand-alone document to aid conservation partners in the recognition of the conservation issues and priorities found within the area of their geographic interest. Because each chapter was written to stand alone there is some repetition between those chapters. Each EFA chapter contains a description that includes priority habitats, a list of conservation issues and subsequent conservation actions related to that area. Lastly included is the list of SGCN that occur (or could occur) in that EFA.

How to Use this Plan: Implementation

The purpose of the SWAP is not to produce a plan – it is to implement actions and to improve fish and wildlife conservation in the future. Knowing it will take coordination from many entities for successful conservation impacts, KDWP will continue current efforts to facilitate partnership contacts through ongoing communication and coordination with partners and potential partners. It is expected that through frequent contact with potential partners and stakeholders, project proposals can be developed to address implementation of actions directed at the top ranked species, EFAs, or issues. Through on-going communication and coordination will all stakeholders, Kansas' SWAP will remain a vital, adaptive template for future fish and wildlife conservation efforts in the state.

Chapter 2 – STATEWIDE AND REGIONAL PERSPECTIVE

STATEWIDE PERSPECTIVE

Kansas is a state of variety in terms of landscape, weather, waters, and wildlife. The 82,276 square miles of Kansas offers displays of environmental change and associated diversity of plant and animal species. The land gradually rises from east to west; with elevation ranging from 684 ft. to 4,039 ft. (Collins 1985). In general, the topography of the state consists of flat, rolling, and hilly terrain. The exceptions to the generalities of Kansas' topography offer remarkable diversity of landforms, like the deep box canyons of the Arikaree Breaks in the northwest corner to the dripping ledges of Schermerhorn Cave in the southeast; from the towering chalk formations of the High Plains to the eroded cutouts of the Red Hills along the south-central border (Collins 1985). Millions of years ago, the majority of Kansas was covered by a shallow ocean of salt water called the Permian Sea. The sea, along with its wildlife, created many of the natural resources Kansas provides today, including limestone, coal, oil, natural gas, and thick salt deposits. Geologically, the sedimentary layers of Kansas are relatively young, of Mississippian age and younger (Wilson and Bennett 1985) with the oldest strata exposed in eastern Kansas and most recent near the Colorado border.

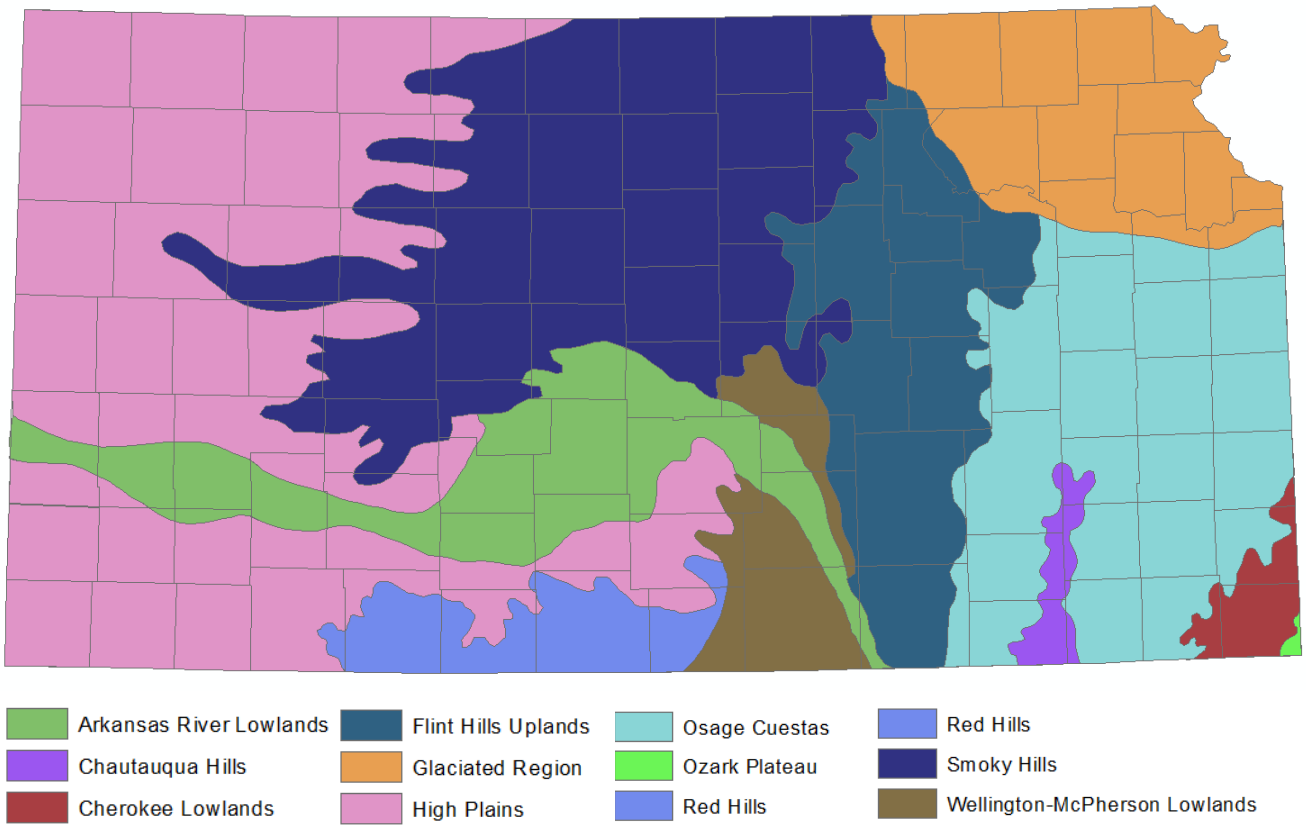


Figure 1. Physiographic regions of Kansas (Kansas Geological Survey 1997)

Not only do the physical properties of the bedrock create different landforms but also the soil that develops from their upper layers. Broad areas of distinct physiography (Figure 1.) are produced by the breakdown of differently composed bedrock belts (Savage 2004). This can lead to characteristic natural vegetation types developing on distinctive soil types (Wilson and Bennett 1985). Powerful forces of nature produced the landforms of the state. Forces such as fierce winds, the interchange between blazing heat and blizzard cold, gushes of floodwater, or melting glaciers, have eroded and broken down the differently composed bedrocks. One result that illustrates these forces is the sand and gravel in western Kansas that was deposited through erosion of the Rocky Mountains (Wilson 1984).

The weather in Kansas can often be described as dramatic and dynamic. The state has seen record high temperatures climb to 121° F, and the record cold drop to -40° F. Kansas temperatures can soar to over 100° F in both October and March but also drop to freezing or below in every month of the year (Eagleman and Simmons 1985). Snowfall has been recorded in every month except July and August. The average amount of snowfall varies from 10 inches in the south-central part of the state to 24 inches in the northwest (Busby and Zimmerman 2001). Although Kansas displays a great variation of temperature regimes, the mean annual temperature is about 55° F (Eagleman and Simmons 1985). The state's varied weather patterns are due, in part, to its diverse topography. Moisture from the Gulf of Mexico is blown to Kansas by strong surface winds. Eastern Kansas receives warm moist air from the Gulf more often since normal surface winds blow from a southerly direction (Savage 2004). The average annual amount of rainfall in the eastern part of the state is around 40 inches, while the western part of the state's average annual rainfall amount drops to 15 inches (Eagleman and Simmons 1985). Summer thunderstorms account for much of the annual rainfall, with 75% of precipitation occurring during the growing season (April through September) (Busby and Zimmerman 2001). The western third of Kansas consists of a semiarid climate, caused by the "rain shadow" of the Rocky Mountains. The mountains pull the moisture from the east moving air masses from the Pacific Ocean. The air that does move over the mountains and across the plains is much drier. The graduale rise in elevation from east to west leads to a long, subtle gradient of temperature and moisture regimes across the state (Eagleman and Simmons 1985).

Water, which aided in sculpting the landscape and is a major factor in the location and dispersal of plants and animals, is available in diverse forms throughout Kansas. Kansas is a land of few natural lakes such as river oxbows. Almost all the large lakes seen in Kansas today are manmade reservoirs and the result of flood-control projects (Madson 1985). Shallow wetlands and playa lakes are another type of water source in Kansasand are scattered across the state. They are found along major rivers and in natural depressions (Busby and Zimmerman 2001). The large wetlands, Cheyenne Bottoms and Quivira National Wildlife Refuge, of central Kansas are the best-known wetlands of the state. The northern half of the state lies in the Kansas River Basin. Those streams and rivers begin on the flatlands east of the Rocky Mountains, eventually draining into the Missouri River (Wilson 1984). The southern part of the state is in the Arkansas River Basin. The Arkansas River, running along the south-western corner of the state, is the only major river in Kansas that originates in the mountains. Most of the sandy-bottomed streams in the western portion of the state exist thanks to the underground reservoir called the Ogallala Aquifer (Madson 1985). Unlike the streams in the eastern part of the state, the western streams are not particularly fertile. There is less vegetative growth and cover, leaving the streams vulnerable to increased evaporation and erosion. The eastern streams typically have more growth and cover, due in part to the more constant supply of water and nutrients from fertile soil erosion.

The location and abundance of Kansas plants and animals are dictated by the combined factors of landscape, weather, and water. Kansas, situated almost entirely within the Great Plains, is home to the prairie. The plants of the prairie have become well-adapted to extreme temperatures and rainfall, large

grazing herbivores, and fire (Busby and Zimmerman 2001). The Kansas prairie is broadly divided into three groups based on dominant species and height of vegetation: the Shortgrass prairie, Mixed-grass prairie, and Tallgrass prairie. Each of these prairie types occupies roughly a third of the state. The Shortgrass prairie occurs in the west, and the Tallgrass prairie in the east. The Mixed-grass prairie, comprising the central third of the state, is a zone of transition between tallgrass prairie species and shortgrass prairie species. In addition to many species of grasses, prairies contain many broad-leaved plants and a minor shrub component. The western limit of the Eastern Deciduous Forest spreads into far eastern Kansas, mingling with portions of the Tallgrass prairie (Savage 2004). The trees of the deciduous forest are large, and their expansive crowns shade the earth from the sun. They blanket river valleys, adjacent drainages, and the associated hillsides. Cottonwood, Green Ash, and Elm are the dominant tree species in eastern Kansas, with occasional groves of Oak, Walnut, and Hickory. Moving westward, the trees begin to hug waterways, and continuous strands of trees eventually disappear in the western half of the state (Brooks 1985). Woodlands in western Kansas keep to the riparian zones but can spread into the uplands when they are protected from fire. Cottonwoods and Willows are dominant in the west, where they can establish themselves quickly in the river bottoms that often experience flooding from torrential rains that scour the ground (Brooks 1985). Many of the trees seen in western Kansas are non-native like Russian Olive, Eastern Redcedar, Black Locust and Saltcedar. These trees were first establishe by people for a number of purposes; shade, lumber, hedge rows, erosion control, and wind protection.

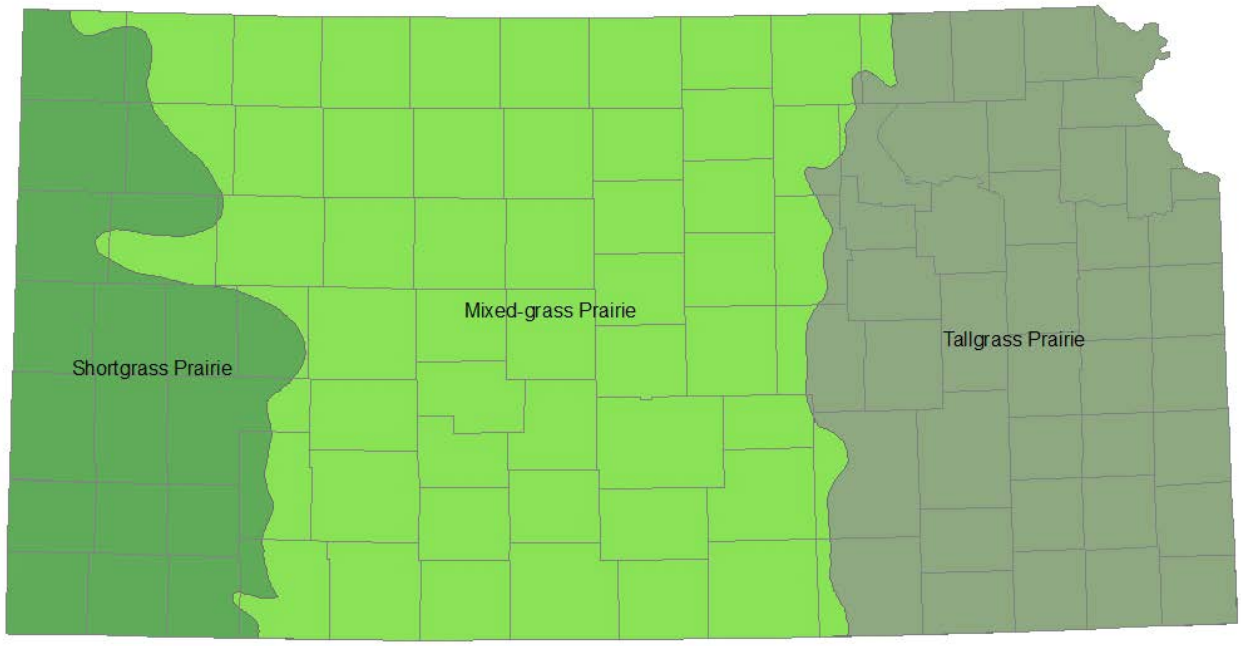


Figure 2. The three groups of Kansas Prairie (U.S. NABCI Bird Conservation Regions)

Many Kansas wildlife species, adapted to the extremes in temperature and precipitation, can live in abundance everywhere, but a fair number are restricted to eastern forest or arid High Plain (Collins 1985). Some restricted species may venture east or west, gradually declining in numbers as they leave the comfort of optimal habitat. Other habitat-specialist species may stay strictly within their distinct living conditions that keep them abundant and healthy. The majority of amphibian species, being restricted to water sources, occur in eastern Kansas, especially the south-eastern portion. Reptile species richness follows a similar pattern, with highest reptile diversity occurring in the south-east quarter of the state. For the most part, resident bird species can occur across the state, but the greatest number of bird species occurs on the eastern side of the state. With Kansas located in the heart of the Central Flyway, along the flight path for many migratory bird species, the state offers areas of shelter,

food, and rest for the weary travelers. Many mammal species occur across the entire state, with the highest number of mammal species occurring in the west. This pattern is demonstrated by the wide variety of Rodentia in the area. The greatest number of fish species occurs in the forested region on the east side of the state. The highest species richness of freshwater mussels occurs in the southeastern Kansas rivers where more stable water flows, with gravel substrates, and underlying riffles and runs are the optimal habitat of many long-lived mussel species. A few short-lived species that can survive in ponded water often occur in western Kansas streams. Insects are the most abundant group of species across the state; however, our knowledge of insects in Kansas is greatly lacking when compared with what is known about other taxa.

Kansas Wildlife Resources

In Kansas, as elsewhere, terrestrial and aquatic wildlife has historically been generically categorized as "game" and "nongame" species. This is driven by the financial and philosophical contributions of hunting and sport fishing interests. Those designations aside, KDWP is tasked with regulating, monitoring, and managing populations of wildlife. KDWP has no statutory jurisdiction for plant protection although many activities address plant conservation through biological community associations and wildlife habitat management. KDWP is responsible for the management of about 798 species of vertebrates. This includes 468 bird species, 89 mammals, 144 fishes, 53 reptiles, 30 amphibians, and 14 turtles. Additionally, approximately 24,000 species of invertebrates, including mussels, crustaceans, and insects are under jurisdiction of the Department. There are presently 29 threatened, 22 endangered (Kansas T&E 2025), and an additional 81 species on the Species in Need of Conservation (SINC) List (Kansas SINC 2025). These lists are reviewed every five years as per amendments to the Kansas Nongame and Endangered Species Conservation Act of 1975. The most recent listed-species review concluded in 2024, and the next review will commence in 2028. To inform species listing changes, data is continually being gathered to assess the current status of species or multiple-species groups.

Recently, the documented and apparent decline in the multi-species group commonly referred to as "pollinators" has emerged as a major conservation concern (Cameron et al., 2011; Cameron & Sadd. 2020). Animal pollinators are extremely important to meeting consumer demand and contributing to the profits generated from the harvest and sale of many agricultural crops. Roughly 75% of the 240,000 species of flowering plants world-wide rely on pollinators for flower reproduction (Potts et al., 2010). Available evidence indicates that certain pollinator species have been declining in the United States. A comprehensive assessment published in *Proceedings of the National Academy of Sciences* evaluated nearly 1,600 species of vertebrate and insect pollinators in North America. The study revealed that over 22% of these species are at an elevated risk of extinction, with native bees being among the most threatened groups (Cornelisse et al., 2025). Declines in pollinator populations can be traced to a multitude of causes, such as intensive agricultural practices, use of certain pesticides and habitat loss, fragmentation, and degradation. Some species, such as bumblebees, have experienced declines as a result of the spread of pathogens and disease from commercially produced colonies to native populations (Colla et al., 2006). Reduced pollinator populations may result in decreased pollination of plant species that require animal-mediated pollination to successfully carryout their life cycle . As a result, the plants that are highly specialized to specific species of pollinators could face population declines or even increased threat of extinction. Climate change is also expected to provide additional challenges to pollinator populations, ranging from disruption of migratory paths of pollinators such as hummingbirds, butterflies, and bats, to decoupling of plant-pollinator interactions when plants and pollinators respond differently to climate cues (Memmott et al., 2007). State Wildlife Grants have been a viable source of funding to assist in providing the needed research and habitat developments to stem the decline of pollinators.

Land Use History

Since pre-settlement times, the Kansas landscape has been greatly modified as a result of human interactions. The diversity and abundance of native habitats and wildlife have declined. The land and waters have been altered, affecting the remaining Kansas wildlife species (Collins 1985). In the east, starting around the 1850s, settlement and accompanying agricultural development swept across the state. Fifty years later, 82.2% of the state was converted to farmland (Busby and Zimmerman 2001). The major crops of the state were, and still are, wheat, corn, soybeans, and grain sorghum. Land that was too steep or rocky to plow was spared from conversion and left as grassland often used for livestock production. Today, there is relatively little prairie remaining in the shortgrass prairie regions of western Kansas (Savage 2004, Cushman and Jones 1988). The largest tract of tallgrass prairie in North America occurs in the Flint Hills of eastern Kansas (Duncan 1978).

Due to the relatively small amount of rainfall, especially in western Kansas, several agricultural crop species require irrigation. Water is most often pumped from the underground aquifers or where surface water is abundant, from rivers, streams, and lakes, which results in detrimental lowering of surface water levels and negatively affects wildlife (Madson 1985).

Fire was, and continues to be, a natural part of the prairie life cycle, contributing to its growth and stability. These fires, which were once started naturally by lightning strikes or purposely by Native Americans, removed residual growth from previous years and prevented or limited shrub and tree invasion of the grasslands. Because of fire's beneficial and rejuvenate effects, fires are still purposely set in prescribed areas under specific conditions to manipulate vegetation structure and composition (Savage 2004).

Kansas was once home to large herds of Bison, Elk, and Pronghorn. They were intensively hunted to very low numbers for their hides and meat (Meade 2008). Today there are no natural populations of Bison left in the state. A few small herds of Bison occur throughout Kansas, primarily in conservation areas or on private lands where they are managed as livestock. Some free-range Elk occur in throughout Kansas; however, their populations are smaller than they were historically. Similarly, Pronghorn herds persist but not to the magnitude they once did. These extant populations are largely the result of reintroduction efforts which occurred after the natural populations were extirpated from the state. Once prevalent prey sources dwindled or were extirpated, larger predators such as Cougars, Grizzly Bears, Black Bears, and Gray Wolves, also began to diminish throughout the state. Ranchers interested in protecting their livestock, further reduced the presence of these larger predators (Choate 1987).

Kansas Recreational Opportunities

Access

Kansas provides many unique and exciting opportunities for recreational outdoor activities. There are 88 public land areas managed for wildlife. Public waters include 54 state fishing lakes as well as 24 federal reservoirs that allow fishing opportunities. There are presently 29 state parks that provide opportunities such as hiking, biking and horseback riding, trails, canoeing and kayaking, rivers, geocaching, archery, swim beaches, and shooting ranges. The three navigable rivers (Kansas, Arkansas, and Missouri rivers) provide a variety of recreation opportunities to the public. The Kansas River and

the Arkansas River (from Great Bend to the KS/OK border) are designated National Water Trails by the National Park Service. There are also several discovery centers and Outdoor Wildlife Learning Sites (OWLS) that provide hands-on environmental awareness experiences for children of all ages. More information on the recreational trends across the state can be found in the Statewide Comprehensive Outdoor Recreation Plan (SCORP) (SCORP 2021).

The SCORP contains several goals that align with this SWAP and help address issues raised during the recent Wildlife Viewer survey. These goals include protecting Kansas's key landscapes while working to enhance outdoor recreation experiences. The SCORP also seeks to explore recreation opportunities closer to where Kansans live. These shared goals will allow for increased collaborative efforts moving forward in our state.

Wildlife viewing

A review of the 2022 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, conducted by the U. S. Fish and Wildlife Service (USFWS), revealed that 39.9 million people fished, 14.4 million hunted, and 148 million engaged in some type of wildlife viewing activity. The economic benefits included $99 billion spent on fishing trips and equipment, $45 billion spent on hunting, and $250 billion going towards wildlife viewing.

In 2021-2022 KDWP worked with AFWA and Virginia Tech as a partner state in a series of Wildlife Viewer Surveys. The purpose of the survey series was to gather information to enhance relevancy of state fish and wildlife agencies and engage support from broader constituencies. Summary results can be found below:

- 47% of respondents were consumptive viewers (participated in hunting and/or angling as well as viewing)
- 53% were nonconsumptive viewers (did not participate in hunting and/or angling, only viewing)
- The most popular wildlife viewing activities in Kansas were visiting parks and natural areas and feeding wild birds
- Kansans were most interested in viewing birds and land mammals
- Almost one-third of both consumptive and nonconsumptive viewers believe KDWP is not prioritizing programs for wildlife viewers enough
- When turning to KDWP, viewers most commonly utilize:
    - Information
    - Lands
    - Visitor centers
- About 25% of viewers had not made any purchases or contributions to KDWP
- The most popular methods of financial contributions to KDWP were fishing licenses and land access fees
- Over 33% of wildlife viewers were likely to increase their contributions to KDWP if they knew their funds would be used for the conservation of rare and vulnerable species or to support wildlife viewing opportunities

Relevancy

In 2018 AFWA, on a recommendation from the Blue Ribbon Panel on Sustaining America's Diverse Fish and Wildlife Resources, developed a roadmap that would allow agencies to adapt to the nation's changing demographics and values by increasing agency engagement and service to broader constituencies. The roadmap was completed in 2019, and consists of several topics related to capacity, culture, and constraints for both agencies and their constituents. For each of these topics, there is a list of barriers to increasing relevancy and ways to overcome those barriers. As part of the development and implementation of the Kansas SWAP there has been focus on the following barriers as it pertains to engaging and serving broader constituencies as listed in the AFWA Relevancy Roadmap.

Barrier 1: Agency culture and values do not align with nature-based values and outdoor interests of broader constituencies

Barrier 2: Agency is not adaptive to the changing nature-based values and outdoor interests of broader constituencies

Barrier 3: Perception by broader constituents that the fish and wildlife agency only cares about and serves hunters and anglers

Barrier 4: Constituents may have fears, concerns, or beliefs that prevent them from engaging with nature

To gather applicable information towards increased relevancy, two public surveys were initiated, addressing aspects of these barriers. In 2021 KDWP-Ecological Services Division worked with Responsive Management to conduct a survey on Kansas Residents Attitudes Regarding Threatened and Endangered Wildlife. This survey had been conducted twice before in 1991 and 2011. Pertinent results from this survey include:

- Nearly two thirds of Kansas residents (64%) indicated they were aware prior to the survey that there are, in addition to federal laws, state laws to protect wildlife that are threatened and endangered. This is an increase in awareness compared to 2011, which had dropped substantially since 1991.
- A large majority of residents (76%) were aware there are state laws protecting the habitats of threatened and endangered wildlife. This is a marked increase over the 2011 survey.
- Residents were presented with three potential funding sources to protect threatened and endangered wildlife in Kansas, and they were asked if they were willing to pay for each. Two thirds of residents (67%) are willing to pay for a wildlife-themed license plate, 59% are willing to buy a Wildlife Diversity Stamp, and 54% are willing to pay a tax on the sale of outdoor equipment.
- A strong majority of landowners who own more than 1 acre (71%) are willing to allow the Department to monitor threatened or endangered wildlife on their land; 33% are very likely. However, 28% are not at all likely.
- Another question found that 62% of landowners who own more than 1 acre would be willing to follow a conservation plan to maintain habitat for threatened and endangered wildlife on their land if they received monetary compensation.
- Nearly three quarters of landowners who own more than 1 acre (72%) would support the reintroduction of a threatened or endangered wildlife species to its historical range if that range was near or adjacent to the landowner's property.
- Sixty percent (60%) of survey participants support the state buying more lands that are habitat for some threatened and endangered wildlife.

Statewide Issues

The following information outlines primary statewide issues regarding the conservation of native plants and wildlife in Kansas. It is recognized that only when issues are well-identified, then strategies to address those issues will be more focused and effective. From the many perspectives we listened to concerning the future of Kansas' fish and wildlife, certain themes repeatedly emerged. These issues are closely related to each other and can have complex interactions. The goal here is to highlight the most crucial conservation and research needs while stressing the importance of on-going conservation planning at the smaller habitat-specific landscape scales. The actions to address the conservation issues are listed in each EFA section.

The diversity of flora and fauna in Kansas is declining due to a variety of stressors, including habitat loss, habitat degradation, habitat fragmentation, climate change, diseases, and competition and predation from invasive species. Past conservation actions have resulted in noteworthy successes but have not provided sufficient achievement in addressing the overall current decline in species. There is a need for a comprehensive, systematic, and proactive approach that involves multiple agencies and an interested public, for conserving Kansas' biological diversity. This plan is the blueprint to implement that proactive approach by addressing these issues.

Although the details are shown in the chapters that address specific geographic areas and habitats, the general themes are identified here for providing an overall, statewide perspective. Here are the primary issues related to the threats that affect many species and/or are issues widely distributed across the state. This list is not exhaustive and is meant to illustrate the ways in which various threats interact with species and/or their habitats.

Statewide Conservation Issues

1. **Residential and commercial development – human settlements or other nonagricultural land uses with a substantial footprint**

   Housing and Urban Areas, and Commercial and Industrial Area
   The most notable impact of residential and commercial development is the loss of functional native habitats due to human infrastructure developments. Residential and commercial development and accompanying roads, utility corridors, and other associated infrastructure cause direct loss, alteration, and fragmentation of native habitats. Fragmentation can reduce the size of intact habitat below the threshold required by a species or negatively impact species ability to move between suitable habitats if adequate travel corridors are not present. Species dynamics, such as predator/prey relationships and competition among species for resources, can also be altered by habitat changes resulting from residential and commercial development. An example is the proliferation of exotic or introduced non-native species that out-compete native species and change the food and cover resources available for wildlife. Hydrology is often negatively affected by impermeable surfaces. For instance, impervious pavement prevents the infiltration of storm water that is then stored in the soil to be used by plants. Pavement also impedes the percolation of storm water to deeper groundwater storage. The continued expansion of residential and commercial developments directly results in more impervious surfaces which, in turn, results in higher rates of sheet flow and runoff that enter streams, rivers, and wetlands. The increase in runoff flow can substantially magnify non-point source pollutants and sedimentation from excessive erosion in aquatic ecosystems.

2. **Agriculture-threats from farming and ranching as a result of agricultural expansion and intensification**

Cropland

Conversion of prairie, wetlands, and woodland to cropland replaces native habitat with grain crops or non-native forage crops. Activities such as plowing, tilling, mowing, and the use of pesticides can have direct or indirect impacts on native species or their habitats. Agricultural fields can still provide food and cover for some wildlife species; however, the activities associated with agricultural production can be fatal to some species inhabiting the fields**.** Many wetlands have been drained or are being farmed through, greatly reducing their functions and habitat value. Farming near stream channels often reduces or eliminates riparian habitats. The loss of riparian corridors, in addition to other factors such as channelizing a stream to increase farmable acreage, result in the incision of the streambank which cuts the stream off from its floodplain and alsoresults in accelerated streambank erosion, land loss, aquatic and terrestrial habitat loss, and increased sedimentation downstream (Rosgen 1997). Drainage systems accelerate flow and reduce the natural filtration process that recharges groundwater and reduce peak flood flows. Another important concern is the groundwater depletion and loss of base flows in western Kansas streams due to irrigation to sustain row crop agriculture. Some of the same concerns for residential and commercial development relative to water quality and quantity also apply to cropland.

Livestock Farming & Ranching

Native grasslands have historically been maintained by grazing and browsing animals leaving a heterogeneous landscape. Some ranching practices, such as overgrazing or lack of rotational grazing, can create homogeneous structure and reduce native forb species resulting in reduced habitat quality for many grassland wildlife species. Overgrazing can also degrade riparian habitats, reducing natural filtration capacity of the soil, and increasing nutrient loads and peak flood flows into streams. Concentrated livestock feeding and dairy operations are a point source of pollution. The runoff from these areas often contains bacteria, nutrients, and other contaminants known to impair water quality and uses (including use by aquatic life) by causing excessive algae growth, spikes in unionized ammonia, and lower dissolved oxygen. Another way livestock ranching may reduce habitat suitability for wildlife is the conversion of native rangeland to non-native pasture grasses, thereby altering the structure and composition of native prairie habitats.

3. **Energy Production – threats from production of non-biological resources (oil and gas drilling and renewable energy)**

Oil and Gas Drilling

Oil and gas development involves a complex series of exploration and production activities, and includes associated infrastructure such as pipelines, well pads, and roads. Some terrestrial wildlife species are impacted by habitat conversion, degradation, and fragmentation that can result in direct loss of individuals or species, reduced reproductive success, or behavioral avoidance of those impacted areas. Similarly, aquatic wildlife can also be affected by infrastructure construction and water use. A significant amount of water is used in oil/gas drilling, followed by disposal of contaminated water post-drilling.

Renewable Energy

Wind and solar energy production continues to grow throughout the state. Renewable energy sources are important for a variety of reasons, but they also have the potential for adverse impacts to wildlife. For instance, the development of wind farms increases habitat fragmentation with associated roads and transmission lines. Migratory bird collisions and bat mortality are also concerns with wind farms that need further research and wider implementation of minimization techniques, such as “smart curtailment”. Habitat loss caused by conversion to energy development use are causing wildlife to vacate an area because of aversion to structures has been documented after wind farm development. Newer types of industrial-scale energy production moving into the state likely present many of the same issues. Biofuel production can exacerbate the issues caused by crop production by increasing land use intensification and conversion while also adding additional intensive use of water resources. Solar energy development, which is poised to be the next renewable energy boom in the state, poses many of the same concerns inherent in wind energy development though may more fully convert previously existing habitat to unusable space by some species.

4. Natural system modifications - threats from actions that convert or degrade habitat in service of “managing” natural or semi-natural systems, often to improve human welfare

Fire and Fire Suppression

The Kansas landscape has evolved with periodic wildfires. Fire can maintain a heterogeneous landscape, and therefore a variety of habitat types, by controlling the density of trees and shrubs, removing thatch and dead plant litter from the ground surface, opening up space for the regeneration of forbs, and much more. The suppression of natural fire regimes results in woody encroachment in prairie ecosystems and understory fuels to accumulate. On the other hand, annual fires on vast tracts of prairie can limit ground cover needed for ground nesting birds. Some alternative approaches such as rotational grazing or patch-burn grazing are economically feasible and provide a more heterogeneous habitat that benefits many wildlife populations.

Dams and Water Management/Use

Dams are common in most Kansas watersheds. Many were built for flood control or as a water source for crop irrigation. The impacts of dams, and the use and management of water on wildlife and their habitats are complex. Dams not only replace habitat, but their operation affects the timing, volume, and temperature of flows. These changes may also indirectly affect closely related habitat characteristics (oxygen levels, sediments, type of riparian vegetation, etc.). Crucial habitat for many wildlife species such as riparian and wetland plants, require specific conditions for growth and reproduction. The amount of surface water and groundwater relates to the survival of these species. Likewise, the amount of water, water temperature, chemical composition and amount of sedimentation affect survivability of fish. Dams and impoundments also fragment stream habitat by preventing or reducing aquatic organism movement. The ways in which water is managed and used can either support or degrade the specific habitats for aquatic and riparian species. Long-term the water releases from dams can increase the rate of streambank erosion by keeping high flows within the banks of a stream for long periods. Dam operation can reduce out-of-bank flows onto the floodplain to protect agricultural crops although by doing so, it also short-circuits groundwater recharge, sediment deposition that enriches floodplain soils, the ability of floodplains to reduce peak flow events, and the capacity of

floodplain soils to filter and reduce nutrient loading. The storage of many Kansas reservoirs for flood control and water supply is being threatened by rapid sedimentation. Attempts to reclaim or protect this storage have varied greatly. In some areas, streambank stabilization has been widely applied upstream of reservoirs to reduce streambank erosion and resulting sediment inputs. Dredging efforts have ranged from removing sediment and placing it into upland locations, to most recently a potential for water injection dredging where reservoir sediments are mobilized with water jets and discharged downstream. While it is important to maintain water infrastructure, these efforts all have potential to negatively affect wildlife if appropriate conservation measures are not applied.

Depletion of aquifers and streamflow's, coupled with frequent drought, has led to water shortages in many parts of the state. Changes in water availability can transform ecosystems by impacting reproduction and recruitment of native wildlife and causing shifts in vegetative communities. Additionally, reaches of dewatered streams act as barriers to movement of aquatic species. Interbasin transfers are an increasingly common practice to address these water shortages for municipal and agricultural users. This practice allows water to be taken from groundwater sources or streams in one basin and moved to another basin through canals or pipes. Interbasin transfers can become a conduit for invasive species to expand into new habitats. They can also exacerbate existing deviations from natural hydrologic conditions in the source basin.

Many Kansas streams have been channelized in attempts to rapidly move storm water or to increase farmable acreage. Channelization reduces stream length and stream habitat available for aquatic organisms. The lack of sinuosity in channelized systems also reduces the ability of a stream to effectively dissipate energy, resulting in higher velocities and increased erosion. Excessive erosion can cause streams to become incised, which reduces floodplain connectivity and the quality and quantity of riparian habitat. Subsequent attempts to stabilize eroding banks with riprap or concrete further exacerbate stream incision and riparian habitat loss. Channelization and resulting high stream velocities combined with reduced floodplain connectivity often lead to more dangerous and destructive flood events. Furthermore, commercial sand and gravel dredging operations can lead to stream bed degradation, channel incision, and bank instability.

5. **Invasive and other problematic species and genes - threats from non-native and native plants, animals, pathogens/microbes, or genetic materials that have or are predicted to have harmful effects on biodiversity following their introduction, spread and/or increase in abundance**

Invasive & Non-Native Species

Non-native species are plants or animals that have been introduced into native ecosystems due to human activity. Often these non-native species are termed as “invasive” because they alter habitat structure, out-compete native species for needed resources, or prey on native species. A few native species can also be considered invasive or undesirable when they limit the establishment or persistence of other native species. Invasives spread rapidly and can overtake and dominate native ecosystems because of a lack of biological or environmental controls. This

can change native species distribution and abundance. Also, the use of pesticides to control invasive, non-native species can impact native wildlife.

Pathogens and Microbes

There are some pathogens impacting Kansas wildlife species that will require monitoring and research. Avian cholera is a contagious bacterial infection that commonly affects geese, coots, gulls, and crows. Avian influenza is caused by infection with avian influenza Type A viruses. These viruses occur naturally among wild aquatic birds worldwide and can infect domestic poultry,other birds, and animal species.

White-nose syndrome (WNS) is a fungal disease impacting many bat species throughout the nation. WNS and/or the causal fungus, *Pseudogymnoascus destructans,* has been confirmed in six Kansas counties.

Chytridomycosis is an infectious fungal disease that is often fatal to many amphibian species. Currently, chytridomycosis is known to be caused in the United State by the fungal pathogen *Batrachochytrium dendrobatidis (Bd).* In addition to *Bd*, a new emerging fungal pathogen, *B. salamandrivorans (Bsal),* has become more prevalent in Europe and is growing concern due to the high probability of being introduced to the United States through the international pet trade or other pathways. Additional research is needed to understand how *Bsal* may affect native amphibian species, particularly species in the Plethodontidae and Salamandridiae families. Research is also needed to understand how species may react to co-infection of *Bd* and *Bsal.*

Chronic Wasting Disease (CWD) is a contagious, neurological disease of deer and elk. CWD belongs to a group of diseases know as transmissible spongiform encephalopathies (TSEs). It is caused by the accumulation of abnormal proteins (prions) in the brain that kills neurons, resulting in a characteristic sponge-like degeneration of the brains of infected animals.

Though the above examples may be the most notable, they certainly do not constitute an exhaustive list of potentially devastating wildlife pathogens.

6. **Pollution – threats from introduction of exotic and/or excess materials or energy from point and nonpoint sources**

Household Sewage and Urban Wastewater,

Pollution sources from housing and urban areas that include nutrients, toxic chemicals and/or sediments. It includes discharge from municipal waste treatment plants, leaking septic systems, untreated sewage, oil or sediment from roads, fertilizers and pesticides from lawns and fold-courses, and road salt.

Agricultural and Forestry Effluents

Water-borne contaminants such as fertilizers, pesticides, toxic chemicals and or sediments via runoff, often end up in water sources where they change water chemistry and thereby impact aquatic vegetation, invertebrate communities, amphibians, and fish.

7. **Climate Change – change in climate patterns (e.g. those resulting from increased atmospheric greenhouse gases like CO2) and/or events outside the natural range of variation that could impact a vulnerable species or ecosystem**

Ecosystem Encroachment
The distribution and abundance of species is strongly influenced by climate. Temperature extremes, along with the variation and frequency of precipitation, affects factors such as growing season lengths and the water cycle, both of which can determine where species occur and how well they thrive. Climate changes are likely to influence species and ecosystems by altering fundamental interactions with other species and the physical environment, potentially creating a cascade of impacts throughout ecosystems (Staudinger et al., 2013).

Changes in Temperature Regimes
Over the last 100 years temperatures in Kansas have been rising. The spring and winter seasons experience greater warming than the summer and fall. Since the 1990's, the number of very cold nights (minimum temperature of 0°F or lower) has fallen below the average (Frankson et al., 2022). Warmer temperatures increase evaporation and water use by plants, which causes the soil to become drier. High rates of soil moisture loss during dry spells can lead to more serious conditions during future naturally occurring droughts, including an increase in the occurrence and severity of wildfires. Increasing and altered temperature regimes may result in the expansion or contraction of species distributions. Species that have limited mobility or are unable to migrate due to their natural history or habitat fragmentation are at a high risk of becoming extirpated or even extinct. Increasing temperatures may also change the seasons physiological processes, shifting phenology of species. The temporal alignment of food availability and reproduction may be shifted. Many aquatic species will suffer due to reduced precipitation and increased temperatures in waterbodies. Altered flooding regimes will affect spawning and rearing habitat (EPA 2016).

Changes in Precipitation and Hydrological Regimes
Precipitation in Kansas varies greatly from year to year with the region transitioning from humid conditions in the east to the semiarid conditions in the west. With the changing climate, the projected increases in winter precipitation and decreases in summer precipitation may have both positive and negative impacts on the state (Frankson et al., 2022). As the atmosphere warms with the increasing average yearly temperature, evaporation increases, which also increases humidity, average rainfall, and the frequency of heavy rainstorms in many places – but contributes to drought in others. Areas of drought are also likely to decrease the average flow of rivers and streams since drier soil becomes hydrophobic and retains less water when it rains. Drier soils will increase the need for farmers to irrigate their crops, but sufficient water might not be available. Decreased river flows can create problems for navigation, recreation, public water supplies, and electric power generation. In the eastern part of the state the increase in extreme precipitation events has been more pronounced. The contrast between expected east and west precipitation changes due to climate change could have substantial implications for future water use and allocation patterns in the state of Kansas.

Severe/Extreme Weather Events
Severe thunderstorms are common in Kansas with some thunderstorms producing large hail, high winds, and tornadoes. Scientists do not know how the frequency and severity of tornadoes will change. Rising concentrations of greenhouse gases tend to increase humidity and thus atmospheric instability, which would encourage the formation of tornadoes. However, wind shear is likely to decrease, which would discourage tornadoes. Research is ongoing to learn whether tornadoes will be more or less frequent.

8. **Law and Policy – actions to develop, change, influence, and help implement formal legislation, regulations, and voluntary standards**

   Compliance and Enforcement

   Poaching and illegal wildlife trade can directly threaten the survival of many species. Kansas natural resource officers not only provide a law enforcement presence in state parks and wildlife areas, but they also enforce Kansas Department of Wildlife and Parks rules and regulations and support the enforcement of the Endangered Species Act throughout the state. Supporting and strengthening law enforcement to monitor and enforce compliance with laws, policies and regulations, and standards and codes at all levels will benefit the protection of at-risk species.

There are also conservation issues considered by this plan that are not direct threats to biodiversity. These issues occur statewide and impede effective conservation planning and implementation.

9. **Lack of Knowledge and Data**

   For effective wildlife management and conservation efforts there is a requirement for sufficient understanding of species life history and habitat requirements, distributions, relationships among and between species, effects of management and conservation efforts. Incomplete knowledge inhibits our ability to identify and interpret potential threats and decide on appropriate actions.

10. **Organizational Capacity and Management**

    Differing goals, bureaucratic obstacles, personnel turnover, and lack of resources can all impact the efficiency and effectiveness of conservation actions. Agencies, researchers, non-governmental and governmental organizations must collaborate, share information, resources, and support each other's efforts to effectively manage and conserve wildlife and their habitats. The implementation of this plan is a forward step toward this collaboration.

11. **Outreach and Education**

    Connecting people to nature is an important element of successful conservation strategy implementation. Community engagement and wildlife conservation education is important for conservation agencies to share the importance of the work they do to protect and manage healthy fish and wildlife populations. Acquiring the knowledge, skills, and motives to conserve the state's natural resources empowers people to work together to take strategic actions for the benefit of current and future generations. Fostering broad participation in conservation will be critical to maintain Kansas' fish, wildlife, and habitats.

12. **Shift in Landowner Types**

    There has been a recent shift in the representation of Kansas landowners. Historically, the vast majority of Kansas lands were owned by residents. In recent years, there has been a noticeable increase in ownership by those residing outside the state. This change is driven by inheritance and people buying land, including hunting grounds (Reid, 2023). Some of the concerns of non-resident landowners, from a wildlife conservation/management perspective, are land management oversight, local knowledge gaps, communication challenges, and potential for poor land management and neglect. Being physically distant from the property can make monitoring and actively managing land use, including invasive vegetation control and wildlife management, difficult. There is potential for lack of experience or knowledge of local ecological conditions which can lead to poor decision-making regarding land management.

Success Story

The Kansas Aquatic Species Conservation Agreement

In 2022, KDWP became the first agency in the nation to sign a statewide Conservation Benefit Agreement (CBA) with the U.S. Fish and Wildlife Service that allowed KDWP to conduct reintroductions of 15 threatened and endangered aquatic species. This is the foundational document for the Kansas Aquatic Species Recovery Program which began in 2023. Areas that used to harbor populations of imperiled species that biologists now believe can sustain populations again can now be stocked through the CBA. These reintroductions are made possible through partnerships with private landowners across the state of Kansas. Landowners who voluntarily wish to participate in the program sign a landowner agreement with KDWP. This agreement allows KDWP to stock and monitor species. In return, the landowners are provided assurances from the U.S. Fish and Wildlife Service that no additional restrictions will be imposed on the property and incidental take of the species that occurs as a result of legal land uses detailed in the agreement will be covered.

Today, that list has expanded to 21 species. Reintroductions have been conducted for 3 species with preliminary surveys and propagation work planned for additional species. Through this work, the Recovery Program seeks to recover, delist, and deregulate populations of these species.

Species Covered under the Kansas Aquatic Species Conservation Agreement

-Peppered Chub – *Macrhybopsis tetranema*
-Ouachita Kidneyshell – *Ptychobranchus occidentalis*
-Plains Minnow – *Hybognathus placitus*
-Spectaclecase – *Cumberlandia monodonta*
-Silver Chub – *Macrhybopsis storeriana*
-Snuffbox – *Epioblasma triquetra*
-Hornyhead Chub – *Nocomis biguttatus*
-Western Fanshell – *Cyprogenia aberti*
-Arkansas River Shiner – *Notropis Girardi*
-Rabbitsfoot – *Quadrula cylindrica*
-Topeka Shiner – *Notropis topeka*
-Neosho Mucket – *Lampsilis rafinesqueana*
-Neosho Madtom – *Notorus placidus*
-Fluted Shell – *Lasmigona costata*
-Lake Sturgeon – *Acipenser fulvescens*
-Flat Floater – *Anodonta suborticulata*
-Sturgeon Chub – *Macrhybopsis gelida*
-Cylindrical Papershell – *Anodontoides ferussacianus*
-Sicklefin Chub – *Macrhybopsis meeki*
-Butterfly Mussel – *Ellipsaria lineolata*
-Alligator Snapping Turtle – *Macrochelys temminckii*

KANSAS WILDLIFE & PARKS

Kansas Aquatic Species Recovery Program

REGIONAL PERSPECTIVE

Climate Change and Adaptation

Measurements and observations clearly indicate the Earth's climate is in a period of rapid change, and many current atmospheric and oceanic conditions have not been present on Earth for tens of thousands, and up to millions of years in some cases. The impacts of climate change are occurring across the United States. These climatic changes have been well documented and described in many reports such as the U.S. Fifth National Climate Assessment, which are the most comprehensive and recent scientific references on climate change science (National Fish, Wildlife, and Plants Climate Adaption Network, 2024).

Kansas lies within the area connecting the Northern and Southern Great Plains. Climate change is degrading the air, lands, and waters that people in the Southern Great Plains rely on for economic, recreational, and cultural activities. These impacts compound existing burdens on those who have the fewest resources to prepare and adapt. The Northern Great Plains is experiencing unprecedented climate-driven extremes, including severe drought, floods, and wildfires. These changes threaten economic sectors such as agriculture and recreation and affect the health, well-being, and livelihood of the region's residents. Climate change creates complex tradeoffs and tests the resilience of the region's residents, especially rural and low-income populations (USGCRP, 2023).

Climate change will most likely exacerbate issues currently affecting natural resources in Kansas. Wildlife and plant species will continue to decline. Species with limited dispersal abilities, slow reproductive rates, and/or narrow physiological tolerances will be the most vulnerable. On the other hand, some species ranges will shift northward, increasing the geographic range for some. With these range contrations and expansions will come increased risk for disease, spread of invasive species, and changes in ecological interactions which can all affectlocal species richness and abundance. Changes in timing of precipitation and increasing temperatures changes plant phenology, disrupting the timing of breeding and feeding by the organisms that rely on them. These shifts can lead to the emergence of a self-organizing, self-sustaining, ecological, or social–ecological system that deviates from prior ecosystem structure and function, like species composition and ecosystem services.

While aspects of climate change are outside the intention of the SWAP, it does allow Kansas to address issues regarding climate adaptation abilities of our flora and fauna, and address changes over time. These should include increasing partnerships and communication with national, regional, and local partners to build awareness, leverage multiple funding opportunities, and amplify existing resources.

Full Life-cycle Conservation

Kansas holds a unique geographical distinction as the center of the contiguous United States. Because of its central location, the state plays a crucial role in the distribution and migration of wildlife. Kansas lies at the intersection of the eastern deciduous forests, western shortgrass prairies, and the Great Plains, making it a biogeographical transition zone. Eastern species reach their western range limits, while western species find their easternmost range. The state is a major stopover for migratory birds due to its location within the Central Flyway. Acknowledging that these migratory birds, as well as many other SGCN, have ranges that are larger than or extend further than the state boundary, Kansas must work regionally, nationally, and internationally to accomplish conservation actions (Figure 3). In order to prevent migratory species from becoming endangered and recover those already endangered, the threats facing species throughout their full life cycle and Kansas' role in supporting their

populations must be addressed. This is particularly important for neotropical migratory birds. There are 27 birds currently included on the SGCN list that are neotropical migratory species that breed in Kansas and spend up to eight months of the year beyond the borders of the U.S.

KDWP has financially contributes to Southern Wings, which is a group that facilitates state fish and wildlife agency participation in the conservation of priority migratory bird species across their full life-cycle. Some of Southern Wings focal countries for full life-cycle conservation of Kansas breeding SGCN include Mexico, Colombia, and Peru. These countries encompass key corridors and geographies that Kansas breeding migratory birds use as corridors or overwintering habitat. Southern Wings projects within these countries include a variety of grasslands, wetlands, coasts, and tropical forested habitats. More information as well as a list of current projects can be found here: (https://southern-wings.fishwildlife.org/).

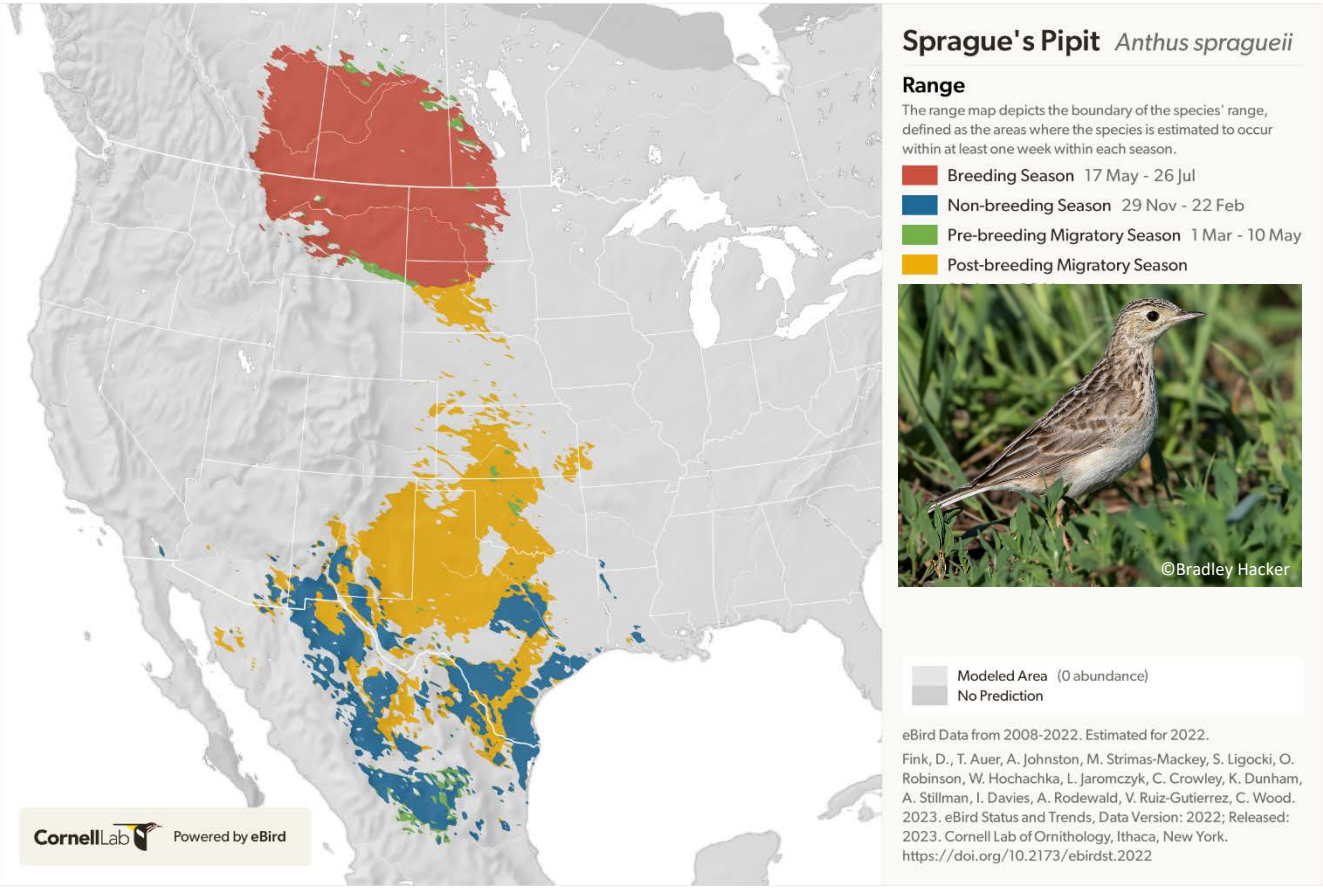


Figure 3. Sprague's Pipit distribution range and Kansas's role in its annual life cycle.

Chapter 3 – Priority Species and Habitat

Species of Greatest Conservation Need

NatureServe's global conservation status ranks (G ranks) are a synthesis of factors relating to rarity, trends, and threats and offer a good assessment of a species' vulnerability throughout its range. The G ranks capture several of the criteria used to determine whether a species qualifies as an SGCN. The list of SGCN identified in the Kansas Wildlife Action Plan is based on five selection criteria (Appendix 1) including consultation with species experts. The list was revised according to the following decisions.

- Changes to nomenclature since the previous edition was updated
- Status assessments that have been updated since the previous edition was reviewed for changes that would affect a species' inclusion
- Changes made as part of the 2023 five-year review of threatened and endangered species were incorporated

Even though there is no state statute protecting plants in Kansas, plants are included as SGCN because the SWAP is a statewide plan meant to be used by all individuals interested in the conservation of Kansas' biodiversity. The final list contains 429 SGCN. With the SWAP being an adaptive document, the SGCN list will be modified, and species of interest may change dependening on the acquisition of new information, the dynamic nature of many existing threats, and as well as emerging issues. Additionally, KDWP is required by state statute to evaluate the State Threatened and Endangered Species list, and the Species in Need of Conservation (SINC) list every five years. Similar to the Federal listing process, this requires extensive coordination with other agencies and groups concerned with the conservation of the species being proposed for up- or downlisting and the effects of the listed species status has on commerce and industry. State endangered and threatened species statuses are the result of consensus among Kansas wildlife professionals as to which species are in most critical need of conservation in the state.

Habitats

Terrestrial habitats were identified from the Kansas Ecological Systems Map (Diamond et al., 2021) which uses both satellite data and field observations to reflect the Kansas landscape. For the purpose of this plan, land cover types were generalized to reflect the habitat types and terminology used by conservation practitioners in the state (Figure 4). Aquatic and riparian habitats are described in two aquatic habitat types: flowing water (rivers and streams), still water (lakes and reservoirs) (Figure 5).

Habitats are prioritized based on their dominance and importance to the conservation of SGCN, SINC, and threatened and endangered species. Priority terrestrial habitats contain native vegetation communities that are dominant on the landscape in each ecoregion. Priority aquatic habitats include rivers and streams and their associated chutes, sloughs, and oxbows. The specific rivers and streams that are considered priority aquatic habitats are those occurring in each Aquatic EFA (Chapters 5-15).

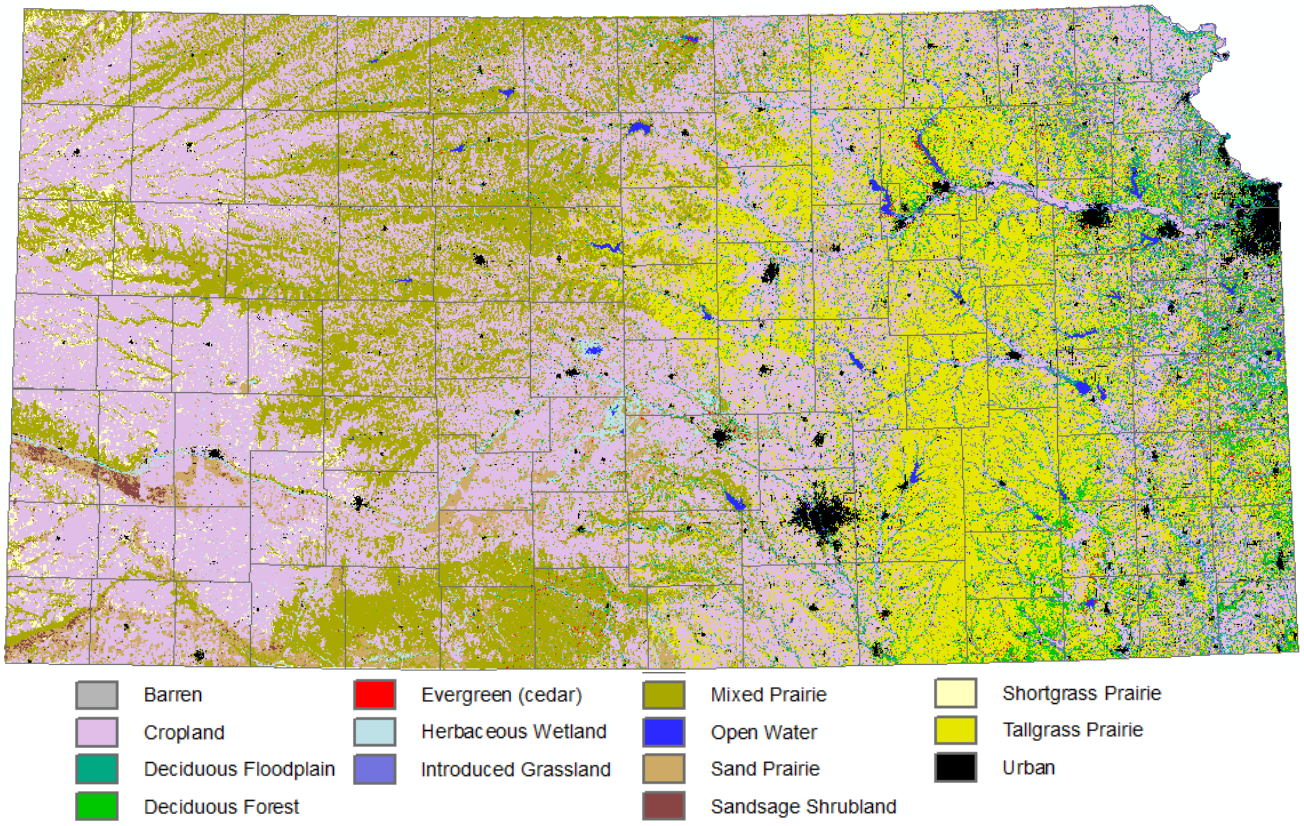


Figure 4. Kansas Terrestrial Habitat Types

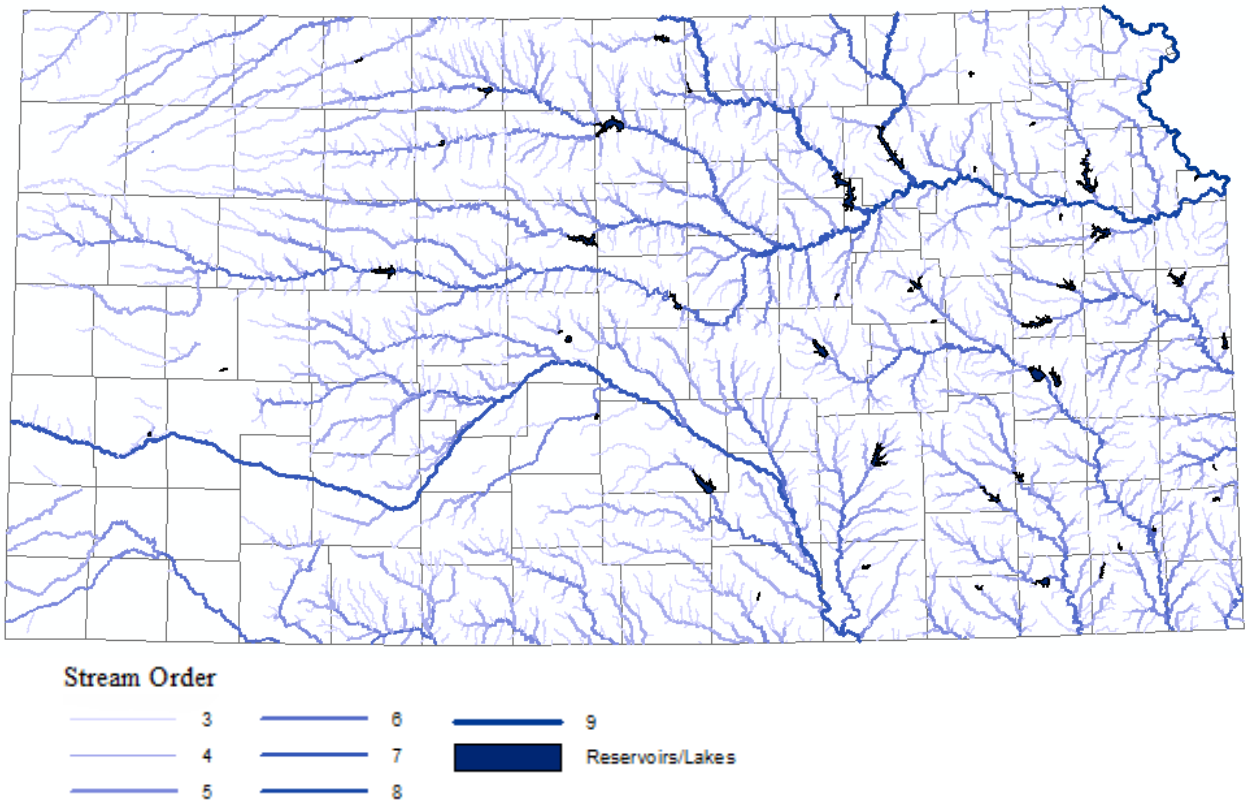


Figure 5. Kansas Aquatic Habitat Types.
Flowing waters include rivers and streams in orders 3-9

PRIORITY HABITATS

Shortgrass Prairie

The relative condition of the Shortgrass Prairie habitat is currently good with a stable trend. The shortgrass prairie is identified by the dominant presence of short grass species like Buffalo Grass (*Buchloe dactyloides*), and Blue Grama (*Bouteloua gracilis*). These species are dominant in well drained soils or on rocky slopes and are highly tolerant to drought conditions. Associations of Blue Grama/Hairy Grama (*Bouteloua hirsuta*) occur on loamy or sandy soils, and Blue Grama/Buffalo Grass/Western Wheatgrass (*Pascopyrum smithii*) on clay soils (Brooks 1985). While grasses are often dominant in this region, vegetative composition also includes a robust forb component such as Heath Aster (*Symphyotrichum ericoides*), Engelmann Daisy (*Engelmannia peristenia*), Slimflower Scurfpea (*Psoralea tenuiflora*), and the ever-present Yarrow (*Achillea millefolium*), along with legumes like Milkvetches (*Astragalus* spp.) and Locoweeds (*Oxytropis* spp.), can be found throughout the Shortgrass Prairie Habitat (Brooks 1985). Much of the original shortgrass prairie has been converted to crop production. Many crop fields have been enrolled in the Conservation Reserve Program (CRP) because of the potential for soil loss due to erosion (Cushman and Jones 1988), which aids the effort to return some of the land back to shortgrass prairie.

Sandsage Shrubland

The Sandsage Shrubland abitat is declining both in quality and quantity. This habitat is located primarily in the southwestern portion of Kansas, along the valleys of the Cimarron and Arkansas rivers. Sandsage (*Artemisia filifolia*) and grasses such as Sand Bluestem (*Andropogon hallii*) and Sandreed Grass (*Calamovilfa longifolia*) are dominant in the Sandsage Shrubland Habitat. While Sandsage dominates the vegetation, prairie grasses and wildflowers are also present. Sandsage functions as an important soil stabilizer by breaking surface winds. Were it not for this plant, much of the western sand prairie would be shifting dunes. Sandsage also provides forage, shade and shelter for smaller kinds of wildlife when all other plants succumb to the intense heat of a High Plains summer (Brooks 1985).

Herbaceous Wetland

The Herbaceous Wetland habitat in the western side of the state includes grass and forb playa lakes, low or wet prairie, freshwater marsh, and bulrush marsh. Playa lakes are the predominant herbaceous wetlands of the western region. Playa lakes are small, circular basins and most are shallow, clay-lined, ephemeral wetlands that hold water during rainy periods. Because rainfall is the only source of water, playa lakes go through a wet-dry cycle each year. The condition of the playa lakes has been significantly impacted by human activity. Plowing, drainage, livestock, watering, and irrigation have severely altered them by decreasing the amount of water input into the system or completely eliminating the wetland altogether. They have also been polluted by sedimentation and runoff of fertilizers and pesticides. Grasses and forbs including Scarlet Globemallow (*Sphaerlcea coccinea*), Blue Mudplantain (*Heteranthera limosa*), Prairie Zinnia (*Zinnia grandiflora*), Muhly Grass (*Muhlehergia torreyi*), Knotweed (*Polygonum* spp.), Watergrass (*Echinochloa* spp.), and Western Wheatgrass grow in more mesic sites such as the margins of playa lakes. Prairie Cordgrass (*Spartina pectinata*) thrives in the low or wet prairie. Many bulrush (*Scirpus* spp.) and cattail (*Typha* spp.) species are found in freshwater marshes. Bulrush marshes are home to Common Three-Square Sedge

(*Scirpus pungens*). The current quality of western Herbaceous Wetland Habitats is unknown and the trend in quantity is declining.

The Herbaceous Wetland habitat in the central part of the state includes salt marsh/prairie, spikerush playa lake, playa lake, low or wet prairie, freshwater marsh, cattail marsh, and weedy marsh. The most well known wetlands in the state, Cheyenne Bottoms Wildlife Area and Quivira National Wildlife Refuge, occur in the Central Mixed Grass Prairie Conservation Region. Cheyenne Bottoms Wildlife Area is a naturally occurring freshwater wetland maintained by water control structures. A close neighbor to Cheyenne Bottoms, Quivira National Wildlife Refuge is a naturally occurring saltwater marsh. Both wetlands complement each other in providing habitat for many migrating waterfowl and shorebirds. In freshwater marshes, Prairie Cordgrass (*Spartina pectinata*), sedges *(Carex* spp.), and cattails dominate, and vegetation may be tall and dense. In salt marshes, Inland Salt Grass (*Distichlis spicata*) and Seepweed (*Suaeda depressa*) dominate, but other grasses, sedges, SpikeRrush (*Eleocharis* spp.), and various forbs may be important; vegetation is usually of low to medium height (Thompson 2011). The current quality of the central Herbaceous Wetland habitat is good and the trend is stable.

The Herbaceous Wetland habitat in the eastern portion of the state is comprised of low or wet prairie, freshwater marsh, cattail marsh, and weedy marsh. These habitats are located in the floodplains along rivers and streams, in swales associated with rivers, or as margins of lakes and impoundments. These are mostly seasonal and permanent wetlands. The dominant species include Softstem Bulrush, (*Scirpus validus*), Spike Rush (*Eleocharis* spp.), and sedges. Prairie Cordgrass (*Spartina pectinata*) thrives in the low or wet prairies. Many bulrush and cattail species are found in freshwater and cattail marshes. Ragweeds (*Ambrosia* spp.) and Sorrel (*Rumex* spp.) dominate weedy marshes. The condition of the Herbaceous Wetlands can be significantly impacted by nonpoint source pollution such as fertilizer and pesticide runoff from surrounding farm and pasture lands. The current quality of eastern Herbaceous Wetland Habitats is good and the trend is stable.

Riparian Corridor Complex

The Riparian Corridor Complex is composed of Deciduous Floodplain habitat, flowing (lotic) surface water habitat, and still (lentic) surface water habitat. The riparian corridor historically consisted of grassland on the ephemeral or intermittent streams with trees only occurring along big rivers. The relative quality and quantity of the components of this habitat complex are declining. Riparian corridors provide an important edge effect and allows for the connection of travel corridors between fragmented habitats. The Deciduous Floodplains are temporarily flooded habitats. Dominant tree species are Pecan (*Carya illinoinensis*), Bur Oak (*Quercus macrocarpa*), Green Ash (*Fraxinus pennsylvanica*), American Elm (*Ulmus americana*), Eastern Cottonwood (*Populus deltoids*), Sugar Maple (*Acer saccharum*), River Birch (*Betula nigra*), and Hackberry (*Celtis occidentalis*). Other dominant vegetation types are Willows (*Salix* spp.), Indigo Bush (*Amorpha* spp.), Eastern Redcedar (*Juniperus virginiana*), and the non-native Salt Cedar (*Tamarix* spp.). Aside from the major rivers, surface water (lotic and lentic) in the western region is mostly ephemeral in nature due to their dependence on precipitation or snowmelt and that area of the state receives the least amount of precipitation in the state. Surface water also suffers from decline due to the lowering of the water table and surface and ground water withdrawal for urban use and agricultural irrigation.

Mixed Prairie

The Mixed Prairie habitat is located primarily in the Smoky Hills, Red Hills, and High Plains regions of Kansas. This habitat is composed of both short-grass and tall-grass species. Shortgrass species such

as Buffalo grass and Blue Grama, are found on the shallow soils of the uplands. Tallgrass species such as Big Bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), and Switchgrass (*Panicum virgatum*), are abundant in moist areas. Midsized grasses such as Little Bluestem (*Schizachyrium scoparium*), Tall Dropseed (*Sporobolus asper*), and Side-oats Grama (*Bouteloua curtipendula*), occur elsewhere. Dominant woody species include Hackberry, Sand Plum (*Prunus angustifolia*), and Smooth Sumac (*Rhus glabra*) (Thompson et al., 2011).

Sand Prairie

The Sand Prairie habitat is found in well-drained sand soils in the Arkansas River Lowlands, the Red Hills, the Smoky Hills, and the Wellington-McPherson Lowlands. Little Bluestem, Sand Bluestem (*Andropogon hallii),* Switchgrass (*Panicum virgatum*), and Sand Dropseed (*Sporobolus crytandrus*) are common components of this grassland type. Broadleaf herbaceous species are common and may include Cuman Ragweed (*Ambrosia psilostachya*), Spotted Bee Balm (*Mondarda punctata*), Evening Primroses (*Oenothera* spp.), and Gayfeather species (*Liatrus* spp.). Sand sagebrush (*Artemisia filifolia*) is a common component in western Kansas.

Aquatic – Rivers and Streams

Flowing water (lotic) habitats includes rivers, streams, and their tributaries. Kansas' diverse network of rivers and streams vary significantly across the state due to difference in geography, climate, and land use. Generally, eastern Kansas has larger, more consistent rivers and streams tend to be more perrenial, with higher flow rates and less seasonal drying. The rivers and streams in the central part of the state while still mostly perennial or intermittent, begin to show more seasonal fluctuations. The drier climate of western Kansas results in more ephemeral or intermittent streams being present. Most western streams are highly dependent on ground water from the Ogallala Aquifer, which is rapidly declining. Human activities have resulted in the greatest effect on aquatic habitat. Activities such as water consumption for urban use and agriculture use, is depleting the water levels and polluting the remaining water (Cross 1995). The relative quality and quantity of the western streams/small rivers is declining due to the increase of water use, lowering of the water table, and changes to precipitation and temperature patterns due to Climate Change. Specific rivers and streams that are considered priority are those identified in the Aquatic EFAs, found in chapters 5-15.

Tallgrass Prairie

Tallgrass Prairie habitat is a core habitat in need of special emphasis. This habitat is dominated by warm-season grasses such as Big Bluestem, Switchgrass, Little Bluestem, and Indian grass (Thompson 2011). Wildflowers such as Violets (*Viola* spp.), Coneflowers (*Echinacea* spp)., Primrose (*Oenothera* spp.), Lobelia and Cardinal Flowers *(Lobelia* spp.), Beardtongues (*Penstemon* spp.), and Sunflowers (Heliantheae tribe) can be found throughout the Tallgrass Prairie habitat. The largest remaining undisturbed tracts of the habitat occur in the Flint Hill Uplands, where the soils are too shallow to plow (Brooks 1985). East of the Flint Hills small tracts of tallgrass prairie still exist in areas not yet impacted by urban sprawl/development and agricultural conversion.

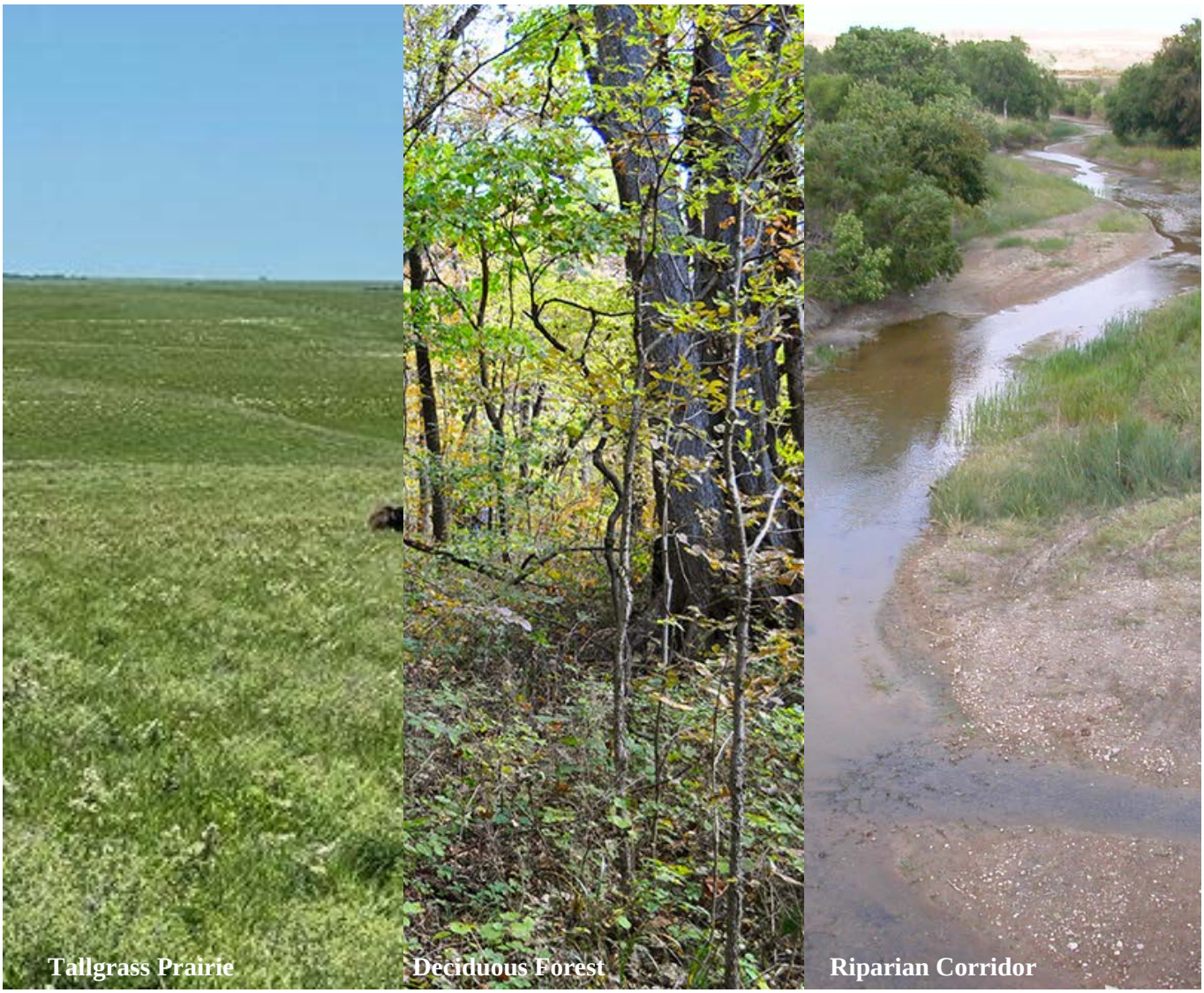
Deciduous Forest Habitat

The Deciduous Forest habitat is a westward extension of the Eastern Deciduous Forest. The multi-layered forests are dominated by oaks and hickory species complemented by an understory of shrubs and herbaceous plants. Oak-hickory forests are composed primarily of Black Oaks (*Quercus velutina*) and Red Oaks (*Quercus rubra*) and Bitternut (*Carya cordiformis*) and Shagbark Hickories (*Carya*

ovata). Open groves of Blackjack Oak (*Quercus marilandica*) and Post Oak (*Quercus stellata*) occur in the southern portion on upland sandstone soils. Along the Missouri River bluffs, Sugar Maple (*Acer saccharum*) and Basswood (*Tilia americana*) form an important part of the canopy community (Brooks 1985). Eastern Cottonwoods (*Populus deltoids*) and Black Willows (*Salix nigra*) are common in lowland areas. Other common tree species include: White Oak (*Ouercus alba*), Chinkapin Oak (*Ouercus muehlenbergii*), Slippery Elm (*Ulmus rubra*), Osage Orange (*Malura pomifera*), and Honey Locust (*Gleditsia triacanthos*). The understory of the Forest is composed of a number of shrubs and forbs. Grasses and grass-like plants are not common in the woodlands and when they occur, they are confined to scattered clumps (Brooks 1985).

Deciduous Floodplain Habitat

The Deciduous Floodplains are temporarily flooded habitats. In areas that often experience flooding from torrential rains that scour the ground, Eastern Cottonwoods and Willows are able to establish themselves quickly and thrive. Other dominant species are: Pecan, Bur Oak, Green Ash, American Elm, Sugar Maple, River Birch, and Hackberry. The understory varies depending on how well the woodlands drain after rainfall. Sedges, Scouring Rush (*Equisetum hyemale*), and weedy nettles can be found with common shrubs and forbs.



Tallgrass Prairie | Deciduous Forest | Riparian Corridor

Chapter 4 – Ecological Focus Areas

Ecological Focus Areas - Identification of priority areas for conservation

The EFA's represent landscapes where conservation actions can be applied for maximum benefit to all Kansas wildlife. Each EFA includes a suite of SGCN and priority habitats and a unique set of conservation actions designed to address the specific resource concerns facing these species and habitats. Each EFA also includes one or more protected areas that can serve as demonstration sites for conservation actions. Although EFAs have been selected for the purpose of concentrating conservation measures, conservation actions will not be limited to EFAs if opportunities arise in other areas. It is acknowledged SGCN and priority habitats can often occur outside of the defined EFA areas, and conservation actions can and should be applied if the need and opportunity arise. A set of statewide conservation issues that are somewhat general in nature have been designed to address issues that plague the entire state or are not associated with any particular priority area.

The design of EFAs was based primarily on priority native habitats and refined using SGCN occurrence locations and was built upon other planning efforts that address conservation priorities in the state.
Aquatic EFAs were based on The Nature Conservancy's priority streams and by the Special Aquatic Life Use (SALU) streams defined by the Kansas Department of Health and Environment, with some exclusions based on expert opinion. The selected streams were buffered by 100 m, and the 12-digit HUCs that intersect the buffers comprise the EFAs.

Terrestrial EFAs were designed using several data layers including large natural areas from the Crucial Habitat Assessment Tool (CHAT), landscape connectivity identified by the CHAT, portfolio sites identified by The Nature Conservancy, landcover, potential high-quality forest, high-quality natural communities, physiographic provinces, and documented locations of SGCN.

The following data layers were used as inputs in the development of terrestrial EFAs:

- CHAT large natural areas: This dataset was calculated from the NatureServe Landscape Integrity Model as a way to identify large areas that are relatively intact or have low levels of anthropogenic impacts. A minimum size was set at 1,000 hectares, but the threshold for "impacted" varied by ecodivisions to account for regional differences. Landscape condition is a measure of land cover impacted by human activities associated with ecological stressors. The Wildlife Council's Landscape Integrity Workgroup used a NatureServe landscape condition model to identify Large Natural Areas and Important Connectivity Zones.
- CHAT connectivity: The Landscape Integrity workgroup of the CHAT produced a West-wide dataset on Important Connectivity Zones which represents buffered landscape pathways connected to core habitats of Large Natural Areas. Landscape connectivity describes ease of movement for fish and wildlife based on species-specific habitat preferences and behavior. Well-connected habitats provide for higher quality ecological and biological processes.

- TNC portfolio sites: This layer was derived from Ecoregional Assessments conducted by The Nature Conservancy and its partners to identify areas of biodiversity significance and prioritize conservation action.
- GAP land cover patterns – Level I: This dataset was developed by the Kansas Applied Remote Sensing Program at the Kansas Biological Survey using imagery from the Landsat 5 satellite. The percent of natural vegetation (grassland or forest) within a procedural hexagon was calculated from the 11 cover types mapped.
- Potential high-quality forest: This layer was developed by the Kansas Biological Survey by intersecting forest cover from the 2005 Land Cover Patterns layer with the Kansas Historic Forest layer derived from GLO plat maps created in the 1850s and 1860s. Currently forested areas that were forested prior to Euro-American settlement were considered potential high-quality forest. Much of the area included in EFAs has been determined to be of high quality from field surveys.
- High-quality natural communities: This layer was developed through field surveys conducted primarily by the Kansas Natural Heritage Inventory. Comprehensive natural area surveys have been conducted in only seven counties in northeast Kansas so the layers usefulness outside this region is limited. It was used to develop the Tallgrass Prairies EFA.
- Locations of SGCN: This layer includes observation data from the Kansas Natural Heritage Inventory, the Kansas herpetological and mammal atlases maintained by the Sternberg Museum of Natural History, and KDWP databases. Records more than 40 years old were not used to eliminate the possibility of including areas that no longer provide suitable habitat. Comprehensive surveys for most SGCN have not been conducted and distribution data of many SGCN is lacking and therefore insufficient for identifying priority areas.
- Spatial priorities developed by partners were used to develop EFAs where appropriate. Layers showing the priority areas from the following entities were evaluated: The Nature Conservancy, Playa Lakes Joint Venture, Kansas Dept. of Wildlife and Parks, U.S. Fish and Wildlife Service, National Wild Turkey Federation, Ducks Unlimited, Kansas Dept. of Health and Environment, and Kansas Forest Service.

Revision of EFAs

During the 2025 revision of the SWAP, feedback was received from conservation partners on updating some EFAs based on updated information and highlighting areas of importance. The partners provided suggested changes with the supporting data. The two EFAs were then reanalyzed incorporating the new data. The Playa Landscape EFA was expanded to include additional large playa clusters. The Smoky Hill River Breaks EFA was expanded to include more areas of intact grasslands important to the Lesser Prairie Chicken, as well as other grassland obligate SGCN. The Smoky Hill River Breaks EFA was renamed to Western River Breaks EFA since the added area was not focused around the Smoky Hill River.

Corridors and Connectivity

EFAs were designed to maximize conservation efforts for habitats and SGCN in the state. We recognize that these habitats should not be managed as isolated islands. Ecological connectivity provides the capacity for movements of organisms, gene flow and range contractions and expansions.

The terrestrial EFAs were developed by incorporating connectivity data. The designated aquatic EFAs include riparian buffers and tend to overlap with the majority of the terrestrial EFAs. These riparian buffers act as movement corridors for many species and provide connectivity among many of our EFAs.

Identification of conservation issues and actions

Conservation issues and actions were initially identified from several existing planning documents developed by KDWP Wildlife Diversity Program, Kansas Central Grasslands All-bird Workshop, Partners in Flight, and Playa Lakes Joint Venture. With each review and revision these issues and actions were analyzed for current applicability and updated where needed. Issues were prioritized according to their impact on conservation and management of SGCN within key habitats within EFAs. The issues listed in each EFA are considered priority due to their impact on conservation and management of SGCN; however, these lists are not exhaustive. The order in which the issues and actions are listed is not significant to their priority. Conservation actions were identified to address these issues. Conservation issues and actions were organized according to the Conservation Measures Partnership's (CMP) Conservation Direct Threats Classification. Adopting CMP's classification system will improve conservation work through consistency of terms and enable SWAPs to be summarized at the regional level.

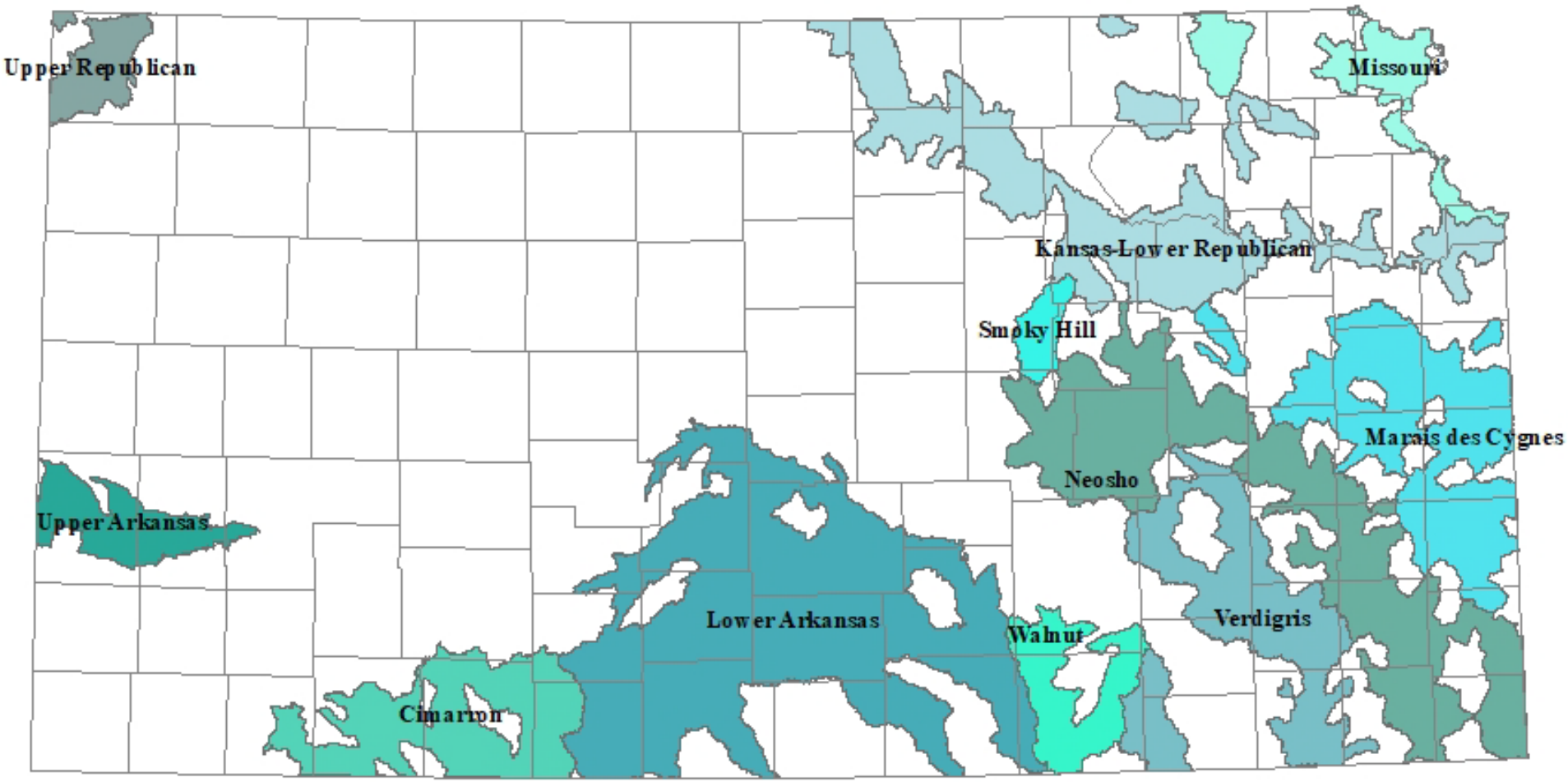


Figure 6. Aquatic EFAs (Individual Aquatic EFA chapters 5 – 15, listed alphabetically)

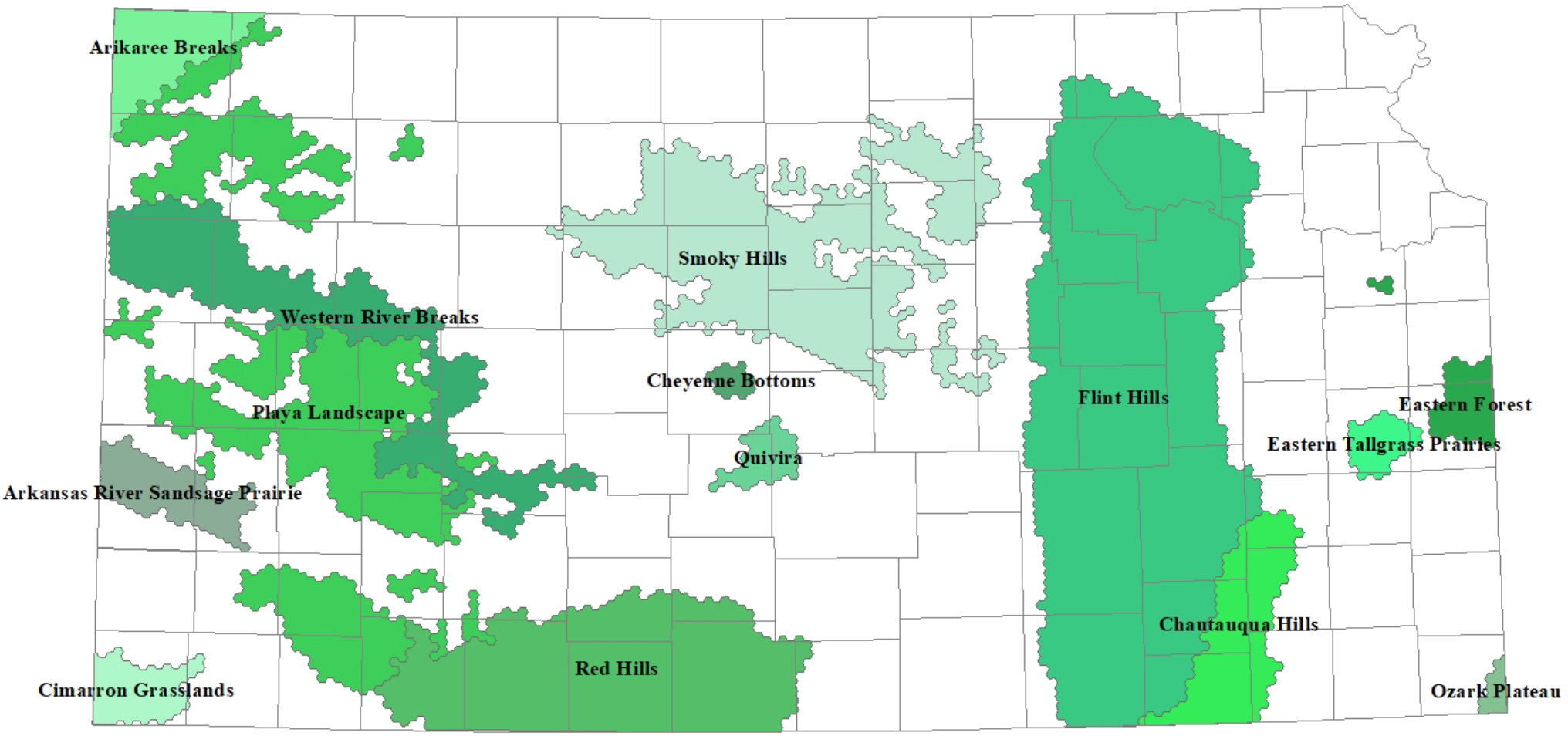
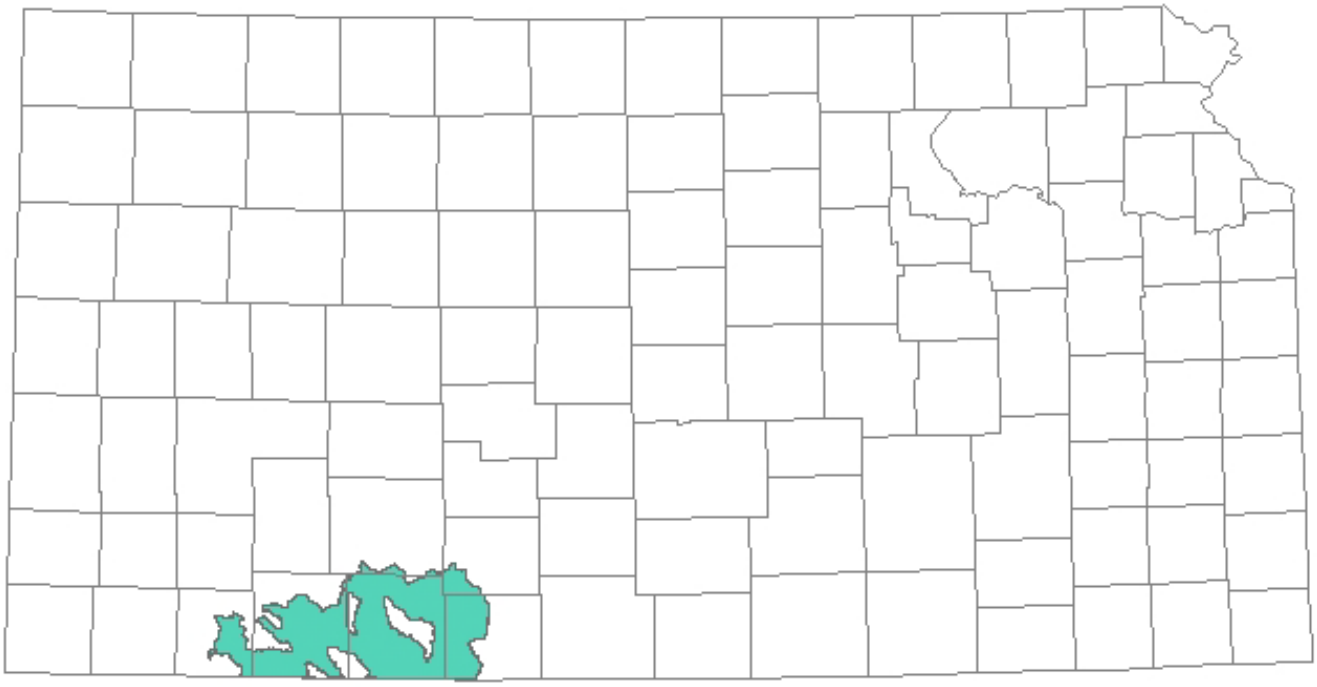


Figure 7. Terrestrial EFAs (Individual Terrestrial EFA chapters 16-29, listed alphabetically)

Chapter 5 – CIMARRON



The Cimarron EFA is located on the south-western edge of the state. It has irregular, dissected slopes, bluffs, and gypsum-capped red buttes. Rangeland and grassland are the dominant land use and land cover with cattle grazing throughout the area. Croplands are much more common in the flat lands and river valleys. The region has many spring-fed streams. Stream bottoms tend to be sandy, and the water is more mineralized than in adjacent areas. The Cimarron River flows through this area. The Cimarron River is designated critical habitat for the Arkansas River Shiner and Plains Minnow.

CONSERVATION ISSUES

Agriculture

-Direct diversion of surface flow for irrigation reduces stream flows, impacting native aquatic communities

-Farming near stream channels impacts riparian habitats, resulting in erosion, sedimentation and nutrient input issues

-Intense grazing regimes can degrade riparian habitats

-Livestock access to streams can increase soil erosion of stream banks and increase nutrient input through direct defecation and urination

Natural system modifications

-Bank destabilization (due to riparian management, headcuts, etc.) and some subsequent stabilization methods can cause stream incision and loss aquatic and riparian habitat.

-Stream channelization reduces aquatic and riparian habitats, and changes stream flow regimes and increases stream incision which reduces floodplain connectivity and increases streambank erosion

-Fragmentation from low-head dams and other impoundments impedes aquatic organism movement and reproduction

-Structures that divert water from its natural drainage impact the natural hydrology of streams

-Use of ground water and surface water from rivers and streams for irrigation and urban use is lowering the water table, and as a result, many miles of stream are continuously drying

Invasive and other problematic species and genes

-Introduced predatory and competition species (Red River Pupfish and Red River Shiner) impact populations of native aquatic species. Fisheries management, as it relates to stocking game fish, can be detrimental to native species

-Invasive plants, like Salt Cedar (*Tamarix* spp.) impact riparian areas and reduce streamflows

-Invasive species negatively impact native aquatic species and habitat

Pollution

-Overuse/misapplication of pesticides and fertilizer also contribute to water quality degradation from runoff

Residential and commercial development

-Stormwater management in urban areas often results in channelized, concrete-lined streams that lead to intensified flooding events downstream

-Urbanization and impervious surfaces reduce water infiltration and increase runoff that often contains contaminants

-Pipeline remediation issues, like applying a concrete mesh patch, prohibit fish passage

Transportation and service corridors

-Perched culverts and stream crossings prevent aquatic organism passage

-Reinforced concrete box and corrugated metal pipe culverts replace stream bed habitat with artificial surfaces

CONSERVATION ACTIONS

Education and awareness

-Conduct wildlife surveys that are rigorous, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics

-Continue disease monitoring (Ranavirus, bsal, WNS etc.)

-Educate landowners and managers on the value of rare species

-Educate landowners on Salt Cedar (*Tamarix* spp.) control methods and the benefits of Salt Cedar removal

-Educate the public about the value of wetlands and streams, including riparian corridors and remediation techniques

-Educate the public regarding the importance of preventing the spread of invasive species

-Inform landowners and managers of and promote best management practices

-Inventory perched culverts and other structures that are preventing aquatic organism passage

-Investigate contaminant effects on reptilian and amphibian populations

-Research and develop engineering techniques for effective river and stream management

-Study the impact of introduced species on native species

External capacity building

-Coordinate with Watershed Restoration and Protection Strategy groups to improve water quality and habitat

-Improve the coordination of mitigation activities with the Army Corps of Engineers

-Promote and encourage formation of coalitions/associations such as KAWS or "local grassroots efforts"

-Promote the use of conservation culverts that retain natural stream bed features

-Work with county road departments and Kansas Dept. of Transportation to identify and replace structures that are preventing aquatic organism passage

-Work with local, state and federal agencies to reduce negative impacts to habitat from their programs

-Work with neighboring states to gain compliance of interstate compacts in regard to water rights

Land/water management

-Coordinate with NRCS and other partners to develop and implement grazing and land management practices that benefit landowners as well as stream and riparian habitats

-Continue to impliment plans to prevent the invasion and spread of Aquatic Invasive Species

-Encourage engineering techniques that promote high habitat diversity

-Encourage planting of native riparian buffers at least twice the active channel-width to improve aquatic habitats

-Encourage the use of wildlife friendly. fences where necessary to manage riparian corridors, and otherwise conduct proper grazing management

-Expand cooperative programs that supply technical and direct assistance for non-native species removal

-Identify pollution problem areas and improve conditions detrimental to biodiversity and endangered species

-Promote ecologically sound techniques for flood control, erosion control, nonpoint source pollution control, and bank stabilization

-Promote effective instream flow management through the development and implementation of ecologically appropriate flow regimes

-Promote fish passage designs for new in-stream structures and retrofit old structures to allow passage

-Promote improved water quality standards

-Promote mechanical removal of non-native, invasive plant species, like Salt Cedar, by utilizing local habitat partnerships

-Promote restoration of stream channels through natural stream design

-Promote restoration projects that increase floodplain connectivity in incised streams

Land/water protection

-Acquire rare, critical and/or important habitats through willing sellers/donors

-Acquire riparian corridor acreages through willing sellers/donors

-Acquire water rights as advisable and possible to maintain instream flows

-Encourage conservation easements on high quality habitats

Livelihood, economic, and other incentives

-Develop practices that provide benefits to landowners and to wildlife

-Offer incentive to private landowners to preserve native habitats from a watershed approach, remove invasive species, and use best management practices that benefit stream and riparian habitats

Species management

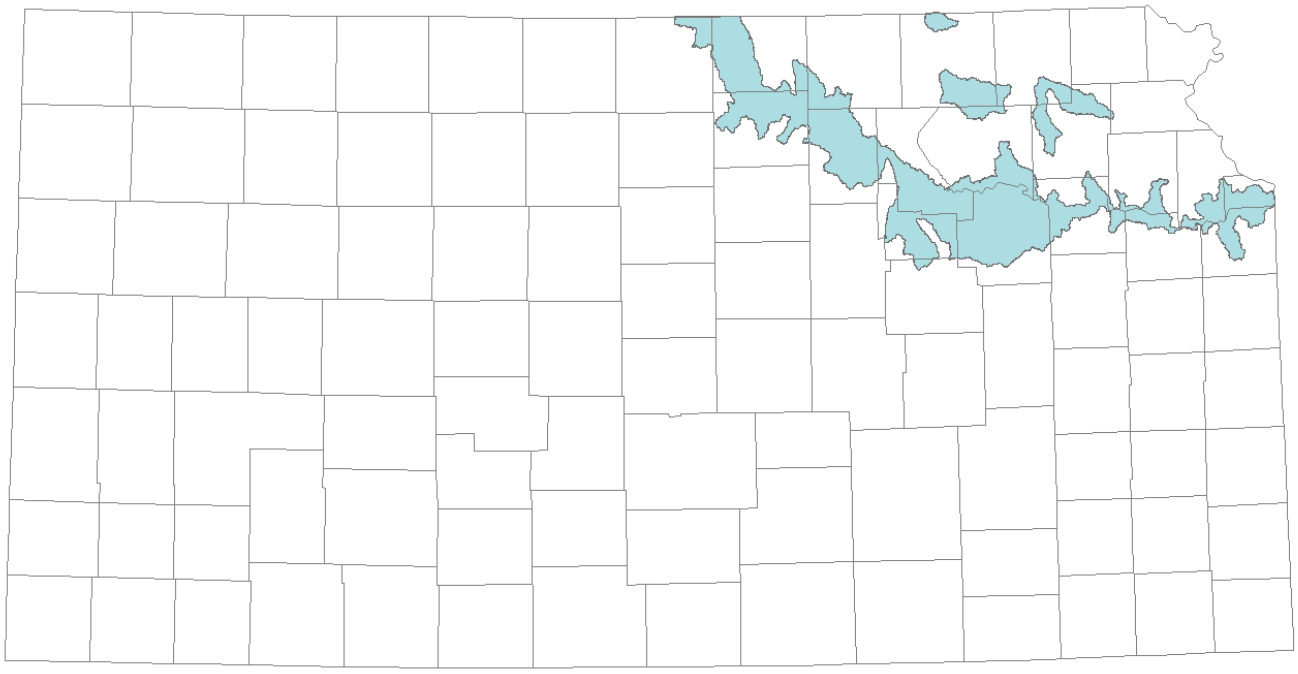
-Propagate imperiled species for reintroduction and population augmentation efforts

-Work with landowners and partners to identify appropriate reintroduction sites for imperiled species

Species of Greatest Conservation Need

Amphibians	Red-spotted Toad	*Anaxyrus punctatus*	SINC
Arachnida	An aquatic mite	*Tyrrellia hibbardi*	
Fish	Arkansas Darter	*Etheostoma cragini*	SINC
Fish	Arkansas River Shiner	*Notropis girardi*	Federal & State Threatened
Fish	Golden Redhorse	*Moxostoma erythrurum*	
Fish	Northern Plains Killifish	*Fundulus kansae*	
Fish	Plains Minnow	*Hybognathus placitus*	State Threatened
Mussels	Lilliput	*Toxolasma parvum*	
Mussels	Pondhorn	*Uniomerus tetralasmus*	

Chapter 6 – KANSAS-LOWER REPUBLICAN



The Kansas - Lower Republican EFA is located from north-central to northeast Kansas. The Lower Republican River flows south from Nebraska until it joins the Smoky Hill River in Geary County to form the Kansas River. The majority of streams in this system have sand substrates. The portions disjunct from the main stem Lower Republican and Kansas rivers include parts of the Big Blue, Vermillion, and Delaware rivers and Soldier Creek. Historically, the landscape ranged from Mixed Grass Prairie in the west to Tallgrass Prairie in the east, but much of the area has been converted to agriculture. Environmental concerns associated with agriculture in this region include high levels of pesticide and nutrient contaminants and sedimentation. Large reservoirs fragmenting the basin include Lovewell, Milford, Tuttle Creek, Perry, and Clinton reservoirs. Additionally, channelization and urbanization of streams near Manhattan have led to increased flooding issues. The Kansas – Lower Republican EFA contains habitat for several SGCN fish species.

CONSERVATION ISSUES

Agriculture

-Direct diversion of surface flow for irrigation reduces stream flows, impacting native aquatic communities

-Farming near streams impacts riparian habitats, resulting in erosion, sedimentation and nutrient input issues

-Intense grazing regimes can degrade riparian habitats

-Livestock access to streams can increase soil erosion of stream banks and increase nutrient input through direct defecation and urination

Human intrusions and disturbance

-Use of UTVs/dirt bikes etc. on creek sides when water level is lower increases streambank erosion

Invasive and other problematic species and genes

-Introduced predatory species can impact populations of native aquatic species

-Introduced species, such as Bighead and Silver Carp, negatively impact native aquatic species and habitat.
-Invasive plants impact riparian areas and reduce streamflows, i.e phragmities and water uptake issues

Natural system modifications

-Bank destabilization (due to riparian management, headcuts, etc.) and some subsequent stabilization methods can cause stream incision and loss of riparian habitat.
-Channelization reduces stream habitat, and causes stream incision which reduces floodplain connectivity
-Fragmentation from impoundments (i.e low-head dams) impedes aquatic organism movement and reproductio
-Sand dredging in the Kansas River impacts the river channel, riparian area, and tributaries
-Structures that alter the water from its natural drainage are impacting natural hydrology of streams
-The use of water from streams for irrigation, industries and municipalities is lowering the water level

Pollution

-Runoff of pesticides, herbicides and fertilizers have negative impacts on the flora and fauna
-The outflows from sewage plants of cities and towns impact water quality
-Urban runoff contains industrial and lawn chemicals that impact water quality

Residential and commercial development

-Storm sewers bypass absorption of rainwater
-Stormwater management in urban areas often results in channelized, concrete-lined streams that lead to intensified flooding events downstream
-Urbanization and impervious surfaces reduce water infiltration and increase runoff that often contains contaminants

Transportation and service corridors

-Pipeline remediation issues, like applying a concrete mesh patch, prohibit fish passage
-Perched culverts and stream crossings prevent aquatic organism passage
-Reinforced concrete box and corrugated metal pipe culverts replace stream bed habitat with artificial surfaces

CONSERVATION ACTIONS

Education and awareness

-Conduct wildlife surveys that are rigorous, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics
-Continue disease monitoring (Ranavirus, bsal, etc.)
-Educate county commissioners and zoning boards on best management practices?
-Educate landowners and managers on the value of rare species
-Educate public about eco-friendly lawn care and effects of lawn chemicals on aquatic systems
-Educate public and developers on the effects of impervious surfaces and the potential for Low Impact Development
-Educate public about value of wetlands and streams, including riparian corridors and remediation techniques
-Educate the public regarding the importance of preventing the spread of invasive species
-Inform landowners and managers of and promote best management practices
-Inventory perched culverts and other structures that are preventing aquatic organism passage
-Investigate contaminant effects on reptilian and amphibian populations
-Research and develop engineering techniques for effective river and stream management
-Study the impact of introduced species on native species

External capacity building

-Coordinate with Watershed Restoration and Protection Strategy groups to improve water quality and habitat

-Improve the coordination of mitigation activities with the Army Corps of Engineers

-Promote and encourage formation of coalitions/associations such as KAWS or "local grassroots efforts"

-Promote sound water quality standards and their enforcement through education and continued coordination with the Kansas Dept. of Health and Environment

-Promote the use of conservation culverts that retain natural stream bed features

-Work with city and county public works to improve storm water management

-Work with county road departments and Kansas Dept. of Transportation to identify and replace structures that are preventing aquatic organism passage

-Work with other states and federal agencies to gain assurance that no species are being transported in Kansas

-Work with the county zoning boards to implement good urban planning procedures

Land/water management

-Coordinate with NRCS and other partners to develop and implement grazing and land management practices that benefit landowners as well as stream and riparian habitats

-Continue to impliment plans to prevent the invasion and spread of Aquatic Invasive Species

-Encourage engineering techniques that promote high habitat diversity

-Encourage planting of native riparian buffers at least twice the active channel-width to improve aquatic habitats, allowing agroforestry operations in the area farthest from the active channel

-Encourage sand acquisition from Kansas River valley and/or reservoirs to reduce impacts to the river channel

-Encourage the use of fences where necessary to manage riparian corridors, and otherwise conduct proper grazing management

-Encourage use of permeable asphalt or pavement and Low Impact Development practices to improve storm water management by increasing infiltration of water and decreasing/replacing impervious surfaces

-Identify pollution problem areas and improve conditions detrimental to biodiversity and endangered species

-Promote conservation and restoration of oxbow habitats

-Promote ecologically sound techniques for flood control, erosion control, nonpoint source pollution control, and bank stabilization

-Promote effective instream flow management through the development and implementation of ecologically appropriate flow regimes

-Promote fish passage designs for new in-stream structures and retro-fit old structures to allow passage

-Promote improved water quality standards

-Promote restoration of stream channels through natural stream design

-Promote restoration projects that increase floodplain connectivity in incised streams

Land/water protection

-Acquire rare, critical and/or important habitats through willing sellers/donors

-Acquire riparian corridor acreages through willing sellers/donors

-Acquire water rights as advisable and possible to maintain instream flows

-Encourage conservation easements on high quality habitats

Livelihood, economic, and other incentives

-Develop practices that provide benefits to landowners and to wildlife

-Offer incentive to private landowners to preserve native habitats, remove invasive species, and use best management practices that benefit stream and riparian habitats

Species management

-Propagate imperiled species for reintroduction and population augmentation efforts

-Work with landowners and partners to identify appropriate reintroduction sites for imperiled species

Species of Greatest Conservation Need

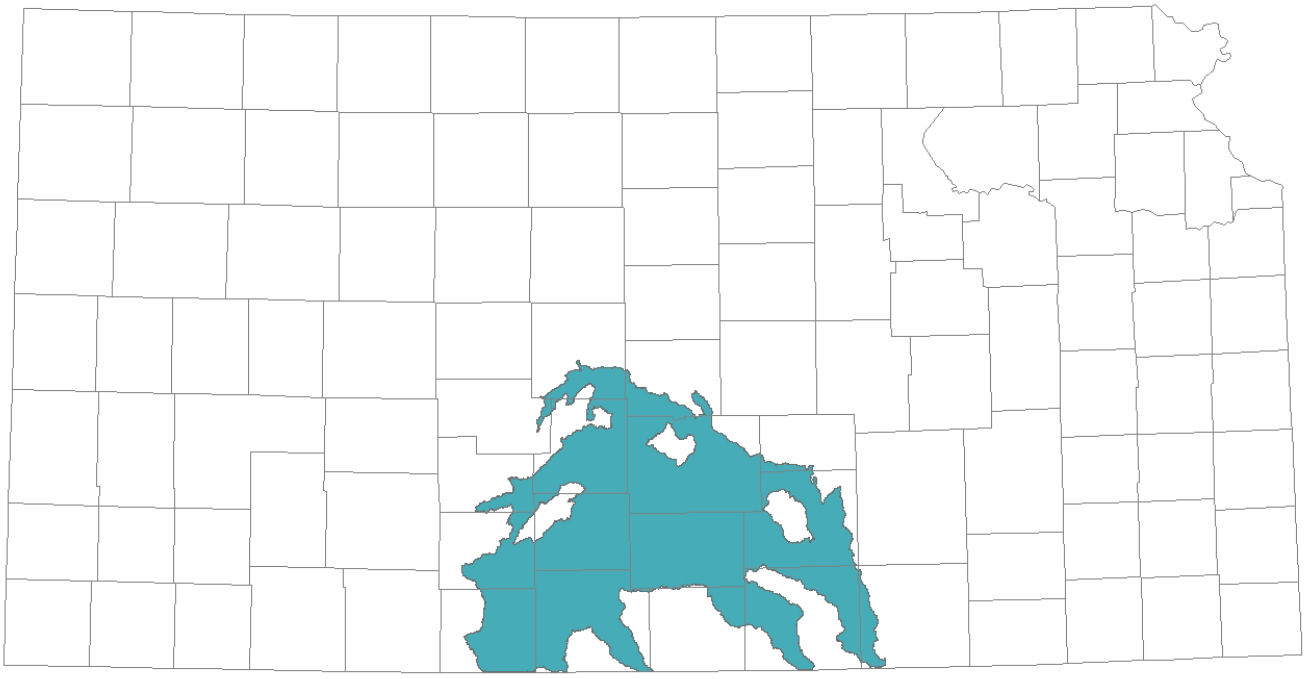
Crustaceans	Great Plains Mudbug	Lacunicambarus nebrascensis	
Crustaceans	Golden Crayfish	Faxonius luteus	
Fish	American Eel	*Anguilla rostrata*	
Fish	Black Buffalo	*Ictiobus niger*	
Fish	Blackside Darter	*Percina maculata*	State Threatened
Fish	Blue Sucker	*Cycleptus elongatus*	SINC
Fish	Brassy Minnow	*Hybognathus hankinsoni*	SINC
Fish	Cardinal Shiner	*Luxilus cardinalis*	SINC
Fish	Chestnut Lamprey	*Ichthyomyzon castaneus*	
Fish	Common Shiner	*Luxilus cornutus*	
Fish	Golden Redhorse	*Moxostoma erythrurum*	
Fish	Highfin Carpsucker	*Carpiodes velifer*	SINC
Fish	Johnny Darter	*Etheostoma nigrum*	SINC
Fish	Lake Sturgeon	*Acipenser fulvescens*	SINC
Fish	Northern Plains Killifish	*Fundulus kansae*	
Fish	Orangethroat Darter	*Etheostoma spectabile*	
Fish	Ozark Logperch	*Percina caprodes fulvitaenia*	
Fish	Paddlefish	*Polyodon spathula*	
Fish	Pallid Sturgeon	*Scaphirhynchus albus*	Federal & State Endangered
Fish	Plains Minnow	*Hybognathus placitus*	State Threatened
Fish	Quillback	*Carpiodes cyprinus*	
Fish	River Redhorse	*Moxostoma carinatum*	SINC
Fish	River Shiner	*Notropis blennius*	SINC
Fish	Shoal Chub	*Macrhybopsis hyostoma*	State Threatened
Fish	Shorthead Redhorse	*Moxostoma macrolepidotum*	
Fish	Shovelnose Sturgeon	*Scaphirhynchus platorynchus*	
Fish	Sicklefin Chub	*Macrhybopsis meeki*	State Endangered
Fish	Silver Chub	*Macrhybopsis storeriana*	State Endangered
Fish	Slender Madtom	*Noturus exilis*	
Fish	Slenderhead Darter	*Percina phoxocephala*	
Fish	Southern Redbelly Dace	*Chrosomus erythrogaster*	SINC
Fish	Spotfin Shiner	*Cyprinella spiloptera*	SINC
Fish	Stonecat	*Noturus flavus*	
Fish	Sturgeon Chub	*Macrhybopsis gelida*	State Threatened
Fish	Tadpole Madtom	*Noturus gyrinus*	SINC
Fish	Topeka Shiner	*Notropis topeka*	Federal Endangered, State Threatened
Fish	Western Silvery Minnow	*Hybognathus argyritis*	State Threatened
Fish	White Sucker	*Catostomus commersonii*	
Insect	A longhorned caddisfly	*Ceraclea spongillovorax*	
Insect	A mayfly	*Apobaetis lakota*	
Insect	A mayfly	*Heterocloeon grande*	
Insect	A sand-filtering mayfly	*Homoeoneuria ammophilasmo*	
Insect	A small minnow mayfly	*Plauditus texanus*	
Insect	Konza Prairie Mayfly	*Leptophlebia konza*	
Insect	Rock Island Springfly	*Isogenoides varians*	
Insect	Wallace's Deepwater Mayfly	*Spinadis simplex*	
Mussels	Creeper	*Strophitus undulatus*	SINC
Mussels	Fatmucket	*Lampsilis siliquoidea*	SINC
Mussels	Fawnsfoot	*Truncilla donaciformis*	SINC
Mussels	Lilliput	*Toxolasma parvum*	
Mussels	Pink Heelsplitter	*Potamilus alatus*	
Mussels	Plain Pocketbook	*Lampsilis cardium*	
Mussels	Pondhorn	*Uniomerus tetralasmus*	
Mussels	Snuffbox	*Epioblasma triquetra*	Federal Endangered, SINC
Mussels	Wabash Pigtoe	*Fusconaia flava*	
Mussels	Yellow Sandshell	*Lampsilis teres*	SINC
Plants	Missouri Mud-plantain	*Heteranthera missouriensis*	
Plants	Narrowleaf Morning-glory	*Ipomoea shumardiana*	
Turtles	Smooth Softshell	*Apalone mutica*	

Success Story

Reintroduction of the Neosho Mucket

The Neosho Mucket is a freshwater mussel species native to the Verdigris and Neosho River watersheds. This species was listed as a Species in Need of Conservation (SINC) under the Kansas Nongame and Endangered Species Conservation Act in 1987 and uplisted to endangered in 1993. Neosho Muckets have been extirpated from about 60% of their historical range due to pollution, fragmentation from dams, and commercial harvest. In 2022, the species was included in the Kansas Aquatic Species Conservation Agreement and since then, over 3,000 Neosho Muckets raised at the Neosho National Fish Hatchery have been stocked at locations within the species' historical range in Kansas. Monitoring surveys in 2024 documented survival of the species at the first location stocked under the agreement. In 2024, KDWP was awarded a recovery permit from the U.S. Fish and Wildlife Service to begin propagating Neosho Muckets at their own facility, the Kansas Aquatic Biodiversity Center. Many more stockings for this species are planned until self-sustaining populations are reestablished across its range in Kansas.

Chapter 7 – LOWER ARKANSAS



The Lower Arkansas EFA follows the course of the Arkansas River as it flows southeast and across southern Kansas until it crosses into Oklahoma south of Arkansas City. The area is primarily made up of undulating to rolling sand plains and flat alluvial lowlands. Center pivot irrigation is implemented to a greater degree in the sand plains than surrounding regions. Loess and river valley deposits support extensive cropland agriculture of winter wheat and grain sorghum in the lowlands. The northern area contains the alluvial Equus beds, an aquifer important to the region. Much of the area has been impacted by urbanization from the city of Wichita and surrounding communities.

CONSERVATION ISSUES

Agriculture

-Direct diversion of surface flow for irrigation reduces stream flows, impacting native aquatic communities

-Farming near stream channels impacts riparian habitats, resulting in erosion, sedimentation and nutrient input issues

-Intense grazing regimes can degrade riparian habitats

-Livestock access to streams can increase soil erosion of stream banks and increase nutrient input through direct defecation and urination

Invasive and other problematic species and genes

-Introduced predatory and competition species can impact populations of native aquatic species. Fisheries management, as it relates to stocking game fish, can be detrimental to native species

-Introduced species negatively impact native aquatic species and habitat

-Invasive plants impact riparian areas and reduce streamflows

Water uptake from Eastern Red Cedars and phreatophytes has reduced flows in many streams of the Lower Arkansas Basin

Natural system modifications

-Bank destabilization (due to riparian management, headcuts, etc.) and some subsequent stabilization methods can cause stream incision and loss of riparian habitat.

-Channelization reduces stream habitat, and causes stream incision which reduces floodplain connectivity

-Fragmentation from low-head dams and other impoundments impedes aquatic organism movement and reproduction

-Structures that alter the water from its natural drainage are impacting natural hydrology of streams

-Use of ground water and surface water from rivers and streams for irrigation is lowering the water level, and as a result many miles of stream are drying

Pollution

-Overuse/misapplication of pesticides and fertilizer also contribute to water quality degradation from runoff

-The outflows from sewage plants of cities and towns impact water quality

-Urban runoff contains industrial and lawn chemicals that impact water quality

Residential and commercial development

-Lack of water conservation efforts in urban environments increases surface water leading to increased evaporation

-Storm water management in urban areas often results in channelized, concrete-lined streams that lead to intensified flooding events downstream

-Urbanization and impervious surfaces reduce water infiltration and increase runoff that often contains contaminants

Transportation and service corridors

-Pipeline remediation issues, like applying a concrete mesh patch, prohibit fish passage

-Perched culverts and stream crossings prevent aquatic organism passage.

-Reinforced concrete box and corrugated metal pipe culverts replace stream bed habitat with artificial surfaces

CONSERVATION ACTIONS

Education and awareness

-Conduct wildlife surveys that are rigorous, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics

-Continue disease monitoring (Ranavirus, bsal, etc.)

-Educate landowners and managers on the value of rare species

-Educate landowners on the benefits of Eastern Red Cedar removal

-Educate public about eco-friendly lawn care and effects of lawn chemicals on aquatic systems

-Educate public and developers on the effects of impervious surfaces and the potential for Low Impact Development

-Educate the public about the value of wetlands and streams, including riparian corridors and remediation techniques

-Educate the public and other agencies regarding the importance of preventing the spread of invasive species

-Inform landowners and managers of and promote best management practices

-Inventory perched culverts and other structures that are preventing aquatic organism passage

-Investigate contaminant effects on reptilian and amphibian populations

-Research and develop engineering techniques for effective river and stream management

-Study the impact of introduced species on native species

External capacity building

-Coordinate with Watershed Restoration and Protection Strategy groups to improve water quality and habitat

-Improve the coordination of mitigation activities with the Army Corps of Engineers

-Promote and encourage formation of coalitions/associations such as KAWS or "local grassroots efforts"

-Promote the use of conservation culverts that retain natural stream bed features

-Work with city and county public works to improve storm water management

-Work with county road departments and Kansas Dept. of Transportation to identify and replace structures that are preventing aquatic organism passage

-Work with neighboring states to gain compliance of interstate compacts in regard to water rights

-Work with the county zoning boards to implement good urban planning procedures

Land/water management

-Coordinate with NRCS and other partners to develop and implement grazing and land management practices that benefit landowners as well as stream and riparian habitats

- Continue to impliment plans to prevent the invasion and spread of Aquatic Invasive Species

-Encourage engineering techniques that promote high habitat diversity

-Encourage planting of native riparian buffers at least twice the active channel-width to improve aquatic habitats

-Encourage the use of fences where necessary to manage riparian corridors, and otherwise conduct proper grazing management

-Encourage use of permeable asphalt or pavement and Low Impact Development practices to improve storm water management by increasing infiltration of water and decreasing/replacing impervious surfaces

-Expand cooperative programs that supply technical and direct assistance for non-native species removal

-Promote conservation and restoration of oxbow habitats

-Promote ecologically sound techniques for flood control, erosion control, nonpoint source pollution control and bank stabilization

-Promote effective instream flow management through the development and implementation of ecologically appropriate flow regimes

-Promote fish passage designs for new in-stream structures and retro-fit old structures to allow passage

-Promote improved water quality standards

-Promote removal of non-native, invasive plant species, like Eastern Red Cedar, by utilizing local habitat partnerships

-Promote restoration of stream channels through natural stream design

-Promote restoration projects that increase floodplain connectivity in incised streams

Land/water protection

-Acquire rare, critical and/or important habitats through willing sellers/donors

-Acquire riparian corridor acreages through willing sellers/donors

-Acquire water rights as advisable and possible to maintain instream flows

-Encourage conservation easements on high quality habitats

Livelihood, economic, and other incentives

-Develop practices that provide benefits to landowners and to wildlife

-Offer incentive to private landowners to preserve native habitats from a watershed approach, remove invasive species, and use best management practices that benefit stream and riparian habitats

Species management

-Propagate imperiled species for reintroduction and population augmentation efforts

-Work with landowners and partners to identify appropriate reintroduction sites for imperiled species

Species of Greatest Conservation Need

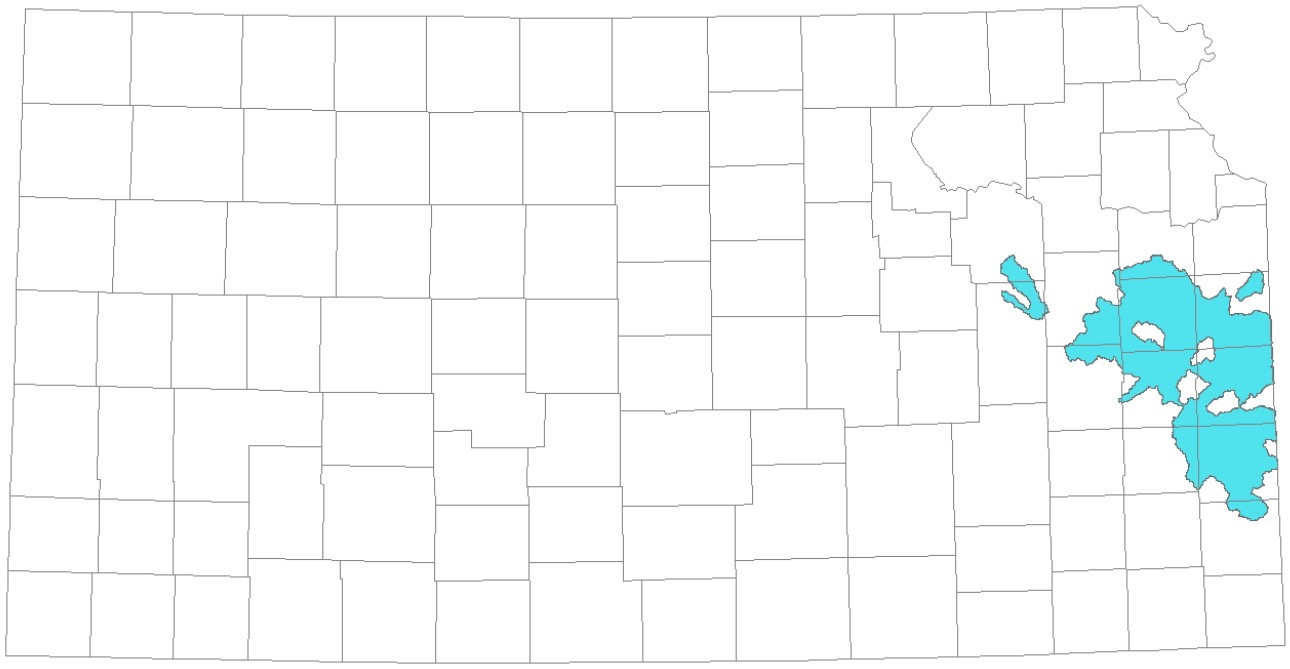
Amphibians	Red-spotted Toad	*Anaxyrus punctatus*	SINC
Amphibians	Strecker's Chorus Frog	*Pseudacris streckeri*	State Threatened
Fish	Arkansas Darter	*Etheostoma cragini*	SINC
Fish	Arkansas River Shiner	*Notropis girardi*	Federal & State Threatened
Fish	Black Buffalo	*Ictiobus niger*	
Fish	Channel Darter	*Percina copelandi*	
Fish	Freckled Madtom	*Noturus nocturnus*	
Fish	Golden Redhorse	*Moxostoma erythrurum*	
Fish	Northern Plains Killifish	*Fundulus kansae*	
Fish	Orangethroat Darter	*Etheostoma spectabile*	
Fish	Ozark Logperch	*Percina caprodes fulvitaenia*	
Fish	Pealip Redhorse	*Moxostoma pisolabrum*	
Fish	Peppered Chub	*Macrhybopsis tetranema*	Federal & State Endangered
Fish	Plains Minnow	*Hybognathus placitus*	State Threatened
Fish	Quillback	*Carpiodes cyprinus*	
Fish	Shorthead Redhorse	*Moxostoma macrolepidotum*	
Fish	Silver Chub	*Macrhybopsis storeriana*	State Endangered
Fish	Slenderhead Darter	*Percina phoxocephala*	
Fish	Southern Redbelly Dace	*Chrosomus erythrogaster*	SINC
Fish	Warmouth	*Lepomis gulosus*	
Insect	A longhorned caddisfly	*Ceraclea spongillovorax*	
Insect	A mayfly	*Heterocloeon grande*	
Insect	A small minnow mayfly	*Plauditus texanus*	
Mussels	Bleufer	*Potamilus purpuratus*	
Mussels	Lilliput	*Toxolasma parvum*	
Mussels	Pondhorn	*Uniomerus tetralasmus*	
Plants	Hall's Bulrush	*Schoenoplectiella hallii*	
Plants	Missouri Mud-plaintain	*Heteranthera missouriensis*	
Turtles	Smooth Softshell	*Apalone mutica*	

Success Story

Arkansas Darter

The Arkansas Darter is a stout bodied member of the perch family. They prefer shallow, clear, spring-fed tributary and headwater streams having sand or sandy-gravel substrates. The Arkansas Darter was added to the USFWS candidate list in 1989 because of concern over its diminishing range. In 2016 USFWS concluded that listing the species was not warranted and removed it from candidate status. The work done by Kansas Department of Wildlife and Parks contributed greatly to that decision. KDWP's Stream Survey Program have been tracking the occurrences of the Arkansas Darter for 25 years. The removal of invasive red cedar trees in riparian and upland areas where Arkansas Darters habitat occurs has resulted in increased stream flow, with some perennial streams flowing for the first time in years. Once flow was restored to these prairie streams, the Arkansas Darter was typically one of the first species to reappear.

Chapter 8 – MARAIS DES CYGNES



The Marais des Cygnes EFA is located in east-central and southeast Kansas. The Marmaton and Little Osage rivers join the Marais des Cygnes River in Missouri but make up a considerable portion of the watershed in Kansas. Stream substrates in this system are mostly gravel. The cuestas and gentle undulating plains of the area ranges from a mosaic of Tallgrass Prairie and Oak-Hickory Forest in the west, to dense woodlands in the east. One of the most prevalent impacts in this EFA is fragmentation of river systems due to large reservoirs (e.g. Melvern, Pomona, and Hillsdale) and heavy construction of watershed impoundments that continue today. Agricultural inputs have also led to high loads of nutrients and oxygen demanding pollutants. The Marais des Cygnes EFA contains several SGCN species including fish, mussels, and herpetofauna.

CONSERVATION ISSUES

Agriculture

-Direct diversion of surface flow for irrigation reduces stream flows, impacting native aquatic communities

-Fisheries management, as it relates to stocking game fish, can be detrimental to native species

-Land management practices within the watershed are impacting water quality

-Livestock access to streams can increase soil erosion of stream banks and increase nutrient input through direct defecation and urination

Dams and water management/use

-Deviations from natural hydologic regime due to reservoir operations impact reproduction, recruitment, and survival of aquatic organisms downstream

Invasive and other problematic species and genes

-Introduced species, such as Zebra Mussels, negatively impact native aquatic species and habitat

Natural system modifications

-Bank destabilization (due to riparian management, stream incision, headcuts, etc.) and some subsequent stabilization methods can cause stream incision and loss of riparian habitat

-Channelization reduces stream habitat, and causes stream incision which reduces floodplain connectivity

-Dams and impoundments built for flood control impede aquatic organism movement and reproduction

-Structures that alter the water from its natural drainage are impacting natural hydrology of streams

Pollution

-Runoff of pesticides, herbicides and fertilizers have negative impacts on the flora and fauna

Residential and commercial development

-Stormwater management in urban areas often results in channelized, concrete-lined streams that lead to intensified flooding events downstream

-Urbanization and impervious surfaces reduce water infiltration and increase runoff that often contains contaminants

-Pipeline remediation issues, like applying a concrete mesh patch, prohibit fish passage

Transportation and service corridors

-Perched culverts and stream crossings prevent aquatic organism passage

-Reinforced concrete box and corrugated metal pipe culverts replace stream bed habitat with artificial surfaces

CONSERVATION ACTIONS

Education and awareness

-Conduct wildlife surveys that are rigorous, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics

-Continue disease monitoring (Ranavirus, bsal, etc.)

-Educate landowners and managers on the value of rare species

-Educate landowners on the benefits of natural stream restoration and wetland creation for flood control

-Educate the public about the value of wetlands and streams, including riparian corridors and remediation techniques

-Educate the public regarding the importance of preventing the spread of invasive species

-Inform landowners and managers of and promote best management practices

-Inventory perched culverts and other structures that are preventing aquatic organism passage

-Investigate contaminant effects on reptilian and amphibian populations

-Research and develop engineering techniques for effective river and stream management

-Study the effects of removing watershed impoundments and reservoirs

-Study the impact of introduced species on native species

External capacity building

-Cooperate with U.S. Army Corps of Engineers reservoir management and other partners (i.e. Sustainable Rivers Program) to develop ecological flow recommendations to better support downstream aquatic life

-Coordinate with Watershed Restoration and Protection Strategy groups to improve water quality and habitat

-Improve the coordination of mitigation activities with the Army Corps of Engineers

-Promote sound water quality standards and their enforcement through education and continued coordination with the Kansas Dept. of Health and Environment

-Promote the use of conservation culverts that retain natural stream bed features

-Work with county road departments and Kansas Dept. of Transportation to identify and replace structures that are preventing aquatic organism passage

-Work with Watershed Management Districts to update and improve Watershed Management Plans to include ecologically sound flood control practices like off-channel wetlands

Land/water management

-Coordinate with NRCS and other partners to develop and implement grazing and land management practices that benefit landowners as well as stream and riparian habitats

-Continue to implement plans to prevent the invasion and spread of Aquatic Invasive Species

-Encourage engineering techniques that promote high habitat diversity

-Encourage planting of native riparian buffers at least twice the active channel-width to improve aquatic habitats, allowing agroforestry operations in the area farthest from the active channel

-Encourage the use of fences where necessary to manage riparian corridors, and otherwise conduct proper grazing management

-Expand cooperative programs that supply technical and direct assistance for non-native species removal

-Identify pollution problem areas and improve conditions detrimental to biodiversity and endangered species

-Promote alternatives to watershed impoundments for flood control such as off-channel wetlands, high quality riparian buffers, etc.

-Promote effective instream flow management through the development and implementation of ecologically appropriate flow regimes

-Promote fish passage designs for new in-stream structures and retro-fit old structures to allow passage

-Promote improved water quality standards

-Promote mechanical removal of non-native, invasive plant species by utilizing local habitat partnerships

-Promote removal of aging watershed dams to increase stream connectivity

-Promote restoration of stream channels through natural stream design

-Promote restoration projects that increase floodplain connectivity in incised streams

Land/water protection

-Acquire rare, critical and/or important habitats through willing sellers/donors

-Acquire riparian corridor acreages through willing sellers/donors

-Acquire water rights as advisable and possible to maintain instream flows

-Encourage conservation easements on high quality habitats

Livelihood, economic, and other incentives

-Develop practices that provide benefits to landowners and to wildlife

-Encourage and incentivize use of flood control practices that do not fragment stream habitat such as creating off-channel wetlands, high quality riparian areas, etc.

-Offer incentive to private landowners to preserve native habitats from a watershed approach, remove invasive species, and use best management practices that benefit stream and riparian habitats

Species management

-Propagate imperiled species for reintroduction and population augmentation efforts

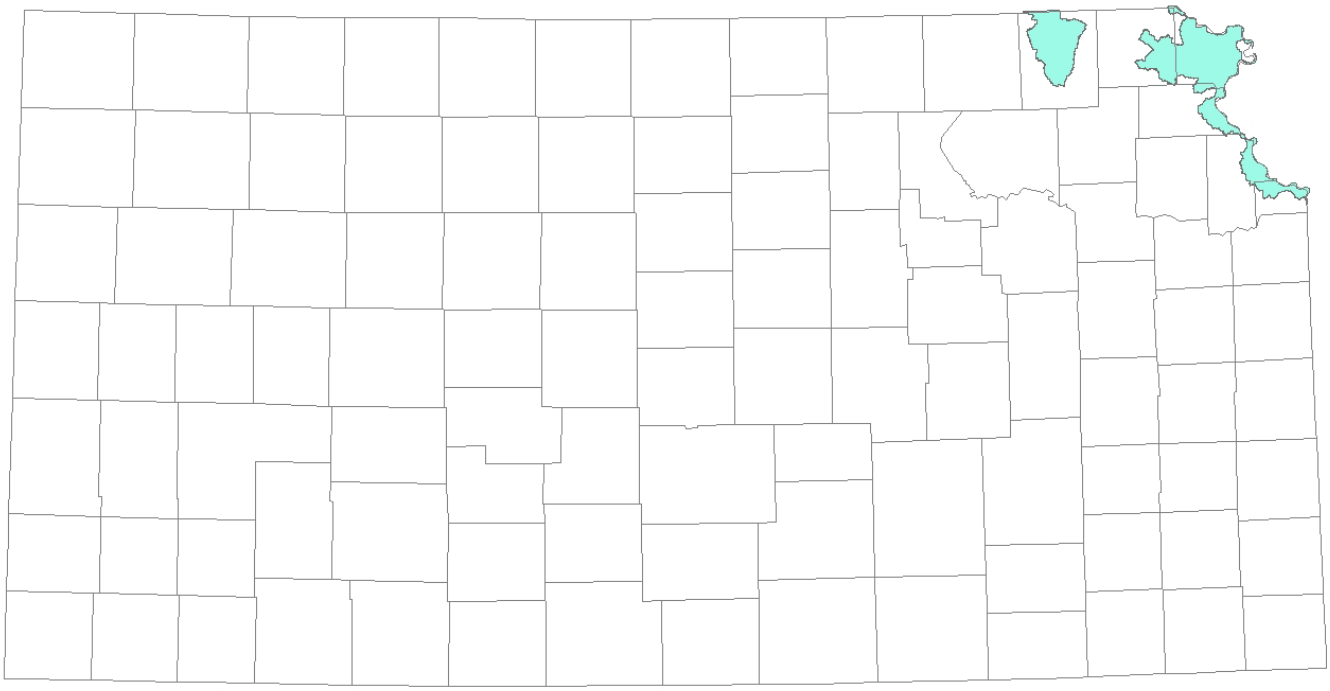
-Work with landowners and partners to identify appropriate reintroduction sites for imperiled species

Golden Crayfish

Species of Greatest Conservation Need

Amphibians	Common Mudpuppy	*Necturus maculosus*	
Amphibians	Spring Peeper	*Pseudacris crucifer*	SINC
Crustaceans	Great Plains Mudbug	*Lacunicambarus nebrascensis*	
Crustaceans	Golden Crayfish	*Faxonius luteus*	
Fish	Black Buffalo	*Ictiobus niger*	
Fish	Fantail Darter	*Etheostoma flabellare*	
Fish	Freckled Madtom	*Noturus nocturnus*	
Fish	Golden Redhorse	*Moxostoma erythrurum*	
Fish	Greenside Darter	*Etheostoma blennioides*	SINC
Fish	Hornyhead Chub	*Nocomis biguttatus*	State Threatened
Fish	Johnny Darter	*Etheostoma nigrum*	SINC
Fish	Orangethroat Darter	*Etheostoma spectabile*	
Fish	Ozark Logperch	*Percina caprodes fulvitaenia*	
Fish	Paddlefish	*Polyodon spathula*	
Fish	Pealip Redhorse	*Moxostoma pisolabrum*	
Fish	Quillback	*Carpiodes cyprinus*	
Fish	Shorthead Redhorse	*Moxostoma macrolepidotum*	
Fish	Slender Madtom	*Noturus exilis*	
Fish	Slenderhead Darter	*Percina phoxocephala*	
Fish	Spotted Gar	*Lepisosteus oculatus*	
Fish	Spotted Sucker	*Minytrema melanops*	SINC
Fish	Stonecat	*Noturus flavus*	
Fish	Tadpole Madtom	*Noturus gyrinus*	SINC
Fish	Warmouth	*Lepomis gulosus*	
Fish	White Sucker	*Catostomus commersonii*	
Gastropods	Sharp Hornsnail	*Campeloma crassulum*	State Threatened
Insect	A microcaddisfly	*Neotrichia falca*	
Insect	A Prongill Mayfly	*Paraleptophlebia calcarica*	
Mussels	Butterfly	*Ellipsaria lineolata*	State Threatened
Mussels	Creeper	*Strophitus undulatus*	SINC
Mussels	Deertoe	*Truncilla truncata*	SINC
Mussels	Fatmucket	*Lampsilis siliquoidea*	SINC
Mussels	Fawnsfoot	*Truncilla donaciformis*	SINC
Mussels	Flat Floater	*Utterbackiana suborbiculata*	State Endangered
Mussels	Flutedshell	*Lasmigona costata*	State Threatened
Mussels	Lilliput	*Toxolasma parvum*	
Mussels	Mucket	*Actinonaias ligamentina*	State Endangered
Mussels	Pink Heelsplitter	*Potamilus alatus*	
Mussels	Plain Pocketbook	*Lampsilis cardium*	
Mussels	Pondhorn	*Uniomerus tetralasmus*	
Mussels	Purple Wartyback	*Cyclonaias tuberculata*	
Mussels	Rock-Pocketbook	*Arcidens confragosus*	State Threatened
Mussels	Round Pigtoe	*Pleurobema sintoxia*	SINC
Mussels	Snuffbox	*Epioblasma triquetra*	Federal Endangered, SINC
Mussels	Spike	*Eurynia dilatata*	SINC
Mussels	Wabash Pigtoe	*Fusconaia flava*	
Mussels	Wartyback	*Quadrula nodulata*	SINC
Mussels	Washboard	*Megalonaias nervosa*	SINC
Mussels	Yellow Sandshell	*Lampsilis teres*	SINC
Plants	Kansas Arrowhead	*Sagittaria ambigua*	
Plants	Missouri Mud-plantain	*Heteranthera missouriensis*	
Turtles	Northern Map Turtle	*Graptemys geographica*	State Threatened
Turtles	Smooth Softshell	*Apalone mutica*	

Chapter 9 – MISSOURI



The Missouri River EFA is composed of the Missouri River, which forms the northeastern border of the state, and the Nemaha River system, which flows north out of Nemaha County into Nebraska where it enters the Missouri River. The substrate of the main stem Missouri River is predominately sand but silt, clay, and gravel are common. Formerly, the landscape in this area was Tallgrass Prairie but much of the area has been converted to corn agriculture which has led to sedimentation and increased nitrogen loads in these aquatic systems. Additionally, much of the Missouri River bordering Kansas has been channelized and impacted by the urbanization of Kansas City and surrounding communities. The Missouri River contains numerous fish SGCN and the Nemaha River system is the only area of the state where the Western Blacknose Dace occurs.

CONSERVATION ISSUES

Agriculture

-Direct diversion of surface flow for irrigation reduces stream flows, impacting native aquatic communities
-Farming near stream channels impacts riparian habitats, resulting in erosion, sedimentation and nutrient input issues

Human intrusions and disturbance

-Use of UTVs/dirt bikes etc. on creek sides when water level is lower increases streambank erosion

Invasive and other problematic species and genes

-Introduced invasive species such as Bighead and Silver Carp negatively impact native aquatic species and habitat

Natural system modifications

-Channelization reduces stream habitat, and causes stream incision which reduces floodplain connectivity

-Dredging the Missouri River for commercial barge traffic and flood capacity impacts bed and bank stability, riparian areas, and tributaries
-Fragmentation from low-head dams and other impoundments impedes aquatic organism movement and reproduction
-The management strategies of other states in the watershed impact this habitat

Pollution

-Runoff of pesticides, herbicides and fertilizers have negative impacts on the flora and fauna
-The outflows from sewage plants of cities and towns impact water quality
-Urban runoff contains industrial and lawn chemicals that impact water quality

Residential and commercial development

-Commercial barge shipping practices impact the hydrology of the rivers
-Storm water management in urban areas often results in channelized, concrete-lined streams that lead to intensified flooding events downstream
-Urbanization and impervious surfaces reduce water infiltration and increase runoff that often contains contaminants

Transportation and service corridors

-Pipeline remediation issues, like applying a concrete mesh patch, prohibit fish passage
-Perched culverts and stream crossings prevent aquatic organism passage
-Reinforced concrete box and corrugated metal pipe culverts replace stream bed habitat with artificial surfaces

CONSERVATION ACTIONS

Education and awareness

-Continue disease monitoring (Ranavirus, bsal, etc.)
-Educate public about eco-friendly lawn care and effects of lawn chemicals on aquatic systems
-Educate public and developers on the effects of impervious surfaces and the potential for Low Impact Development
-Educate the public about the value of wetlands and streams, including riparian corridors, and remediation techniques
-Educate the public regarding the importance of preventing the spread of invasive species
-Inventory perched culverts and other structures that are preventing aquatic organism passage
-Investigate contaminant effects on reptilian and amphibian populations
-Research and develop engineering techniques for effective river and stream management
-Study the impacts of introduced species on native species

External capacity building

-Coordinate with Watershed Restoration and Protection Strategy groups to improve water quality and habitat
Improve the coordination of mitigation activities with the Army Corps of Engineers
-Promote sound water quality standards and their enforcement through education and continued coordination with the Kansas Dept. of Health and Environment
-Promote the use of conservation culverts that retain natural stream bed features
-Work with city and county public works to improve storm water management
-Work with county road departments and Kansas Dept. of Transportation to identify and replace structures that are preventing aquatic organism passage
-Work with the county zoning boards to implement good urban planning procedures

Land/water management

-Coordinate with NRCS and other partners to develop and implement grazing and land management practices that benefit landowners as well as stream and riparian habitats

-Continue to implement plans to prevent the invasion and spread of Aquatic Invasive Species

-Encourage engineering techniques that promote high habitat diversity

-Encourage planting of native riparian buffers at least twice the active channel-width to improve aquatic habitats

-Encourage the use of fences where necessary to manage riparian corridors, and otherwise conduct proper grazing management

-Encourage use of permeable asphalt or pavement and Low Impact Development practices to improve storm water management by increasing infiltration of water and decreasing/replacing impervious surfaces

-Expand cooperative programs that supply technical and direct assistance for non-native species removal

-Identify pollution problem areas and improve conditions detrimental to biodiversity and endangered species

-Promote conservation and restoration of oxbow habitats

-Promote ecologically sound techniques for flood control, erosion control, nonpoint source pollution control, and bank stabilization

-Promote effective instream flow management through the development and implementation of ecologically appropriate flow regimes

-Promote fish passage designs for new in-stream structures and retro-fit old structures to allow passage

-Promote improved water quality standards

-Promote mechanical removal of non-native, invasive plant species by utilizing local habitat partnerships

-Promote restoration of stream channels through natural stream design

-Promote restoration projects that increase floodplain connectivity in incised streams

Land/water protection

-Acquire rare, critical and/or important habitats through willing sellers/donors

-Acquire riparian corridor acreages through willing sellers/donors

-Acquire water rights as advisable and possible to maintain instream flows

-Encourage conservation easements on high quality habitats

Livelihood, economic, and other incentives

-Develop practices that provide benefits to landowners and to wildlife

-Offer incentive to private landowners to preserve native habitats from a watershed approach, remove invasive species, and use best management practices that benefit stream and riparian habitats

Species management

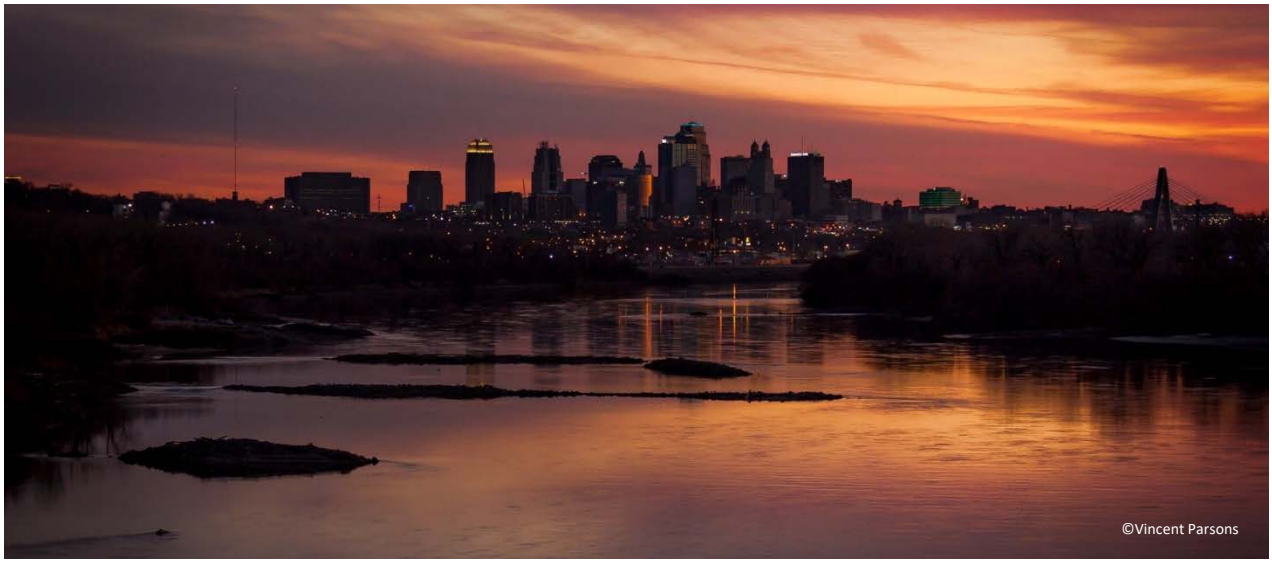
-Propagate imperiled species for reintroduction and population augmentation efforts

-Work with landowners and partners to identify appropriate reintroduction sites for imperiled species

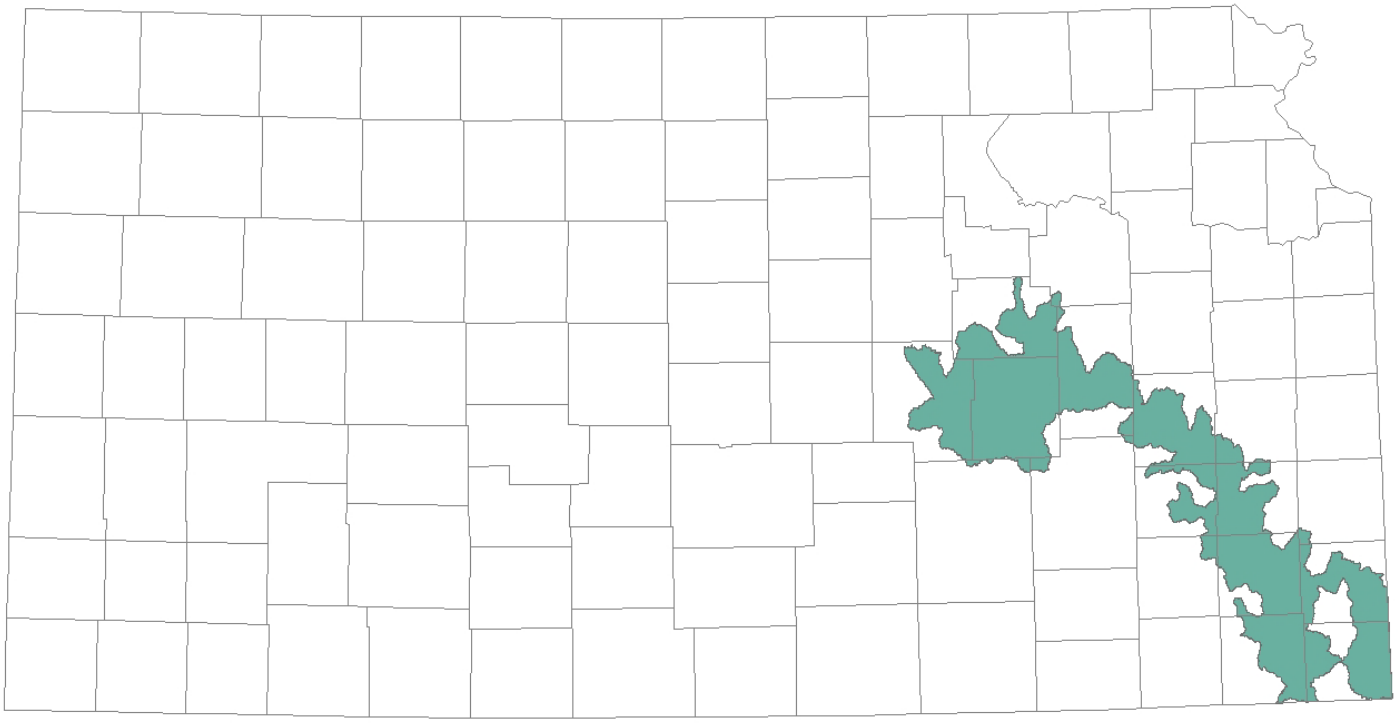
Western Blacknose Dace

Species of Greatest Conservation Need

Crustaceans	Calico Crayfish	*Faxonius immunis*	
Crustaceans	Great Plains Mudbug	*Lacunicambarus nebrascensis*	
Fish	American Eel	*Anguilla rostrata*	
Fish	Black Buffalo	*Ictiobus niger*	
Fish	Blue Sucker	*Cycleptus elongatus*	SINC
Fish	Brassy Minnow	*Hybognathus hankinsoni*	SINC
Fish	Flathead Chub	*Platygobio gracilis*	State Threatened
Fish	Johnny Darter	*Etheostoma nigrum*	SINC
Fish	Pallid Sturgeon	*Scaphirhynchus albus*	Federal & State Endangered
Fish	Plains Minnow	*Hybognathus placitus*	State Threatened
Fish	River Shiner	*Notropis blennius*	SINC
Fish	Quillback	*Carpiodes cyprinus*	
Fish	Shoal Chub	*Macrhybopsis hyostoma*	State Threatened
Fish	Shorthead Redhorse	*Moxostoma macrolepidotum*	
Fish	Shovelnose Sturgeon	*Scaphirhynchus platorynchus*	
Fish	Sicklefin Chub	*Macrhybopsis meeki*	State Endangered
Fish	Silver Chub	*Macrhybopsis storeriana*	State Endangered
Fish	Silverband Shiner	*Notropis shumardi*	SINC
Fish	Spotted Gar	*Lepisosteus oculatus*	
Fish	Stonecat	*Noturus flavus*	
Fish	Sturgeon Chub	*Macrhybopsis gelida*	State Threatened
Fish	Tadpole Madtom	*Noturus gyrinus*	SINC
Fish	Western Blacknose Dace	*Rhinichthys obtusus*	SINC
Fish	Western Silvery Minnow	*Hybognathus argyritis*	State Threatened
Fish	White Sucker	*Catostomus commersonii*	
Insect	Whiting's Flat-headed Mayfly	*Heptagenia whitingi*	
Mussels	Creeper	*Strophitus undulatus*	SINC
Mussels	Deertoe	*Truncilla truncata*	SINC
Mussels	Fatmucket	*Lampsilis siliquoidea*	SINC
Mussels	Lilliput	*Toxolasma parvum*	
Mussels	Pink Heelsplitter	*Potamilus alatus*	
Mussels	Pondhorn	*Uniomerus tetralasmus*	
Mussels	Spectaclecase	*Cumberlandia monodonta*	Federal Endangered
Mussels	Wabash Pigtoe	*Fusconaia flava*	
Mussels	Yellow Sandshell	*Lampsilis teres*	SINC



Chapter 10 – NEOSHO



The Neosho River EFA follows the Neosho River as it flows in a general southeast direction from Morris County to Cherokee County before leaving Kansas. The Neosho River has two major tributaries: The Cottonwood and Spring rivers. Streams in this system have predominately gravel substrates, a product of the limestone soils through which the Neosho River runs. The landscape of the Neosho River EFA ranges from Tallgrass Prairie in the west to Oak-Hickory Forest in the east. The Neosho River Basin is highly fragmented by watershed impoundments, three federal reservoirs (Cottonwood River: Marion Reservoir; Neosho River: Council Grove and John Redmond reservoirs), and several dams on the Neosho River main stem. Other impacts include lead and zinc mining in the southeast, gravel dredging, and high sediment loads. This EFA contains multiple SGCN species including fish, mussels, and herpetofauna.

CONSERVATION ISSUES

Agriculture

-Direct diversion of surface flow for irrigation reduces stream flows, impacting native aquatic communities

-Farming near stream channels impacts riparian habitats, resulting in erosion, sedimentation and nutrient input issues

-Fisheries management, as it relates to stocking game fish, can be detrimental to native species

-Livestock access to streams can increase soil erosion of stream banks and increase nutrient input through direct defecation and urination

Dams and water management/use

-Deviations from natural hydologic regime due to reservoir operations impact reproduction, recruitment, and survival of aquatic organisms downstream

Invasive and other problematic species and genes

-Introduced species, such as Zebra Mussels, impact native aquatic species and habitat

Natural system modifications

-Bank destabilization (due to riparian management, stream incision, headcuts, etc.) and some subsequent stabilization methods can cause stream incision and loss of riparian habitat

-Channelization reduces stream habitat, and causes stream incision which reduces floodplain connectivity

-Fragmentation from low-head dams and other impoundments (Beaver dam analogs) impedes aquatic organism movement and reproduction

-Gravel dredging affects stream morphology and spawning habitats and can result in "take" of species

-Structures that alter the water from its natural drainage are impacting natural hydrology of streams

Pollution

-Runoff of pesticides, herbicides and fertilizers have negative impacts on the flora and fauna

Residential and commercial development

-Storm water management in urban areas often results in channelized, concrete-lined streams that lead to intensified flooding events downstream

-Urbanization and impervious surfaces reduce water infiltration and increase runoff that often contains contaminants

Transportation and service corridors

-Pipeline remediation issues, like applying a concrete mesh patch, prohibit fish passage

CONSERVATION ACTIONS

Education and awareness

-Conduct wildlife surveys that are rigorous, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics

-Continue disease monitoring (Ranavirus, bsal, etc.)

-Educate landowners and managers on the value of rare species

-Educate the public about the value of wetlands and streams, including riparian corridors, and remediation techniques

-Educate the public regarding the importance of preventing the spread of invasive species

-Inform landowners and managers of and promote best management practices

-Inventory perched culverts and other structures that are preventing aquatic organism passage

-Investigate contaminant effects on reptilian and amphibian populations

-Research and develop engineering techniques for effective river and stream management

-Study the impact of introduced species on native species

External capacity building

-Cooperate with U.S. Army Corps of Engineers reservoir management and other partners (i.e. Sustainable Rivers Program) to develop ecological flow recommendations to better support downstream aquatic life

-Coordinate with Watershed Restoration and Protection Strategy groups to improve water quality and habitat

-Improve the coordination of mitigation activities with the Army Corps of Engineers

-Promote sound water quality standards and their enforcement through education and continued coordination with the Kansas Dept. of Health and Environment

-Promote the use of conservation culverts that retain natural stream bed features

-Work with county road departments and Kansas Dept. of Transportation to identify and replace structures that are preventing aquatic organism passage

Land/water management

-Coordinate with NRCS and other partners to develop and implement grazing and land management practices that benefit landowners as well as stream and riparian habitats

- Continue to impliment plans to prevent the invasion and spread of Aquatic Invasive Species

-Encourage engineering techniques that promote high habitat diversity

-Encourage planting of native riparian buffers at least twice the active channel-width to improve aquatic habitats, allowing agroforestry operations in the area farthest from the active channel

-Encourage the use of fences where necessary to manage riparian corridors, and otherwise conduct proper grazing management

-Expand cooperative programs that supply technical and direct assistance for non-native species removal

-Identify pollution problem areas and improve conditions detrimental to biodiversity and endangered species

-Promote ecologically sound techniques for flood control, erosion control, nonpoint source pollution control, and bank stabilization

-Promote effective instream flow management through the development and implementation of ecologically appropriate flow regimes

-Promote fish passage designs for new in-stream structures and retro-fit old structures to allow passage

-Promote improved water quality standards

-Promote mechanical removal of non-native, invasive plant species by utilizing local habitat partnerships

-Promote restoration of stream channels through natural stream design

-Promote restoration projects that increase floodplain connectivity in incised streams

Land/water protection

-Acquire rare, critical and/or important habitats through willing sellers/donors

-Acquire riparian corridor acreages through willing sellers/donors

-Acquire water rights as advisable and possible to maintain instream flows

-Encourage conservation easements on high quality habitats

Livelihood, economic, and other incentives

-Develop practices that provide benefits to landowners and to wildlife

-Offer incentive to private landowners to preserve native habitats from a watershed approach, remove invasive species, and use best management practices that benefit stream and riparian habitats

Species management

-Propagate imperiled species for reintroduction and population augmentation efforts

-Work with landowners and partners to identify appropriate reintroduction sites for imperiled species

Species of Greatest Conservation Need

Amphibians	Green Frog	*Lithobates clamitans*	State Threatened
Amphibians	Spring Peeper	*Pseudacris crucifer*	SINC
Fish	Arkansas Darter	*Etheostoma cragini*	SINC
Fish	Banded Darter	*Etheostoma zonale*	
Fish	Banded Sculpin	*Cottus carolinae*	SINC
Fish	Bigeye Shiner	*Notropis boops*	SINC
Fish	Black Buffalo	*Ictiobus niger*	
Fish	Black Redhorse	*Moxostoma duquesnei*	SINC
Fish	Blue Sucker	*Cycleptus elongatus*	SINC
Fish	Bluntnose Darter	*Etheostoma chlorosoma*	SINC
Fish	Brindled Madtom	*Noturus miurus*	SINC
Fish	Cardinal Shiner	*Luxilus cardinalis*	SINC
Fish	Channel Darter	*Percina copelandi*	
Fish	Common Shiner	*Luxilus cornutus*	
Fish	Fantail Darter	*Etheostoma flabellare*	

Fish	Freckled Madtom	*Noturus nocturnus*	
Fish	Golden Redhorse	*Moxostoma erythrurum*	
Fish	Gravel Chub	*Erimystax x-punctatus*	SINC
Fish	Greenside Darter	*Etheostoma blennioides*	SINC
Fish	Highfin Carpsucker	*Carpiodes velifer*	SINC
Fish	Highland Darter	*Etheostoma teddyroosevelt*	
Fish	Johnny Darter	*Etheostoma nigrum*	SINC
Fish	Least Darter	*Etheostoma microperca*	
Fish	Neosho Madtom	*Noturus placidus*	Federal & State Threatened
Fish	Northern Hog Sucker	*Hypentelium nigricans*	SINC
Fish	Orangethroat Darter	*Etheostoma spectabile*	
Fish	Ozark Logperch	*Percina caprodes fulvitaenia*	
Fish	Ozark Minnow	*Notropis nubilus*	SINC
Fish	Paddlefish	*Polyodon spathula*	
Fish	Pealip Redhorse	*Moxostoma pisolabrum*	
Fish	Redfin Darter	*Etheostoma whipplei*	SINC
Fish	Redspot Chub	*Nocomis asper*	State Threatened
Fish	River Darter	*Percina shumardi*	SINC
Fish	River Redhorse	*Moxostoma carinatum*	SINC
Fish	Shorthead Redhorse	*Moxostoma macrolepidotum*	
Fish	Slender Madtom	*Noturus exilis*	
Fish	Slenderhead Darter	*Percina phoxocephala*	
Fish	Slough Darter	*Etheostoma gracile*	SINC
Fish	Southern Redbelly Dace	*Chrosomus erythrogaster*	SINC
Fish	Speckled Darter	*Etheostoma stigmaeum*	
Fish	Spotfin Shiner	*Cyprinella spiloptera*	SINC
Fish	Spotted Gar	*Lepisosteus oculatus*	
Fish	Spotted Sucker	*Minytrema melanops*	SINC
Fish	Stonecat	*Noturus flavus*	
Fish	Striped Shiner	*Luxilus chrysocephalus*	SINC
Fish	Sunburst Darter	*Etheostoma mihileze*	SINC
Fish	Topeka Shiner	*Notropis topeka*	Federal Endangered, State Threatened
Fish	Warmouth	*Lepomis gulosus*	
Fish	White Sucker	*Catostomus commersonii*	
Insect	A longhorned caddisfly	*Ceraclea spongillovorax*	
Insect	A mayfly	*Heterocloeon grande*	
Insect	A spiny crawler mayfly	*Ephemera traverae*	
Insect	A primitive minnow mayfly	*Siphlonurus minnoi*	
Insect	Ozark Springfly	*Helopicus nalatus*	
Insect	Ouachita Stripetail	*Isoperla ouachita*	
Mussels	Bleufer	*Potamilus purpuratus*	
Mussels	Butterfly	*Ellipsaria lineolata*	State Threatened
Mussels	Creeper	*Strophitus undulatus*	SINC
Mussels	Deertoe	*Truncilla truncata*	SINC
Mussels	Elktoe	*Alasmidonta marginata*	State Endangered
Mussels	Ellipse	*Venustaconcha ellipsiformis*	State Endangered
Mussels	Fatmucket	*Lampsilis siliquoidea*	SINC
Mussels	Fawnsfoot	*Truncilla donaciformis*	SINC
Mussels	Flat Floater	*Utterbackiana suborbiculata*	State Endangered
Mussels	Flutedshell	*Lasmigona costata*	State Threatened
Mussels	Lilliput	*Toxolasma parvum*	
Mussels	Neosho Mucket	*Lampsilis rafinesqueana*	Federal & State Endangered
Mussels	Ouachita Kidneyshell	*Ptychobranchus occidentalis*	State Threatened
Mussels	Plain Pocketbook	*Lampsilis cardium*	
Mussels	Pondhorn	*Uniomerus tetralasmus*	
Mussels	Rabbitsfoot	*Theliderma cylindrica*	Federal Threatened & State Endangered
Mussels	Round Pigtoe	*Pleurobema sintoxia*	SINC
Mussels	Spike	*Eurynia dilatata*	SINC
Mussels	Wabash Pigtoe	*Fusconaia flava*	
Mussels	Wartyback	*Quadrula nodulata*	SINC

Mussels	Washboard	*Megalonaias nervosa*	SINC
Mussels	Western Fanshell	*Cyprogenia aberti*	Federal Threatened & State Endangered
Mussels	Yellow Sandshell	*Lampsilis teres*	SINC
Plants	Kansas Arrowhead	*Sagittaria ambigua*	
Plants	Missouri Mud-plantain	*Heteranthera missouriensis*	
Plants	Narrowleaf Morning-glory	*Ipomoea shumardiana*	
Turtles	Alligator Snapping Turtle	*Macrochelys temminckii*	SINC
Turtles	Northern Map Turtle	*Graptemys geographica*	State Threatened
Turtles	Smooth Softshell	*Apalone mutica*	

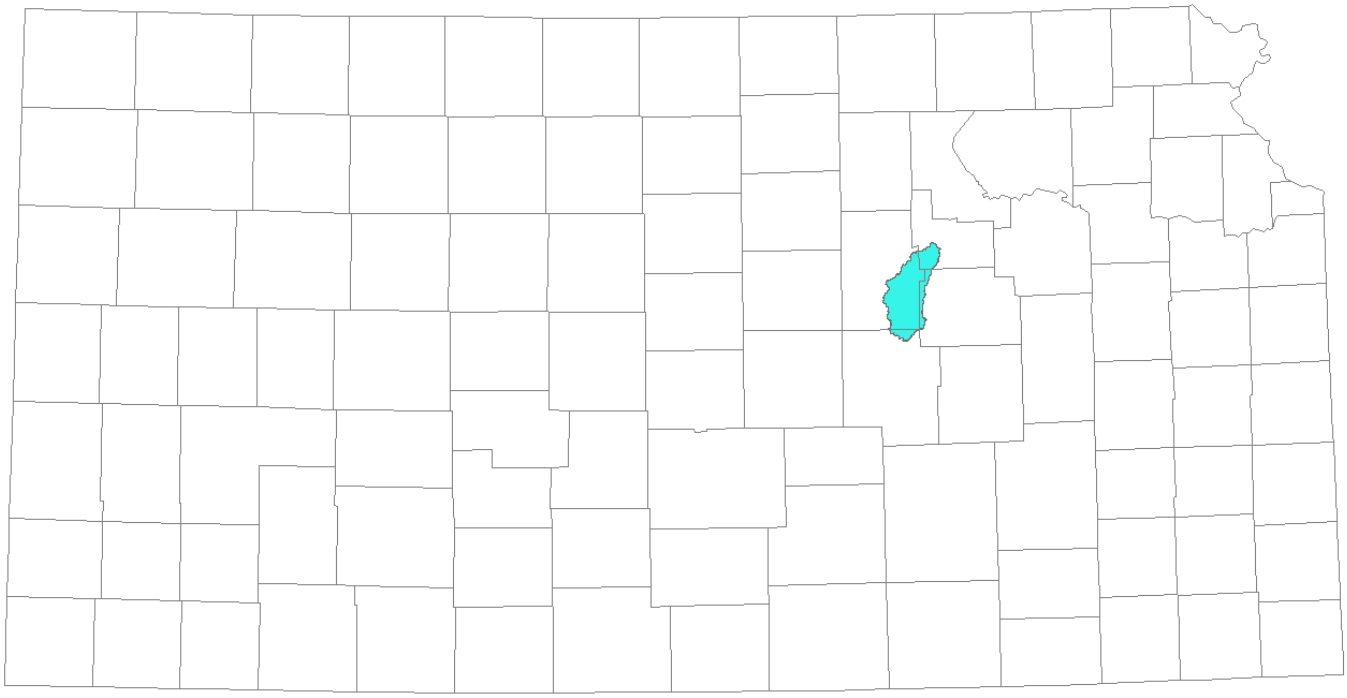
Success Story

Neosho Madtom in the Spring River

The Neosho Madtom is a small catfish listed as Threatened under the Endangered Species Act and under the Kansas Nongame and Endangered Species Conservation Act. In Kansas, the species is native to the Neosho River Basin (located in the Neosho River Ecological Focus Area) but has experience range reductions due to dam construction, gravel harvesting, and water quality impacts. Historically, the Neosho Madtom has been less abundanct in the Spring River mainstem compared to the Cottonwood and Neosho Rivers. Reasons for lower density in the Spring River include different physiochemical conditions compated to the Neosho-Cottonwood system. Specifically, segments of the Spring River drain the Tri-State mining district, where lead (Pb), zinc (Zn), and coal mining were common practive during ~1850-1970. Drainage from previously mined areas results in elevated cadmium (Cd), Pb, and Zn concentrations in the Spring River and its tributaries and is hypothesized to be a primary reason why Neosho Madtoms are less numerous in the Spring River compared to the Neosho-Cottonwood River system. The Neosho-Cottonwood system maintained higher Neosho Madtom densities than the Spring River despite having greater fragmentation and flow regime modification resulting from three large reservoirs (i.e., Marion Reservoir, Council Grove Reservoir, and John Redmond Reservoir) and numerous lowhead dams. In contrast, the Sping river retains a natural flow regime and has a lower degree of fragmentation (i.e., no large reservoirs).

Recently, KDWP partnered with Pittsburg State University to complete a research project comparing Neosho Madtom densities between the Cottonwood-Neosho River system and the Spring River above and below sources of mining pollution. Results to date indicate that there is no significant difference in Neosho Madtom abundance between the Cottonwood-Neosho River system and the Spring River has allowed Neosho Madtom populations to improve considerably compared to studies completed in the 1990s. This is encouraging news, not just for the Neosho Madtom, but also for the dozens of other Species of Greatest Conservation Need in the Spring River. Improved water quality may allow for natural re-colonization or improved recruitment, and also paves the way for conservation propagation if necessary.

Chapter 11 – SMOKY HILL



The Smoky Hill EFA occupies a small, downstream portion of the Smoky Hill-Saline River Basin where the Smoky Hill and Republic rivers join to form the Kansas River. Substrates in this system are predominately sand-silt. The landscape of the area is predominately Tallgrass Prairie, with some Mixed Grass Prairie in the west. Impacts to the Smoky Hill River EFA are mostly agricultural, with high levels of nutrients and oxygen demanding pollutants. Farther upstream in the basin, oil and gas development is common, but to a lesser degree within the EFA. The Smoky Hill River EFA contains a few SGCN, but the most notable is the Topeka Shiner.

CONSERVATION ISSUES

Agriculture

-Direct diversion of surface flow for irrigation reduces stream flows, impacting native aquatic communities

-Farming near stream channels impacts riparian habitats, resulting in erosion, sedimentation and nutrient input issues

-Fisheries management, as it relates to stocking game fish, can be detrimental to native species

-Intense grazing regimes can degrade riparian habitats

-Livestock access to streams can increase soil erosion of stream banks and increase nutrient input through direct defecation and urination

Invasive and other problematic species and genes

-Introduced predatory species can impact populations of native aquatic species

-Introduced species negatively impact native aquatic species and habitat

Natural system modifications

-Bank destabilization (due to riparian management, stream incision, headcuts, etc.) and some subsequent stabilization methods can cause stream incision and loss of riparian habitat

-Channelization reduces stream habitat, and causes stream incision which reduces floodplain connectivity

-Fragmentation from low-head dams and other impoundments impedes aquatic organism movement and reproduction

-Structures that alter the water from its natural drainage are impacting natural hydrology of streams

-Use of ground water and surface water from rivers and streams for irrigation is lowering the water level, and as a result many miles of stream are drying

Pollution

-Runoff of pesticides, herbicides and fertilizers have negative impacts on the flora and fauna

Residential and commercial development

-Storm water management in urban areas often results in channelized, concrete-lined streams that lead to intensified flooding events downstream

-Urbanization and impervious surfaces reduce water infiltration and increase runoff that often contains contaminants

Transportation and service corridors

-Pipeline remediation issues, like applying a concrete mesh patch, prohibit fish passage

-Perched culverts and stream crossings prevent aquatic organism passage

-Reinforced concrete box and corrugated metal pipe culverts replace stream bed habitat with artificial surfaces

CONSERVATION ACTIONS

Education and awareness

-Conduct wildlife surveys that are rigorous, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics

-Continue disease monitoring (Ranavirus, bsal, etc.)

-Educate landowners and managers on the value of rare species

-Educate the public about the value of wetlands and streams, including riparian corridors, and remediation techniques

-Educate the public regarding the importance of preventing the spread of invasive species

-Inform landowners and managers of and promote best management practices

-Inventory perched culverts and other structures that are preventing aquatic organism passage

-Investigate contaminant effects on reptilian and amphibian populations

-Research and develop engineering techniques for effective river and stream management

-Study the impact of introduced species on native species

External capacity building

-Coordinate with Watershed Restoration and Protection Strategy groups to improve water quality and habitat

-Improve the coordination of mitigation activities with the Army Corps of Engineers

-Promote sound water quality standards and their enforcement through education and continued coordination with the Kansas Dept. of Health and Environment

-Promote the use of conservation culverts that retain natural stream bed features

-Work with county road departments and Kansas Dept. of Transportation to identify and replace structures that are preventing aquatic organism passage

Land/water management

-Coordinate with NRCS and other partners to develop and implement grazing and land management practices that benefit landowners as well as stream and riparian habitats

-Continue to impliment plans to prevent the invasion and spread of Aquatic Invasive Species

-Encourage engineering techniques that promote high habitat diversity

-Encourage planting of native riparian buffers at least twice the active channel-width to improve aquatic habitats

-Encourage the use of fences where necessary to manage riparian corridors, and otherwise conduct proper grazing management

-Expand cooperative programs that supply technical and direct assistance for non-native species removal

-Identify pollution problem areas and improve conditions detrimental to biodiversity and endangered species

-Promote ecologically sound techniques for flood control, erosion control, nonpoint source pollution control, and bank stabilization

-Promote effective instream flow management through the development and implementation of ecologically appropriate flow regimes

-Promote fish passage designs for new in-stream structures and retro-fit old structures to allow passage

-Promote improved water quality standards

-Promote mechanical removal of non-native, invasive plant species by utilizing local habitat partnerships

-Promote restoration of stream channels through natural stream design

-Promote restoration projects that increase floodplain connectivity in incised streams

Land/water protection

-Acquire rare, critical and/or important habitats through willing sellers/donors

-Acquire riparian corridor acreages through willing sellers/donors

-Acquire water rights as advisable and possible to maintain instream flows

-Encourage conservation easements on high quality habitats

Livelihood, economic, and other incentives

-Develop practices that provide benefits to landowners and to wildlife

-Offer incentive to private landowners to preserve native habitats from a watershed approach, remove invasive species, and use best management practices that benefit stream and riparian habitats

Species management

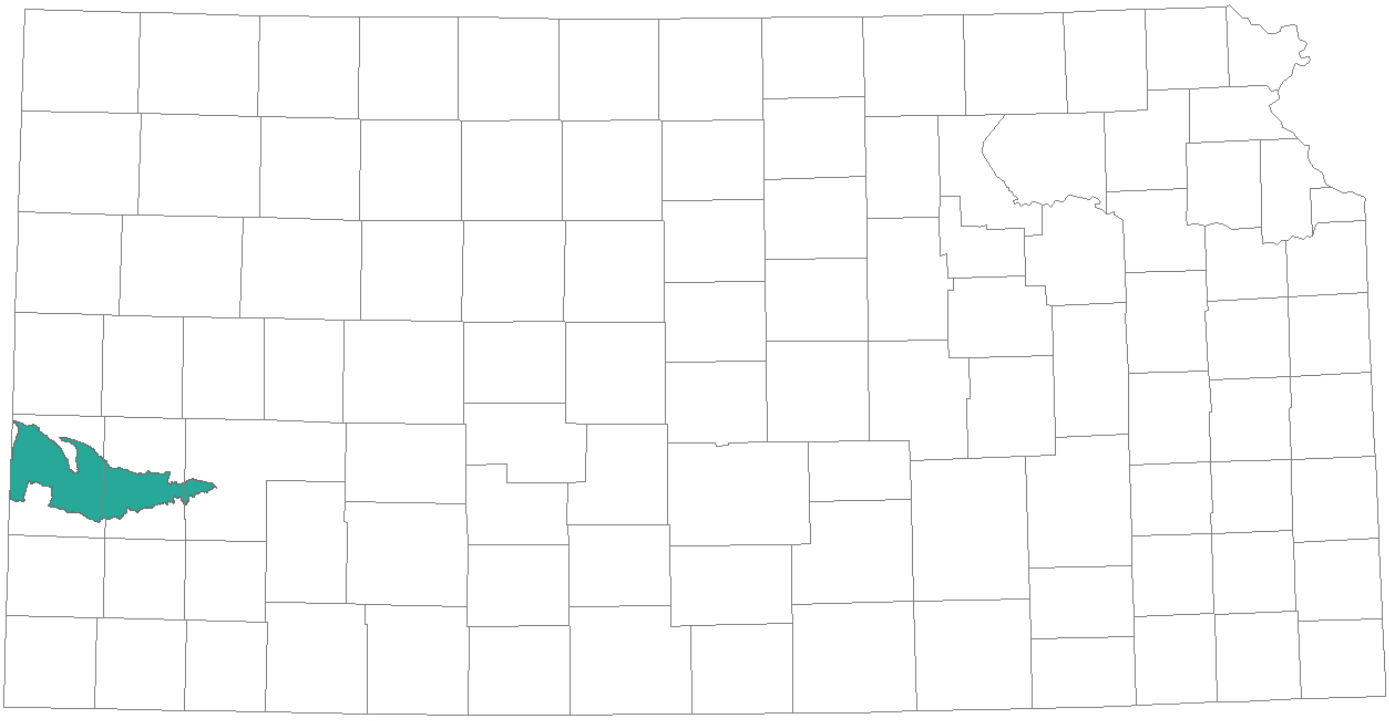
-Propagate imperiled species for reintroduction and population augmentation efforts

-Work with landowners and partners to identify appropriate reintroduction sites for imperiled species

Species of Greatest Conservation Need

Fish	Common Shiner	*Luxilus cornutus*	
Fish	Johnny Darter	*Etheostoma nigrum*	SINC
Fish	Orangethroat Darter	*Etheostoma spectabile*	
Fish	Ozark Logperch	*Percina caprodes fulvitaenia*	
Fish	Shorthead Redhorse	*Moxostoma macrolepidotum*	
Fish	Slender Madtom	*Noturus exilis*	
Fish	Southern Redbelly Dace	*Chrosomus erythrogaster*	SINC
Fish	Stonecat	*Noturus flavus*	
Fish	Topeka Shiner	*Notropis topeka*	Federal Endangered, State Threatened
Fish	White Sucker	*Catostomus commersonii*	
Insect	A sand-filtering mayfly	*Homoeoneuria ammophila*	
Mussels	Creeper	*Strophitus undulatus*	SINC
Mussels	Pink Heelsplitter	*Potamilus alatus*	
Mussels	Pondhorn	*Uniomerus tetralasmus*	
Mussels	Wabash Pigtoe	*Fusconaia flava*	

Chapter 12 – UPPER ARKANSAS



The Upper Arkansas EFA is the Kansas entry point of the Arkansas River, which originates in Colorado. This EFA is characterized by sandy plains and dune areas as well as irregular plains with moderate slope. The focus area contains a mosaic of land use, primarily as rangeland with areas of irrigated agriculture. The Upper Arkansas is habitat for state threatened species such as the Arkansas River Shiner, Flathead Chub, and Plains Minnow.

CONSERVATION ISSUES

Agriculture

-Direct diversion of surface flow for irrigation reduces stream flows, impacting native aquatic communities

-Farming near stream channels impacts riparian habitats, resulting in erosion, sedimentation and nutrient input issues

-Groundwater mining of the Ogallala Aquifer has caused parts of the upper Arkansas River to become dry, which reduces and fragments available habitat for aquatic organisms

-Intense grazing regimes can degrade riparian habitats

-Livestock access to streams can increase soil erosion of stream banks and increase nutrient input through direct defecation and urination

Energy production and mining

-Commercial sand mining, and large sand pits impact native habitat

Human intrustions and disturbance

-Navigable rivers, not defined well resulting in increased use during dry river bottom periods, i.e. driving atvs/side by side, horses and foot traffic

Invasive and other problematic species and genes

-Introduced predatory species can impact populations of native aquatic species.

-Introduced species negatively impact native aquatic species and habitat.

-Invasive plants impact riparian areas and reduce streamflows

Natural system modifications

-Water delivery inefficiency, piping vs open ditch transport reduces water loss through evaporation

-Bank destabilization (due to riparian management, headcuts, etc.) and some subsequent stabilization methods can cause stream incision and loss of riparian habitat

-Channelization reduces stream habitat, and causes stream incision which reduces floodplain connectivity

-Fragmentation from low-head dams and other impoundments impedes aquatic organism movement and reproduction

-Movement of water between drainage systems can significantly hydrology, and the environment in both donor and receiving systems

-Structures, massive diversions & low water crossings, that alter the water from its natural drainage are impacting natural hydrology of streams

-Use of ground water and surface water from rivers and streams for irrigation is lowering the water level, and as a result many miles of stream are drying

Pollution

-Uranium pollution from Colorado shale deposits and water recycling from canals to Arkansas River impacts water quality

-Overuse/misapplication of pesticides and fertilizer also contribute to water quality degradation from runoff

-Widespread broadcast application of pesticides often causes off-target species mortality, contributes to development of pesticide resistance, and reduces diversity of flora and fauna while increasing soil salinity

Residential and commercial development

-Storm water management in urban areas often results in channelized, concrete-lined streams that lead to intensified flooding events downstream

-Urbanization and impervious surfaces reduce water infiltration and increase runoff that often contains contaminants

Transportation and service corridors

-Pipeline remediation issues, like applying a concrete mesh patch, prohibit fish passage

-Counties and KDOT planting non-native brome

-Perched culverts and stream crossings prevent aquatic organism passage.

-Reinforced concrete box and corrugated metal pipe culverts replace stream bed habitat with artificial surfaces

CONSERVATION ACTIONS

Education and awareness

-Conduct wildlife surveys that are rigorous, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics.

-Continue disease monitoring (Ranavirus, bsal, etc.)

-Educate landowners and managers on the value of rare species

-Educate the public about the value of wetlands and streams, including riparian corridors, and remediation techniques

-Educate the public regarding the importance of preventing the spread of invasive species

-Inform landowners and managers of and promote best management practices

-Inventory perched culverts and other structures that are preventing aquatic organism passage

-Investigate contaminant effects on reptilian and amphibian populations

-Research and develop engineering techniques for effective river and stream management

-Study the impact of introduced species on native species

External capacity building

-Coordinate with Watershed Restoration and Protection Strategy groups to improve water quality and habitat

-Improve the coordination of mitigation activities with the Army Corps of Engineers

-Promote and encourage formation of coalitions/associations such as KAWS or "local grassroots efforts"

-Promote sound water quality standards and their enforcement through education and continued coordination with the Kansas Dept. of Health and Environment

-Promote the use of conservation culverts that retain natural stream bed features

-Work with county road departments and Kansas Dept. of Transportation to identify and replace structures that are preventing aquatic organism passage

-Work with neighboring states to gain compliance of interstate compacts in regard to water rights

-Work with the county zoning boards to implement good urban planning procedures

Land/water management

-Coordinate with NRCS and other partners to develop and implement grazing and land management practices that benefit landowners as well as stream and riparian habitats

-Continue to impliment plans to prevent the invasion and spread of Aquatic Invasive Species

-Encourage engineering techniques that promote high habitat diversity

-Encourage planting of native riparian buffers at least twice the active channel-width to improve aquatic habitats

-Encourage the use of fences where necessary to manage riparian corridor, and otherwise conduct proper grazing management

-Expand cooperative programs that supply technical and direct assistance for non-native species removal

-Identify pollution problem areas and improve conditions detrimental to biodiversity and endangered species

-Promote ecologically sound techniques for flood control, erosion control, nonpoint source pollution control and bank stabilization

-Promote effective instream flow management through the development and implementation of ecologically appropriate flow regimes

-Promote fish passage designs for new in-stream structures and retro-fit old structures to allow passage

-Promote improved water quality standards

-Promote mechanical removal of non-native, invasive plant species by utilizing local habitat partnerships

-Promote restoration of stream channels through natural stream design

-Promote restoration projects that increase floodplain connectivity in incised streams

Land/water protection

-Acquire rare, critical and/or important habitats through willing sellers/donors

-Acquire riparian corridor acreages through willing sellers/donors

-Acquire water rights as advisable and possible to maintain instream flows

-Encourage conservation easements on high quality habitats

Livelihood, economic, and other incentives

-Develop practices that provide benefits to landowners and to wildlife

-Offer incentive to private landowners to preserve native habitats from a watershed approach, remove invasive species, and use best management practices that benefit stream and riparian habitats

-Promote the use of more efficient irrigation methods and drought tolerant crops to conserve water in the Ogallala Aquifer

Species management

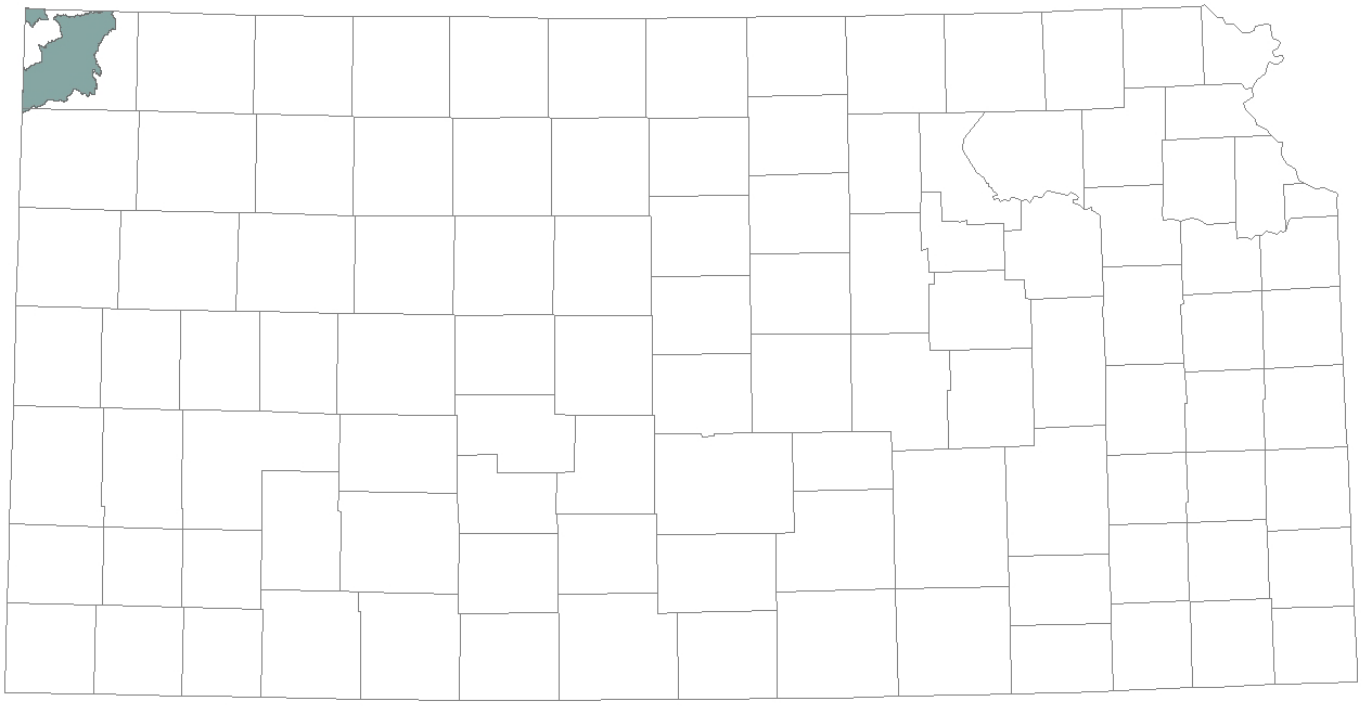
-Propagate imperiled species for reintroduction and population augmentation efforts

-Work with landowners and partners to identify appropriate reintroduction sites for imperiled species

Species of Greatest Conservation Need

Fish	Arkansas River Shiner	*Notropis girardi*	Federal & State Threatened
Fish	Flathead Chub	*Platygobio gracilis*	State Threatened
Fish	Golden Redhorse	*Moxostoma erythrurum*	
Fish	Northern Plains Killifish	*Fundulus kansae*	
Fish	Peppered Chub	*Macrhybopsis tetranema*	Federal & State Endangered
Fish	White Sucker	*Catostomus commersonii*	
Turtles	Smooth Softshell	*Apalone mutica*	

Chapter 13 – UPPER REPUBLICAN



The Upper Republican EFA is composed of the South Fork Republican River. The river flows from its origins in eastern Colorado, through the northwest corner of Kansas, and into Nebraska where it joins with the Republican River. This EFA is characterized by flat to rolling plains that are smooth, level, with thick loess-mantled uplands. Dryland farming with areas of irrigated cropland agriculture are extensive throughout the region. The South Fork Republican River is considered habitat for state listed species such as the Flathead Chub, Brassy Minnow, and Plains Minnow.

CONSERVATION ISSUES

Agriculture

-Direct diversion of surface flow for irrigation reduces stream flows, impacting native aquatic communities

-Farming near stream channels impacts riparian habitats, resulting in erosion, sedimentation and nutrient input issues

-Intense grazing regimes can degrade riparian habitats

-Livestock access to streams can increase soil erosion of stream banks and increase nutrient input through direct defecation and urination

Invasive and other problematic species and genes

-Introduced non-native species negatively impact native aquatic species and habitat

-Introduced predatory species can impact populations of native aquatic species, fisheries management in stocking game fish, can be detrimental to native species

-Invasive plants impact riparian areas and reduce streamflows

Natural system modifications

-Bank destabilization (due to riparian management, headcuts, etc.) and some subsequent stabilization methods can cause stream incision and loss of riparian habitat

-Channelization reduces stream habitat, and causes stream incision which reduces floodplain connectivity

-Fragmentation from low-head dams and other impoundments impedes aquatic organism movement and reproduction

-Structures that alter the water from its natural drainage are impacting natural hydrology of streams

-Use of ground water and surface water from rivers and streams for irrigation is lowering the water level, and as a result many miles of stream are drying

Pollution

-Runoff of pesticides, herbicides and fertilizers have negative impacts on the flora and fauna

Residential and commercial development

-Storm water management in urban areas often results in channelized, concrete-lined streams that lead to intensified flooding events downstream

-Urbanization and impervious surfaces reduce water infiltration and increase runoff that often contains contaminants

Transportation and service corridors

-Pipeline remediation issues, like applying a concrete mesh patch, prohibit fish passage

CONSERVATION ACTIONS

Education and awareness

-Conduct wildlife surveys that are rigorous, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics.

-Continue disease monitoring (Ranavirus, bsal, etc.)

-Educate landowners and managers on the value of rare species

-Educate the public about the value of wetlands and streams, including riparian corridors, and remediation techniques

-Educate the public regarding the importance of preventing the spread of invasive species

-Inform landowners and managers of and promote best management practices

-Inventory perched culverts and other structures that are preventing aquatic organism passage

-Investigate contaminant effects on reptilian and amphibian populations

-Research and develop engineering techniques for effective river and stream management

-Study the impact of introduced species on native species

External capacity building

-Coordinate with Watershed Restoration and Protection Strategy groups to improve water quality and habitat

-Improve the coordination of mitigation activities with the Army Corps of Engineers

-Promote and encourage formation of coalitions/associations such as KAWS or "local grassroots efforts"

-Promote sound water quality standards and their enforcement through education and continued coordination with the Kansas Dept. of Health and Environment

-Promote the use of conservation culverts that retain natural stream bed features

-Work with county road departments and Kansas Dept. of Transportation to identify and replace structures that are preventing aquatic organism passage

-Work with neighboring states to gain compliance of interstate compacts in regard to water rights

Land/water management

-Coordinate with NRCS and other partners to develop and implement grazing and land management practices that benefit landowners as well as stream and riparian habitats

- Continue to impliment plans to prevent the invasion and spread of Aquatic Invasive Species

-Encourage engineering techniques that promote high habitat diversity

-Encourage planting of native riparian buffers at least twice the active channel-width to improve aquatic habitats

-Encourage the use of fences where necessary to manage riparian corridors, and otherwise conduct proper grazing management

-Expand cooperative programs that supply technical and direct assistance for non-native species removal

-Identify pollution problem areas and improve conditions detrimental to biodiversity and endangered species

-Promote ecologically sound techniques for flood control, erosion control, nonpoint source pollution control, and bank stabilization

-Promote effective instream flow management through the development and implementation of ecologically appropriate flow regimes

-Promote fish passage designs for new in-stream structures and retro-fit old structures to allow passage

-Promote improved water quality standards

-Promote mechanical removal of non-native, invasive plant species by utilizing local habitat partnerships

-Promote restoration of stream channels through natural stream design

-Promote restoration projects that increase floodplain connectivity in incised streams

Land/water protection

-Acquire rare, critical and/or important habitats through willing sellers/donors

-Acquire riparian corridor acreages through willing sellers/donors

-Acquire water rights as advisable and possible to maintain instream flows

-Encourage conservation easements on high quality habitats

Livelihood, economic, and other incentives

-Develop practices that provide benefits to landowners and to wildlife

-Offer incentive to private landowners to preserve native habitats, remove invasive species, and use best management practices that benefit stream and riparian habitats

Species management

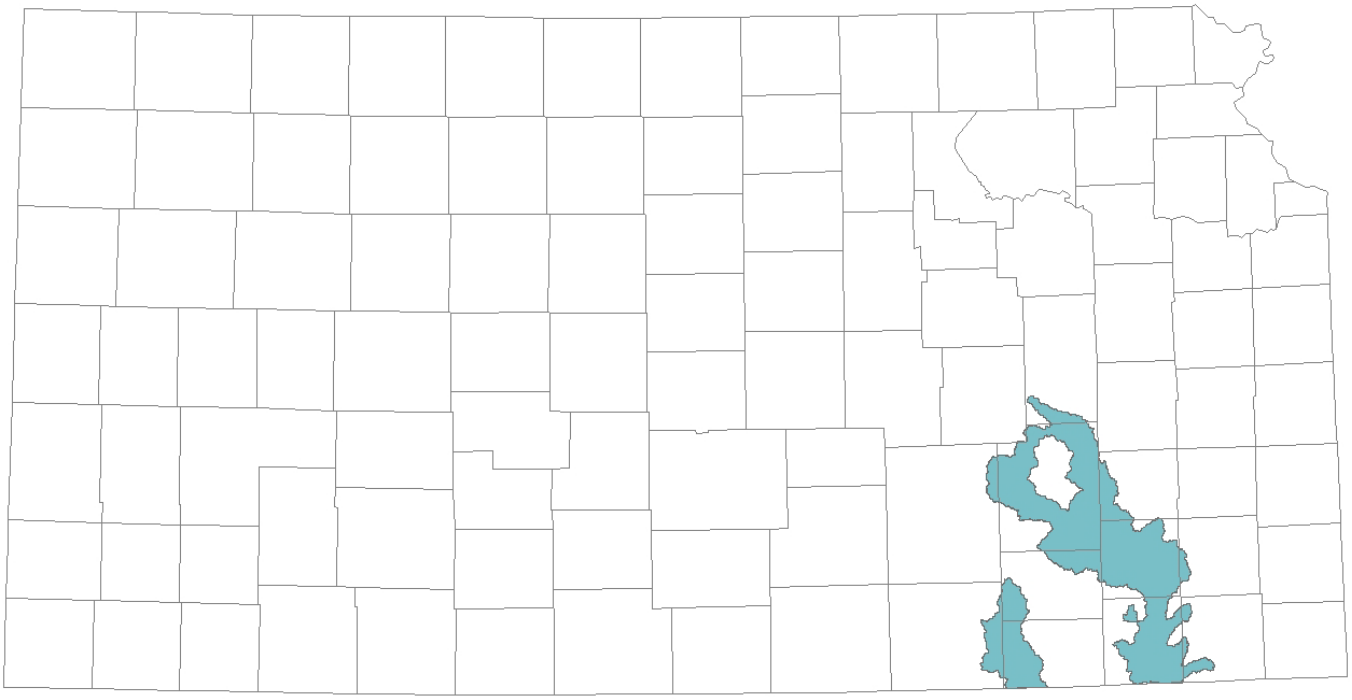
-Propagate imperiled species for reintroduction and population augmentation efforts

-Work with landowners and partners to identify appropriate reintroduction sites for imperiled species

Species of Greatest Conservation Need

Fish	Brassy Minnow	*Hybognathus hankinsoni*	SINC
Fish	Northern Plains Killifish	*Fundulus kansae*	
Fish	Orangethroat Darter	*Etheostoma spectabile*	
Fish	Plains Minnow	*Hybognathus placitus*	State Threatened
Fish	Quillback	*Carpiodes cyprinus*	
Fish	Stonecat	*Noturus flavus*	
Fish	White Sucker	*Catostomus commersonii*	
Mussels	Pondhorn	*Uniomerus tetralasmus*	

Chapter 14 – VERDIGRIS



The Verdigris EFA is comprised of rolling hills and uplands, a transitional area between the tallgrass prairie vegetation to the west and the mosaic of oak-hickory forest to the south. The Verdigris, Fall, and Elk rivers are the major aquatic systems in this EFA. Listed species within this EFA include freshwater mussels such as the Rabbitsfoot (endangered), the Neosho Mucket (endangered) andthe Ouachita Kidneyshell (threatened). The Brindled Madtom, Redfin Darter, and Spotted Sucker are all SINC within this area.

CONSERVATION ISSUES

Agriculture

-Direct diversion of surface flow for irrigation reduces stream flows, impacting native aquatic communities

-Fisheries management, as it relates to stocking game fish, can be detrimental to native species

-Land management practices within the watershed are impacting water quality

-Livestock access to streams can increase soil erosion of stream banks and increase nutrient input through direct defecation and urination

Dams and water management/use

-Deviations from natural hydologic regime due to reservoir operations impact reproduction, recruitment, and survival of aquatic organisms downstream

Invasive and other problematic species and genes

-Introduced species negatively impact native aquatic species and habitat

Natural system modifications

-Bank destabilization (due to riparian management, stream incision, headcuts, etc.) and some subsequent stabilization methods can cause stream incision and loss of riparian habitat

-Channelization reduces stream habitat, and causes stream incision which reduces floodplain connectivity
-Fragmentation from low-head dams and other impoundments impedes aquatic organism movement and reproduction
-Structures that alter the water from its natural drainage are impacting natural hydrology of streams

Pollution

-Runoff of pesticides, herbicides and fertilizers have negative impacts on the flora and fauna

Residential and commercial development

-Storm water management in urban areas often results in channelized, concrete-lined streams that lead to intensified flooding events downstream
-Urbanization and impervious surfaces reduce water infiltration and increase runoff that often contains contaminants

Transportation and service corridors

-Pipeline remediation issues, like applying a concrete mesh patch, prohibit fish passage
-Perched culverts and stream crossings prevent aquatic organism passage
-Reinforced concrete box and corrugated metal pipe culverts replace stream bed habitat with artificial surfaces

Conservation Actions

Education and awareness

-Conduct wildlife surveys that are rigorous, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics
-Continue disease monitoring (Ranavirus, bsal, etc.)
-Educate landowners and managers on the value of rare species
-Educate the public about the value of wetlands and streams, including riparian corridors, and remediation techniques
-Educate the public regarding the importance of preventing the spread of invasive species
-Inform landowners and managers of and promote best management practices
-Inventory perched culverts and other structures that are preventing aquatic organism passage
-Investigate contaminant effects on reptilian and amphibian populations
-Research and develop engineering techniques for effective river and stream management
-Study the effects of removing watershed impoundments and reservoirs
-Study the impact of introduced species on native species

External capacity building

-Cooperate with U.S. Army Corps of Engineers reservoir management and other partners (i.e. Sustainable Rivers Program) to develop ecological flow recommendations to better support downstream aquatic life
-Coordinate with Watershed Restoration and Protection Strategy groups to improve water quality and habitat
-Improve the coordination of mitigation activities with the Army Corps of Engineers
-Promote sound water quality standards and their enforcement through education and continued coordination with the Kansas Dept. of Health and Environment
-Promote the use of conservation culverts that retain natural stream bed features
-Work with county road departments and Kansas Dept. of Transportation to identify and replace structures that are preventing aquatic organism passage

Land/water management

-Coordinate with NRCS and other partners to develop and implement grazing and land management practices that benefit landowners as well as stream and riparian habitats

-Continue to impliment plans to prevent the invasion and spread of Aquatic Invasive Species

-Encourage engineering techniques that promote high habitat diversity

-Encourage planting of native riparian buffers at least twice the active channel-width to improve aquatic habitats, allowing agroforestry operations in the area farthest from the active channel

-Encourage the use of fences where necessary to manage riparian corridors, and otherwise conduct proper grazing management

-Expand cooperative programs that supply technical and direct assistance for non-native species removal

-Identify pollution problem areas and improve conditions detrimental to biodiversity and endangered species

-Promote ecologically sound techniques for flood control, erosion control, nonpoint source pollution control, and bank stabilization

-Promote effective instream flow management through the development and implementation of ecologically appropriate flow regimes

-Promote fish passage designs for new in-stream structures and retro-fit old structures to allow passage

-Promote improved water quality standards

-Promote mechanical removal of non-native, invasive plant species by utilizing local habitat partnerships

-Promote restoration of stream channels through natural stream design

-Promote restoration projects that increase floodplain connectivity in incised streams

Land/water protection

-Acquire rare, critical and/or important habitats through willing sellers/donors

-Acquire riparian corridor acreages through willing sellers/donors

-Acquire water rights as advisable and possible to maintain instream flows

-Encourage conservation easements on high quality habitats

Livelihood, economic, and other incentives

-Develop practices that provide benefits to landowners and to wildlife

-Offer incentive to private landowners to preserve native habitats from a watershed approach, remove invasive species, and use best management practices that benefit stream and riparian habitats

Species management

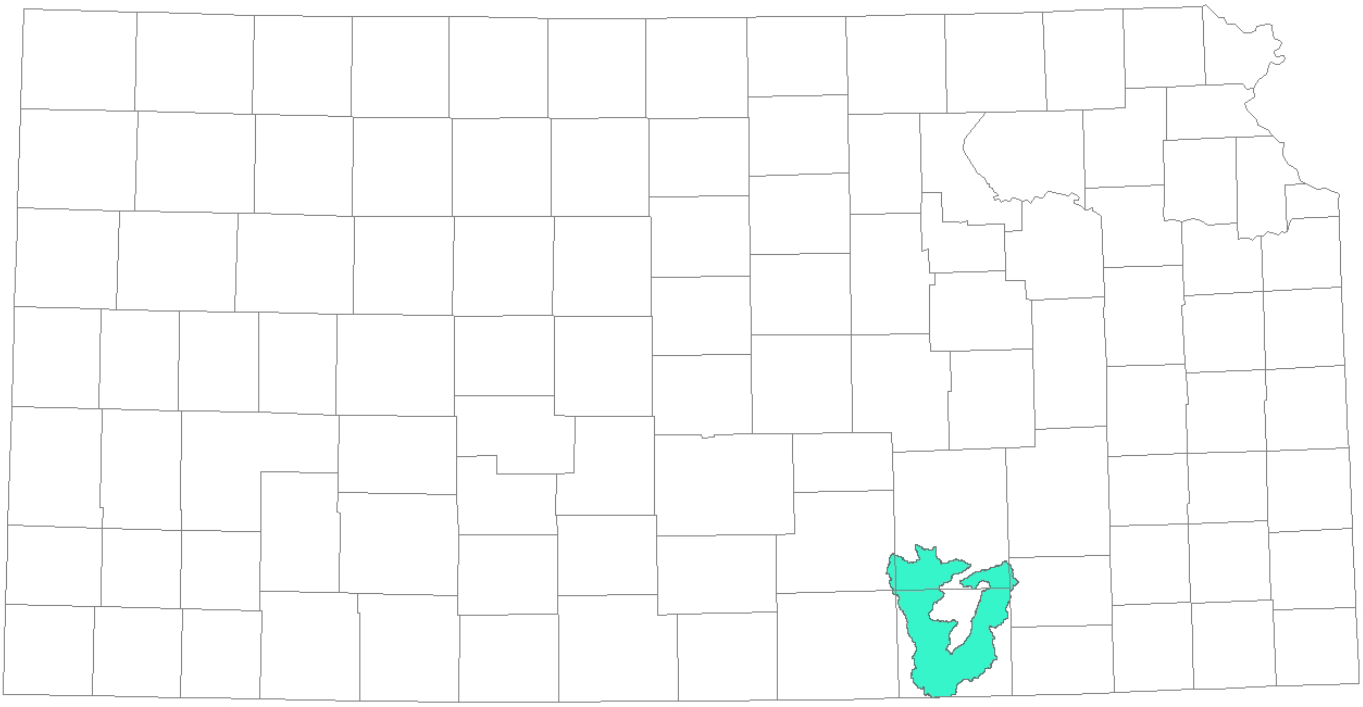
-Propagate imperiled species for reintroduction and population augmentation efforts

-Work with landowners and partners to identify appropriate reintroduction sites for imperiled species

Species of Greatest Conservation Need

Amphibians	Common Mudpuppy	*Necturus maculosus*	
Fish	Banded Darter	*Etheostoma zonale*	
Fish	Bigeye Shiner	*Notropis boops*	SINC
Fish	Black Buffalo	*Ictiobus niger*	
Fish	Brindled Madtom	*Noturus miurus*	SINC
Fish	Channel Darter	*Percina copelandi*	
Fish	Fantail Darter	*Etheostoma flabellare*	
Fish	Freckled Madtom	*Noturus nocturnus*	
Fish	Golden Redhorse	*Moxostoma erythrurum*	
Fish	Highfin Carpsucker	*Carpiodes velifer*	SINC
Fish	Orangethroat Darter	*Etheostoma spectabile*	
Fish	Ozark Logperch	*Percina caprodes fulvitaenia*	
Fish	Pealip Redhorse	*Moxostoma pisolabrum*	
Fish	Quillback	*Carpiodes cyprinus*	
Fish	Redfin Darter	*Etheostoma whipplei*	SINC
Fish	Slenderhead Darter	*Percina phoxocephala*	
Fish	Slough Darter	*Etheostoma gracile*	SINC
Fish	Spotted Gar	*Lepisosteus oculatus*	
Fish	Spotted Sucker	*Minytrema melanops*	SINC
Fish	Stonecat	*Noturus flavus*	
Fish	Warmouth	*Lepomis gulosus*	
Insect	A longhorned caddisfly	*Ceraclea spongillovorax*	
Insect	A mayfly	*Heterocloeon grande*	
Insect	A midge	*Oliveridia hugginsi*	
Insect	A Prongill Mayfly	*Paraleptophlebia calcarica*	
Insect	Grey Petaltail	*Tachopteryx thoreyi*	
Insect	Ozark Emerald	*Somatochlora ozarkensis*	SINC
Mussels	Bleufer	*Potamilus purpuratus*	
Mussels	Butterfly	*Ellipsaria lineolata*	State Threatened
Mussels	Creeper	*Strophitus undulatus*	SINC
Mussels	Deertoe	*Truncilla truncata*	SINC
Mussels	Fatmucket	*Lampsilis siliquoidea*	SINC
Mussels	Fawnsfoot	*Truncilla donaciformis*	SINC
Mussels	Lilliput	*Toxolasma parvum*	
Mussels	Neosho Mucket	*Lampsilis rafinesqueana*	Federal & State Endangered
Mussels	Ouachita Kidneyshell	*Ptychobranchus occidentalis*	State Threatened
Mussels	Plain Pocketbook	*Lampsilis cardium*	
Mussels	Pondhorn	*Uniomerus tetralasmus*	
Mussels	Round Pigtoe	*Pleurobema sintoxia*	SINC
Mussels	Wabash Pigtoe	*Fusconaia flava*	
Mussels	Wartyback	*Quadrula nodulata*	SINC
Mussels	Washboard	*Megalonaias nervosa*	SINC
Mussels	Western Fanshell	*Cyprogenia aberti*	Federal Threatened & State Endangered
Mussels	Yellow Sandshell	*Lampsilis teres*	SINC
Plants	Kansas Arrowhead	*Sagittaria ambigua*	
Turtles	Alligator Snapping Turtle	*Macrochelys temminckii*	SINC

Chapter 15 – WALNUT



The Walnut EFA is part of the Flint Hills ecoregion. The area can be characterized by rolling hills, rocky soils and humid wet summers. Due to the rocky surface, the region supports little cropland agriculture. The prairie is used for range and pasture land. Some cropland agriculture has been implemented in river valleys and along the periphery of the Flint Hills that contains level topography. The Walnut River is the major system in this EFA. While there are no species listed as threatened or endangered by the state of Kansas, the species diversity within this area and proximity to areas containing listed species is noteworthy. The effects of urbanization are ever present with the city of Wichita located to the west.

CONSERVATION ISSUES

Agriculture

-Direct diversion of surface flow for irrigation reduces stream flows, impacting native aquatic communities

-Farming near stream channels impacts riparian habitats, resulting in erosion, sedimentation and nutrient input issues

-Fisheries management, as it relates to stocking game fish, can be detrimental to native species

-Intense grazing regimes can degrade riparian habitats

-Livestock access to streams can increase soil erosion of stream banks and increase nutrient input through direct defecation and urination

Invasive and other problematic species and genes

-Introduced predatory species can impact populations of native aquatic species

-Introduced species negatively impact native aquatic species and habitat.

Natural system modifications

-Bank destabilization (due to riparian management, stream incision, headcuts, etc.) and some subsequent stabilization methods can cause stream incision and loss of riparian habitat.

-Channelization reduces stream habitat, and causes stream incision which reduces floodplain connectivity

-Fragmentation from low-head dams and other impoundments impedes aquatic organism movement and reproduction

-Structures that alter the water from its natural drainage are impacting natural hydrology of streams

Pollution

-Runoff of pesticides, herbicides, and fertilizers have negative impacts on the flora and fauna

Residential and commercial development

-Storm water management in urban areas often results in channelized, concrete-lined streams that lead to intensified flooding events downstream

-Urbanization and impervious surfaces reduce water infiltration and increase runoff that often contains contaminants

Transportation and service corridors

-Pipeline remediation issues, like applying a concrete mesh patch, prohibit fish passage

-Perched culverts and stream crossings prevent aquatic organism passage

-Reinforced concrete box and corrugated metal pipe culverts replace stream bed habitat with artificial surfaces

CONSERVATION ACTIONS

Education and awareness

-Conduct wildlife surveys that are rigorous, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics

-Continue disease monitoring (Ranavirus, bsal, etc.)

-Educate landowners and managers on the value of rare species

-Educate public about eco-friendly lawn care and effects of lawn chemicals on aquatic systems

-Educate public and developers on the effects of impervious surfaces and the potential for Low Impact Development

-Educate the public about the value of wetlands and streams, including riparian corridors, and remediation techniques

-Educate the public regarding the importance of preventing the spread of invasive species

-Inform landowners and managers of and promote best management practices

-Inventory perched culverts and other structures that are preventing aquatic organism passage

-Investigate contaminant effects on reptilian and amphibian populations

-Research and develop engineering techniques for effective river and stream management

-Study the impact of introduced species on native species

External capacity building

-Coordinate with Watershed Restoration and Protection Strategy groups to improve water quality and habitat

-Improve the coordination of mitigation activities with the Army Corps of Engineers

-Promote sound water quality standards and their enforcement through education and continued coordination with the Kansas Dept. of Health and Environment

-Promote the use of conservation culverts that retain natural stream bed features

-Work with city and county public works to improve storm water management

-Work with county road departments and Kansas Dept. of Transportation to identify and replace structures that are preventing aquatic organism passage

Land/water management

-Coordinate with NRCS and other partners to develop and implement grazing and land management practices that benefit landowners as well as stream and riparian habitats

-Continue to impliment plans to prevent the invasion and spread of Aquatic Invasive Species

-Encourage engineering techniques that promote high habitat diversity

-Encourage planting of native riparian buffers at least twice the active channel-width to improve aquatic habitats, allowing agroforestry operations in the area farthest from the active channel

-Encourage the use of fences where necessary to manage riparian corridors, and otherwise conduct proper grazing management

-Encourage use of permeable asphalt or pavement and Low Impact Development practices to improve storm water management by increasing infiltration of water and decreasing/replacing impervious surfaces

-Expand cooperative programs that supply technical and direct assistance for non-native species removal

-Identify pollution problem areas and improve conditions detrimental to biodiversity and endangered species

-Promote ecologically sound techniques for flood control, erosion control, nonpoint source pollution control, and bank stabilization

-Promote effective instream flow management through the development and implementation of ecologically appropriate flow regimes

-Promote fish passage designs for new in-stream structures and retro-fit old structures to allow passage

-Promote improved water quality standards

-Promote mechanical removal of non-native, invasive plant species by utilizing local habitat partnerships

-Promote restoration of stream channels through natural stream design

-Promote restoration projects that increase floodplain connectivity in incised streams

Land/water protection

-Acquire rare, critical and/or important habitats through willing sellers/donors

-Acquire riparian corridor acreages through willing sellers/donors

-Acquire water rights as advisable and possible to maintain instream flows

-Encourage conservation easements on high quality habitats

Livelihood, economic, and other incentives

-Develop practices that provide benefits to landowners and to wildlife

-Offer incentive to private landowners to preserve native habitats from a watershed approach, remove invasive species, and use best management practices that benefit stream and riparian habitats

Species management

-Propagate imperiled species for reintroduction and population augmentation efforts

-Work with landowners and partners to identify appropriate reintroduction sites for imperiled species

Species of Greatest Conservation Need

Fish	Arkansas Darter	*Etheostoma cragini*	SINC
Fish	Bigeye Shiner	*Notropis boops*	SINC
Fish	Black Buffalo	*Ictiobus niger*	
Fish	Channel Darter	*Percina copelandi*	
Fish	Freckled Madtom	*Noturus nocturnus*	
Fish	Golden Redhorse	*Moxostoma erythrurum*	
Fish	Orangethroat Darter	*Etheostoma spectabile*	
Fish	Ozark Logperch	*Percina caprodes fulvitaenia*	
Fish	Pealip Redhorse	*Moxostoma pisolabrum*	
Fish	Slenderhead Darter	*Percina phoxocephala*	
Fish	Spotted Sucker	*Minytrema melanops*	SINC
Fish	Stonecat	*Noturus flavus*	
Mussels	Bleufer	*Potamilus purpuratus*	
Mussels	Creeper	*Strophitus undulatus*	SINC
Mussels	Fatmucket	*Lampsilis siliquoidea*	SINC
Mussels	Lilliput	*Toxolasma parvum*	
Mussels	Plain Pocketbook	*Lampsilis cardium*	
Mussels	Pondhorn	*Uniomerus tetralasmus*	
Mussels	Round Pigtoe	*Pleurobema sintoxia*	SINC
Mussels	Wabash Pigtoe	*Fusconaia flava*	
Mussels	Yellow Sandshell	*Lampsilis teres*	SINC

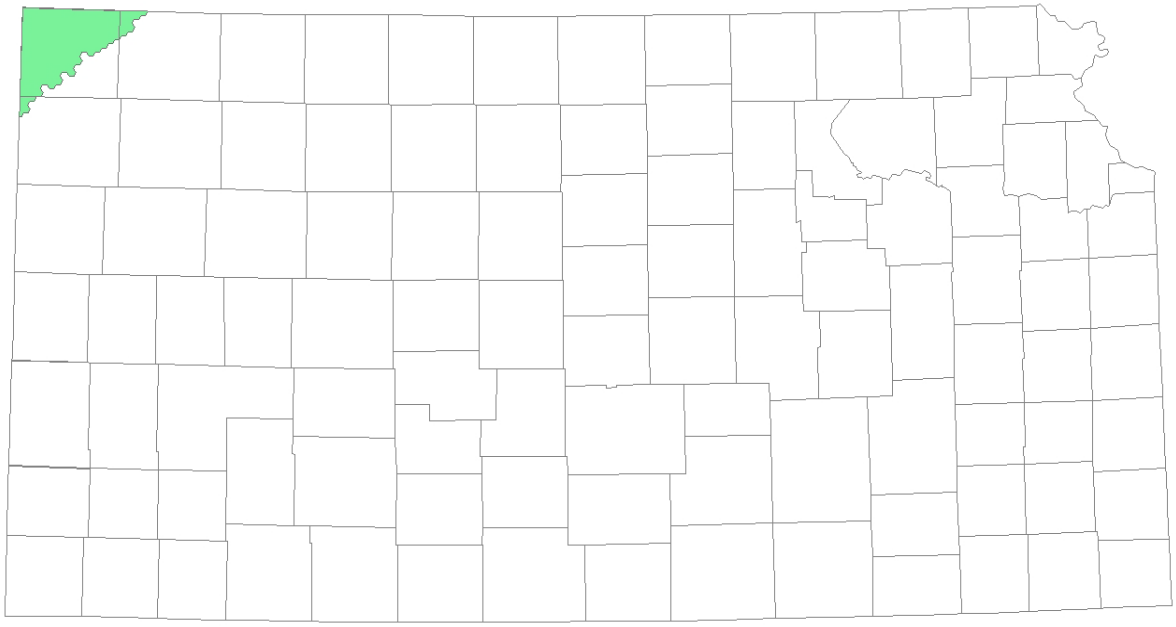
Success Story

Incorporating the KS SWAP Across Partners

State Wildlife Action Plans are meant to be partner driven plans, with input by external partners driving SWAP development, and in turn, aspects of the SWAP to be incorporated by statewide partners in their efforts to conserve the states natural resources. Of course, State Wildlife Grant allocations are designed to implement each state's SWAP, but there are opportunities to leverage other funds to aid in implementation. Internally, the Kansas Nongame Wildlife Improvement Program, also known as the Chickadee Checkoff, was established in 1980 as a donation program to fund small projects for researching species and improving habitats. Each year, a request for proposals for small projects to be funded by Chickadee Checkoff is released publicly, and applicants have to be able to connect their proposed project with the Kansas SWAP.

Externally, our sister state agencies implement our SWAP in several ways. The Kansas Forest Service (KFS) also maintains a ten-year Forest Action Plan. The KFS plan incorporates Species of Greatest Conservation Need (SGCN), Ecological Focus Areas (EFAs) and threats from the SWAP into their strategic plan as appropriate. The Kansas Department of Health and Environment (KDHWE recognizes and protects Special Aquatic Life Use (SALU) waters defined as surface waters that contain combinations of habitat types and indigenous biota not found commonly in the state, or surface waters that contain representative populations of threatened or endangered species. Information governing SALU determination is driven in part by the states SGCN list and recognition of aquatic EFAs. Ducks Unlimited, Pheasants Forever, and Quail Forever all use the SWAP when writing their planning and implementation grants. The United States Forest Service (USFS), which owns and manages the Cimarron National Grasslands, a standalone EFA in the Kansas SWAP, is updating their strategic plan for the first time in 40 years. The basic USFS plan structure follows the SWAP structure, and we (KDWP) have provided our EFA specific Issues and Actions, as well as the SGCN occurring in the Grasslands.

Chapter 16 – ARIKAREE BREAKS



The Arikaree Breaks EFA is located in the northwestern half of Cheyenne County. This area borders Colorado on the west and Nebraska on the north. The Arikaree Breaks are named for its rough terrain, with deep ravines and gullies that were formed by the erosion of loess soils causing head and side wall cutting creating tributaries of the Arikaree River and South Fork Republican River. In addition to the rugged terrain of the Arikaree Breaks, this area includes a small cluster of playa lakes and the upland areas to the north of the South Fork Republican River. The priority habitats found in this area are Shortgrass Prairie and Mixed Grass Prairie. This area is ecologically important as the habitats change throughout the focus area and are host to numerous state listed and SGCN species.

EFA Development

This EFA captures a concentration of Large Natural Areas in Cheyenne County. The final boundary is based on the Level 4 EPA ecoregion (Moderate Relief Rangeland).

CONSERVATION ISSUES

Agriculture

-Conversion of native grasslands to other uses and/or haying of native grasslands causes fragmentation, destroys native flora and decreases habitat availability

-Inappropriate grazing and haying practices on native grasslands decreases habitat heterogeneity and can change vegetative community composition

Invasive and other problematic species and genes

-Non-native invasive woody and herbaceous plants compete with native flora and modify habitat structure and function for fauna

Natural system modifications

-Bank destabilization caused by human disturbance and some resulting bank stabilization methods are negatively affecting riparian corridors

-Improperly applied use of prescribed fire (*i.e.* prominence of annual burning is detrimental for some grassland nesting birds while infrequent burning causes prairie to transition to shrubland or forest)

Pollution

-Overuse/misapplication of pesticides and fertilizer also contribute to water quality degradation from runoff

-Widespread broadcast application of pesticides often causes off-target species mortality, contributes to development of pesticide resistance, and reduces diversity of flora and fauna while increasing soil salinity

CONSERVATION ACTIONS

Education and awareness

-Conduct wildlife surveys for data lacking species. Surveys should be rigorous, repeatable, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics

-Continued disease monitoring (Chytrid Fungus, Ranavirus, Snake Fungal Disease, etc.)

-Develop a broad scale education approach and outreach program detailing the impacts of fragmentation, woody invasion and encroachment, energy development and other land use changes on flora and fauna

-Research cover crop benefits for wildlife

External capacity building

-Develop/expand partnerships to assist in addressing conservation issues

-Work with other state agencies to avoid, minimize, reduce and mitigate impacts to habitat resulting from their programs

Land/water management

-Continue to develop and implement incentive programs for landowners and managers to promote heterogeneity and diversity for wildlife while maintaining viable farming/ranching operation (*i.e.* cover crops, defer/limit herbicide applications, CRP grazing reserve)

-Develop and implement methods to offset economic practices (*i.e.* wind farms, farm management systems encouraging overproduction, conversion of marginal lands into crop production, urbanization) that have negative environmental impacts

-Develop cost-neutral conservation practices for producers to provide for maintenance of ecologically and economically viable farming/ranching operations (*i.e.* patch burn grazing)

-Encourage the use of CRP as a grazing reserve to allow recovery of native range

-Implement ecologically sensitive grazing and haying practices for shortgrass prairie on private and public lands; as well as promoting the responsible, well-planned use of prescribed fire as a management/restoration tool

-Increase the heterogeneity of native habitats, as well as general landscapes by using greenways, corridors, buffer strips, refuges, and the Conservation Reserve

-Reduce grazing impacts by designing and encouraging implementation of wildlife friendly grazing systems, drought management plans, and conservation payment systems

Land/water protection

-Acquire key parcels of land including corridors from willing sellers and/or donors

-Promote field border programs and county road easements which are landowner and wildlife friendly

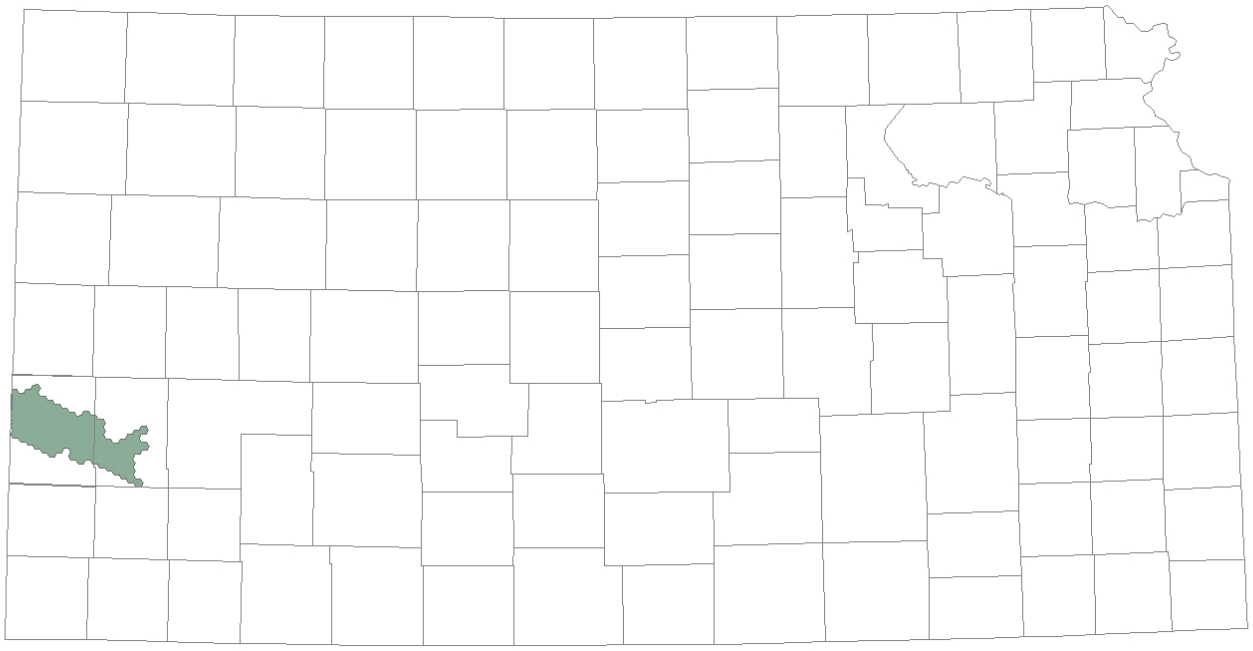
-Provide incentives to landowners to maintain, improve, enhance key grassland sites, and reduce intensified agricultural practices

-Use conservation easements to prevent further fragmentation

Species of Greatest Conservation Need

Amphibians	Tiger Salamander	*Ambystoma tigrinum*	
Birds	American Tree Sparrow	*Spizella arborea*	
Birds	Baltimore Oriole	*Icterus galbula*	
Birds	Barn Owl	*Tyto alba*	
Birds	Bell's Vireo	*Vireo bellii*	
Birds	Bullock's Oriole	*Icterus bullockii*	
Birds	Burrowing Owl	*Athene cunicularia*	
Birds	Cassin's Sparrow	*Peucaea cassinii*	
Birds	Chestnut-collared Longspur	*Calcarius ornatus*	
Birds	Common Nighthawk	*Chordeiles minor*	
Birds	Common Poorwill	*Phalaenoptilus nuttallii*	
Birds	Eastern Kingbird	*Tyrannus tyrannus*	
Birds	Ferruginous Hawk	*Buteo regalis*	SINC
Birds	Golden Eagle	*Aquila chrysaetos*	SINC
Birds	Grasshopper Sparrow	*Ammodramus savannarum*	
Birds	Greater Prairie-Chicken	*Tympanuchus cupido*	
Birds	Lark Bunting	*Calamospiza melanocorys*	
Birds	Lark Sparrow	*Chondestes grammacus*	
Birds	Loggerhead Shrike	*Lanius ludovicianus*	
Birds	McCown's Longspur	*Rhynchopanes mccownii*	
Birds	Northern Bobwhite	*Colinus virginianus*	
Birds	Red-headed Woodpecker	*Melanerpes erythrocephalus*	
Birds	Spotted Towhee	*Pipilo maculatus*	
Birds	Swainson's Hawk	*Buteo swainsoni*	
Birds	Western Kingbird	*Tyrannus verticalis*	
Crustaceans	Ringed Crayfish	*Faxonius neglectus*	
Gastropods	Mudbank Ambersnail	*Catinella vagans*	
Gastropods	Xeric Ambersnail	*Succinea vaginacontorta*	
Insect	A scarab beetle	*Geomyphilus kiowensis*	
Insect	A scarab beetle	*Onthophagus knausi*	
Insect	A scarab beetle	*Orizabus pyriformis*	
Insect	A scarab beetle	*Pardalosus neodistinctus*	
Insect	A scarab beetle	*Tetraclipeoides dentigerulus*	
Insect	A scarab beetle	*Trox paulseni*	
Insect	A sweat bee	*Dieunomia apacha*	
Insect	A wool-carder bee	*Anthidium maculosum*	
Insect	American Bumble Bee	*Bombus pensylvanicus*	Federal Under Review
Insect	Black-and-gold Bumble Bee	*Bombus auricomus*	
Insect	Hunt’s Bumble Bee	*Bombus huntii*	
Insect	Monarch	*Danaus plexippus*	Federal Candidate
Insect	Old World Swallowtail	*Papilio machaon*	
Insect	Ottoe Skipper	*Hesperia ottoe*	
Insect	Pocket Gopher Flower Beetle	*Eupharia disciollis*	
Insect	Regal Fritillary	*Argynnis idalia*	Federal Under Review
Insect	Two-spotted Skipper	*Euphyes bimacula illinois*	
Insect	Southern Plains Bumble Bee	*Bombus fraternus*	
Insect	Splendid Sweat Bee	*Agopostemon splendens*	
Insect	Yellow Bumble Bee	*Bombus fervidus*	
Mammals	Black-tailed Prairie Dog	*Cynomys ludovicianus*	
Mammals	Western Small-footed Myotis	*Myotis ciliolabrum*	
Reptiles	Glossy Snake	*Arizona elegans*	SINC
Reptiles	Common Lesser Earless Lizard	*Holbrookia maculata*	
Reptiles	Plains Hog-nosed Snake	*Heterodon nasicus*	SINC
Reptiles	Prairie Rattlesnake	*Crotalus viridis*	
Turtles	Ornate Box Turtle	*Terrapene ornata*	

Chapter 17 – ARKANSAS RIVER SANDSAGE PRAIRIE



The Arkansas River Sandsage Prairie EFA is located in the southwestern portion of Kansas, adjacent to the Arkansas River drainage from the Colorado/Kansas state line to the Finney/Kearny County line. The area is characterized by fine sandy soils and rolling sand dunes. Sandsage brush and deep-rooted, sand tolerant native grasses (Sand Bluestem, Sand Lovegrass, Giant Sandreed Grass, etc.) make this ecosystem unique. The once common Sandsage Shrubland habitat in Kansas is declining in both quality and quantity due to the fragmentation and conversion of grasslands to agricultural crop production through the use of center pivot irrigation, lack of proper grazing management, uniformed herbicide applications to eliminate sandsage, invasive species, and energy development. Moreover, the issue is compounded by the observed difficulties of successfully restoring formerly cropped sites to native species. This area is ecologically sensitive as well as ecologically important, because it contains some of the last remaining intact remnants of sandsage prairie in the state.

EFA Development

This EFA was delineated using Large Natural Areas, CHAT Connectivity, Species of Concern and Land Cover as base data. Within this area 2.5 km hexagons with >= 50% Natural Vegetation were selected. Note this EFA extends further north than the extent of the TNC portfolio site, including a concentration of CRP land.

CONSERVATION ISSUES

Agriculture

-Conversion of native grasslands to other uses causes fragmentation, destroys native flora, and decreases habitat availability

-Inappropriate grazing and haying practices on native grasslands decreases habitat heterogeneity and can change vegetative community composition

Biological resource use

-Black-tailed Prairie Dog population is low and under continual threat due to eradication programs

Invasive and other problematic species and genes

-Invasive woody and herbaceous plants compete with native flora and modify habitat structure and function for fauna

CONSERVATION ACTIONS

Education and awareness

-Conduct research on ways to improve effectiveness and efficiency of irrigation practices

-Conduct research to better understand the threats of exotic and invasive species

-Conduct wildlife surveys for data lacking species. Surveys should be rigorous, repeatable, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics

-Continued disease monitoring (Chytrid Fungus, Ranavirus, Snake Fungal Disease, Sylvatic Plague, etc.)

-Determine dewatering impacts on aquatic wildlife and wetlands

-Research cover crop benefits for wildlife

-Research methods to control and manage sagebrush, instead of its elimination

External capacity building

-Develop better coordination of government programs to increase efficiency of actions

Land/water management

-Develop a sandsage shrubland restoration plan that identifies mitigation opportunities and funding sources.

-Develop an integrated exotic and invasive species control program

-Develop and implement incentive programs for landowners and managers to promote heterogeneity and diversity for wildlife while maintaining viable farming/ranching operation (*i.e.* cover crops, defer herbicide applications)

-Develop and implement methods to offset economic practices (*i.e.* wind farms, farm management systems encouraging overproduction, conversion of marginal lands into crop production, urbanization) that have negative environmental impacts

-Develop cost-neutral conservation practices for producers to provide for maintenance of ecologically and economically viable farming/ranching operations (*i.e.* patch burn grazing)

-Develop new programs or modify existing incentive programs encouraging implementation of wildlife friendly grazing systems, drought management plans, and conservation payment systems for private lands

-Implement ecologically-sensitive grazing and haying practices, including rest periods, for shortgrass prairie on private and public lands as well as promoting the responsible, well-planned use of prescribed fire as a management/restoration tool

-Implement programs to minimize disturbance of public and private lands, including roads and trails.

-Increase the heterogeneity of native habitats, as well as general landscapes by using greenways, corridors, buffer strips, refuges and the Conservation Reserve

-Promote improved water quality

-Use CRP as a Grassbank to allow recovery of native range

Land/water protection

-Provide incentives to landowners to maintain, improve, enhance key grassland sites, and reduce intensified agricultural practices

-Work with willing donors/sellers to prevent further prairie fragmentation and expand connectivity corridors by using conservation easements and other tools

Species management

-Continue to conduct population and distributional surveys of the Black-tailed Prairie Dog

-Develop and implement an effective information and educational program focused on the role and value of Black-tailed Prairie Dogs in native grasslands and the importance of ending removal policies for prairie dogs from public and private lands

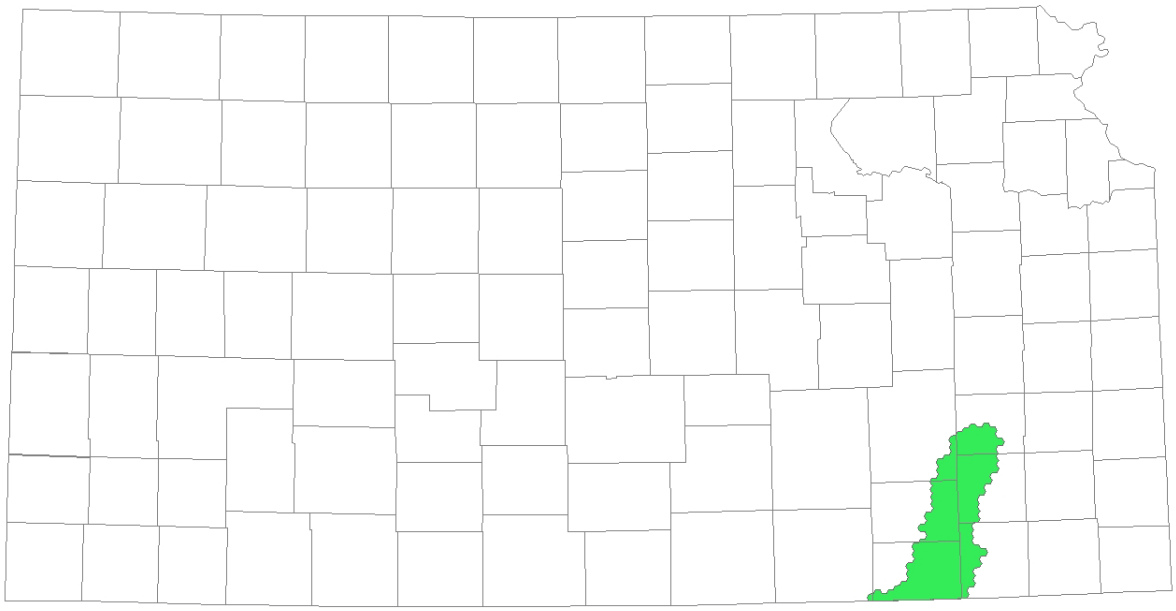
-Review and implement the Black-tailed Prairie Dog Management Plan

Species of Greatest Conservation Need

Amphibians	Tiger Salamander	*Ambystoma tigrinum*	
Birds	American Tree Sparrow	*Spizella arborea*	
Birds	Barn Owl	*Tyto alba*	
Birds	Bullock's Oriole	*Icterus bullockii*	
Birds	Burrowing Owl	*Athene cunicularia*	
Birds	Cassin's Sparrow	*Peucaea cassinii*	
Birds	Chestnut-collared Longspur	*Calcarius ornatus*	
Birds	Common Nighthawk	*Chordeiles minor*	
Birds	Common Poorwill	*Phalaenoptilus nuttallii*	
Birds	Eastern Kingbird	*Tyrannus tyrannus*	
Birds	Grasshopper Sparrow	*Ammodramus savannarum*	
Birds	Lark Bunting	*Calamospiza melanocorys*	
Birds	Lark Sparrow	*Chondestes grammacus*	
Birds	Lesser Prairie-Chicken	*Tympanuchus pallidicinctus*	State Threatened
Birds	Loggerhead Shrike	*Lanius ludovicianus*	
Birds	McCown's Longspur	*Rhynchopanes mccownii*	
Birds	Scaled Quail	*Callipepla squamata*	
Birds	Short-eared Owl	*Asio flammeus*	SINC
Birds	Swainson's Hawk	*Buteo swainsoni*	
Birds	Western Grebe	*Aechmophorus occidentalis*	
Birds	Western Kingbird	*Tyrannus verticalis*	
Gastropods	Mudbank Ambersnail	*Catinella vagans*	
Gastropods	Xeric Ambersnail	*Succinea vaginacontorta*	
Insect	A dieunomia bee	*Dieunomia triangulifera*	
Insect	A longhorned beetle	*Tetraopes pilosus*	
Insect	A scarab beetle	*Geomyphilus kiowensis*	
Insect	A scarab beetle	*Onthophagus knausi*	
Insect	A scarab beetle	*Pardalosus neodistinctus*	
Insect	A scarab beetle	*Tetraclipeoides dentigerulus*	
Insect	A scarab beetle	*Trox paulseni*	
Insect	A sweat bee	*Agopostemon coloradensis*	
Insect	A sweat bee	*Dieunomia apacha*	
Insect	A wool-carder bee	*Anthidium maculosum*	
Insect	Abberrant Cellophane Bee	*Colletes aberrans*	
Insect	American Bumble Bee	*Bombus pensylvanicus*	Federal Candidate
Insect	Black-and-gold Bumble Bee	*Bombus auricomus*	
Insect	Monarch	*Danaus plexippus*	Federal Candidate
Insect	Orange-bellied Sweat Bee	*Agopostemon melliventris*	
Insect	Pocket Gopher Flower Beetle	*Eupharia disciollis*	
Insect	Regal Fritillary	*Argynnis idalia*	Federal Under Review
Insect	Sage Sphinx	*Lintneria eremitoides*	
Insect	Southern Chimney Bee	*Diadasia australis*	
Insect	Southern Plains Bumble Bee	*Bombus fraternus*	
Insect	Splendid Sweat Bee	*Agopostemon splendens*	
Insect	Yellow Bumble Bee	*Bombus fervidus*	
Mammals	Black-tailed Prairie Dog	*Cynomys ludovicianus*	
Mammals	Spotted Ground Squirrel	*Xerospermophilus spilosoma*	
Mammals	Swift Fox	*Vulpes velox*	
Mammals	Yellow-faced Pocket Gopher	*Cratogeomys castanops*	
Plants	Sandhill Goosefoot	*Chenopodium cycloides*	
Plants	Sandsage Prairie-clover	*Dalea cylindriceps*	
Reptiles	Eastern Hog-nosed Snake	*Heterodon platirhinos*	SINC
Reptiles	Glossy Snake	*Arizona elegans*	SINC

Reptiles	Common Lesser Earless Lizard	*Holbrookia maculata*	
Reptiles	Long-nosed Snake	*Rhinocheilus lecontei*	SINC
Reptiles	Western Massasauga	*Sistrurus tergeminus*	
Reptiles	Plains Hog-nosed Snake	*Heterodon nasicus*	SINC
Reptiles	Prairie Rattlesnake	*Crotalus viridis*	
Reptiles	Texas Horned Lizard	*Phrynosoma cornutum*	
Turtles	Ornate Box Turtle	*Terrapene ornata*	

Chapter 18 – CHAUTAUQUA HILLS



The Chautauqua Hills EFA is located in southeast Kansas just east of the Flint Hills. The Chautauqua Hills are rolling uplands with sandstone bedrock underneath. Blackjack and post oaks are interspersed throughout the tallgrass prairie habitat. An open savannah landscape was probably more common before fire suppression occurred and may have kept the oak stands from becoming dense. The priority habitats are Tallgrass Prairie and Deciduous Forest. Protected areas include Cross Timbers/Toronto State Park, Woodson Wildlife Area, Fall River State Park, and Elk City Wildlife Area.

EFA Development

This EFA is defined by the Physiographic Province boundary (Kansas Geological Survey 1997) on the east and the Level 3 ecoregion boundary on the west.

CONSERVATION ISSUES

Agriculture

-Conversion of native grasslands to other uses causes fragmentation, destroys native flora, and decreases habitat availability

-Inappropriate grazing and haying practices on native grasslands decreases habitat heterogeneity and can change vegetative community composition

Biological resource use

-Lack of proper timber harvest and market for low quality species

Invasive and other problematic species and genes

-Invasive insect pests damaging habitats

-Spread of woody invasive plant species, including: Eastern Red Cedar, Osage Orange, Sericea lespedeza (*Lespedeza cuneata*) and Old World Bluestems pose a threat to biodiversity through competitive interaction with native species

Natural system modifications

-Improperly applied use of prescribed fire (*i.e.* prominence of annual burning is detrimental for some grassland nesting birds while infrequent burning causes prairie to transition to shrubland or forest)

-Management of floodplain water levels by diking which restrict natural flooding cycles

Pollution

-Pollution from point and non-point sources includes runoff of pesticides, fertilizers, herbicides, and other chemicals as well as trash diposal/landfill opperations

Residential and commercial development

-The increase of urban, suburban and exurban/rural homes and development is reducing and fragmenting native habitat.

CONSERVATION ACTIONS

Education and awareness

-Conduct wildlife surveys for data lacking species. Surveys should be rigorous, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics

-Educate landowners, managers and natural resource managers in the proper use of pesticides and fire

-Promote the ecosystem services provided by forests and natural floodplains to municipalities to encourage habitat protection in urban areas

-Implement surveys to quantify current wetlands, and identify priority areas

-Research and investigate best management practices to control invasive species (*e.g.* Sericea Lespedeza, Old World Bluestems, etc.)

External capacity building

-Develop partnerships to help private landowners conduct prescribed burns, providing education, equipment, expert advice and assistance

-Work with county zoning boards to implement well thought out planning procedures—especially on issues like wind farm construction or conversion of zoned land uses

-Work with Kansas Dept. of Transportation to determine appropriate management activities and species to plant along roads

Land/water management

-Promote rangeland management tools, such as techniques for controlling invasive species, patch-burn-grazing, and drought management planning

-Promote proper forest management tools, such as techniques for controlling invasive species, patch burn grazing, timber stand improvement, and sustainable harvest

-Restore forests, especially in strategic situations such as in sensitive environments (steep slopes, riparian zones, etc.), to connect existing important forest tracts, or for public use

-Provide incentives for landowners to conserve listed species on their property

Land/water protection

-Acquire water rights for wetlands as advisable and possible

-Provide incentives to landowners to maintain, improve, enhance key grassland sites and wetlands, and reduce intensified agricultural practices

-Work with willing donors/sellers to prevent further prairie fragmentation and expand connectivity corridors by using conservation easements and other tools

-Identify and conserve large forests tracts through landowner friendly methods, such as conservation forestry incentive programs and conservation easements

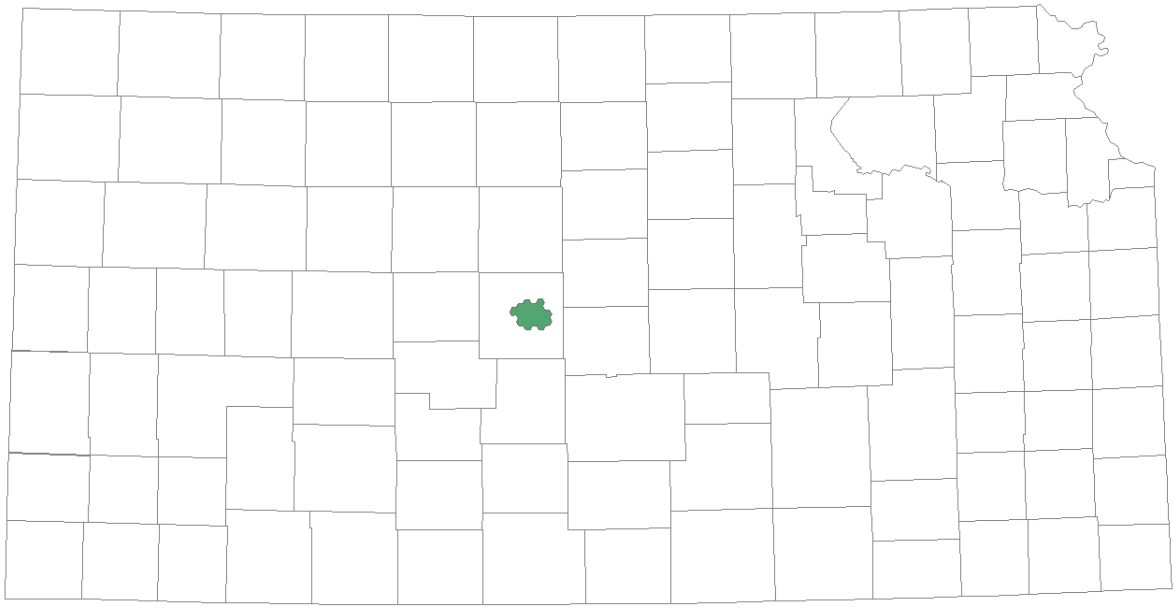
-Work with willing landowners to protect and maintain high-quality forest

Species of Greatest Conservation Need

Amphibians	Crawfish Frog	*Lithobates areolatus*	SINC
Amphibians	Common Mudpuppy	*Necturus maculosus*	
Amphipod	Kansas Well Amphipod	*Bactrurus hubrichti*	
Arachnida	a trap door spider	*Ummidia beatula*	
Birds	American Golden-Plover	*Pluvialis dominica*	
Birds	American Tree Sparrow	*Spizella arborea*	
Birds	American White Pelican	*Pelecanus erythrorhynchos*	
Birds	Bald Eagle	*Haliaeetus leucocephalus*	
Birds	Baltimore Oriole	*Icterus galbula*	
Birds	Bell's Vireo	*Vireo bellii*	
Birds	Buff-breasted Sandpiper	*Calidris subruficollis*	
Birds	Chuck-will's-widow	*Antrostomus carolinensis*	
Birds	Common Nighthawk	*Chordeiles minor*	
Birds	Dickcissel	*Spiza americana*	
Birds	Eastern Kingbird	*Tyrannus tyrannus*	
Birds	Eastern Meadowlark	*Sturnella magna*	
Birds	Eastern Wood-Pewee	*Contopus virens*	
Birds	Grasshopper Sparrow	*Ammodramus savannarum*	
Birds	Greater Prairie-Chicken	*Tympanuchus cupido*	
Birds	Henslow's Sparrow	*Centronyx henslowii*	SINC
Birds	Kentucky Warbler	*Geothlypis formosa*	
Birds	Lark Sparrow	*Chondestes grammacus*	
Birds	Loggerhead Shrike	*Lanius ludovicianus*	
Birds	Northern Bobwhite	*Colinus virginianus*	
Birds	Painted Bunting	*Passerina ciris*	
Birds	Prothonotary Warbler	*Protonotaria citrea*	
Birds	Red-headed Woodpecker	*Melanerpes erythrocephalus*	
Birds	Rusty Blackbird	*Euphagus carolinus*	
Birds	Smith's Longspur	*Calcarius pictus*	
Birds	Yellow-throated Warbler	*Setophaga dominica*	SINC
Gastropods	Delta Hydrobe	*Probythinella emarginata*	State Threatened
Gastropods	Mudbank Ambersnail	*Catinella vagans*	
Gastropods	Slope Ambersnail	*Catinella wandae*	
Gastropods	Xeric Ambersnail	*Succinea vaginacontorta*	
Insect	A scarab beetle	*Trox paulseni*	
Insect	American Burying Beetle	*Nicrophorus americanus*	Federal Threatened, State Endangered
Insect	Bell's Roadside-Skipper	*Amblyscirtes belli*	
Insect	Black-and-gold Bumble Bee	*Bombus auricomus*	
Insect	Byssus Skipper	*Problema byssus*	
Insect	Dotted Skipper	*Hesperia attalus attalus*	
Insect	Gray Petaltail	*Tachopteryx thoreyi*	Federal Candidate, SINC
Insect	Lichen Grasshopper	*Trimerotropis saxatilis*	
Insect	Monarch	*Danaus plexippus*	Federal Candidate
Insect	Ozark Emerald	*Somatochlora ozarkensis*	SINC
Insect	Prairie Mole Cricket	*Gryllotalpa major*	SINC
Insect	Regal Fritillary	*Argynnis idalia*	Federal Under Review
Insect	Southern Plains Bumble Bee	*Bombus fraternus*	
Insect	Yellow Bumble Bee	*Bombus fervidus*	
Mammals	Plains Spotted Skunk	*Spilogale interrupta*	State Threatened
Mammals	Fulvous Harvest Mouse	*Reithrodontomys fulvescens*	
Mammals	Gray Fox	*Urocyon cinereoargenteus*	
Mammals	Southern Flying Squirrel	*Glaucomys volans*	SINC
Mammals	Texas Deermouse	*Peromyscus attwateri*	SINC
Plants	Buffalo Clover	*Trifolium reflexum*	
Plants	Earleaf False Foxglove	*Agalinis auriculata*	
Plants	Great Plains Ladies'-tresses	*Spiranthes magnicamporum*	
Plants	Hancin's Dewberry	*Rubus hancinianus*	
Plants	Kansas Arrowhead	*Sagittaria ambigua*	
Plants	Oklahoma Phlox	*Phlox oklahomensis*	

Plants	Pale False Foxglove	*Agalinis skinneriana*	
Plants	Topeka Purple-coneflower	*Echinacea atrorubens*	
Reptiles	Coal Skink	*Plestiodon anthracinus*	
Reptiles	Eastern Hog-nosed Snake	*Heterodon platirhinos*	SINC
Reptiles	Ground-snake	*Sonora semiannulata*	
Reptiles	Western Massasauga	*Sistrurus tergeminus*	
Reptiles	Plains Hog-nosed Snake	*Heterodon nasicus*	SINC
Reptiles	Rough Earthsnake	*Haldea striatula*	SINC
Reptiles	Texas Horned Lizard	*Phrynosoma cornutum*	
Reptiles	Timber Rattlesnake	*Crotalus horridus*	SINC
Turtles	American Box Turtle	*Terrapene carolina*	
Turtles	Ornate Box Turtle	*Terrapene ornata*	

Chapter 19 – CHEYENNE BOTTOMS



The Cheyenne Bottoms EFA is located in Barton County. It occurs in a large natural basin that consists of native Mixed Grass Prairies and Herbaceous Wetlands having typical hydrophilic vegetation and large pools of water supplied by Walnut Creek inlet canal as well as the intermittent Blood Creek and Deception Creek drainages. Protected areas include the Cheyenne Bottoms Wildlife Area (CBWA), and The Nature Conservancy's Cheyenne Bottoms Preserve. Historically Cheyenne Bottoms consisted of one vast pool fed by two drainages, Blood and Deception creeks, and many small, isolated marshes. A canal was built to manage water flow from the Arkansas River and Walnut Creek into CBWA (Zimmerman 1990). KDWP implements chemical application to treat herbaceous invasive species, prescribed grazing management plans and prescribed burning as management tools on the Bottoms. Within the Central Flyway, CBWA is a major migratory bird rest and resource area for waterfowl, shorebirds, and other water birds and is managed accordingly. Numerous SGCN occur within this EFA as well as federally designated critical habitat for the Whooping Crane.

EFA Development

This EFA is based on the TNC portfolio site from the Central Mixed-Grass Prairie ecoregional plan with a slight adjustment to include the entirety of the protected areas.

CONSERVATION ISSUES

Agriculture

-Some herbaceous wetlands have been or might be drained and converted to cropland

Invasive and other problematic species and genes

-Invasive woody and herbaceous species compete with native flora and modify habitat structure and function for fauna (e.g. Phragmites, cattail, Tamarisk, etc.)

Natural system modifications

-The use of surface and ground water for irrigation is lowering the water inflow

Pollution

-Pollution from point and non-point sources includes runoff of pesticides, fertilizers, and other chemicals as well as trash diposal/landfill opperations

CONSERVATION ACTIONS

Education and awareness

-Conduct wildlife surveys for data lacking species. Surveys should be rigorous, repeatable, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics

-Continue disease monitoring (Avian influenza, Chytrid Fungus, Ranavirus, etc.)

-Water quality education

External capacity building

-Cooperate with bird viewing groups relative to the IBA (Important Birding Areas) program.

Land/water management

-Implement procedures to discourage planting of invasive species, while encouraging the establishment of appropriate native species

-Plant vegetation strips or buffers around wetlands to reduce sedimentation and filter pollutants.

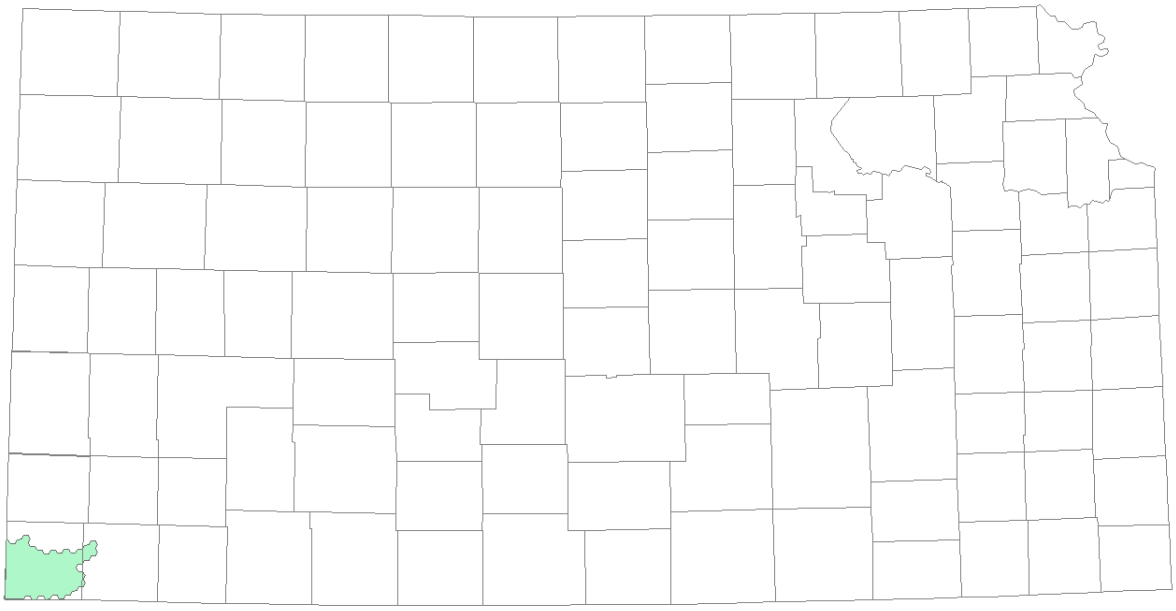
Species of Greatest Conservation Need

Amphibians	Tiger Salamander	*Ambystoma tigrinum*	
Birds	American Avocet	*Recurvirostra americana*	
Birds	American Bittern	*Botaurus lentiginosus*	
Birds	American Golden-Plover	*Pluvialis dominica*	
Birds	American Tree Sparrow	*Spizella arborea*	
Birds	American White Pelican	*Pelecanus erythrorhynchos*	
Birds	Baird's Sandpiper	*Calidris bairdii*	
Birds	Bald Eagle	*Haliaeetus leucocephalus*	
Birds	Baltimore Oriole	*Icterus galbula*	
Birds	Barn Owl	*Tyto alba*	
Birds	Bell's Vireo	*Vireo bellii*	
Birds	Black Rail	*Laterallus jamaicensis*	Federal Threatened & SINC
Birds	Black Tern	*Chlidonias niger*	SINC
Birds	Black-bellied Plover	*Pluvialis squatarola*	
Birds	Black-necked Stilt	*Himantopus mexicanus*	
Birds	Bobolink	*Dolichonyx oryzivorus*	SINC
Birds	Buff-breasted Sandpiper	*Calidris subruficollis*	
Birds	Burrowing Owl	*Athene cunicularia*	
Birds	Dickcissel	*Spiza americana*	
Birds	Eared Grebe	*Podiceps nigricollis*	
Birds	Eastern Kingbird	*Tyrannus tyrannus*	
Birds	Eastern Meadowlark	*Sturnella magna*	
Birds	Forster's Tern	*Sterna forsteri*	
Birds	Grasshopper Sparrow	*Ammodramus savannarum*	
Birds	Greater Yellowlegs	*Tringa melanoleuca*	
Birds	Harris's Sparrow	*Zonotrichia querula*	
Birds	Hudsonian Godwit	*Limosa haemastica*	
Birds	Least Bittern	*Ixobrychus exilis*	
Birds	Least Sandpiper	*Calidris minutilla*	
Birds	Least Tern	*Sternula antillarum*	Federal & State Endangered
Birds	Lesser Yellowlegs	*Tringa flavipes*	
Birds	Loggerhead Shrike	*Lanius ludovicianus*	
Birds	Long-billed Curlew	*Numenius americanus*	SINC
Birds	Long-billed Dowitcher	*Limnodromus scolopaceus*	
Birds	Marbled Godwit	*Limosa fedoa*	

Birds	Northern Pintail	*Anas acuta*	
Birds	Pectoral Sandpiper	*Calidris melanotos*	
Birds	Peregrine Falcon	*Falco peregrinus*	
Birds	Piping Plover	*Charadrius melodus*	Federal & State Threatened
Birds	Red-headed Woodpecker	*Melanerpes erythrocephalus*	
Birds	Red Knot	*Calidris canutus rufa*	Federal Threatened
Birds	Rusty Blackbird	*Euphagus carolinus*	
Birds	Scissor-tailed Flycatcher	*Tyrannus forficatus*	
Birds	Semipalmated Sandpiper	*Calidris pusilla*	
Birds	Snowy Plover	*Charadrius alexandrinus*	Federal & State Threatened
Birds	Sprague's Pipit	*Anthus spragueii*	
Birds	Stilt Sandpiper	*Calidris himantopus*	
Birds	Upland Sandpiper	*Bartramia longicauda*	
Birds	Western Grebe	*Aechmophorus occidentalis*	
Birds	Western Kingbird	*Tyrannus verticalis*	
Birds	White-rumped Sandpiper	*Calidris fuscicollis*	
Birds	Whooping Crane	*Grus americana*	Federal & State Endangered
Birds	Wilson's Phalarope	*Phalaropus tricolor*	
Crustaceans	Kansas Fairy Shrimp	*Branchinecta mediospinosa*	
Gastropods	A terrestrial snail	*Succinea pseudavara*	
Gastropods	Mudbank Ambersnail	*Catinella vagans*	
Gastropods	Xeric Ambersnail	*Succinea vaginacontorta*	
Insect	A dieunomia bee	*Dieunomia triangulifera*	
Insect	A Cave Obligate Isopod	*Caecidotea tridentata*	
Insect	A leafcutter bee	*Megachile integra*	
Insect	A leafcutter bee	*Megachile mucorosa*	
Insect	A scarab beetle	*Geomyphilus insolitus*	
Insect	A scarab beetle	*Orizabus pyriformis*	
Insect	A scarab beetle	*Pardalosus neodistinctus*	
Insect	A scarab beetle	*Strategus mormon*	
Insect	A scarab beetle	*Tetraclipeoides dentigerulus*	
Insect	A sweat bee	*Agopostemon coloradensis*	
Insect	A sweat bee	*Dieunomia apacha*	
Insect	Abberrant Cellophane Bee	*Colletes aberrans*	
Insect	American Bumble Bee	*Bombus pensylvanicus*	Federal Candidate
Insect	Arogos Skipper	*Atrytone arogos*	
Insect	Bald-spot Sweat Bee	*Lasioglossum paraforbesii*	
Insect	Bicoloured Sweat Bee	*Agopostemon virescens*	
Insect	Black-and-gold Bumble Bee	*Bombus auricomus*	
Insect	Byssus Skipper	*Problema byssus*	
Insect	Dotted Skipper	*Herperia attralus*	
Insect	Ghost Tiger Beetle	*Ellipsoptera lepida*	
Insect	Monarch	*Danaus plexippus*	Federal Candidate
Insect	Morrison’s Bumble Bee	*Bombus morrisoni*	
Insect	Occidental Digger Bee	*Anthophora occidentalis*	
Insect	Ottoe Skipper	*Hesperia ottoe*	
Insect	Particular Small Dung Beetle	*Scabrostonus peculiosis*	
Insect	Regal Fritillary	*Argynnis idalia*	Federal Under Review
Insect	Robust Sunflower Leafcutter Bee	*Megachile fortis*	
Insect	Soapberry Hairstreak	*Phaeostrymon alcestis*	
Insect	Southern Plains Bumble Bee	*Bombus fraternus*	
Insect	Splendid Sweat Bee	*Agopostemon splendens*	
Insect	Susan’s Plasterer Bee	*Colletes susannae*	
Insect	The Unexpected Milkweed Moth	*Cycnia inopinatus*	
Insect	Variable Cuckoo Bumble Bee	*Bombus variabilis*	Federal Under Review
Insect	White-cloaked Tiger Beetle	*Eunota togata latilabris*	
Insect	Whitish Sweat Bee	*Agopostemon sericeus*	
Insect	Yellow Bumble Bee	*Bombus fervidus*	
Mammals	Plains Spotted Skunk	*Spilogale interrupta*	State Threatened
Mammals	Black-tailed Prairie Dog	*Cynomys ludovicianus*	

Mammals	Southern Bog Lemming	*Synaptomys cooperi*	SINC
Reptiles	Eastern Hog-nosed Snake	*Heterodon platirhinos*	SINC
Reptiles	Glossy Snake	*Arizona elegans*	SINC
Reptiles	Long-nosed Snake	*Rhinocheilus lecontei*	SINC
Reptiles	Western Massasauga	*Sistrurus tergeminus*	
Reptiles	Plains Hog-nosed Snake	*Heterodon nasicus*	SINC
Reptiles	Prairie Rattlesnake	*Crotalus viridis*	
Turtles	Ornate Box Turtle	*Terrapene ornata*	

Chapter 20 – CIMARRON GRASSLANDS



The Cimarron Grasslands EFA is located in extreme southwest Kansas and is dominated by Shortgrass Prairie but also includes Sand Prairie and riparian communities along the Cimarron River. The focus area includes the Cimarron National Grasslands, the largest publicly owned parcel of land in Kansas and the only parcel managed by the United States Forest Service. This focus area represents a large portion of Sandsage Shrubland that is surrounded by cropland. Lack of proper grazing management for biological diversity, and improper prescribed fire frequency/management, are a few of the issues impacting this ecological focus area.

EFA Development

The core of this EFA is the TNC portfolio site “Cimarron Grasslands” from the Central Shortgrass Prairie Ecoregional Plan. Hexagons containing outlying parcels of the Cimarron National Grasslands were then added as well as all hexagons intersecting TNC priority areas with a minimum of 50% Natural Vegetation.

CONSERVATION ISSUES

Agriculture

-Conversion of native grasslands to other uses causes fragmentation, destroys native flora, and decreases habitat availability

-Inappropriate grazing and haying practices on native grasslands decreases habitat heterogeneity and can change vegetative community composition, grazing coalition managing and they don't prevent overgrazing

Biological resource use

-Black-tailed Prairie Dog population is low and under continual threat due to eradication programs

Energy Production

-Development and expansion of wind energy, solar arrays, trasmission, and oil/gas fields infrastructure and activities in native grasslands – impacting grasslands and migratory birds, bats, and other wildlife

Invasive and other problematic species and genes

-Non-native and invasive woody and herbaceous plants compete with native flora and modify habitat structure and function for fauna (*i.e.* Tamarix sp.)

CONSERVATION ACTIONS

Education and awareness

-Conduct wildlife surveys for data lacking species. Surveys should be rigorous, repeatable, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics

-Continued disease monitoring (Ranavirus, Snake Fungal Disease, etc.)

-Develop a broad scale education approach and outreach program on the impacts of fragmentation, woody invasion and encroachment, energy development and other land use changes on flora and fauna

-Research cover crop benefits for wildlife

External capacity building

-Work with other agencies to avoid, minimize, reduce and mitigate impacts to habitat resulting from their programs

Land/water management

-Develop and implement incentive programs for landowners and managers to promote heterogeneity and diversity for wildlife while maintaining viable farming/ranching operation (*i.e.* cover crops, defer spraying)

-Develop and implement methods to offset economic practices (*i.e.* wind farms, farm management systems encouraging overproduction, conversion of marginal lands into crop production, urbanization) that have negative environmental impacts

-Implement ecologically-sensitive grazing and haying practices, including rest periods, for shortgrass prairie on private and public lands as well as promoting the responsible, well-planned use of prescribed fire as a management/restoration tool

-Increase the heterogeneity of native habitats, as well as general landscapes by using greenways, corridors, buffer strips, refuges and the Conservation Reserve

-Promote the use of wildlife friendly fencing and structures

-Provide incentives to landowners to maintain, improve, enhance key grassland sites, and reduce intensified agricultural practices

-Use CRP as a Grassbank to allow recovery of native range

-Develop and implement incentive programs for landowners and managers to promote heterogeneity and diversity for wildlife while maintaining viable farming/ranching operation (i.e. cover crops, defer spraying)

-Develop water management plan for periods of drought

Land/water protection

-Promote field border programs and county road easements which are landowner and wildlife friendly.

-Provide incentives to landowners to maintain, improve, enhance key grassland sites, and reduce intensified agricultural practices.

-Work with willing donors/sellers to prevent further prairie fragmentation and expand connectivity corridors by using conservation easements and other tools

Species management

-Continue Lesser Prairie Chicken surveys. Bury or route power lines around nesting, brood rearing and lek habitats. Acquire, as advisable and possible, conservation easements on critical habitat with protocols for non-impact.

-Continue to conduct population and distributional surveys of the Black-tailed Prairie Dog

-Develop and implement an effective information and educational program focused on the role and value of Black-tailed Prairie Dogs in native grasslands and the importance of ending removal policies for prairie dogs from public and private lands

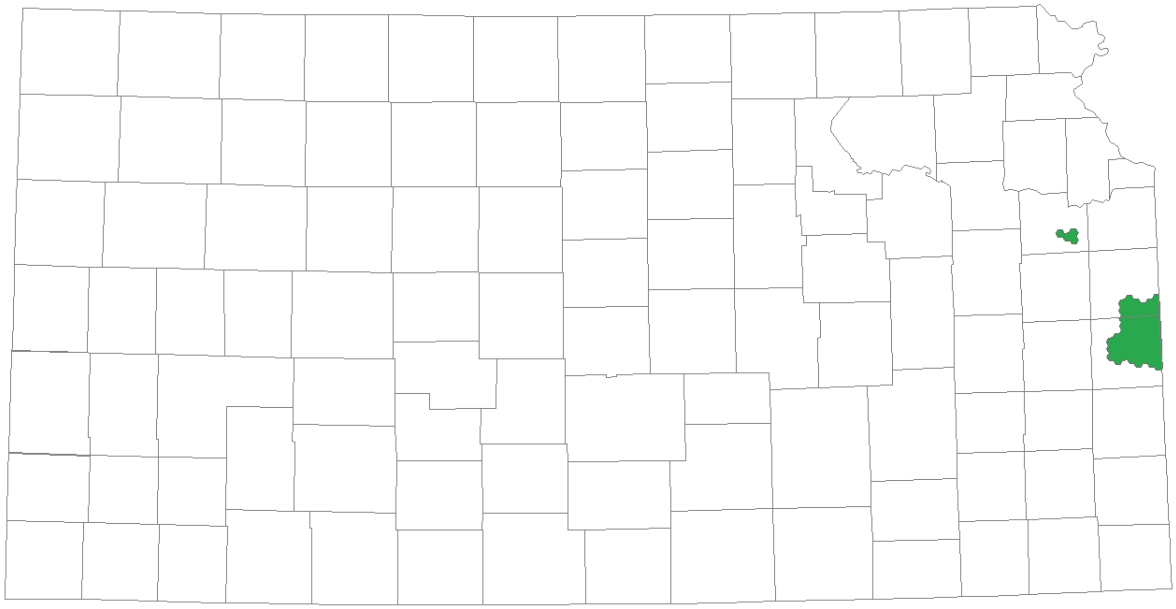
-Review and implement the Black-tailed Prairie Dog Management Plan

Species of Greatest Conservation Need

Amphibians	Chihuahuan Green Toad	*Anaxyrus debilis*	State Threatened
Amphibians	Red-spotted Toad	*Anaxyrus punctatus*	SINC
Amphibians	Tiger Salamander	*Ambystoma tigrinum*	
Birds	American Avocet	*Recurvirostra americana*	
Birds	American Tree Sparrow	*Spizella arborea*	
Birds	Baird's Sparrow	*Centronyx bairdii*	
Birds	Barn Owl	*Tyto alba*	
Birds	Bullock's Oriole	*Icterus bullockii*	
Birds	Burrowing Owl	*Athene cunicularia*	
Birds	Cassin's Sparrow	*Peucaea cassinii*	
Birds	Chestnut-collared Longspur	*Calcarius ornatus*	
Birds	Chihuahuan Raven	*Corvus cryptoleucus*	SINC
Birds	Common Nighthawk	*Chordeiles minor*	
Birds	Common Poorwill	*Phalaenoptilus nuttallii*	
Birds	Curve-billed Thrasher	*Toxostoma curvirostre*	SINC
Birds	Eastern Kingbird	*Tyrannus tyrannus*	
Birds	Ferruginous Hawk	*Buteo regalis*	SINC
Birds	Grasshopper Sparrow	*Ammodramus savannarum*	
Birds	Ladder-backed Woodpecker	*Dryobates scalaris*	SINC
Birds	Lark Bunting	*Calamospiza melanocorys*	
Birds	Lark Sparrow	*Chondestes grammacus*	
Birds	Lesser Prairie-Chicken	*Tympanuchus pallidicinctus*	Federal Threatened
Birds	Loggerhead Shrike	*Lanius ludovicianus*	
Birds	Long-billed Curlew	*Numenius americanus*	SINC
Birds	McCown's Longspur	*Rhynchopanes mccownii*	
Birds	Mississippi Kite	*Ictinia mississippiensis*	
Birds	Mountain Plover	*Charadrius montanus*	SINC
Birds	Northern Bobwhite	*Colinus virginianus*	
Birds	Red-headed Woodpecker	*Melanerpes erythrocephalus*	
Birds	Scaled Quail	*Callipepla squamata*	
Birds	Scissor-tailed Flycatcher	*Tyrannus forficatus*	
Birds	Short-eared Owl	*Asio flammeus*	SINC
Birds	Western Kingbird	*Tyrannus verticalis*	
Gastropods	Mudbank Ambersnail	*Catinella vagans*	
Gastropods	Xeric Ambersnail	*Succinea vaginacontorta*	
Insect	A longhorned beetle	*Tetraopes pilosus*	
Insect	A nomia bee	*Nomia universitatis*	
Insect	A scarab beetle	*Cryptoscatomaseter paulseni*	
Insect	A scarab beetle	*Geomyphilus kiowensis*	
Insect	A scarab beetle	*Geomyphilus viceversus*	
Insect	A scarab beetle	*Onthophagus knausi*	
Insect	A scarab beetle	*Pardalosus neodistinctus*	
Insect	A scarab beetle	*Tetraclipeoides dentigerulus*	
Insect	A scarab beetle	*Trox paulseni*	
Insect	A sweat bee	*Dieunomia apacha*	
Insect	A wool-carder bee	*Anthidium maculosum*	
Insect	American Bumble Bee	*Bombus pensylvanicus*	Federal Candidate
Insect	Arogos Skipper	*Atrytone arogos*	
Insect	Black-and-gold Bumble Bee	*Bombus auricomus*	
Insect	Burrow Small Dung Beetle	*Geomyphilus thomomysi*	
Insect	Monarch	*Danaus plexippus*	Federal Candidate
Insect	Ottoe Skipper	*Hesperia ottoe*	
Insect	Pocket Gopher Flower Beetle	*Eupharia disciollis*	
Insect	Punctured Small Dung Beetle	*Cryptoscatomaseter punctissimus*	
Insect	Sage Sphinx	*Lintneria eremitoides*	
Insect	Southern Chimney Bee	*Diadasia australis*	
Insect	Southern Plains Bumble Bee	*Bombus fraternus*	
Insect	Splendid Sweat Bee	*Agopostemon splendens*	
Insect	Yellow Bumble Bee	*Bombus fervidus*	

Mammals	Black-tailed Prairie Dog	*Cynomys ludovicianus*	
Mammals	Spotted Ground Squirrel	*Xerospermophilus spilosoma*	
Mammals	Swift Fox	*Vulpes velox*	
Plants	Sandhill Goosefoot	*Chenopodium cycloides*	
Plants	Sandsage Prairie-clover	*Dalea cylindriceps*	
Reptiles	Eastern Hog-nosed Snake	*Heterdon platirhinos*	SINC
Reptiles	Glossy Snake	*Arizona elegans*	SINC
Reptiles	Common Lesser Earless Lizard	*Holbrookia maculata*	
Reptiles	Long-nosed Snake	*Rhinocheilus lecontei*	SINC
Reptiles	New Mexico Threadsnake	*Rena dissectus*	State Threatened
Reptiles	Plains Hog-nosed Snake	*Heterodon nasicus*	SINC
Reptiles	Prairie Rattlesnake	*Crotalus viridis*	
Reptiles	Texas Horned Lizard	*Phrynosoma cornutum*	

Chapter 21 – EASTERN FOREST



The Eastern Forest EFA is comprised of two areas in eastern Kansas; the Baldwin Woods section in Douglas County and the Marais des Cygnes section in Miami and Linn counties. These areas include isolated Tallgrass Prairie remnants and Deciduous Forests habitat (fragmented oak-hickory forests and oak savannah ecosystems). The Marais des Cygnes section also includes the Marais des Cygnes River and its associated floodplain and wetlands. The Baldwin Woods section includes over 1000 acres of priority Deciduous Forest habitat which are being actively managed and protected through Landscape Forest Stewardship planning and the Forest Legacy Program. These protective efforts capitalize on partnerships among many public and private entities. The Marais des Cygnes section includes La Cygne Wildlife Area and La Cygne Lake, Marais des Cygnes Wildlife Area, and Marais des Cygnes Wildlife Refuge. The Kansas Department of Wildlife and Parks and the U.S. Fish and Wildlife Service implement native tree plantings, invasive species removal, and prescribed fires to manage the woodland habitats. Common threats include invasive species, miss-management, and fragmentation of intact native woodlands.

EFA Development

This EFA captures high-quality forest habitat that occurs in areas that were forested prior to European settlement and that are in the range of forest-dependent SGCN species. To create the boundary of the Marais des Cygnes section we selected 2.5 km hexagons that intersect one of the following: Marais des Cygnes Wildlife Area or National Wildlife Refuge; locations of SGCN species; or forested areas at La Cygne Lake Wildlife Area or along Big Sugar Creek. To create the Baldwin Woods section, we selected 2.5 km hexagons that intersect the historic forest polygon that contains the currently protected areas.

CONSERVATION ISSUES

Agriculture

-Conversion of forest to agricultural purposes and inappropriate grazing practices in forested areas fragmented habitat and decreases its quality and quantity

-Conversion of forest to agricultural purposes creates fragmentation, decreases habitat quality and availability

Biological resource use
-Lack of proper timber harvest and market for low quality species

Invasive and other problematic species and genes
-Invasive insect pests damaging habitats
-Spread of invasive species pose a threat to biodiversity through competitive interaction with native species affecting understory and canopy

Natural system modifications
-Floodplain hydrology has been modified by dikes and impoundments. Reduced flooding has allowed conversion to agriculture and changed ecological conditions for remaining floodplain forests
-Increased fire suppression or lack of well-planned fire management changes species dominance (fewer oaks) and forest structure (savanna has become very rare)

Pollution
-Pollution from point and non-point sources includes runoff of pesticides, fertilizers, herbicides and other chemicals as well as trash diposal/landfill opperations

Residential and commercial development
-The increase of urban, suburban and exurban/rural homes and development is reducing and fragmenting forests

Conservation Actions

Education and awareness
-Conduct wildlife surveys for data lacking species. Surveys should be rigorous, repeatable, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics
-Continue disease monitoring (White-nose Syndrome, Chytrid Fungus, Ranavirus, etc.)
-Educate landowners, managers and natural resource managers in the proper use of pesticides and fire
-Promote the ecosystem services provided by forests and natural floodplains to municipalities to encourage habitat protection in urban areas
-Research and investigate best management practices to control invasive species (*e.g.* Sericea Lespedeza, Honey Locust, etc.)

External capacity building
-Develop partnerships to help private landowners conduct prescribed burns, providing education, equipment, expert advice and assistance
-Work with county zoning boards to implement well thought out planning procedures—especially on issues like wind farm construction or conversion of zoned land uses
-Work with Kansas Dept. of Transportation to determine appropriate management activities and species to plant along roads

Land/water management
-Assess dike removal and other structural modifications needed to return floodplains to their natural hydrology
-Promote proper forest management tools, such as techniques for controlling invasive species, patch burn grazing, timber stand improvement, and sustainable harvest
-Restore forests, especially in strategic situations such as in sensitive environments (steep slopes, riparian zones, etc.), to connect existing important forest tracts, or for public use

Land/water protection

-Identify and conserve large forests tracts through landowner friendly methods, such as conservation forestry incentive programs and conservation easements
-Identify opportunities to connect large forest tracts
-Work with willing landowners to protect and maintain high-quality forest

Species of Greatest Conservation Need

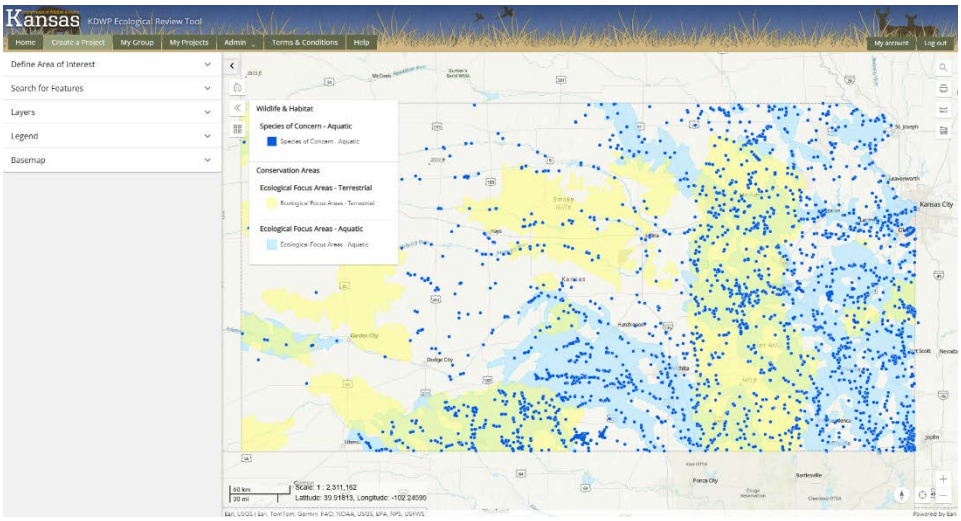
Amphibians	Crawfish Frog	*Lithobates areolatus*	SINC
Amphibians	Eastern Newt	*Notophthalmus viridescens*	State Threatened
Amphibians	Spring Peeper	*Pseudacris crucifer*	SINC
Birds	American Tree Sparrow	*Spizella arborea*	
Birds	American White Pelican	*Pelecanus erythrorhynchos*	
Birds	Bald Eagle	*Haliaeetus leucocephalus*	
Birds	Baltimore Oriole	*Icterus galbula*	
Birds	Bell's Vireo	*Vireo bellii*	
Birds	Black-billed Cuckoo	*Coccyzus erythropthalmus*	
Birds	Cerulean Warbler	*Setophaga cerulea*	SINC
Birds	Chuck-will's-widow	*Antrostomus carolinensis*	
Birds	Dickcissel	*Spiza americana*	
Birds	Eastern Kingbird	*Tyrannus tyrannus*	
Birds	Eastern Meadowlark	*Sturnella magna*	
Birds	Eastern Whip-poor-will	*Antrostomus vociferus*	SINC
Birds	Eastern Wood-Pewee	*Contopus virens*	
Birds	Harris's Sparrow	*Zonotrichia querula*	
Birds	Henslow's Sparrow	*Centronyx henslowii*	SINC
Birds	Kentucky Warbler	*Geothlypis formosa*	
Birds	Least Bittern	*Ixobrychus exilis*	
Birds	Loggerhead Shrike	*Lanius ludovicianus*	
Birds	Northern Bobwhite	*Colinus virginianus*	
Birds	Prothonotary Warbler	*Protonotaria citrea*	
Birds	Red-headed Woodpecker	*Melanerpes erythrocephalus*	
Birds	Rusty Blackbird	*Euphagus carolinus*	
Birds	Scissor-tailed Flycatcher	*Tyrannus forficatus*	
Birds	Yellow Rail	*Coturnicops noveboracensis*	
Birds	Yellow-throated Warbler	*Setophaga dominica*	SINC
Gastropods	Mudbank Ambersnail	*Catinella vagans*	
Gastropods	Xeric Ambersnail	*Succinea vaginacontorta*	
Insect	A scarab beetle	*Trox paulseni*	
Insect	American Bumble Bee	*Bombus pensylvanicus*	Federal Candidate
Insect	Black-and-gold Bumble Bee	*Bombus auricomus*	
Insect	Monarch	*Danaus plexippus*	Federal Candidate
Insect	Regal Fritillary	*Argynnis idalia*	Federal Under Review
Insect	Southern Plains Bumble Bee	*Bombus fraternus*	
Insect	Yellow Bumble Bee	*Bombus fervidus*	
Mammals	Franklin’s Ground Squirrel	*Poliocitellus franklinii*	SINC
Mammals	Gray Fox	*Urocyon cinereoargenteus*	
Mammals	Southern Flying Squirrel	*Glaucomys volans*	SINC
Mammals	Tricolored Bat	*Perimyotis subflavus*	
Plants	Running Buffalo Clover	*Trifolium stoloniferum*	
Reptiles	Broad-headed Skink	*Plestiodon laticeps*	State Threatened
Reptiles	Coal Skink	*Plestiodon anthracinus*	
Reptiles	Eastern Hog-nosed Snake	*Heterodon platirhinos*	SINC
Reptiles	Red-bellied Snake	*Storeria occipitomaculata*	SINC
Reptiles	Smooth Earthsnake	*Virginia valeriae*	SINC
Reptiles	Timber Rattlesnake	*Crotalus horridus*	SINC
Turtles	American Box Turtle	*Terrapene carolina*	
Turtles	Northern Map Turtle	*Graptemys geographica*	State Threatened
Turtles	Ornate Box Turtle	*Terrapene ornata*	
Turtles	Smooth Softshell	*Apalone mutica*	

Success Story

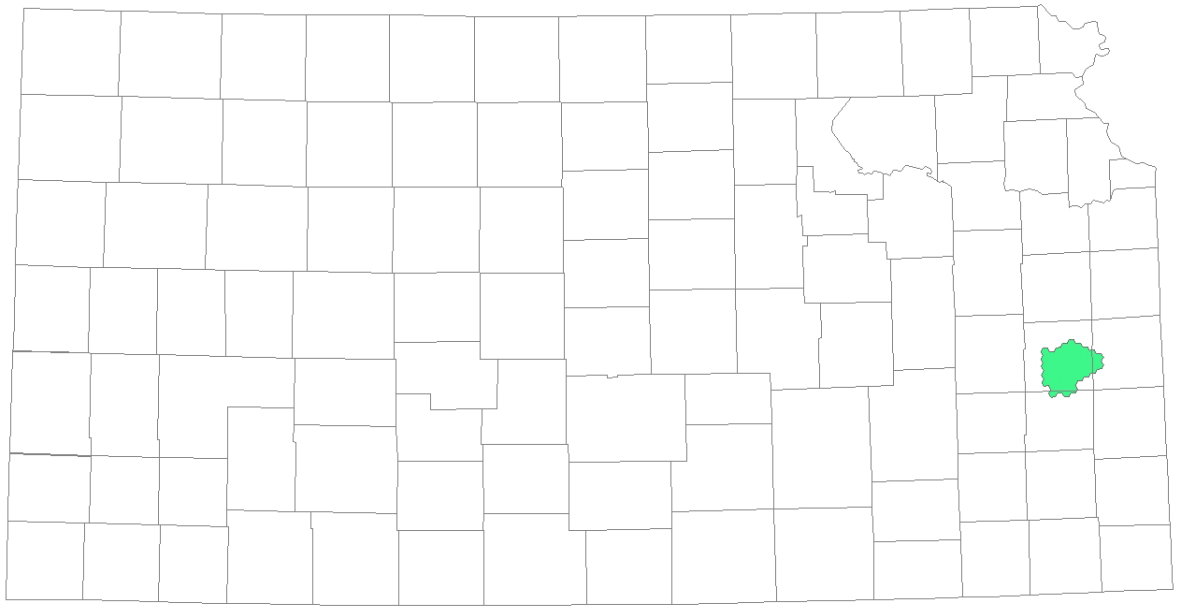
Modernizing KDWP Ecological Review Processes

Unlike many state natural resource agencies, Kansas Department of Wildlife and Parks (KDWP) has the ability to designate and conserve critical habitat for state-Threatened and Endangered species. This is primarily achieved through ecological review of development projects to avoid, minimize, or mitigate impacts to critical habitat. For KDWP project reviewers in the 1980's, consulting multiple paper maps (landcover, species distributions, etc.) was standard practice, but aerial photographs were a rarity. Driving across the state to see sites first-hand was the norm. A single computer was shared between staff for project review and tracking. Regulatory correspondence was largely done through snail mail and fax machines. It's safe to say we've come a long way technologically. However, technological advancements (e.g. renewable energy), legislation (e.g. Bipartisan Infrastructure Law), and economic booms (e.g. new residential development) all can influence the number, types, and sizes of development projects that need to be reviewed for potential impacts to wildlife habitat. In the late 1990's, KDWP reviewed 1,300 development projects on average. That number has since increased to an average of 2,200 projects in the early 2020's, with many projects becoming larger and more complex.

KDWP recently partnered with NatureServe to develop the Kansas Ecological Review Tool (ERT) to modernize and streamline the review process for both agency staff and regulated project proponents. ERT provides a webmap user interface with numerous regulatory and conservation geodata layers to inform users of potential habitat quality or regulatory conflicts. This helps with project siting consultations as well as early development site prospecting and due diligence. To submit a project for review, ERT users draw their project boundaries on the webmap (or upload shapefiles) and enter some basic information about their project. Based on geospatial data and potential project activities, ERT makes an initial determination if the project is cleared or if additional review by KDWP staff is required. Cleared projects are generally low-impact and receive regulatory documentation within 5 minutes – a huge time savings for project proponents and agency staff compared to previous 30-day timelines. Overall, ERT will allow KDWP staff to be more efficient and dynamic, resulting in better consultation outcomes for larger and higher impact projects. The tool will also allow better tracking of development activities and locations to assist KDWP in targeting conservation projects in landscapes that are less impacted by existing or proposed developments



Chapter 22 – EASTERN TALLGRASS PRAIRIE



The Eastern Tallgrass Prairie EFA is located in Anderson County in eastern Kansas in the Osage Cuestas physiographic province (Kansas Geological Survey 1997). It is dominated by unglaciated Tallgrass Prairie habitat and is one of the largest tracts of unbroken prairie east of the Flint Hills. Livestock grazing is the primary land use (both native rangeland and tame pastures) along with some hay and crop production. The area is home to many grassland-dependent SGCN including the Greater Prairie-Chicken, Grasshopper Sparrow, Regal Fritillary, and Prairie Mole Cricket. Overgrazing of native pastures, conversion to tame/cool-season pastures, and indiscriminate herbicide application to native range and haymeadows are some of the dominant issues impacting biodiversity in the EFA.

EFA Development

This EFA is based on the delineation of the TNC portfolio site "Anderson County prairies" from the Flint Hills/Osage Cuestas Ecoregional Plan.

CONSERVATION ISSUES

Agriculture

-Conversion of native prairie to other uses causes fragmentation, destroys native flora and decreases habitat availability

-Inappropriate grazing and haying practices on native rangelands decreases habitat heterogeneity and can change vegetative community composition

Invasive and other problematic species and genes

-Spread of invasive species, particularly Sericea Lespedeza, Eastern Red Cedar, and Osage Orange, pose a threat to biodiversity through competitive interaction with native species

Natural system modifications

-Improperly applied use of prescribed fire (*i.e.* prominence of annual burning is detrimental for some grassland nesting birds while infrequent burning causes prairie to transition to shrubland or forest)

-Excessive run-off due to hydrological alteration, past erosion and wetland drainage

Pollution
-Pollution from point and non-point sources includes runoff of pesticides, fertilizers, herbicides and other chemicals as well as trash disposal/landfill opperations

CONSERVATION ACTIONS

Education and awareness
-Conduct wildlife surveys for data lacking species. Surveys should be rigorous, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics
-Continue disease monitoring (e.g. Chytrid Fungus, Ranavirus, White-nose Syndrome and other potential diseases)
-Research and investigate best management practices to control invasive species (*e.g.* Sericea Lespedeza, Old World Bluestems, etc.)

External capacity building
-Work with county zoning boards to implement planning procedures, especially on issues like wind farm construction or conversion of zoned land uses
-Develop partnerships to help private landowners conduct prescribed burns, providing education, equipment, expert advice, and assistance
-Encourage formation of a local grazing association to address and inform land management issues.
Continue to communicate and initiate planning efforts with public and private organizations that are involved with land management issues

Land/water management
-Provides incentives to landowners for conservation management through State and USDA programs.
-Promote rangeland management tools, such as techniques for controlling invasive species, patch burn grazing, and drought management planning
-Develop an invasive species task force to create state invasive plant and animal management plans

Land/water protection
-Work with willing donors/sellers to prevent further prairie fragmentation and expand connectivity corridors by using conservation easements and other tools

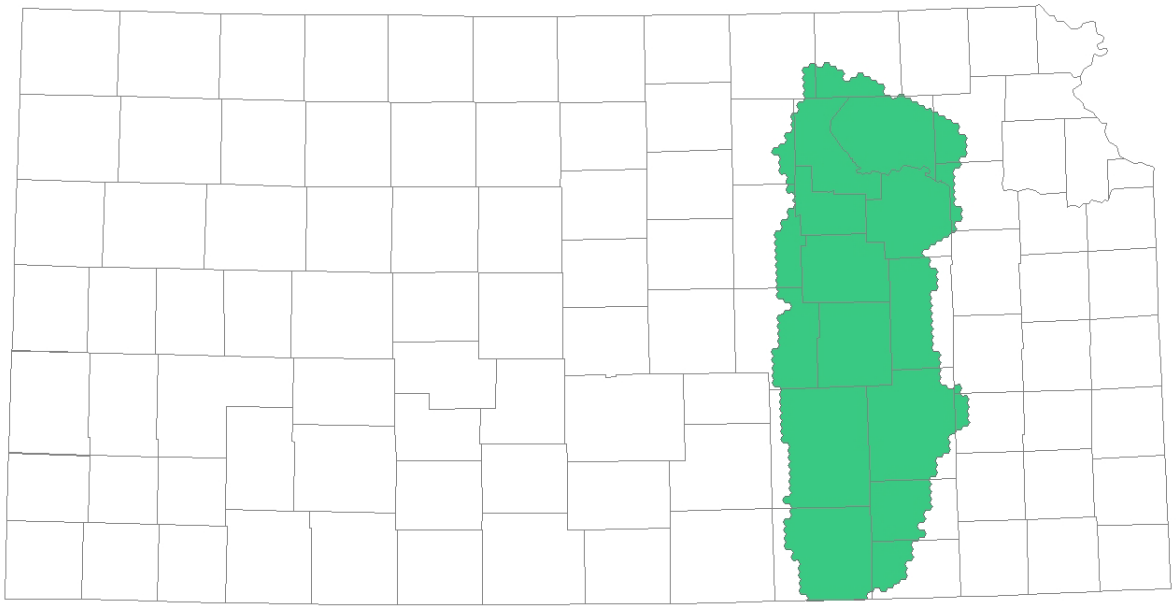
Species of Greatest Conservation Need

Amphibians	Crawfish Frog	*Lithobates areolata*	SINC
Amphipod	Clanton's Cave Amphipod	*Stygobromus clantoni*	
Amphipod	Kansas Well Amphipod	*Bactrurus hubrichti*	
Arachnida	a trap door spider	*Antrodiaetus lincolnianus*	
Arachnida	a trap door spider	*Sphodros fitchi*	
Arachnida	a trap door spider	*Ummidia beatula*	
Birds	American Golden-Plover	*Pluvialis dominica*	
Birds	American Tree Sparrow	*Spizella arborea*	
Birds	Baltimore Oriole	*Icterus galbula*	
Birds	Bell's Vireo	*Vireo bellii*	
Birds	Black-billed Cuckoo	*Coccyzus erythropthalmus*	
Birds	Buff-breasted Sandpiper	*Calidris subruficollis*	
Birds	Chuck-will's-widow	*Antrostomus carolinensis*	
Birds	Dickcissel	*Spiza americana*	
Birds	Eastern Kingbird	*Tyrannus tyrannus*	
Birds	Eastern Meadowlark	*Sturnella magna*	
Birds	Eastern Whip-poor-will	*Antrostomus vociferus*	SINC
Birds	Eastern Wood-Pewee	*Contopus virens*	
Birds	Grasshopper Sparrow	*Ammodramus savannarum*	
Birds	Greater Prairie-Chicken	*Tympanuchus cupido*	

Birds	Harris's Sparrow	*Zonotrichia querula*	
Birds	Henslow's Sparrow	*Centronyx henslowii*	SINC
Birds	Kentucky Warbler	*Geothlypis formosa*	
Birds	Loggerhead Shrike	*Lanius ludovicianus*	
Birds	Northern Bobwhite	*Colinus virginianus*	
Birds	Painted Bunting	*Passerina ciris*	
Birds	Red-headed Woodpecker	*Melanerpes erythrocephalus*	
Birds	Rusty Blackbird	*Euphagus carolinus*	
Birds	Scissor-tailed Flycatcher	*Tyrannus forficatus*	
Birds	Smith's Longspur	*Calcarius pictus*	
Birds	Upland Sandpiper	*Bartramia longicauda*	
Gastropods	Domed Supercoil	*Paravitera significans*	
Gastropods	Kaw Whitelip	*Webbhelix chadwicki*	
Gastropods	Mudbank Ambersnail	*Catinella vagans*	
Gastropods	Slope Ambersnail	*Catinella wandae*	
Gastropods	Texas Liptooth	*Lininsa texasiana*	
Gastropods	Oldfield Coil	*Lucilla inermis*	
Gastropods	Ozark Threetooth	*Triodopsis neglecta*	
Gastropods	Ozark Whitelip	*Neohelix divesta*	
Gastropods	Xeric Ambersnail	*Succinea vaginacontorta*	
Insect	A Cave Obligate Isopod	*Caecidotea tridentata*	
Insect	A leafcutter bee	*Megachile amica*	
Insect	A leafcutter bee	*Megachile integra*	
Insect	A leafcutter bee	*Megachile mucorosa*	
Insect	A nomia bee	*Nomia universitatis*	
Insect	A scarab beetle	*Onthophagus knausi*	
Insect	A scarab beetle	*Phyllophaga albina*	
Insect	A scarab beetle	*Trox paulseni*	
Insect	A Spur-throat Grasshopper	*Melanoplus beameri*	
Insect	An underwing moth	*Catocala frederici*	
Insect	An underwing moth	*Catocala nuptialis*	
Insect	American Bumble Bee	*Bombus pensylvanicus*	Federal Candidate
Insect	Arogos Skipper	*Atrytone arogos*	
Insect	Bald-spot Sweat Bee	*Lasioglossum paraforbesii*	
Insect	Black-and-gold Bumble Bee	*Bombus auricomus*	
Insect	Byssus Skipper	*Problema byssus*	
Insect	Columbine Duskywing	*Erynnis lucilius*	
Insect	Delilah Underwing	*Catocala delilah*	
Insect	Fedor Digger Bee	*Anthophora fedorica*	
Insect	Interrupted Cuckoo Nomad Bee	*Epeolis interruptus*	
Insect	Linda’s Roadside Skipper	*Amblyscirtes linda*	Federal Under Review
Insect	Low-ridged Pygmy Grasshopper	*Nomotettix parvus*	
Insect	Maculated Flower Chafer	*Gnorimella maculosa*	
Insect	Monarch	*Danaus plexippus*	Federal Candidate
Insect	Morrison’s Bumble Bee	*Bombus morrisoni*	
Insect	Mottled Duskywing	*Erynnis martialis*	
Insect	Ottoe Skipper	*Hesperia ottoe*	
Insect	Prairie Mole Cricket	*Gryllotalpa major*	SINC
Insect	Regal Fritillary	*Argynnis idalia*	Federal Under Review
Insect	Robust Sunflower Leafcutter Bee	*Megachile fortis*	
Insect	Southern Plains Bumble Bee	*Bombus fraternus*	
Insect	Variable Cuckoo Bumble Bee	*Bombus variabilis*	Federal Under Review
Insect	Whitish Sweat Bee	*Agopostemon sericeus*	
Insect	Yellow Bumble Bee	*Bombus fervidus*	
Mammals	Plains Spotted Skunk	*Spilogale interrupta*	State Threatened
Mammals	Gray Fox	*Urocyon cinereoargenteus*	
Plants	Buffalo Clover	*Trifolium reflexum*	
Plants	Bush’s Poppy-mallow	*Callirhoe bushii*	
Plants	Earleaf False Foxglove	*Agalinis auriculata*	
Plants	Great Plains Ladies-tresses	*Spiroanthes magnicamporum*	

Plants	Kansas Arrowhead	*Sagittaria ambigua*	
Plants	Missouri Mud-plantain	*Heteranthera missouriensis*	
Plants	Mead's Milkweed	*Asclepias meadii*	Federal Threatened
Plants	Osage Plains False Foxglove	*Agalinis densiflora*	
Plants	Pale False Foxglove	*Agalinis skinneriana*	
Plants	Topeka Purple-coneflower	*Echinacea atrorubens*	
Plants	Western Prairie White-fringed Orchid	*Platanthera praeclara*	Federal Threatened
Reptiles	Western Massasauga	*Sistrurus tergeminus*	
Reptiles	Smooth Earthsnake	*Virginia valeriae*	SINC
Reptiles	Texas Horned Lizard	*Phrynosoma cornutum*	
Reptiles	Timber Rattlesnake	*Crotalus horridus*	SINC
Turtles	Ornate Box Turtle	*Terrapene ornata*	

Chapter 23 – FLINT HILLS



The Flint Hills EFA is located in east-central Kansas, within the Flint Hills ecoregion. This Tallgrass Prairie habitat is characterized by bands of rolling hills with abundant residual flint eroded from the bedrock that lies near the surface. The rocky uplands of this prairie are not conducive to cultivation, leaving this area still largely intact as native prairie well-suited for livestock production. The region is ecologically important because it is the largest remaining expanse of tallgrass prairie in the country. Disturbance from grazing and fire play important roles in preserving the dominance of herbaceous species and floristic diversity of the prairie. Numerous SGCN requiring large contiguous tracts of native prairie occur in this region.

EFA Development

This EFA is based on the Flint Hills Level 3 ecoregion with a modification of part of the western boundary to exclude large expanses of cropland. This western portion was designed to more closely follow the Large Natural Areas and 2.5 km hexagons with >= 50% Natural Vegetation.

CONSERVATION ISSUES

Agriculture

-Opposing mindsets for plant dominance in rangeland, native grasses vs cool season pastures

-Conversion of native grasslands to other uses causes existing habitat creates fragmentation, destroys native flora, and decreases habitat availability

-Inappropriate grazing and haying practices on native grasslands decreases habitat heterogeneity and can change vegetative community composition

Energy Production

-Development and expansion of wind energy, solar arrays, transmission infrastructure, and oil/gas fields infrastructure and activities in native grasslands – impacting grasslands and migratory birds, bats, and other wildlife

Invasive and other problematic species and genes

-Sericea lespedeza and Old World bluestems pose a serious threat to the biodiversity through competitive interaction with native species

-Woody species such as Osage Orange, Eastern Red Cedar, and Honey Locust continue to encroach on native prairie

Natural system modifications

-Hydrological changes in the watersheds impacting the quality of wetlands, i.e. increased nutrients in water systems, sedimentation problems, and tiling and draining of wet meadows

-Improperly applied use of prescribed fire (*i.e.* prominence of annual burning is detrimental for some grassland nesting birds while, infrequent burning causes prairie to transition to shrubland or forest)

Pollution

-Air quality impacts associated withprescribed burning

-Pollution from point and non-point sources includes runoff of pesticides, fertilizers, herbicides and other chemicals as well as trash disposal/landfill operations

Residential and commercial development

-Major highways and turnpikes and non-wildlife friendly fences create physical barriers that fragment habitat

-The increase of urban, suburban, and exurban rural homes and development is reducing and fragmenting native habitat

CONSERVATION ACTIONS

Education and awareness

-Conduct wildlife surveys for data lacking species. Surveys should be rigorous, repeatable, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics

-Continue disease monitoring (e.g. Chytrid Fungus, Ranavirus, White-nose Syndrome and other potential diseases, etc.)

-Continued disease monitoring (Chytrid Fungus, Ranavirus, Snake Fungal Disease, etc.)

-Educate energy companies on reducing impacts to playa lakes

-Educate landowners on the negative impacts of woody encroachment and promote management techniques

-Educate the general public about the value of grasslands

-Implement surveys to quantify current wetlands, and identify priority areas

-Investigate ways to determine water use (i.e., implement metering and have fees based upon amount used)

-Research and investigate best management practices to control invasive species (*e.g.* Sericea Lespedeza, Old World Bluestems, etc.)

External capacity building

-Develop partnerships to help private landowners conduct prescribed burns, providing education, equipment, expert advice and assistance

-Develop/expand partnerships to assist in addressing conservation issues.

-Encourage solar fam siting in previously disturbed areas

-Work with county zoning boards and townships to implement well thought out planning procedures on grassland management and nonnative plant control strategies

-Work with Kansas Dept. of Transportation for wise roadside vegetation management utilizing native species and to control invasive species

-Increase managing positions to assist with working with external partners

Land/water management

-Promote the use of wildlife friendly fencing and structures

-Develop a standardized water quality-testing program for playa lakes.

-Develop an invasive species task force to create a state invasive plant and animal management plans

-Develop and implement methods to offset economic practices (*i.e.* wind farms, farm programs that encourage overproduction, conversion of unsuitable lands into production, urbanization) that have negative environmental impacts

-Develop and implement watershed management plans that approach playa landscape conservation from a holistic perspective.

-Develop cost-neutral conservation practices for producers to provide for maintenance of ecologically and economically viable farming/ranching operations (*i.e.* patch burn grazing)

-Develop incentive programs and cost-effective practices for landowners and managers to protect and restore playa landscapes and to promote heterogeneity and diversity

-Develop projects which inform management and policies to achieve conservation and inform landscape design

-Encourage water right and water quality regulations in appropriate watersheds to reduce aquifer depletion, increase overland flow to basins, and improve water quality

-Increase the heterogeneity of native habitats, as well as general landscapes by using greenways, corridors, buffer strips, refuges and the Conservation Reserve Program, Grassland Reserve and Sodbuster programs

-Promote rangeland management tools, such as targeted techniques for controlling invasive plant species, patch-burn-grazing, and drought management planning

-Promote the use of permanent grass buffers around playa lakes

Land/water protection

-Acquire water rights as advisable and possible and/or incentivize landowner retirement of water rights and conversion to less intensive land use

-Promote the development of widlife overpasses

-Provide incentives to landowners to maintain, improve, enhance key grassland sites, and reduce intensified agricultural practices

-Provide landowners incentives for restoring and maintaining playa lakes

-Work with willing donors/sellers to prevent further prairie fragmentation and expand connectivity corridors by using conservation easements and other tools

-Acquire water rights for wetlands as advisable and possible.

-Promote the use of Conservation Easement Programs, USFWS' Flint Hills Legacy Easement Program, or other conservation easements to maintain the integrity of tallgrass prairie wildlife habitat, stream water quality, and rich agricultural heritage of the Flint hills

-Provide landowners incentives to maintain wetlands

-Work with willing donors/sellers to prevent further prairie fragmentation and expand connectivity corridors by using conservation easements and other tools

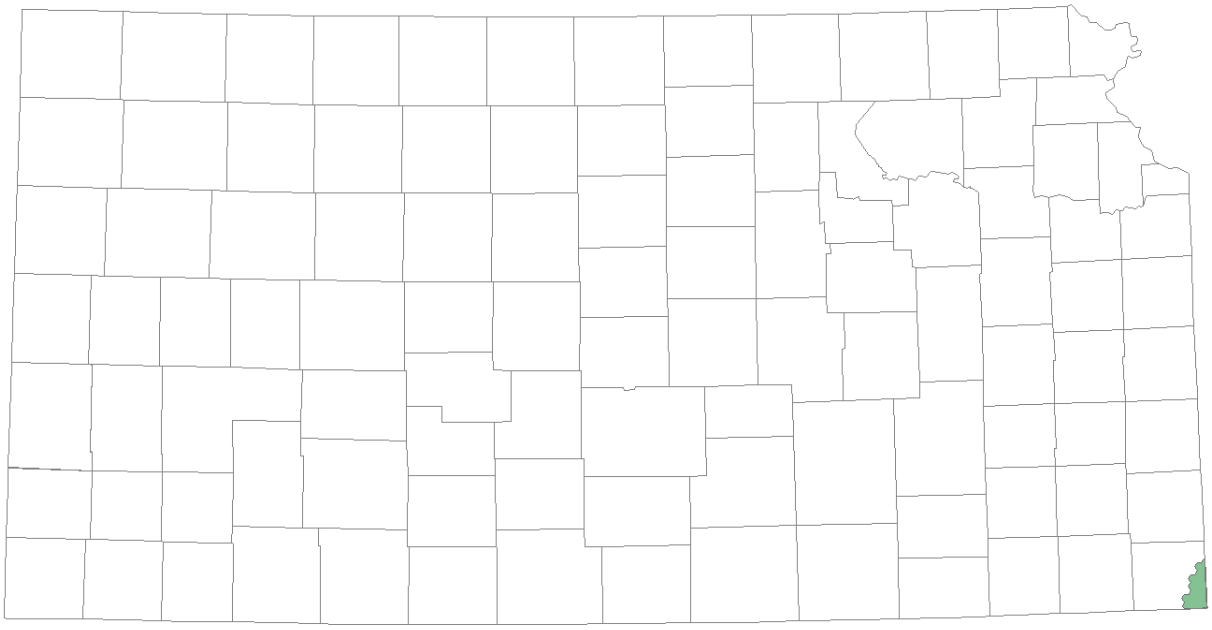
Species of Greatest Conservation Need

Amphibians	Common Mudpuppy	*Necturus maculosus*	
Amphibians	Crawfish Frog	*Lithobates areolatus*	SINC
Amphibians	Tiger Salamander	*Ambystoma tigrinum*	
Amphipod	Clanton's Cave Amphipod	Stygobromus clantoni	
Amphipod	Kansas Well Amphipod	*Bactrurus hubrichti*	
Amphipod	Onondaga Cave Amphipod	*Stygobromus onondagaensis*	
Arachnida	a trap door spider	*Ummidia beatula*	
Birds	American Golden-Plover	*Pluvialis dominica*	
Birds	American Tree Sparrow	*Spizella arborea*	
Birds	American White Pelican	*Pelecanus erythrorhynchos*	
Birds	Baird's Sparrow	*Centronyx bairdii*	
Birds	Bald Eagle	*Haliaeetus leucocephalus*	

Birds	Baltimore Oriole	*Icterus galbula*	
Birds	Bell's Vireo	*Vireo bellii*	
Birds	Black-billed Cuckoo	*Coccyzus erythropthalmus*	
Birds	Bobolink	*Dolichonyx oryzivorus*	SINC
Birds	Buff-breasted Sandpiper	*Calidris subruficollis*	
Birds	Burrowing Owl	*Athene cunicularia*	
Birds	Chuck-will's-widow	*Antrostomus carolinensis*	
Birds	Common Nighthawk	*Chordeiles minor*	
Birds	Common Poorwill	*Phalaenoptilus nuttallii*	
Birds	Dickcissel	*Spiza americana*	
Birds	Eastern Kingbird	*Tyrannus tyrannus*	
Birds	Eastern Meadowlark	*Sturnella magna*	
Birds	Eastern Wood-Pewee	*Contopus virens*	
Birds	Grasshopper Sparrow	*Ammodramus savannarum*	
Birds	Greater Prairie-Chicken	*Tympanuchus cupido*	
Birds	Harris's Sparrow	*Zonotrichia querula*	
Birds	Henslow's Sparrow	*Centronyx henslowii*	SINC
Birds	Least Bittern	*Ixobrychus exilis*	
Birds	Least Tern	*Sternula antillarum*	Federal & State Endangered
Birds	Loggerhead Shrike	*Lanius ludovicianus*	
Birds	Mississippi Kite	*Ictinia mississippiensis*	
Birds	Northern Bobwhite	*Colinus virginianus*	
Birds	Painted Bunting	*Passerina ciris*	
Birds	Piping Plover	*Charadrius melodus*	Federal & State Threatened
Birds	Prothonotary Warbler	*Protonotaria citrea*	
Birds	Red-headed Woodpecker	*Melanerpes erythrocephalus*	
Birds	Rusty Blackbird	*Euphagus carolinus*	
Birds	Scissor-tailed Flycatcher	*Tyrannus forficatus*	
Birds	Smith's Longspur	*Calcarius pictus*	
Birds	Sprague's Pipit	*Anthus spragueii*	
Birds	Upland Sandpiper	*Bartramia longicauda*	
Birds	Western Kingbird	*Tyrannus verticalis*	
Birds	Yellow Rail	*Coturnicops noveboracensis*	
Crustaceans	Ringed Crayfish	*Faxonius neglectus*	
Gastropods	Delta hydrobe	*Probythinella emarginata*	State Threatened
Gastropods	Mudbank Ambersnail	*Catinella vagans*	
Gastropods	Xeric Ambersnail	*Succinea vaginacontorta*	
Insect	A Cave Obligate Isopod	*Caecidotea tridentata*	
Insect	A Cave Obligate Isopod	*Caecidotea metcalfi*	
Insect	A nomia bee	*Nomia universitatis*	
Insect	A scarab beetle	*Trox paulseni*	
Insect	A sweat bee	*Agopostemon coloradensis*	
Insect	Abbreviated Underwing	*Catocala abbreviatella*	
Insect	Abberrant Cellophane Bee	*Colletes aberrans*	
Insect	American Bumble Bee	*Bombus pensylvanicus*	Federal Candidate
Insect	Arogos Skipper	*Atrytone arogos*	
Insect	Bald-spot Sweat Bee	*Lasioglossum paraforbesii*	
Insect	Bell's Roadside-Skipper	*Amblyscirtes belli*	
Insect	Black-and-gold Bumble Bee	*Bombus auricomus*	
Insect	Byssus Skipper	*Problema byssus*	
Insect	Dotted Skipper	*Hesperia attalus attalus*	
Insect	Konza Prairie Mayfly	*Leptophlebia konza*	
Insect	Maritime Sunflower Borer Moth	*Papaipema maritima*	
Insect	Monarch	*Danaus plexippus*	Federal Candidate
Insect	Mottled Duskywing	*Erynnis martialis*	
Insect	Occidental Digger Bee	*Anthophora occidentalis*	
Insect	Ottoe Skipper	*Hesperia ottoe*	
Insect	Prairie Mole Cricket	*Gryllotalpa major*	SINC
Insect	Regal Fritillary	*Speyeria idalia*	Federal Under Review
Insect	Sage Sphinx	*Lintneria eremitoides*	

Insect	Southern Plains Bumble Bee	*Bombus fraternus*	
Insect	Variable Cuckoo Bumble Bee	*Bombus variabilis*	Federal Under Review
Insect	Whitish Sweat Bee	*Agopostemon sericeus*	
Insect	Yellow Bumble Bee	Bombus fervidus	
Isopod	Steeve's Cave Isopod	Caecidotea steevesi	
Mammals	Plains Spotted Skunk	Spilogale interrupta	State Threatened
Mammals	Franklin's Ground Squirrel	Poliocitellus franklinii	SINC
Mammals	Gray Fox	*Urocyon cinereoargenteus*	
Mammals	Little Brown Myotis	*Myotis lucifugus*	Federal Under Review
Mammals	Southern Bog Lemming	Synaptomys cooperi	SINC
Mammals	Southern Flying Squirrel	*Glaucomys volans*	SINC
Mammals	Tricolored Bat	*Perimyotis subflavus*	
Planarians	Kansas Planarian	*Sphalloplana kansensis*	
Plants	Bush's Poppy-mallow	*Callirhoe bushii*	
Plants	Great Plains Ladies'-tresses	*Spiranthes magnicamporum*	
Plants	Hancin's Dewberry	*Rubus hancinianus*	
Plants	Mead's Milkweed	*Asclepias meadii*	Federal Threatened
Plants	Missouri Mud-plantain	*Heteranthera missouriensis*	
Plants	Narrowleaf Morning-glory	*Ipomoea shumardiana*	
Plants	Oklahoma Phlox	*Phlox oklahomensis*	
Plants	Osage Plains False Foxglove	*Agalinis densiflora*	
Plants	Running Buffalo Clover	*Trifolium stoloniferum*	
Plants	Taper-tip Dodder	*Cuscuta attenuata*	
Plants	Topeka Purple-coneflower	*Echinacea atrorubens*	
Plants	Western Prairie White-fringed Orchid	*Platanthera praeclara*	Federal Threatened
Reptiles	Eastern Hog-nosed Snake	*Heterdon platirhinos*	SINC
Reptiles	Glossy Snake	*Arizona elegans*	SINC
Reptiles	Ground-snake	*Sonora semiannulata*	
Reptiles	Common Lesser Earless Lizard	*Holbrookia maculata*	
Reptiles	Western Massasauga	*Sistrurus tergeminus*	
Reptiles	Plains Hog-nosed Snake	*Heterodon nasicus*	SINC
Reptiles	Rough Earthsnake	*Haldea striatula*	SINC
Reptiles	Texas Horned Lizard	*Phrynosoma cornutum*	
Reptiles	Timber Rattlesnake	*Crotalus horridus*	SINC
Turtles	American Box Turtle	*Terrapene carolina*	
Turtles	Ornate Box Turtle	*Terrapene ornata*	
Turtles	Smooth Softshell	*Apalone mutica*	

Chapter 24 – OZARK PLATEAU



The Ozark Plateau EFA represents the Kansas extent of a much larger physiographic province that extends into Missouri, Oklahoma, and Arkansas. Although this EFA is quite small (55 sq. miles) it contains flora and fauna not found anywhere else in the state. Its caves and fast flowing streams support species such as the Cave Salamander and Banded Sculpin.

EFA Development

This EFA follows the boundary of Ozark Plateau physiographic province (Kansas Biological Survey 1997).

CONSERVATION ISSUES

Invasive and other problematic species and genes

-Conversion of forest to agricultural purposes creates fragmentation, decreases habitat quality and availability

-Invasive insect pests damaging habitats

-Spread of invasive plant species pose a threat to biodiversity through competitive interaction with native species

Natural system modifications

-Management of floodplain water levels by diking which restrict natural flooding cycles

-Increased fire suppression or lack of well-planned fire management changes dominate woody species and increases shade tolerant tree species

Pollution

-Pollution from point and non-point sources includes runoff of pesticides, fertilizers, herbicides, and other chemicals as well as trash disposal/landfill opperations

Residential and commercial development

-The increase of urban, suburban and exurban/rural homes and development reduces and fragments native habitat

CONSERVATION ACTIONS

Education and awareness

-Conduct wildlife surveys for data-lacking species. Surveys should be rigorous, repeatable, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics

-Continue disease monitoring (e.g. Chytrid Fungus, Ranavirus, White-nose Syndrome and other potential diseases, etc.)

-Implement surveys to quantify current wetlands, and identify priority areas

-Research and investigate best management practices to control invasive species (*e.g.* Sericea Lespedeza, Old World Bluestems, etc.)

External capacity building

-Develop partnerships to help private landowners conduct prescribed burns, providing education, equipment, expert advice and assistance

-Work with county zoning boards to implement well thought out planning procedures—especially on issues like wind farm construction or conversion of zoned land uses.

-Work with Kansas Dept. of Transportation to determine appropriate management activities and species to plant along roads

Land/water management

-Increase funding for USDA Agricultural Conservation Easement Program and other easement programs to reverse trend of conversion of grassland to cropland, targeting efforts toward habitat that is being or has been degraded

-Promote forest management tools, such as techniques for controlling invasive species, patch burn grazing, timber stand improvement, and sustainable harvest

-Restore forests, especially in strategic situations such as in sensitive environments (steep slopes, riparian zones, etc.), to connect existing important forest tracts, or for public use

-Provide incentives for landowners to conserve listed species on their property

Land/water protection

-Acquire water rights for wetlands as advisable and possible

-Provide landowners incentives and education to properly maintain and manage wetlands and prevent woody encroachment

-Work with willing donors/sellers to acquire/protect important habitats, especially wetlands, by using conservation easements and other tools

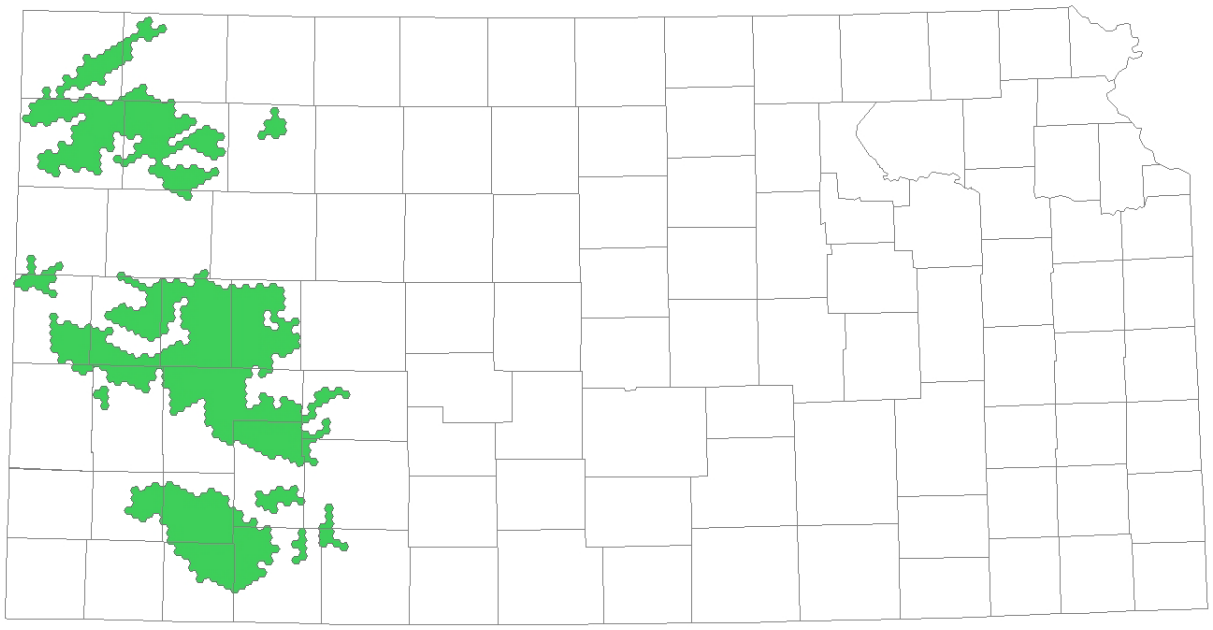
-Identify and conserve forests tracts through landowner friendly methods, such as conservation forestry incentive programs and conservation easements.

Species of Greatest Conservation Need

Amphibians	Cave Salamander	*Eurycea lucifuga*	State Endangered
Amphibians	Crawfish Frog	*Lithobates areolatus*	SINC
Amphibians	Eastern Narrow-mouthed Toad	*Gastrophryne carolinensis*	State Threatened
Amphibians	Eastern Newt	*Notophthalmus viridescens*	State Threatened
Amphibians	Green Frog	*Lithobates clamitans*	State Threatened
Amphibians	Grotto Salamander	*Eurycea spelaea*	State Endangered
Amphibians	Long-tailed Salamander	*Eurycea longicauda*	State Threatened
Amphibians	Spring Peeper	*Pseudacris crucifer*	SINC
Birds	American Tree Sparrow	*Spizella arborea*	
Birds	Baltimore Oriole	*Icterus galbula*	
Birds	Bell's Vireo	*Vireo bellii*	
Birds	Chuck-will's-widow	*Antrostomus carolinensis*	
Birds	Dickcissel	*Spiza americana*	
Birds	Eastern Kingbird	*Tyrannus tyrannus*	
Birds	Eastern Meadowlark	*Sturnella magna*	
Birds	Eastern Whip-poor-will	*Antrostomus vociferus*	SINC

Birds	Eastern Wood-Pewee	*Contopus virens*	
Birds	Harris's Sparrow	*Zonotrichia querula*	
Birds	Kentucky Warbler	*Geothlypis formosa*	
Birds	Lark Sparrow	*Chondestes grammacus*	
Birds	Loggerhead Shrike	*Lanius ludovicianus*	
Birds	Northern Bobwhite	*Colinus virginianus*	
Birds	Prothonotary Warbler	*Protonotaria citrea*	
Birds	Red-headed Woodpecker	*Melanerpes erythrocephalus*	
Birds	Rusty Blackbird	*Euphagus carolinus*	
Birds	Scissor-tailed Flycatcher	*Tyrannus forficatus*	
Birds	Yellow-throated Warbler	*Setophaga dominica*	SINC
Crustaceans	Neosho Midget Crayfish	*Faxonius macrus*	
Crustaceans	Ringed Crayfish	*Faxonius neglectus*	
Crustaceans	White River Crawfish	*Procambarus acutus*	
Gastropods	Mudbank Ambersnail	*Catinella vagans*	
Gastropods	Ozark Threetooth	*Triodopsis neglecta*	
Gastropods	Sharp Hornsnail	*Pleurocera acuta*	State Threatened
Gastropods	Slope Ambersnail	*Catinella wandae*	
Gastropods	Xeric Ambersnail	*Succinea vaginacontorta*	
Insect	A scarab beetle	*Trox paulseni*	
Insect	American Bumble Bee	*Bombus pensylvanicus*	Federal Candidate
Insect	Bell's Roadside-Skipper	*Amblyscirtes belli*	
Insect	Black-and-gold Bumble Bee	*Bombus auricomus*	
Plants	Kansas Arrowhead	*Sagittaria ambigua*	
Insect	Monarch	*Danaus plexippus*	Federal Candidate
Insect	Mottled Duskywing	*Erynnis martialis*	
Insect	Southern Plains Bumble Bee	*Bombus fraternus*	
Insect	Spring Plains Groundwater Isopod	*Caecidotea simulator*	
Insect	Steeve’s Cave Isopod	*Caecidotea steevesi*	
Insect	Yellow Bumble Bee	*Bombus fervidus*	
Isopods	Steeve's Cave Isopod	Caecidotea steevesi	
Mammals	Fulvous Harvest Mouse	*Reithrodontomys fulvescens*	
Mammals	Gray Fox	*Urocyon cinereoargenteus*	
Mammals	Gray Myotis	*Myotis grisescens*	Federal & State Endangered
Mammals	Southern Flying Squirrel	*Glaucomys volans*	SINC
Mammals	Tricolored Bat	*Perimyotis subflavus*	
Plants	Kansas Arrowhead	*Sagittaria ambigua*	
Plants	Buffalo Clover	*Trifolium reflexum*	
Plants	Delta Bulrush	*Schoenoplectus deltarum*	
Plants	Oklahoma Grass-pink	*Calopogon oklahomensis*	
Plants	Royal Catchfly	*Silene regia*	
Reptiles	Broad-headed Skink	*Plestiodon laticeps*	State Threatened
Reptiles	Coal Skink	*Plestiodon anthracinus*	
Reptiles	Red-bellied Snake	*Storeria occipitomaculata*	SINC
Reptiles	Rough Earthsnake	*Haldea striatula*	SINC
Turtles	American Box Turtle	*Terrapene carolina*	
Turtles	Northern Map Turtle	*Graptemys geographica*	State Threatened
Turtles	Ornate Box Turtle	*Terrapene ornata*	

Chapter 25 – PLAYA LANDSCAPE



The Playa Landscape EFA is dotted with shallow, temporary wetlands, each of which lies in the lowest point of a closed watershed. Lined with clay soil, their basins collect and hold water from rainfall and runoff events. These temporary lakes are an important water source for prairie wildlife and serve as stopover locations for migrating waterfowl and shorebirds. Shortgrass Prairie, Mixed Grass Prairie and Herbaceous Wetlands are the primary native habitats found within the playa clusters, though current land use in the area is dominated by crop cultivation. Playa lakes are threatened by agricultural and other land conversion activities that result in sedimentation and loss of function.

EFA Development

This EFA was created by selecting 2.5 km hexagons containing ≥ 50% PLJV playa clusters overlaying occurrences of SGCN, CHAT connectivity layer, and CHAT large intact blocks layer.

CONSERVATION ISSUES

Agriculture

-Grassland conversion and improper grazing regimes result in habitat loss and fragmentation, and increases sediment discharge to basins and increases nutrient runoff which alters playa hydrology (timing, duration, and depth of flooding) and water quality

-Practices such as wetland drainage and cropland cultivation degrades water quality from runoff and increases sedimentation

Energy Production

-Construction of infrastructure and associated roads negatively alter surface water runoff into playa lakes

-Development and expansion of wind energy, solar arrays, transmission infrastructure, and oil/gas fields infrastructure and activities in native grasslands – impacting grasslands and migratory birds, bats, and other wildlife

Natural system modifications

-The use of terraces built above playa lakes to treat highly erodible land compliance requirements and building roads without culverts is lowering groundwater levels and degrading playa hydrology
-Building roads without culverts directly impacts playa lake habitat and degrades hydology

Residential and commercial development
-The increase of urban, suburban and exurban/rural homes and development reduces and fragments native habitat along river floodplains

CONSERVATION ACTIONS

Education and awareness
-Conduct wildlife surveys for data lacking species. Surveys should be rigorous, repeatable, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics
-Continued disease monitoring (Chytrid Fungus, Ranavirus, Snake Fungal Disease, etc.)
-Educate energy companies on reducing impacts to playa lakes
-Educate the general public and landowners on the benefits and values of playa lakes
-Investigate ways to determine water use (i.e., implement metering and have fees based upon amount used)

External capacity building
-Develop/expand partnerships to assist in addressing conservation issues.

Land/water management
-Develop a standardized water quality-testing program for playa lakes
-Develop and implement methods to offset economic practices (*i.e.* wind farms, farm management systems encouraging overproduction, conversion of marginal lands into crop production, urbanization) that have negative environmental impacts
-Develop and implement watershed management plans that approach playa landscape conservation from a holistic perspective.
-Develop cost-neutral conservation practices for producers to provide for maintenance of ecologically and economically viable farming/ranching operations (*i.e.* patch burn grazing)
-Develop incentive programs and cost-effective practices for landowners and managers to protect and restore playa landscapes and to promote heterogeneity and diversity
-Develop projects which inform management and policies to achieve conservation and inform landscape design
-Encourage water right and water quality regulations in appropriate watersheds to reduce aquifer depletion, increase overland flow to basins, and improve water quality
-Increase the heterogeneity of native habitats, as well as general landscapes by using greenways, corridors, buffer strips, refuges and the Conservation Reserve
-Promote the use of permanent grass buffers around playa lakes

Land/water protection
-Acquire water rights as advisable and possible and/or incentivize landowner retirement of water rights and conversion to less intensive land use
-Provide incentives to landowners to maintain, improve, enhance key grassland sites, and reduce intensified agricultural practices
-Provide landowners incentives for restoring and maintaining playa lakes
-Work with willing donors/sellers to prevent further prairie fragmentation and expand connectivity corridors by using conservation easements and other tools

Species of Greatest Conservation Need

Amphibians	Tiger Salamander	*Ambystoma tigrinum*	
Birds	American Avocet	*Recurvirostra americana*	
Birds	American Golden-Plover	*Pluvialis dominica*	
Birds	American Tree Sparrow	*Spizella arborea*	
Birds	American White Pelican	*Pelecanus erythrorhynchos*	
Birds	Baird's Sandpiper	*Calidris bairdii*	
Birds	Barn Owl	*Tyto alba*	
Birds	Black-bellied Plover	*Pluvialis squatarola*	
Birds	Black-necked Stilt	*Himantopus mexicanus*	
Birds	Buff-breasted Sandpiper	*Calidris subruficollis*	
Birds	Bullock's Oriole	*Icterus bullockii*	
Birds	Burrowing Owl	*Athene cunicularia*	
Birds	Canvasback	*Aythya valisineria*	
Birds	Chestnut-collared Longspur	*Calcarius ornatus*	
Birds	Common Nighthawk	*Chordeiles minor*	
Birds	Eastern Kingbird	*Tyrannus tyrannus*	
Birds	Ferruginous Hawk	*Buteo regalis*	SINC
Birds	Grasshopper Sparrow	*Ammodramus savannarum*	
Birds	Greater Yellowlegs	*Tringa melanoleuca*	
Birds	Lark Sparrow	*Chondestes grammacus*	
Birds	Least Sandpiper	*Calidris minutilla*	
Birds	Lesser Prairie-Chicken	*Tympanuchus pallidicintus*	State Threatened
Birds	Lesser Yellowlegs	*Tringa flavipes*	
Birds	Loggerhead Shrike	*Lanius ludovicianus*	
Birds	Long-billed Curlew	*Numenius americanus*	SINC
Birds	Long-billed Dowitcher	*Limnodromus scolopaceus*	
Birds	Marbled Godwit	*Limosa fedoa*	
Birds	McCown's Longspur	*Rhynchopanes mccownii*	
Birds	Mississippi Kite	*Ictinia mississippiensis*	
Birds	Northern Pintail	*Anas acuta*	
Birds	Pectoral Sandpiper	*Calidris melanotos*	
Birds	Piping Plover	*Charadrius melodus*	Federal & State Threatened
Birds	Semipalmated Sandpiper	*Calidris pusilla*	
Birds	Short-eared Owl	*Asio flammeus*	SINC
Birds	Snowy Plover	*Charadrius alexandrinus*	Federal & State Threatened
Birds	Stilt Sandpiper	*Calidris himantopus*	
Birds	Swainson's Hawk	*Buteo swainsoni*	
Birds	Upland Sandpiper	*Bartramia longicauda*	
Birds	Western Kingbird	*Tyrannus verticalis*	
Birds	White-rumped Sandpiper	*Calidris fuscicollis*	
Birds	Wilson's Phalarope	*Phalaropus tricolor*	
Gastropods	Mudbank Ambersnail	*Catinella vagans*	
Gastropods	Xeric Ambersnail	*Succinea vaginacontorta*	
Insect	A callirhoe bee	*Melissodes intortus*	
Insect	A dieunomia bee	*Dieunomia triangulifera*	
Insect	A nomia bee	*Nomia universitatis*	
Insect	A scarab beetle	*Geomyphilus kiowensis*	
Insect	A scarab beetle	*Onthophagus knausi*	
Insect	A scarab beetle	*Pardalosus neodistinctus*	
Insect	A scarab beetle	*Tetraclipeoides dentigerulus*	
Insect	A scarab beetle	*Trox paulseni*	
Insect	A sweat bee	*Dieunomia apacha*	
Insect	A wool-carder bee	*Anthidium maculosum*	
Insect	American Bumble Bee	*Bombus pensylvanicus*	Federal Candidate
Insect	Black-and-gold Bumble Bee	*Bombus auricomus*	
Insect	Monarch	*Danaus plexippus*	Federal Candidate
Insect	Nevada Bumble Bee	*Bombus nevadensis*	
Insect	Old World Swallowtail	*Papilio machaon*	
Insect	Orange-bellied Sweat Bee	*Agopostemon melliventris*	

Insect	Pocket Gopher Flower Beetle	*Eupharia disciollis*	
Insect	Red-belted Bumble Bee	*Bombus rufocintus*	
Insect	Regal Fritillary	*Argynnis idalia*	Federal Under Review
Insect	Southern Plains Bumble Bee	*Bombus fraternus*	
Insect	Splendid Sweat Bee	*Agopostemon splendens*	
Insect	Yellow Bumble Bee	*Bombus fervidus*	
Mammals	Black-tailed Prairie Dog	*Cynomys ludovicianus*	
Mammals	Plains Spotted Skunk	*Spilogale interrupta*	State Threatened
Mammals	Swift Fox	*Vulpes velox*	
Mammals	Yellow-faced Pocket Gopher	*Cratogeomys castanops*	
Reptiles	Eastern Hog-nosed Snake	*Heterodon platirhinos*	SINC
Reptiles	Glossy Snake	*Arizona elegans*	SINC
Reptiles	Common Lesser Earless Lizard	*Holbrookia maculata*	
Reptiles	Long-nosed Snake	*Rhinocheilus lecontei*	SINC
Reptiles	Western Massasauga	*Sistrurus tergeminus*	
Reptiles	Plains Hog-nosed Snake	*Heterodon nasicus*	SINC
Reptiles	Prairie Rattlesnake	*Crotalus viridis*	
Reptiles	Texas Horned Lizard	*Phrynosoma cornutum*	
Turtles	Ornate Box Turtle	*Terrapene ornata*	

Success Story

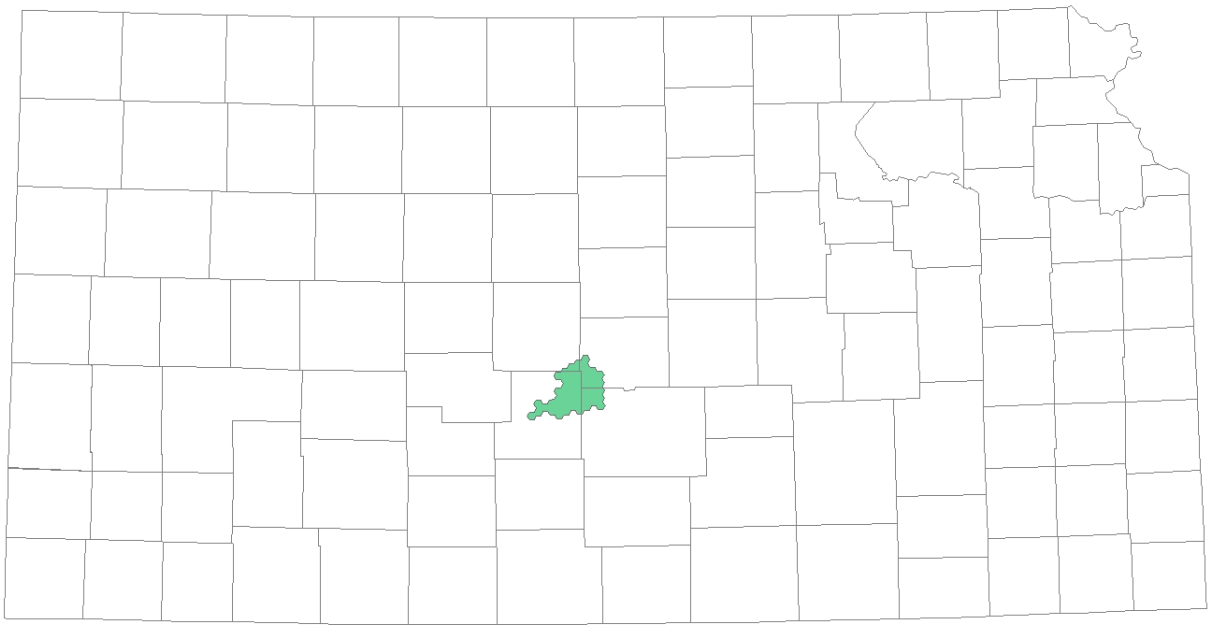
Bald Eagles in Kansas

KDWP and a group of interested partners started a three-year study to collect information that will give wildlife managers and energy developers the data to make scientifically based decisions to address potential conflict between Bald Eagles and energy development infrastructure. The primary way to acquire these vital data is to telemeter Bald Eagles in Kansas to produce highly detailed data on where they fly and how they use airspace. The data will subsequently be analyzed in the context of topography, weather, land cover, and energy infrastructure, to gain an understanding of what environmental conditions and eagle responses to those conditions that may put them at risk from wind turbines, powerlines, and associated features.

In early May 2021, project partners came together to band and affix GPS transmitters on thirteen Bald Eagle nestlings in five counties. The seven to nine-week nestlings were captured in the nest, lowered to the ground in bags, and fitted with both identification leg bands and GPS transmitters.

These units will provide data on the bird's location, including altitiude at intervals of 3-5 seconds in flight and 15 minutes at roost. The data collected will provide intimate details of eagle travel and flight response to topography, land cover, and weather.

Chapter 26 – QUIVIRA



The Quivira EFA is located in Stafford, Reno, Barton, and Rice counties. Rare habitats include inland salt marshes and Herbaceous Wetlands. The wetlands range from high salinity to fresh water throughout the EFA and are dominated by typical hydrophilic vegetation and/or salt-tolerant plants with large pools of water supplied by Rattlesnake Creek. Mixed Grass Prairie habitat dominates the uplands around the wetlands where soils are not too alkaline. The Quivira National Wildlife Refuge (QNWR) is the only protected area within the Quivira EFA. The U.S. Fish and Wildlife Service implements prescribed grazing management, prescribed burning, invasive species control, and brush removal as management tools to overcome the primary issues of fragmentation, conversion, woody invasion and miss-managed rangelands. Like it's close neighbor, Cheyenne Bottoms, QNWR is a major migratory bird rest and resource area for waterfowl, shorebirds, and blackbirds and is managed accordingly. Interior Least Terns are known to successfully nest at Quivira, and numerous other SGCN occur within this EFA, which also includes federally designated critical habitat for the Whooping Crane.

EFA Development

This EFA is based on the TNC portfolio site from the Central Mixed-Grass Prairie ecoregional plan.

CONSERVATION ISSUES

Agriculture

-Some herbaceous wetlands are being converted, drained, and plowed

Invasive and other problematic species and genes

-Invasive woody and herbaceous species compete with native flora and modify habitat structure and function for fauna (Phragmites, cattail, Tamarisk, etc.)

Natural system modifications

-The use of surface and ground water for irrigation is lowering the water inflow

Pollution

-Pollution from point and non-point sources includes runoff of pesticides, fertilizers, herbicides, and other chemicals as well as trash diposal/landfill opperations

CONSERVATION ACTIONS

Education and awareness

-Conduct wildlife surveys for data lacking species. Surveys should be rigorous, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics

-Develop and continue disease monitoring (Avian influenza, Chytrid Fungus, Ranavirus, etc.)

-Water quality education

External capacity building

-Cooperate with bird viewing groups relative to the IBA (Important Birding Areas) program

Land/water management

-Implement procedures to discourage planting of invasive species and to encourage planting appropriate species

-Restore converted wetlands and enhance existing wetlands to increase habitat quality, quantity, and connectivity

-Plant vegetation strips or buffers around wetlands to reduce siltation and filter pollutants

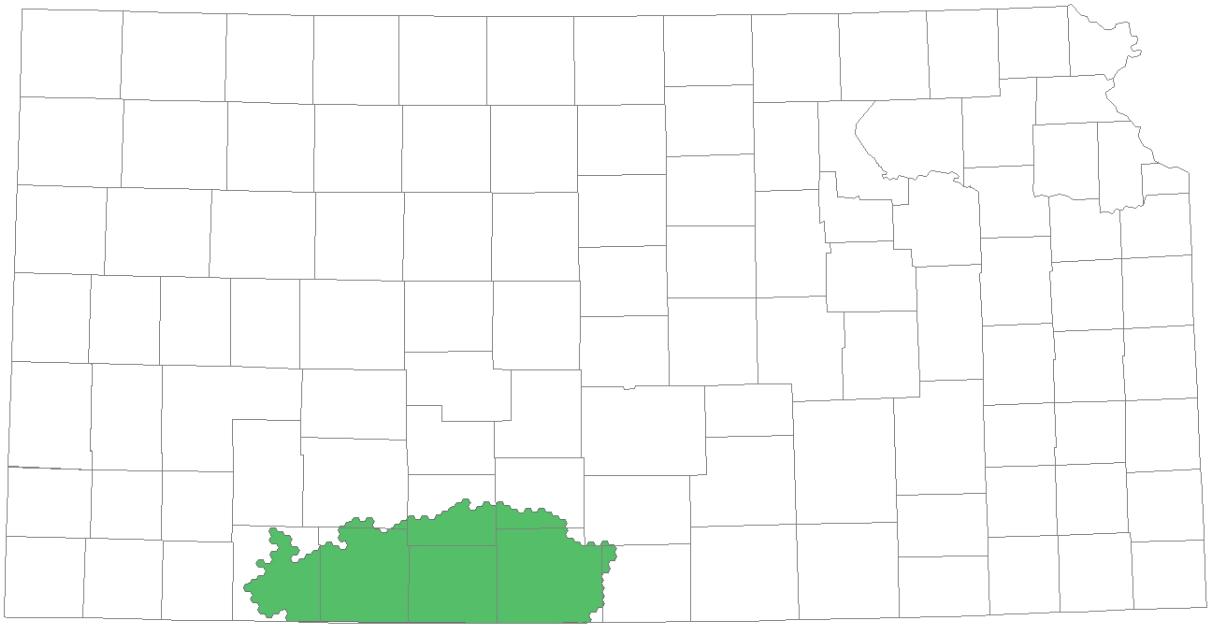
Species of Greatest Conservation Need

Amphibians	Tiger Salamander	*Ambystoma tigrinum*	
Birds	American Avocet	*Recurvirostra americana*	
Birds	American Bittern	*Botaurus lentiginosus*	
Birds	American Golden-Plover	*Pluvialis dominica*	
Birds	American Tree Sparrow	*Spizella arborea*	
Birds	American White Pelican	*Pelecanus erythrorhynchos*	
Birds	Baird's Sandpiper	*Calidris bairdii*	
Birds	Bald Eagle	*Haliaeetus leucocephalus*	
Birds	Baltimore Oriole	*Icterus galbula*	
Birds	Barn Owl	*Tyto alba*	
Birds	Bell's Vireo	*Vireo bellii*	
Birds	Black Rail	*Laterallus jamaicensis*	Federal Threatened & SINC
Birds	Black Tern	*Chlidonias niger*	SINC
Birds	Black-bellied Plover	*Pluvialis squatarola*	
Birds	Black-necked Stilt	*Himantopus mexicanus*	
Birds	Bobolink	*Dolichonyx oryzivorus*	SINC
Birds	Buff-breasted Sandpiper	*Calidris subruficollis*	
Birds	Canvasback	*Aythya valisineria*	
Birds	Common Nighthawk	*Chordeiles minor*	
Birds	Dickcissel	*Spiza americana*	
Birds	Eared Grebe	*Podiceps nigricollis*	
Birds	Eastern Kingbird	*Tyrannus tyrannus*	
Birds	Eastern Meadowlark	*Sturnella magna*	
Birds	Forster's Tern	*Sterna forsteri*	
Birds	Grasshopper Sparrow	*Ammodramus savannarum*	
Birds	Greater Yellowlegs	*Tringa melanoleuca*	
Birds	Harris's Sparrow	*Zonotrichia querula*	
Birds	Hudsonian Godwit	*Limosa haemastica*	
Birds	Lark Sparrow	*Chondestes grammacus*	
Birds	Least Bittern	*Ixobrychus exilis*	
Birds	Least Sandpiper	*Calidris minutilla*	
Birds	Least Tern	*Sternula antillarum*	Federal & State Endangered
Birds	Lesser Yellowlegs	*Tringa flavipes*	

Birds	Loggerhead Shrike	*Lanius ludovicianus*	
Birds	Long-billed Curlew	*Numenius americanus*	SINC
Birds	Long-billed Dowitcher	*Limnodromus scolopaceus*	
Birds	Marbled Godwit	*Limosa fedoa*	
Birds	Mississippi Kite	*Ictinia mississippiensis*	
Birds	Northern Bobwhite	*Colinus virginianus*	
Birds	Northern Pintail	*Anas acuta*	
Birds	Pectoral Sandpiper	*Calidris melanotos*	
Birds	Peregrine Falcon	*Falco peregrinus*	
Birds	Piping Plover	*Charadrius melodus*	Federal & State Threatened
Birds	Red-headed Woodpecker	*Melanerpes erythrocephalus*	
Birds	Red Knot	*Calidris canutus rufa*	Federal Threatened
Birds	Rusty Blackbird	*Euphagus carolinus*	
Birds	Semipalmated Sandpiper	*Calidris pusilla*	
Birds	Snowy Plover	*Charadrius alexandrinus*	Federal & State Threatened
Birds	Stilt Sandpiper	*Calidris himantopus*	
Birds	Upland Sandpiper	*Bartramia longicauda*	
Birds	Western Grebe	*Aechmophorus occidentalis*	
Birds	Western Kingbird	*Tyrannus verticalis*	
Birds	White-rumped Sandpiper	*Calidris fuscicollis*	
Birds	Wilson's Phalarope	*Phalaropus tricolor*	
Gastropods	A terrestrial snail	*Succinea pseudavara*	
Gastropods	Mudbank Ambersnail	*Catinella vagans*	
Gastropods	Xeric Ambersnail	*Succinea vaginacontorta*	
Insect	A Cave Obligate Isopod	*Caecidotea tridentata*	
Insect	A dieunomia bee	*Dieunomia triangulifera*	
Insect	A leafcutter bee	*Megachile integra*	
Insect	A leafcutter bee	*Megachile mucorosa*	
Insect	A scarab beetle	*Geomyphilus insolitus*	
Insect	A scarab beetle	*Orizabus pyriformis*	
Insect	A scarab beetle	*Pardalosus neodistinctus*	
Insect	A scarab beetle	*Strategus mormon*	
Insect	A scarab beetle	*Tetraclipeoides dentigerulus*	
Insect	A sweat bee	*Agopostemon coloradensis*	
Insect	A sweat bee	*Dieunomia apacha*	
Insect	American Bumble Bee	*Bombus pensylvanicus*	Federal Candidate
Insect	Abberrant Cellophane Bee	*Colletes aberrans*	
Insect	Arogos Skipper	*Atrytone arogos*	
Insect	Bald-spot Sweat Bee	*Lasioglossum paraforbesii*	
Insect	Bicoloured Sweat Bee	*Agopostemon virescens*	
Insect	Black-and-gold Bumble Bee	*Bombus auricomus*	
Insect	Byssus Skipper	*Problema byssus*	
Insect	Dotted Skipper	*Herperia attralus*	
Insect	Ghost Tiger Beetle	*Ellipsoptera lepida*	
Insect	Monarch	*Danaus plexippus*	Federal Candidate
Insect	Morrison’s Bumble Bee	*Bombus morrisoni*	
Insect	Occidental Digger Bee	*Anthophora occidentalis*	
Insect	Ottoe Skipper	*Hesperia ottoe*	
Insect	Particular Small Dung Beetle	*Scabrostonus peculiosis*	
Insect	Regal Fritillary	*Argynnis idalia*	Federal Under Review
Insect	Robust Sunflower Leafcutter Bee	*Megachile fortis*	
Insect	Soapberry Hairstreak	*Phaeostrymon alcestis*	
Insect	Southern Plains Bumble Bee	*Bombus fraternus*	
Insect	Splendid Sweat Bee	*Agopostemon splendens*	
Insect	Susan’s Plasterer Bee	*Colletes susannae*	
Insect	The Unexpected Milkweed Moth	*Cycnia inopinatus*	
Insect	Variable Cuckoo Bumble Bee	*Bombus variabilis*	Federal Under Review
Insect	White-cloaked Tiger Beetle	*Eunota togata latilabris*	
Insect	Whitish Sweat Bee	*Agopostemon sericeus*	
Insect	Yellow Bumble Bee	*Bombus fervidus*	

Mammals	Southern Bog Lemming	*Synaptomys cooperi*	SINC
Plants	Great Plains Ladies'-tresses	*Spiranthes magnicamporum*	
Plants	Kansas Arrowhead	*Sagittaria ambigua*	
Plants	Prairie Fameflower	*Talinum rugospermum*	
Reptiles	Western Massasauga	*Sistrurus tergeminus*	
Reptiles	Plains Hog-nosed Snake	*Heterdon nasicus*	SINC
Turtles	Ornate Box Turtle	*Terrapene ornata*	

Chapter 27 – RED HILLS



The Red Hills EFA is located in south-central Kansas. It is characterized by beautiful prairie vistas, rich grazing lands, pristine streams and red soils with exposed gypsum canyon breaks and canyons. The area is dominated by Mixed Grass and Sandsage Prairie habitats dissected by spring-fed streams that flow into the Medicine, Salt Fork of the Arkansas, and Cimarron rivers. Known locally as the “Gyp Hills”, this area has rich, highly diverse plant and wildlife communities. The region is ecologically important because it is Kansas' second largest intact tract of native prairie, one of the last expanses of contiguous mixed grass prairie and is home to numerous state-listed threatened or endangered and SGCN species requiring large unfragmented tracts of native prairie. The majority of the land is privately owned, and often large parcels of the rangeland (thousands of acres) are owned and managed by a single family or ranching operation. Lack of proper grazing management, invasion of woody and herbaceous plants, improper prescribed fire frequency, and energy development are a few of the issues impacting this ecological focus area. Protected areas include the Big Basin Prairie Preserve (includes Big Basin, Little Basin and St. Jacob’s well) and the Isabel Wetlands.

EFA Development

This EFA captures a concentration of Large Natural Areas in the Red Hills and High Plains physiographic provinces. The final boundary is based on the Level 3 EPA ecoregion (Southwestern Tablelands).

CONSERVATION ISSUES

Agriculture

-Conversion of native grasslands to other uses causes fragmentation, destroys native flora, and decreases habitat availability

-Practices such as wetland drainage and cropland cultivation degrades water quality from runoff and increases sedimentation

Energy Production
-Development and expansion of wind energy, solar arrays, transmission infrastructure, and oil/gas fields infrastructure and activities in native grasslands – impacting grasslands and migratory birds, bats, and other wildlife

Invasive and other problematic species and genes
Invasive woody and herbaceous species compete with native flora and modify habitat structure and function for fauna (e.g. Eastern Red Cedar, Tamarisk, Old World Bluestem, etc.)

Natural system modifications
-Improperly applied use of prescribed fire (including periodicity and seasonality of fire)
-Suppression of fire alters composition of native grasslands
-The use of surface and ground water for irrigation is lowering the groundwater level

Pollution
-Air quality impacts associated with prescibed burning
-Pollution from point and non-point sources includes runoff of pesticides, fertilizers, herbicides, and other chemicals as well as trash disposal/landfill operations

CONSERVATION ACTIONS

Education and awareness
-Conduct pre and post studies on energy facility sites to determine the impact on wildlife and habitat. Research temperature and vegetation impacts caused by wind generators
-Conduct wildlife surveys for data-lacking species. Surveys should be rigorous, repeatable, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics
-Continue disease monitoring (e.g. White-nose Syndrome, Chytrid Fungus, Ranavirus, etc.)
-Develop plots to demonstrate best management practices on public and private lands
-Place special emphasis on programs to study and conserve grassland-nesting birds
-Research and investigate best management practices to control woody invasive species (e.g. Eastern Red Cedar and Old World Bluestems)
-Research the effects of coal bed methane extraction on wildlife and water quality

External capacity building
-Cooperate with the state and federal Department of Agriculture in developing management strategies for coping with potential problems from exotic livestock and wildlife introductions
-Develop contingency plans for managing exotic wildlife
-Work with county zoning boards to implement well thought out planning procedures

Land/water management
-Develop and implement a Kansas invasive species plan
-Implement ecologically sensitive grazing and haying practices, including rest periods, for mixed grass prairie on private and public lands as well as promoting the responsible, well-planned use of prescribed fire as a management/restoration too
-Implement procedures to discourage planting of invasive species, while encouraging the establishment of appropriate native species
-Implement Wildlife expert review of wind energy siting effects on prairie chickens, bats, etc., and make recommendations
-Promote ecologically sound techniques for flood control, erosion control, non-point source pollution control, and bank stabilization
-Provide incentives for mechanical control of woody invasive species

Land/water protection

-Offer incentives for constructing fences around seeps and springs to keep livestock out

-Offer incentives to landowners not to sell land for private development

-Work with willing donors/sellers to prevent further prairie fragmentation and expand connectivity corridors by using conservation easements and other tools

Species management

-Continue to support population and distributional surveys of the Black-tailed Prairie Dog.

-Develop and implement an effective information and educational program focused on the role and value of Black-tailed Prairie Dogs in native grasslands and the importance of ending removal policies for prairie dogs from public and private lands.

-Review and implement the Black-tailed Prairie Dog Management Plan

-For mammals, describe habitat associations and measure trends in habitat distribution and quality in coordination with conservation societies

-Initiate and continue distributional surveys of bats, Lesser Prairie Chickens, Northern Bobwhite quail and other SGCN

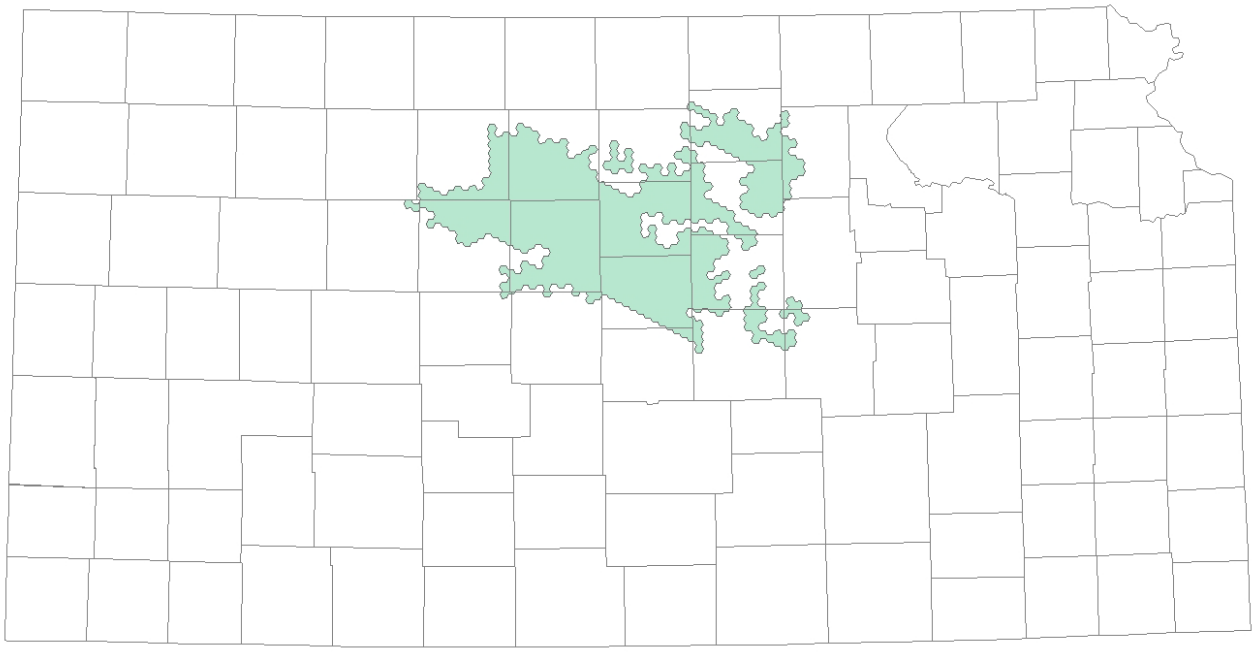
Species of Greatest Conservation Need

Amphibians	Red-spotted Toad	*Anaxyrus punctatus*	SINC
Amphibians	Strecker's Chorus Frog	*Pseudacris streckeri*	State Threatened
Amphibians	Tiger Salamander	*Ambystoma tigrinum*	
Birds	American Avocet	*Recurvirostra americana*	
Birds	American Tree Sparrow	*Spizella arborea*	
Birds	American White Pelican	*Pelecanus erythrorhynchos*	
Birds	Baird's Sparrow	*Centronyx bairdii*	
Birds	Baltimore Oriole	*Icterus galbula*	
Birds	Barn Owl	*Tyto alba*	
Birds	Bell's Vireo	*Vireo bellii*	
Birds	Black Rail	*Laterallus jamaicensis*	Federal Threatened & SINC
Birds	Black-billed Cuckoo	*Coccyzus erythropthalmus*	
Birds	Black-necked Stilt	*Himantopus mexicanus*	
Birds	Bullock's Oriole	*Icterus bullockii*	
Birds	Burrowing Owl	*Athene cunicularia*	
Birds	Cassin's Sparrow	*Peucaea cassinii*	
Birds	Chestnut-collared Longspur	*Calcarius ornatus*	
Birds	Chuck-will's-widow	*Antrostomus carolinensis*	
Birds	Common Nighthawk	*Chordeiles minor*	
Birds	Common Poorwill	*Phalaenoptilus nuttallii*	
Birds	Dickcissel	*Spiza americana*	
Birds	Eastern Kingbird	*Tyrannus tyrannus*	
Birds	Eastern Meadowlark	*Sturnella magna*	
Birds	Golden Eagle	*Aquila chrysaetos*	SINC
Birds	Grasshopper Sparrow	*Ammodramus savannarum*	
Birds	Harris's Sparrow	*Zonotrichia querula*	
Birds	Lark Sparrow	*Chondestes grammacus*	
Birds	Least Bittern	*Ixobrychus exilis*	
Birds	Least Tern	*Sternula antillarum*	Federal & State Endangered
Birds	Lesser Prairie-Chicken	*Tympanuchus pallidicinctus*	Federal Threatened
Birds	Loggerhead Shrike	*Lanius ludovicianus*	
Birds	McCown's Longspur	*Rhynchopanes mccownii*	
Birds	Mississippi Kite	*Ictinia mississippiensis*	
Birds	Northern Bobwhite	*Colinus virginianus*	
Birds	Painted Bunting	*Passerina ciris*	
Birds	Red-headed Woodpecker	*Melanerpes erythrocephalus*	
Birds	Rusty Blackbird	*Euphagus carolinus*	
Birds	Scissor-tailed Flycatcher	*Tyrannus forficatus*	
Birds	Short-eared Owl	*Asio flammeus*	SINC

Birds	Snowy Plover	*Charadrius alexandrinus*	Federal & State Threatened
Birds	Sprague's Pipit	*Anthus spragueii*	
Birds	Swainson's Hawk	*Buteo swainsoni*	
Birds	Upland Sandpiper	*Bartramia longicauda*	
Birds	Western Kingbird	*Tyrannus verticalis*	
Gastropods	A terrestrial snail	*Succinea pseudavara*	
Gastropods	Mudbank Ambersnail	*Catinella vagans*	
Gastropods	Texas Liptooth	*Lininsa texasiana*	
Gastropods	Xeric Ambersnail	*Succinea vaginacontorta*	
Insect	A callirhoe bee	*Melissodes intortus*	
Insect	A Cave Obligate Isopod	*Caecidotea tridentata*	
Insect	A dieunomia bee	*Dieunomia triangulifera*	
Insect	A leafcutter bee	*Megachile amica*	
Insect	A leafcutter bee	*Megachile integra*	
Insect	A leafcutter bee	*Megachile mucorosa*	
Insect	A longhorned beetle	*Tetraopes pilosus*	
Insect	An oil-collecting bee	*Centris (Paracentris) lanosus*	
Insect	A scarab beetle	*Alloblackburneus cynomysi*	
Insect	A scarab beetle	*Cryptoscatomaseter paulseni*	
Insect	A scarab beetle	*Cryptoscatomaseter salsburyi*	
Insect	A scarab beetle	*Geomyphilus insolitus*	
Insect	A scarab beetle	*Geomyphilus kiowensis*	
Insect	A scarab beetle	*Geomyphilus viceversus*	
Insect	A scarab beetle	*Onthophagus cynomysi*	
Insect	A scarab beetle	*Orizabus pyriformis*	
Insect	A scarab beetle	*Oscarinus pseudabusus*	
Insect	A scarab beetle	*Pardalosus neodistinctus*	
Insect	A scarab beetle	*Scabrostomus sepultus*	
Insect	A scarab beetle	*Strategus mormon*	
Insect	A scarab beetle	*Tetraclipeoides dentigerulus*	
Insect	A sweat bee	*Agopostemon coloradensis*	
Insect	A sweat bee	*Dieunomia apacha*	
Insect	A wool-carder bee	*Anthidium michenerorum*	
Insect	A wool-carder bee	*Anthidium psoraleae*	
Insect	Abberrant Cellophane Bee	*Colletes aberrans*	
Insect	American Bumble Bee	*Bombus pensylvanicus*	Federal Candidate
Insect	Arogos Skipper	*Atrytone arogos*	
Insect	Bald-spot Sweat Bee	*Lasioglossum paraforbesii*	
Insect	Bell’s Roadside Skipper	Amblyscirtes belli	
Insect	Bicoloured Sweat Bee	Agopostemon virescens	
Insect	Black-and-gold Bumble Bee	Bombus auricomus	
Insect	Burrow Small Dung Beetle	*Geomyphilus thomomysi*	
Insect	Dotted Skipper	*Hesperia attalus attalus*	
Insect	Ghost Tiger Beetle	*Ellipsoptera lepida*	
Insect	Monarch	*Danaus plexippus*	Federal Candidate
Insect	Morrison’s Bumble Bee	*Bombus morrisoni*	
Insect	Mottled Duskywing	*Erynnis martialis*	
Insect	Occidental Digger Bee	*Anthophora occidentalis*	
Insect	Orange-bellied Sweat Bee	*Agopostemon melliventris*	
Insect	Ottoe Skipper	*Hesperia ottoe*	
Insect	Pahaska Skipper	*Hesperia pahaska*	
Insect	Particular Small Dung Beetle	*Scabrostonus peculiosis*	
Insect	Red Satyr	*Megisto rubricata*	
Insect	Regal Fritillary	*Argynnis idalia*	Federal Under Review
Insect	Robust Sunflower Leafcutter Bee	*Megachile fortis*	
Insect	Soapberry Hairstreak	*Phaeostrymon alcestis*	
Insect	Southern Plains Bumble Bee	*Bombus fraternus*	
Insect	Splendid Sweat Bee	*Agopostemon splendens*	
Insect	Susan’s Plasterer Bee	*Colletes susannae*	
Insect	The Unexpected Milkweed Moth	*Cycnia inopinatus*	

Insect	Variable Cuckoo Bumble Bee	*Bombus variabilis*	Federal Under Review
Insect	White-cloaked Tiger Beetle	*Eunota togata latilabris*	
Insect	Whitish Sweat Bee	*Agopostemon sericeus*	
Insect	Whitney's Underwing	*Catocala whitneyi*	
Insect	Yellow Bumble Bee	*Bombus fervidus*	
Mammals	Black-tailed Prairie Dog	*Cynomys ludovicianus*	
Mammals	Fulvous Harvest Mouse	*Reithrodontomys fulvescens*	
Mammals	Pallid Bat	*Antrozous pallidus*	SINC
Mammals	Townsend's Big-eared Bat	*Corynorhinus townsendii*	SINC
Mammals	Tricolored Bat	*Perimyotis subflavus*	
Plants	Great Plains Ladies'-tresses	*Spiranthes magnicamporum*	
Plants	Oklahoma Phlox	*Phlox oklahomensis*	
Plants	Sand-dune Broomspurge	*Euphorbia carunculata*	
Reptiles	Checkered Gartersnake	*Thamnophis marcianus*	State Threatened
Reptiles	Chihuahuan Nightsnake	*Hypsiglena jani*	SINC
Reptiles	Eastern Hog-nosed Snake	*Heterodon platirhinos*	SINC
Reptiles	Glossy Snake	*Arizona elegans*	SINC
Reptiles	Ground-snake	*Sonora semiannulata*	
Reptiles	Common Lesser Earless Lizard	*Holbrookia maculata*	
Reptiles	Long-nosed Snake	*Rhinocheilus lecontei*	SINC
Reptiles	New Mexico Threadsnake	*Rena dissecta*	State Threatened
Reptiles	Western Massasauga	*Sistrurus tergeminus*	
Reptiles	Plains Hog-nosed Snake	*Heterodon nasicus*	SINC
Reptiles	Prairie Rattlesnake	*Crotalus viridis*	
Reptiles	Texas Horned Lizard	*Phrynosoma cornutum*	
Turtles	Ornate Box Turtle	*Terrapene ornata*	

Chapter 28 – SMOKY HILLS



The Smoky Hills EFA is within the mixed grass prairie in north -central Kansas. The area is characterized as gently rolling hills with numerous limestone rocky outcrops and uplifts of Dakota sandstone. The primary plant communities are composed of Mixed Grass Prairie habitat transitioning into Tallgrass Prairie habitat towards the east. The Smoky Hill River, Saline River, and a portion of the Republican River are encompassed within the EFA. Protected areas include: Wilson Lake Wildlife Area, Kanopolis Lake and associated wildlife areas, and Maxwell Wildlife Refuge. The region is predominantly agriculture with cattle grazing and haying the common practices within the native landscapes; mismanagement and fragmentation are common threats within the EFA.

EFA Development

This EFA was delineated using CHAT Large Natural Areas, CHAT Connectivity, SGCN locations and Land Cover as base data. Hexagons were selected with >= 50% Natural Vegetation within the Smoky Hills physiographic province in an area generally bounded by the TNC portfolio sites occurring within the Smoky Hills. The EFA connects several disjunct TNC portfolio sites into a continuous landscape.

CONSERVATION ISSUES

Agriculture

-Conversion of native grasslands to other uses causes fragmentation, destroys native flora, and decreases habitat availability

-Grassland conversion and improper grazing regimes result in habitat loss and fragmentation, and increases sediment discharge to basins and increases nutrient runoff which alters playa hydrology (timing, duration, and depth of flooding) and water quality

-Practices such as wetland drainage and cropland cultivation degrades water quality from runoff and increases sedimentation

Energy Production
-Development and expansion of wind energy, solar arrays, transmission infrastructure, and oil/gas fields infrastructure and activities in native grasslands – impacting grasslands and migratory birds, bats, and other wildlife

Invasive and other problematic species and genes
-Invasive woody and herbaceous plants compete with native flora and modify habitat structure and function for fauna

Natural system modifications
-Improperly applied use of prescribed fire (including periodicity and seasonality of fire)
-Suppression of fire alters composition of native grasslands
-The use of surface water from rivers and streams for irrigation is lowering the ground water level

Pollution
-Pollution from point and non-point sources includes runoff of pesticides, fertilizers, herbicides, and other chemicals as well as trash disposal/landfill opperations

CONSERVATION ACTIONS

Education and awareness
-Conduct pre- and post-construction studies on energy generation facilities to determine the impact on wildlife and habitat. Research temperature and vegetation impacts caused by wind generators
-Conduct wildlife surveys for data lacking species. Surveys should be rigorous, repeatable, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics
-Continue disease monitoring (e.g. Chytrid Fungus, Ranavirus, White-nose Syndrome)
-Develop sites to demonstrate best management practices on public and private lands
-Place special emphasis on programs to study and conserve grassland-nesting birds
-Research and investigate best management practices to control invasive species (e.g. Eastern Red Cedar and Old World Bluestems)
-Research the effects of coal bed-methane extraction on wildlife and water quality

External capacity building
-Cooperate with the state and federal Department of Agriculture in developing management strategies for coping with potential problems from exotic livestock and wildlife introductions. Develop contingency plans for managing exotic wildlife
-Work with county zoning boards to implement well thought out planning procedures.

Land/water management
-Implement ecologically sensitive grazing and haying practices, including rest periods, for mixed grass prairie on private and public lands as well as promoting the responsible, well-planned use of prescribed fire as a management/restoration too
-Implement procedures to discourage planting of invasive species, while encouraging the establishment of appropriate native species
-Implement wildlife expert review of wind energy siting effects on prairie chickens, bats, etc., and make recommendations
-Promote ecologically sound techniques for flood control, erosion control, non-point source pollution control, and bank stabilization
-Provide incentives for mechanical control of woody invasive species

Land/water protection

-Offer incentives for constructing fences around seeps and springs to restrict livestock access

-Offer incentives to landowners not to sell land for private development

-Work with willing donors/sellers to prevent further prairie fragmentation and expand connectivity corridors by using conservation easements and other tools

Species management

-Continue to support population and distributional surveys of the Black-tailed Prairie Dog

-Develop and implement an effective information and educational program focused on the role and value of Black-tailed Prairie Dogs in native grasslands and the importance of ending removal policies for prairie dogs from public and private lands

-Review and implement the Black-tailed Prairie Dog Management Plan

-For mammals, describe habitat associations and measure trends in habitat distribution and quality in coordination with conservation societies. Assess the range and distribution of particular restricted range species, such as the Southern Bog Lemming

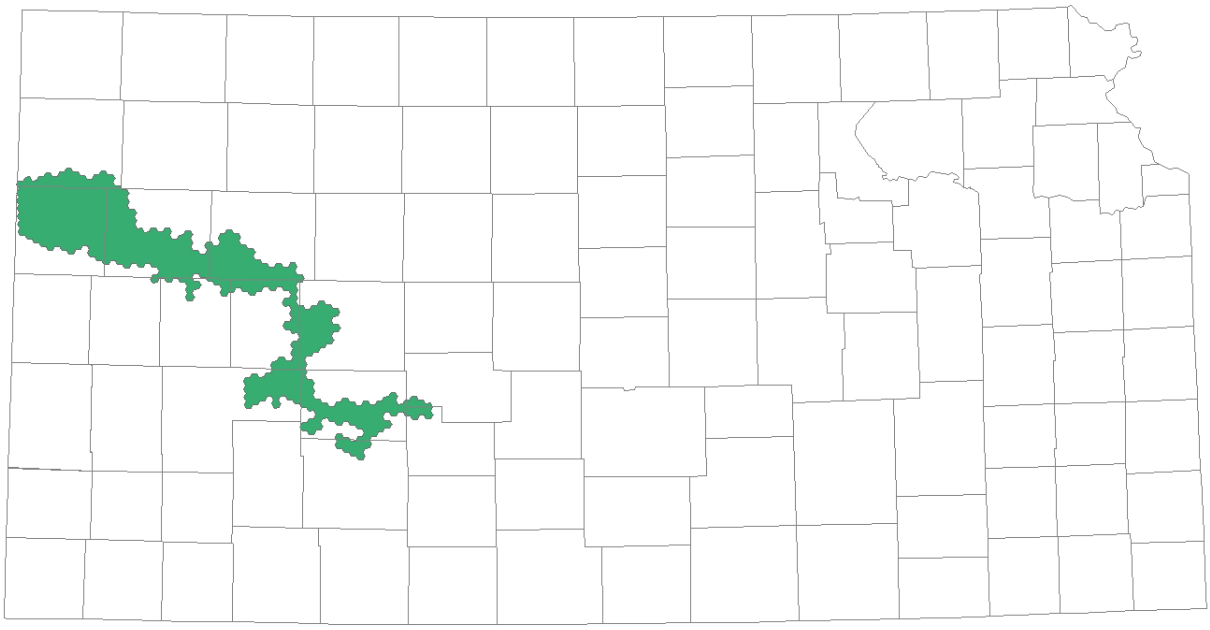
-Initiate and continue distributional surveys of Greater and Lesser Prairie Chickens, and other declining grasslands bird species

Species of Greatest Conservation Need

Amphibians	Tiger Salamander	*Ambystoma tigrinum*	
Birds	American Tree Sparrow	*Spizella arborea*	
Birds	American White Pelican	*Pelecanus erythrorhynchos*	
Birds	Baird's Sparrow	*Centronyx bairdii*	
Birds	Bald Eagle	*Haliaeetus leucocephalus*	
Birds	Baltimore Oriole	*Icterus galbula*	
Birds	Barn Owl	*Tyto alba*	
Birds	Bell's Vireo	*Vireo bellii*	
Birds	Black-billed Cuckoo	*Coccyzus erythropthalmus*	
Birds	Buff-breasted Sandpiper	*Calidris subruficollis*	
Birds	Burrowing Owl	*Athene cunicularia*	
Birds	Chestnut-collared Longspur	*Calcarius ornatus*	
Birds	Common Nighthawk	*Chordeiles minor*	
Birds	Common Poorwill	*Phalaenoptilus nuttallii*	
Birds	Dickcissel	*Spiza americana*	
Birds	Eastern Kingbird	*Tyrannus tyrannus*	
Birds	Grasshopper Sparrow	*Ammodramus savannarum*	
Birds	Greater Prairie-Chicken	*Tympanuchus cupido*	
Birds	Harris's Sparrow	*Zonotrichia querula*	
Birds	Henslow's Sparrow	*Centronyx henslowii*	SINC
Birds	Lark Sparrow	*Chondestes grammacus*	
Birds	Lesser Prairie Chicken	*Tympanuchus pallidicinctus*	Federal Threatened
Birds	Loggerhead Shrike	*Lanius ludovicianus*	
Birds	Northern Bobwhite	*Colinus virginianus*	
Birds	Piping Plover	*Charadrius melodus*	Federal & State Threatened
Birds	Red-headed Woodpecker	*Melanerpes erythrocephalus*	
Birds	Rusty Blackbird	*Euphagus carolinus*	
Birds	Short-eared Owl	*Asio flammeus*	SINC
Birds	Sprague's Pipit	*Anthus spragueii*	
Birds	Swainson's Hawk	*Buteo swainsoni*	
Birds	Upland Sandpiper	*Bartramia longicauda*	
Birds	Western Kingbird	*Tyrannus verticalis*	
Birds	Wilson's Phalarope	*Phalaropus tricolor*	
Gastropods	A terrestrial snail	*Succinea pseudavara*	
Gastropods	Mudbank Ambersnail	*Catinella vagans*	
Gastropods	Ruidoso Snaggletooth	*Gastrocopta ruidosensis*	
Gastropods	Xeric Ambersnail	*Succinea vaginacontorta*	

Insect	A Cave Obligate Isopod	*Caecidotea tridentata*	
Insect	A dieunomia bee	*Dieunomia triangulifera*	
Insect	A leafcutter bee	*Megachile integra*	
Insect	A leafcutter bee	*Megachile mucorosa*	
Insect	A scarab beetle	*Geomyphilus insolitus*	
Insect	A scarab beetle	*Orizabus pyriformis*	
Insect	A scarab beetle	*Pardalosus neodistinctus*	
Insect	A scarab beetle	*Strategus mormon*	
Insect	A scarab beetle	*Tetraclipeoides dentigerulus*	
Insect	A sweat bee	*Agopostemon coloradensis*	
Insect	A sweat bee	*Dieunomia apacha*	
Insect	Abberrant Cellophane Bee	*Colletes aberrans*	
Insect	American Bumble Bee	*Bombus pensylvanicus*	Federal Candidate
Insect	Arogos Skipper	*Atrytone arogos*	
Insect	Bald-spot Sweat Bee	*Lasioglossum paraforbesii*	
Insect	Bicoloured Sweat Bee	*Agopostemon virescens*	
Insect	Black-and-gold Bumble Bee	*Bombus auricomus*	
Insect	Byssus Skipper	*Problema byssus*	
Insect	Dotted Skipper	*Herperia attralus*	
Insect	Ghost Tiger Beetle	*Ellipsoptera lepida*	
Insect	Maritime Sunflower Borer Moth	*Papaipema maritima*	
Insect	Monarch	*Danaus plexippus*	Federal Candidate
Insect	Morrison's Bumble Bee	*Bombus morrisoni*	
Insect	Mottled Duskywing	*Erynnis martialis*	
Insect	Occidental Digger Bee	*Anthophora occidentalis*	
Insect	Ottoe Skipper	*Hesperia ottoe*	
Insect	Pahaska Skipper	*Hesperia pahaska*	
Insect	Particular Small Dung Beetle	*Scabrostonus peculiosis*	
Insect	Robust Sunflower Leafcutter Bee	*Megachile fortis*	
Insect	Soapberry Hairstreak	*Phaeostrymon alcestis*	
Insect	Southern Plains Bumble Bee	*Bombus fraternus*	
Insect	Splendid Sweat Bee	*Agopostemon splendens*	
Insect	Susan's Plasterer Bee	*Colletes susannae*	
Insect	Variable Cuckoo Bumble Bee	*Bombus variabilis*	Federal Under Review
Insect	The Unexpected Milkweed Moth	*Cycnia inopinatus*	
Insect	White-cloaked Tiger Beetle	*Eunota togata latilabris*	
Insect	Whitish Sweat Bee	*Agopostemon sericeus*	
Insect	Yellow Bumble Bee	*Bombus fervidus*	
Mammals	Black-tailed Prairie Dog	*Cynomys ludovicianus*	
Mammals	Plains Spotted Skunk	*Spilogale interrupta*	State Threatened
Mammals	Northern Myotis	*Myotis septentrionalis*	Federal Endangered, SINC
Mammals	Southern Bog Lemming	*Synaptomys cooperi*	SINC
Mammals	Tricolored Bat	*Perimyotis subflavus*	
Mammals	Franklin's Gound Squirrel	*Poliocitellus franklinii*	
Plants	Hancin's Dewberry	*Rubus hancinianus*	
Plants	Kansas Arrowhead	*Sagittaria ambigua*	
Plants	Missouri Mud-plantain	*Heteranthera missouriensis*	
Reptiles	Eastern Hog-nosed Snake	*Heterodon platirhinos*	SINC
Reptiles	Ground-snake	*Sonora semiannulata*	
Reptiles	Common Lesser Earless Lizard	*Holbrookia maculata*	
Reptiles	Western Massasauga	*Sistrurus tergeminus*	
Reptiles	Plains Hog-nosed Snake	*Heterodon nasicus*	SINC
Reptiles	Prairie Rattlesnake	*Crotalus viridis*	
Reptiles	Texas Horned Lizard	*Phrynosoma cornutum*	
Turtles	Ornate Box Turtle	*Terrapene ornata*	
Turtles	Smooth Softshell	*Apalone mutica*	

Chapter 29 – WESTERN RIVER BREAKS



The Western River Breaks EFA is dominated by the Shortgrass Prairie and Mixed Grass Prairie habitats. Dramatic chalk badlands and bluffs overlook large expanses of rangeland and rocky ravines along the river and streams. The Smoky Hill River floodplain and its surrounding upland habitats provide valuable refugia to the biodiversity of the EFA. Rangeland grazing is a common practice within the EFA. Issues include fragmentation of prairies and mismanaged grazing practices, which have modified the existing prairies. Protected areas include the Logan Wildlife Area, the Smoky Valley Ranch, and Scott State Park. Numerous SGCN occur within this EFA, including the endemic Scott Riffle Beetle and isolated populations of the Chihuahuan Green Toad. Prairie dog colonies provide habitats for many SGCN including the Burrowing Owl, Swift Fox, Lesser Prairie Chickens and Black-footed Ferret.

EFA Development

This EFA is similar to the TNC portfolio site "Chalk Bluffs" from the Central Shortgrass Prairie Ecoregional Plan but includes hexagons overlaying areas of SGCN locations, CHAT connectivity layer, and CHAT large intact blocks layer.

CONSERVATION ISSUES

Agriculture

-Conversion of native grasslands to other uses cause fragmentation, destroys native flora and decreases habitat availability

-Inappropriate grazing and haying practices on native grasslands decreases habitat heterogeneity and can change vegetative community composition

-Practices such as wetland drainage and cropland cultivation degrades water quality from runoff and increases sedimentation

Biological resource use
-Black-tailed Prairie Dog population is low and under continual threat due to eradication programs (some counties very heavy handed on readicating species & Black tailed prairie dog labeled as noxious species)

Energy Production
-Development and expansion of wind energy, solar arrays, trasmission infrastructure, and oil/gas fields infrastructure and activities in native grasslands – impacting grasslands and migratory birds, bats, and other wildlife

Invasive and other problematic species and genes
-Invasive woody and herbaceous plants compete with native flora and modify habitat structure and function for fauna
-Sylvatic plague has the potential to impact black-tailed prairie dog populations

Natural system modifications
-The use of aquafer or alluvial water from rivers and streams for irrigation is lowering the ground water level

Pollution
-Overuse/misapplication of pesticides and fertilizer also contribute to water quality degradation from runoff
-Widespread broadcast application of pesticides often causes off-target species mortality, contributes to development of pesticide resistance, and reduces diversity of flora and fauna while increasing soil salinity

CONSERVATION ACTIONS

Education and awareness
-Conduct wildlife surveys for data lacking species. Surveys should be rigorous, repeatable, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics
-Continued disease monitoring (Chytrid Fungus, Ranavirus, Snake Fungal Disease, Sylvatic Plague, etc.)
-Develop a broad scale education approach and outreach program on the impacts of fragmentation, woody invasion and encroachment, energy development and other land use changes on flora and fauna
-Develop best management practices to control and manage invasive species
-Educate landowners on wildlfie preservation programs and the benefits to landowners, prevent misinformation and distrust of state agency
-Research cover crop benefits for wildlife

External capacity building
-Concerns over NRCS is not regulating CRP requirements and its not being grazed properly
-Partner with industrial, energy, and telecommunication companies as well as private landowners to reduce impacts on native grasslands and lesser prairie chickens by encouraging burial or rerouting of power lines and other structures around key lekking, nesting, and brood rearing habitats
-Work with other state agencies, to avoid, minimize, reduce and mitigate impacts to habitat resulting from their programs

Land/water management
-Develop and implement incentive programs for landowners and managers to promote heterogeneity and diversity for wildlife while maintaining viable farming/ranching operation (*i.e.* cover crops, defer/limit herbicide applications, CRP grazing reserve)
-Develop and implement methods to offset economic practices (*i.e.* wind farms, farm management systems encouraging overproduction, conversion of marginal lands into crop production, urbanization) that have negative environmental impacts
-Encourage the use of CRP as a grazing reserve to allow recovery of native range

-Implement ecologically-sensitive grazing and haying practices, including rest periods, for shortgrass prairie on private and public lands as well as promoting the responsible, well-planned use of prescribed fire as a management/restoration tool
-Increase the heterogeneity of native habitats, as well as general landscapes by using greenways, corridors, buffer strips, refuges and the Conservation Reserve
-Promote ecologically sounds techniques for flood control, erosion control, non-point source pollution control, and bank stabilization

Land/water protection

-Promote field border programs and county road easements which are landowner and wildlife friendly
-Provide incentives to landowners to maintain, improve, enhance key grassland sites, and reduce intensified agricultural practices
-Provide incentives to prevent or reduce the likelihood of the sale of key grassland sites for industrial, housing, or other development
-Work with willing donors/sellers to prevent further prairie fragmentation and expand connectivity corridors by using conservation easements and other tools

Species management

-Continue to conduct population and distributional surveys of the Black-tailed Prairie Dog
-Develop and implement an effective information and educational program focused on the role and value of Black-tailed Prairie Dogs in native grasslands and the importance of ending removal policies for prairie dogs from public and private lands
-Review and implement the Black-tailed Prairie Dog Management Plan

Species of Greatest Conservation Need

Amphibians	Chihuahuan Green Toad	*Anaxyrus debilis*	State Threatened
Amphibians	Tiger Salamander	*Ambystoma tigrinum*	
Birds	American Tree Sparrow	*Spizella arborea*	
Birds	Baltimore Oriole	*Icterus galbula*	
Birds	Barn Owl	*Tyto alba*	
Birds	Bullock's Oriole	*Icterus bullockii*	
Birds	Burrowing Owl	*Athene cunicularia*	
Birds	Cassin's Sparrow	*Peucaea cassinii*	
Birds	Chestnut-collared Longspur	*Calcarius ornatus*	
Birds	Common Nighthawk	*Chordeiles minor*	
Birds	Common Poorwill	*Phalaenoptilus nuttallii*	
Birds	Eastern Kingbird	*Tyrannus tyrannus*	
Birds	Ferruginous Hawk	*Buteo regalis*	SINC
Birds	Golden Eagle	*Aquila chrysaetos*	SINC
Birds	Grasshopper Sparrow	*Ammodramus savannarum*	
Birds	Greater Prairie-Chicken	*Tympanuchus cupido*	
Birds	Lark Bunting	*Calamospiza melanocorys*	
Birds	Lesser Prairie-Chicken	*Tympanuchus pallidicinctus*	Federal Threatened
Birds	Loggerhead Shrike	*Lanius ludovicianus*	
Birds	Long-billed Curlew	*Numenius americanus*	SINC
Birds	McCown's Longspur	*Rhynchopanes mccownii*	
Birds	Red-headed Woodpecker	*Melanerpes erythrocephalus*	
Birds	Short-eared Owl	*Asio flammeus*	SINC
Birds	Swainson's Hawk	*Buteo swainsoni*	
Birds	Western Kingbird	*Tyrannus verticalis*	
Gastropods	Mudbank Ambersnail	*Catinella vagans*	
Gastropods	Xeric Ambersnail	*Succinea vaginacontorta*	
Insect	A leafcutter bee	*Megachile deflexa*	
Insect	A scarab beetle	*Geomyphilus kiowensis*	
Insect	A scarab beetle	*Onthophagus knausi*	
Insect	A scarab beetle	*Orizabus pyriformis*	

Insect	A scarab beetle	*Pardalosus neodistinctus*	
Insect	A scarab beetle	*Tetraclipeoides dentigerulus*	
Insect	A scarab beetle	*Trox paulseni*	
Insect	A sweat bee	*Agopostemon coloradensis*	
Insect	A sweat bee	*Dieunomia apacha*	
Insect	A wool-carder bee	*Anthidium maculosum*	
Insect	American Bumble Bee	*Bombus pensylvanicus*	Federal Candidate
Insect	Bicoloured Sweat Bee	*Agopostemon virescens*	
Insect	Black-and-gold Bumble Bee	*Bombus auricomus*	
Insect	Evening Primrose Leafcutter Bee	*Megachile anograe*	
Insect	Great Plains Giant Tiger Beetle	*Amblycheila cylindriformis*	
Insect	Monarch	*Danaus plexippus*	Federal Candidate
Insect	Morrison's Bumble Bee	*Bombus morrisoni*	
Insect	Ottoe Skipper	*Hesperia ottoe*	
Insect	Pocket Gopher Flower Beetle	*Eupharia disciollis*	
Insect	Regal Fritillary	*Argynnis idalia*	Federal Under Review
Insect	Scott Riffle Beetle	*Optioservus phaeus*	State Endangered
Insect	Southern Chimney Bee	*Diadasia australis*	
Insect	Southern Plains Bumble Bee	*Bombus fraternus*	
Insect	Splendid Sweat Bee	*Agopostemon splendens*	
Insect	Yellow Bumble Bee	*Bombus fervidus*	
Mammals	Black-footed Ferret	*Mustela nigripes*	Federal & State Endangered
Mammals	Black-tailed Prairie Dog	*Cynomys ludovicianus*	
Mammals	Plains Spotted Skunk	*Spilogale interrupta*	State Threatened
Mammals	Spotted Ground Squirrel	*Xerospermophilus spilosoma*	
Mammals	Swift Fox	*Vulpes velox*	
Mammals	Western Small-footed Myotis	*Myotis ciliolabrum*	
Reptiles	Eastern Hog-nosed Snake	*Heterodon platirhinos*	SINC
Reptiles	Glossy Snake	*Arizona elegans*	SINC
Reptiles	Common Lesser Earless Lizard	*Holbrookia maculata*	
Reptiles	Long-nosed Snake	*Rhinocheilus lecontei*	SINC
Reptiles	Plains Hog-nosed Snake	*Heterodon nasicus*	SINC
Reptiles	Prairie Rattlesnake	*Crotalus viridis*	
Turtles	Ornate Box Turtle	*Terrapene ornata*	

Success Story

KDWP Biodiversity Survey Program

As with most programs within Kansas Wildlife and Parks, data driven means collecting data on the various non-game species within Kansas. While there is always a need for data on sensitive species, information about less imperiled species is just as important to keep with the overall theme of the State Wildlife Action Plan for “Keeping Common Species Common.”

The Stream Survey Program was initiated in 1994 to address the need of the status of sensitive stream-fish species for KDWP’s project review process. At that time stream surveys were funded by Sportfish Restoration Funds. But in the early 2000s, funding was shifted to the State Wildlife Grant Program (SWG). These cost-effective surveys were able to continue in ongoing 2-3 year cycles addressing various questions regarding the status of species such as the Arkansas Darter, a species considered for listing as threatened at the federal level. The efforts of the biologist and technicians surveying potential areas of occurrence for this species was instrumental in the Species Status Assessment ultimately rendering a “not warranted" decision for federal listing. Similar surveys have yielded positive results when assessing other species of concern within Kansas as part of the state’s 5-year review of its State Threatened and Endangered Species list. To this date, 2562 aquatic surveys have been performed on over 1142 miles of streams in Kansas. Sampling time for other methods employed has amounted to over 1432 hours. The number of fish species recorded during this time is 124.

In 2015 a Terrestrial Survey crew was added that conducted herpetofauna surveys while focusing on individual species of interest. Just recently the Broad-headed Skink was petitioned for downlisting from Threatened status to a Species in Need of Conservation (SINC). Such actions would not have been possible without the data collected from these survey efforts. Terrestrial efforts continue to yield valuable data as Biologists have covered thousands of hectares of ground employing various survey methods including camera traps, visual encounter surveys, and trap arrays. The focus has been primarily on herpetofauna with some small mammal data collection also occurring.

From a human dimensions side, the biodiversity survey program has employed approximately 175 Seasonal ecological technicians to aid in these intensive sampling efforts. Many of these technicians have gone on to work for other state fish and wildlife agencies, including KDWP. The combination of effort and science continues to positively add to the growing successes of this program.

Chapter 30 - PLAN TO REVIEW AND MONITORING

Plan Review and Revision

Element 6 of the "Eight Required Elements for State Wildlife Action Plans" directs each state to review its SWAP at least every ten years. KDWP proposes to implement an interim review every five years. The interim review will provide a foundation for the next required ten-year comprehensive review and allow for a periodic review of the plan or its parts, if needed, in order to address emerging issues, new information on changes in abundance, distribution, population trends, listing status of species, and habitat conditions.

This comprehensive, 10-year review allowed KDWP and its conservation partners to evaluate the Ecological Focus Area approach and update any new emerging issues or actions not previously identified. This 4th edition serves as the states 2nd comprehensive review of its SWAP.

KDWP will continue to annually collect and collate species occurrence, status, and trends data obtained through direct research by KDWP and conservation partners. Habitat data will be updated using new land cover products, data collected in the field, and other new products as they become available.

Ongoing communication and coordination among conservation partners will help track progress and identify new circumstances and changing situations. Conservation partners will review the relevance of the plan and identify opportunities for work sharing and joint budgeting of projects. This process will be facilitated by KDWP but will involve many members of the conservation community in Kansas.

Adaptive Management and Monitoring

Adaptive management recognizes uncertainty in how habitats may respond to management and capitalizes upon changes and improvements in how we manage natural resources. Adaptive management involves four essential pieces: (1) developing plans, (2), implementing those plans, (3) monitoring the effects of management actions, and (4) adjusting future plans. Plan implementation and monitoring are conducted within an experimental framework to facilitate the learning process and allow for testing of new management methods and techniques. Monitoring and adaptive management will be facilitated through processes involving KDWP and potential partners. Through ongoing communication supplemented by this process, ideas for projects can be exchanged and coordinated, information from existing surveys can be shared, and projects can be developed for implementing top strategies from this plan ("top" strategies being those addressing highest ranked habitats, issues, and species).

Monitoring approaches are identified within each key habitat within each conservation region. Monitoring is crucial to employing adaptive management approaches and ensuring strategies have the desired results. It is an ongoing part of management by KDWP and many other agencies and

organizations. Existing monitoring/data-gathering processes will be the basis for assessing the results of implementation of this plan. As individual projects are developed, evaluation/monitoring will be part of each project. In addition, specific projects, solely for monitoring, may be designed and implemented. In some cases, new approaches will have to be developed, and in other cases, information will be available from partner agencies and organizations. Monitoring of some species and habitats will provide relevant information for evaluating plan success. This includes monitoring SGCN at the statewide, conservation region, and habitat scales, in addition to monitoring success of individual projects. These monitoring projects will analyze both performance measures and achievement of actual changes in habitats or species status.

In keeping with the concepts behind the design of the Kansas Wildlife Action Plan approach and advice from the U.S. Fish and Wildlife Service and the International Association of Fish and Wildlife Agencies, at first Kansas' monitoring will employ existing surveys and inventories, including monitoring being done by conservation partners. As with the concept of using the best available information and not gathering new information on which to base this plan, the same concept applies to monitoring. KDWP and their potential partners assisting in implementing this plan have ongoing, standardized surveys to monitor a host of parameters dealing with species and habitats in Kansas. Information from these existing data gathering efforts will be meshed with information from additional monitoring efforts to provide the best, comprehensive picture of plan results. Monitoring will initially be focused on priority research and survey needs to obtain basic information. Monitoring will also be used to determine when strategies have adequately addressed various issues. When conservation success is not what was anticipated, monitoring will allow plans to be updated and altered so new actions can be developed and implemented – the "adaptive" part of adaptive management. In a number of cases, monitoring or research will need to be the first step to determine existing conditions where this basic knowledge does not yet exist.

As implementation of Kansas' Wildlife Action Plan proceeds, monitoring will shift to include tracking tangible achievement of resource conservation. As this plan is implemented through operational planning and specific, detailed projects, it is anticipated that achieving positive conservation results may in many instances take several years. It will be necessary to maintain emphasis on monitoring to determine when, and to what extent, tangible results are achieved, and to decide when changes may need to be made in actions.

Chapter 31 – ACKNOWLEDGEMENTS

SWAP Partners

Thank you to all the conservation partners and general public who committed their valuable time to either review the document, attend a regional meeting, reach out with suggestions or concerns, shared data, or offer expertise. The effort provided improves the SWAP to make it the most effective, comprehensive, and innovative conservation strategy possible.

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Appendix 1
Selection Criteria for
Species of Greatest Conservation Need

Step 1: Selection of Species of Greatest Conservation Need; a species must meet at least one or more of the following criteria.

1. Native species, which are classified as federally threatened, endangered or candidate under the Endangered Species Act (ESA).

2. Native species, which are classified as Kansas threatened, endangered, or Species in Need of Conservation (SINC).

3. Native species, which have been assigned a global conservation status rank of G1, G2 or G3 by NatureServe.

4. Native species which have been identified as conservation priorities through a range wide status assessment, or assessment of large taxonomic divisions or which has significant conservation implication, or has major conservation contribution to the state; or are indicative of a diversity and health of the state's wildlife.
   Assessments include: American Fisheries Society assessments of freshwater fish, freshwater mussels, and crayfish. Partners in Flight Conservation Plan, Playa Lakes Joint Venture, and the U.S. Fish and Wildlife Service Region 6 Priority Birds.

5. Native species, which are regionally endemic (distribution confined to central states) regardless of their conservation status.

Appendix 2
Species of Greatest Conservation Need

This table includes Kansas' Species of Greatest Conservation Need along with the species' federal status, state status, selection criteria number, global and state conservation status ranks, and the Ecological Focus Area (EFA) in which the species occur.
T = Threatened, **E** = Endangered, **C** = Candidate, **UR =** Under Review, **PE =** Proposed Endangered, **SINC** = Species in Need of Conservation
Aquatic EFAs: **MO**-Missouri, **NO**-Neosho, **SH**-Smoky Hill, **UA**-Upper Arkansas, **CN**-Cimarron, **LAR**-Lower Arkansas, **KLR**-Kansas Lower Republican, **MC**-Marias des Cygnes, **UR**-Upper Republican, **VS**-Verdigris, **WT**-Walnut
Terrestiral EFAs: **AB**-Arikaree Breaks, **PL**-Playa Landscape, **WRB**-Smoky Hill River Breaks, **ARSP**-Arkansas River Sandsage Prairie, **CG**-Cimarron Grasslands, **RH**-Red Hills, **QA**-Quivira, **CB**-Cheyenne Bottoms, **SH**-Smoky Hills, **FH**-Flint Hills, **CH**-Chautauqua Hills, **ETP**-Eastern Tallgrass Prairie, **EF**-Eastern Forests, **OP**-Ozark Plateau

Group	Common Name	Scientific Name	Federal Status	State Status	Selection Criteria	G-rank (Rounded)	S-rank	Aquatic EFA	Terrestrial EFA
Amphibians	Cave Salamander	*Eurycea lucifuga*		E	2	G5	S1		OP
Amphibians	Common Mudpuppy	*Necturus maculosus*			4	G5	S3	MC, VS	FH, CH
Amphibians	Crawfish Frog	*Lithobates areolata*		SINC	2	G4	S3		FH, CH, OP
Amphibians	Eastern Narrow-mouthed Toad	*Gastrophryne carolinensis*		T	2	G5	S1		OP
Amphibians	Eastern Newt	*Notophtalmus viridescens*		T	2	G5	S2		OP
Amphibians	Green Frog	*Lithobates clamitans*		T	2	G5	S1	NO	OP
Amphibians	Chihuahuan Green Toad	*Anaxyrus debilis*		T	2,5	G5	S2S3		WRB, CG
Amphibians	Grotto Salamander	*Eurycea spelaeas*		E	2,5	G4	S1		OP
Amphibians	Long-tailed Salamander	*Eurycea longicauda*		T	2	G5	S2		OP
Amphibians	Red-spotted Toad	*Anaxyrus punctatus*		SINC	2	G5	S2S3	LAR, CN	CG, RH
Amphibians	Spring Peeper	*Pseudacris crucifer*		SINC	2	G5	S3	MC, NO	OP
Amphibians	Strecker's Chorus Frog	*Pseudacris streckeri*		T	2,5	G5	S3	LAR	RH,
Amphibians	Eastern Tiger Salamander	*Ambystoma tigrinum*			4	G5	S5		PL, WRB, SH, CB, QA, RH, FH
Amphipod	Clanton's Cave Amphipod	*Stygobromus clantoni*			4,5	G3	S2S3		FH, ETP
Amphipod	Kansas Well Amphipod	*Bactrurus hubrichti*			5	G1	S3S4		FH, CH, ETP
Amphipod	Onondaga Cave Amphipod	*Stygobromus onondagaensis*			3	G3	SNR		FH
Arachnida	A trap door spider	*Antrodiaetus lincolnianus*			5	GNR	SNR		ETP
Arachnida	A trap door spider	*Sphodros fitchi*			5	GNR	SNR		ETP
Arachnida	A trap door spider	*Ummidia beatula*			5	GNR	SNR		FH, CH, ETP

Appendix 2
Species of Greatest Conservation Need

Group	Common Name	Scientific Name	Federal Status	State Status	Selection Criteria	G-rank (Rounded)	S-rank	Aquatic EFA	Terrestrial EFA
Arachnida	An aquatic mite	*Tyrrellia hibbardi*			5	GNR	SNR	CN	
Birds	American Avocet	*Recurvirostra americana*			4	G5	S2B,S3N		PL, CN, CB, QA, RH
Birds	American Bittern	*Botaurus lentiginosus*			4	G5	S1B		CB, QA, FH, CH, EF, ETP, OP
Birds	American Golden-Plover	*Pluvialis dominica*			4	G5	S3N		PL, CB, QA, FH, CH, ETP
Birds	American Tree Sparrow	*Spizella arborea*			4	G5	S5N		All terrestrial EFAs
Birds	American White Pelican	*Pelecanus erythrorhynchos*			4	G4	S5N		PL, SH, CB, QA, RH, CH, EF
Birds	Baird's Sandpiper	*Calidris bairdii*			4	G5	S4N		PL, CG, CB, QA, RH, FH, CH, EF, ETP, OP
Birds	Baird's Sparrow	*Centronyx bairdii*			4	G4	SNA		SH, FH, CH, EF, ETP, OP
Birds	Bald Eagle	*Haliaeetus leucocephalus*			4	G5	S4B,S4N		SH, CB, QA, FH, CH, EF
Birds	Baltimore Oriole	*Icterus galbula*			4	G5	S5B		AB, WRB, SH, CB, QA, RH, FH, CH, EF, ETP, OP
Birds	Barn Owl	*Tyto alba*			4	G5	S3		All terrestrial EFAs
Birds	Bell's Vireo	*Vireo bellii*			4	G5	S4B		AB, SH, CB, QA, RH, FH, CG, EF, ETP, OP
Birds	Black Rail	*Laterallus jamaicensis*	T	SINC	2,3	G3	S1B		CB, QA, RH
Birds	Black Tern	*Chlidonias niger*		SINC	2	G5	S1B		CB, QA, FH, CH, EF, ETP, OP
Birds	Black-bellied Plover	*Pluvialis squatarola*			4	G5	S3N		PL, CB, QA, FH, CH, EF, ETP, OP
Birds	Black-billed Cuckoo	*Coccyzus erythropthalmus*			4	G5	S3B		SH, CB, RH, FH, EF, ETP
Birds	Black-necked Stilt	*Himantopus mexicanus*			4	G5	S1B		PL, CB, QA, RH
Birds	Bobolink	*Dolichonyx orzivorus*		SINC	2	G5	S1B		CB, QA, FH
Birds	Buff-breasted Sandpiper	*Calidris subruficollis*			4	G4	SNA		PL, SH, CB, QA, FH, CH, ETP

Appendix 2
Species of Greatest Conservation Need

Group	Common Name	Scientific Name	Federal Status	State Status	Selection Criteria	G-rank (Rounded)	S-rank	Aquatic EFA	Terrestrial EFA
Birds	Bullock's Oriole	*Icterus bullockii*			4	G5	S3B		AB, PL, WRB, ARSP, CG, RH
Birds	Burrowing Owl	*Athene cunicularia*			4	G4	S3B		AB, PL, WRB, CG, SH, CB, RH, FH
Birds	Canvasback	*Aythya valisineria*			4	G5	S3N		PL, QA, FH, CH, EF, ETP, OP
Birds	Cassin's Sparrow	*Peucaea cassinii*			4,5	G5	S3B		AB, WRB, ARSP, CG, RH
Birds	Cerulean Warbler	*Setophaga cerulea*		SINC	2	G4	S1B		EF
Birds	Chestnut-collared Longspur	*Calcarius ornatus*			4	G5	S3N		AB, PL, WRB, ARSP, CG, SH, RH
Birds	Chihuahuan Raven	*Corvus cryptoleucus*		SINC	2,4	G5	S1		CG
Birds	Chuck-will's-widow	*Antrostomus carolinensis*			4	G5	S4B		RH, FH, CH, EF, ETP, OP
Birds	Common Nighthawk	*Chordeiles minor*			4	G5	S5B		AB, PL, WRB, ARSP, CG, SH, QA, RH, FH, CH
Birds	Common Poorwill	*Phalaenoptilus nuttallii*			4	G5	S3B		AB, WRB, ARSP, CG, SH, RH, FH
Birds	Curve-billed Thrasher	*Toxostoma curvirostre*		SINC	2	G5	S1B		CG
Birds	Dickcissel	*Spiza americana*			4	G5	S5B		SH, CB, QA, RH, FH, CH, EF, ETP, OP
Birds	Eared Grebe	*Podiceps nigricollis*			4	G5	S1B		CB, QA
Birds	Eastern Kingbird	*Tyrannus tyrannus*			4	G5	S5B		All terrestrial EFAs
Birds	Eastern Meadowlark	*Sturnella magna*			4	G5	S5BS3N		CB, RH, FH, CH, EF, ETP, OP
Birds	Eastern Whip-poor-will	*Antrostomus vociferus*		SINC	2	G5	S3B		CH, EF, ETP, OP
Birds	Eastern Wood-Pewee	*Contopus virens*			4	G5	S5B		WRB, SH, CB, QA, RH, FH, EF, ETP, OP
Birds	Ferruginous Hawk	*Buteo regalis*		SINC	2	G4	S2BS4N		AB, PL, WRB, CG
Birds	Forster's Tern	*Sterna forsteri*			4	G5	S1B		CB, QA
Birds	Golden Eagle	*Aquila chrysaetos*		SINC	2	G5	S1BS2N		AB, WRB, RH

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Group	Common Name	Scientific Name	Federal Status	State Status	Selection Criteria	G-rank (Rounded)	S-rank	Aquatic EFA	Terrestrial EFA
Birds	Grasshopper Sparrow	*Ammodramus savannarum*			4	G5	S5B		AB, PL, WRB, ARSP, CG, SH, CB, QA, RH, FH, CH, ETP
Birds	Greater Prairie-Chicken	*Tympanuchus cupido*			4	G4	S4		AB, WRB, SH, CB, FH, CH, ETP
Birds	Greater Yellowlegs	*Tringa melanoleuca*			4	G5	S4N		PL, QA, FH, CH, ETP
Birds	Harris's Sparrow	*Zonotrichia querula*			4	G5	S4N		SH, CB, QA, RH, FH, EF, ETP, OP
Birds	Henslow's Sparrow	*Centronyx henslowii*		SINC	2,4	G4	S3B		SH, FH, CH, EF, ETP
Birds	Hudsonian Godwit	*Limosa haemastica*			4	G4	S3N		CB, QA, FH, CH, ETP
Birds	Kentucky Warbler	*Geothlypis formosa*			4	G5	S3B		CH, EF, ETP, OP
Birds	Ladder-backed Woodpecker	*Dryobates scalaris*		SINC	2	G5	S1		CG
Birds	Lark Bunting	*Calamospiza melanocorys*			4	G5	S5B		AB, WRB, ARSP, CG
Birds	Lark Sparrow	*Chondestes grammacus*			4	G5	S5B		AB, PL, ARSP, CG, SH, CB, QA, RH, CH, OP
Birds	Least Bittern	*Ixobrychus exilis*			4	G4	S2B		CB, QA, RH, FH, EF
Birds	Least Sandpiper	*Calidris minutilla*			4	G5	S4N		PL, CB, QA, FH, CH, ETP
Birds	Least Tern	*Sternula antillarum*		E	1,2,4	G4	S1B		CB, QA, RH, FH
Birds	Lesser Prairie-Chicken	*Tympanuchus pallidicinctus*	T		1,3,5	G3	S3		PL, WRB, ARSP, CG, RH
Birds	Lesser Yellowlegs	*Tringa flavipes*			4	G5	S4N		PL, CB, QA, FH, CH, ETP
Birds	Loggerhead Shrike	*Lanius ludovicianus*			4	G4	S4BS2N		All terrestrial EFAs
Birds	Long-billed Curlew	*Numenius americanus*		SINC	2,4	G4	S1BS2N		PL, WRB, CG, CB, QA
Birds	Long-billed Dowitcher	*Limnodromus scolopaceus*			4	G5	S4N		PL, CB, QA, FH, CH, ETP

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Group	Common Name	Scientific Name	Federal Status	State Status	Selection Criteria	G-rank (Rounded)	S-rank	Aquatic EFA	Terrestrial EFA
Birds	Marbled Godwit	*Limosa fedoa*			4	G5	S3N		PL, CB, QA, FH, CH, ETP
Birds	McCown's Longspur	*Rhynchopanes mccownii*			4	G4	S3N		AR, PL, WRB, ARSP, CG, RD
Birds	Mississippi Kite	*Ictinia mississippiensis*			4	G5	S4B		PL, CG, QA, RH, FH
Birds	Mountain Plover	*Charadrius montanus*		SINC	2,3	G3	S1B		CG
Birds	Northern Bobwhite	*Colinus virginianus*			4	G5	S5		AB, CG, SH, CB, QA, RH, FH, CH, EF, ETP, OP
Birds	Northern Pintail	*Anas acuta*			4	G5	S1BS4N		PL, CB, QA, FH, CH, ETP
Birds	Painted Bunting	*Passerina ciris*			4	G5	S4B		QA, RH, FH, CH, ETP
Birds	Pectoral Sandpiper	*Calidris melanotos*			4	G5	S4N		PL, CB, QA, FH, CH, ETP
Birds	Peregrine Falcon	*Falco peregrinus*			4	G4	S1BS3N		CB, QA, FH, CH, EF, ETP, OP
Birds	Piping Plover	*Charadrius melodus*	T	T	1,2,3	G3	S1BS2N		PL, SH, CB, QA, FH
Birds	Prothonotary Warbler	*Protonotaria citrea*			4	G5	S3B		FH, CH, EF, OP
Birds	Red Knot	*Calidris canutus rufa*	T		1	G4	SNA		CB, QA
Birds	Red-headed Woodpecker	*Melanerpes erythrocephalus*			4	G5	S5B		AB, WRB, CG, SH, CB, QA, RH, FH, CH, EF, ETP, OP
Birds	Rusty Blackbird	*Euphagus carolinus*			4	G4	SNA		SH, CB, QA, RH, FH, CH, EF, ETP, OP
Birds	Scaled Quail	*Callipepla squamata*			4	G5	S2		ARSP, CG
Birds	Scissor-tailed Flycatcher	*Tyrannus forficatus*			4,5	G5	S5B		CG, CB, RH, FH, EF, ETP, OP
Birds	Semipalmated Sandpiper	*Calidris pusilla*			4	G5	S4N		PL, CB, QA, FH, CH, ETP, OP
Birds	Short-eared Owl	*Asio flammeus*		SINC	2,4	G5	S2BS3N		PL, WRB, ARSP, CG, SH, CB, RH
Birds	Smith's Longspur	*Calcarius pictus*			4	G5	S2S3N		FH, CH, ETP

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Group	Common Name	Scientific Name	Federal Status	State Status	Selection Criteria	G-rank (Rounded)	S-rank	Aquatic EFA	Terrestrial EFA
Birds	Snowy Plover	*Charadrius nivosus*	T	T	2,3	G3	S1B		PL, CB, QA, RH
Birds	Spotted Towhee	*Pipilo maculatus*			4	G5	S2BS3N		AB
Birds	Sprague's Pipit	*Anthus spragueii*			4	G4	SNA		SH, CB, RH, FH
Birds	Stilt Sandpiper	*Calidris himantopus*			4	G5	S4N		PL, CB, QA, FH, CH, ETP
Birds	Swainson's Hawk	*Buteo swainsoni*			4	G5	S4B		AB, PL, WRB, ARSP, SH, CB, QA, RH, FH, CH, EF, ETP
Birds	Upland Sandpiper	*Bartramia longicauda*			4	G5	S4B		PL, SH, CB, QA, RH
Birds	Western Grebe	*Aechmophorus occidentalis*			4	G5	S1B		ARSP, CB, QA
Birds	Western Kingbird	*Tyrannus verticalis*			4	G5	S5B		AB, PL, WRB, ARSP, CG, SH, CB, QA, RH, FH
Birds	White-rumped Sandpiper	*Calidris fuscicollis*			4	G5	S4N		PL, CB, QA, FH, CH, ETP
Birds	Whooping Crane	*Grus americana*	E	E	1,2,3	G1	S1N		CB
Birds	Wilson's Phalarope	*Phalaropus tricolor*			4	G5	S2BS4N		PL, SH, CB, QA
Birds	Yellow Rail	*Coturnicops noveborancensis*			4	G4	SNA		FH, ETP
Birds	Yellow-throated Warbler	*Setophaga dominica*		SINC	2	G5	S1B		CH, EF, ETP, OP
Crustaceans	Calico Crayfish	*Faxonius immunis*			4	G5	S4	MO	
Crustaceans	Great Plains Mudbug	*Lacunicambarus nebrascensis*			4	G5	S3S4	MO, KLR, MC	
Crustaceans	Golden Crayfish	*Faxonius luteus*			4,5	G5	S3S4	KLR, MC	
Crustaceans	Gray-speckled Crayfish	*Faxonius palmeri*			4	G5	S2?		
Crustaceans	Kansas Fairy Shrimp	*Branchinecta mediospinosa*			4	GNR	S1		CB
Crustaceans	Neosho Midget Crayfish	*Faxonius macrus*		SINC	2,4,5	G4	S1		OP
Crustaceans	Prairie Crayfish	*Procambarus gracilis*			4	G5	S5		
Crustaceans	Ringed Crayfish	*Faxonius neglectus*			4	G5	S2S3		FH, OP
Crustaceans	Southern Plains Crayfish	*Procambarus simulans*			4,5	G5	S5		

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Group	Common Name	Scientific Name	Federal Status	State Status	Selection Criteria	G-rank (Rounded)	S-rank	Aquatic EFA	Terrestrial EFA
Crustaceans	Virile Crayfish	*Faxonius virilis*			4	G5	S5		
Crustaceans	Water Nymph Crayfish	*Faxonius nais*			4,5	G5	S5		
Crustaceans	White River Crawfish	*Procambarus acutus*			5	G5	S2		OP
Fish	American Eel	*Anguilla rostrata*			4	G4	S2	KLR, MO	
Fish	Arkansas Darter	*Etheostoma cragini*		SINC	2,3,5	G3	S2	LA, CN, NO, WT	
Fish	Arkansas River Shiner	*Notropis girardi*	T	T	1,2,3,4,5	G2	S1	UA, LA, CN	
Fish	Banded Darter	*Etheostoma zonale*		SINC	2	G5	S1	NO, VS	
Fish	Banded Sculpin	*Cottus carolinae*		SINC	2	G5	S1	NO	
Fish	Bigeye Shiner	*Notropis boops*		SINC	4	G5	S2S3	NO, VS, WT	
Fish	Black Buffalo	*Ictiobus niger*			4	G5	S5	LR, LA, MO, KLR, MC, NO, VS, WT	
Fish	Black Redhorse	*Moxostoma duquesnei*		SINC	2	G5	S1	NO	
Fish	Blackside Darter	*Percina maculate*		T	2	G5	S1	KLR	
Fish	Blue Sucker	*Cycleptus elongatus*		SINC	2,3	G3	S3	KLR, MO, NO	
Fish	Bluntnose Darter	*Etheostoma chlorosoma*		SINC	2	G5	S2	NO	
Fish	Brassy Minnow	*Hybognathus hankinsoni*		SINC	2	G5	S1	UR, KLR, MO	
Fish	Brindled Madtom	*Noturus miurus*		SINC	2	G5	S1	NO, VS	
Fish	Cardinal Shiner	*Luxilus cardinalis*		SINC	2,4,5	G4	S3	KLR, NO	
Fish	Channel Darter	*Percina copelandi*			4	G4	S3	LA, NO, VS, WT	
Fish	Chestnut Lamprey	*Ichthyomyzon castaneus*		SINC	2	G4	S1S2	KLR	
Fish	Common Shiner	*Luxilus cornutus*		SINC	2,4	G5	S3	KLR, SH	
Fish	Fantail Darter	*Etheostoma flabellare*			4	G5	S3	MC, NO, VS	
Fish	Flathead Chub	*Platygobio gracilis*		T	2	G5	S1	UA, MO	
Fish	Freckled Madtom	*Noturus nocturnus*			4	G5	S4	LA, MC, NO, VS, WT	
Fish	Golden Redhorse	*Moxostoma erythrurum*			4	G5	S5	UA, KLR, LA, CN, MC, NO, VS, WT	
Fish	Gravel Chub	*Erimystax x-punctatus*		SINC	2	G4	S2S3	NO	

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Group	Common Name	Scientific Name	Federal Status	State Status	Selection Criteria	G-rank (Rounded)	S-rank	Aquatic EFA	Terrestrial EFA
Fish	Greenside Darter	*Etheostoma blennioides*		SINC	2	G5	S2	MC, NO	
Fish	Highfin Carpsucker	*Carpiodes velifer*		SINC	2	G4	S2	KLR, NO, VS	
Fish	Hornyhead Chub	*Nocomis biguttatus*		T	2	G5	S1	MC	
Fish	Johnny Darter	*Etheostoma nigrum*		SINC	2,4	G5	S3	KLR, MO, SH, MC, NO	
Fish	Lake Sturgeon	*Acipenser fulvescens*		SINC	2	G3	SH	KLR	
Fish	Least Darter	*Etheostoma microperca*			4	G5	SH	NO	
Fish	Neosho Madtom	*Noturus placidus*	T	T	1,2,3,5	G2	S2	NO	
Fish	Northern Hog Sucker	*Hypentelium nigricans*		SINC	2	G5	S1	NO	
Fish	Northern Plains Killifish	*Fundulus kansae*			4	G5	S3	UR,UA, KLR, LA, CN	
Fish	Orangethroat Darter	*Etheostoma spectabile*			4	G5	S5	UR, KLR, LA, SH, MC, NO, VS, WT	
Fish	Ozark Logperch	*Percina caprodes fulvitaenia*			4	G5	S5	KLR, LA, SH, MC, NO, VS, WT	
Fish	Ozark Minnow	*Notropis nubilus*		SINC	2	G5	S1	NO	
Fish	Paddlefish	*Polyodon spathula*			4	G4	S3	KLR, MC, NO	
Fish	Pallid Sturgeon	*Scaphirhynchus albus*	E	E	1,2,3	G2	S1	KLR, MO	
Fish	Pealip Redhorse	*Moxostoma pisolabrum*			4	G5	SNR	LA, MC, NO, VS, WT	
Fish	Peppered Chub	*Macrhyhopsis tetranema*	E	E	2,3,4,5	G1	S1	UA, LA	
Fish	Plains Minnow	*Hybognathus placitus*		T	2	G4	S2S3	UR, KLR, LA, CN, MO	
Fish	Quillback	*Carpiodes cyprinus*			4	G5	S3S4	UR, KLR, LA, MO, MC, VS	
Fish	Redfin Darter	*Etheostoma whipplei*		SINC	2,4,5	G4	S3	NO, VS	
Fish	Redspot Chub	*Nocomis asper*		T	2,5	G4	S1	NO	
Fish	River Darter	*Percina shumardi*		SINC	2	G5	S1S2	NO	
Fish	River Redhorse	*Moxostoma carinatum*		SINC	2,4	G4	S1S2	KLR, NO	
Fish	River Shiner	*Notropis blennius*		SINC	2	G5	S3	KLR, MO	
Fish	Shoal Chub	*Macrhybopsis hyostoma*		T	2,4	G5	S3	KLR, MO	

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Group	Common Name	Scientific Name	Federal Status	State Status	Selection Criteria	G-rank (Rounded)	S-rank	Aquatic EFA	Terrestrial EFA
Fish	Shorthead Redhorse	*Moxostoma macrolepidotum*			4	G5	S5	KLR, LA, MO, SH, MC, NO	
Fish	Shovelnose Sturgeon	*Scaphirhynchus platorynchus*			1,4	G4	S3	KLR, MO	
Fish	Sicklefin Chub	*Macrhybopsis meeki*		E	2,3	G3	S1	KLR, MO	
Fish	Silver Chub	*Macrhybopsis storeriana*		E	2	G5	S3	KLR, LA, MO	
Fish	Silverband Shiner	*Notropis shumardi*		SINC	2	G5	SH	MO	
Fish	Slender Madtom	*Noturus exilis*			4	G5	S4	KLR, SH, MC, NO	
Fish	Slenderhead Darter	*Percina phoxocephala*			4	G5	S5	KLR, LA, MC, NO, VS, WT	
Fish	Slough Darter	*Etheostoma gracile*		SINC	2	G5	S1S2	NO, VS	
Fish	Southern Redbelly Dace	*Chrosomus erythrogaster*		SINC	2,4	G5	S2S3	KLR, LA, SH, NO	
Fish	Speckled Darter	*Etheostoma stigmaeum*			2	G5	-	NO	
Fish	Spotfin Shiner	*Cyprinella spiloptera*		SINC	2	G5	S1	KLR, NO	
Fish	Spotted Gar	*Lespisosteus oculatus*			4	G5	S1S2	MO, MC, NO, VS	
Fish	Spotted Sucker	*Minytrema melanops*		SINC	2	G5	S3	MC, NO, VS, WT	
Fish	Stonecat	*Noturus flavus*			4	G5	S5	UR, KLR, MO, SH, MC, NO, VS, WT	
Fish	Striped Shiner	*Luxilus chrysocephalus*		SINC	2	G5	S1	NO	
Fish	Sturgeon Chub	*Macrhybopsis gelida*		T	2,3	G3	S1	KLR, MO	
Fish	Sunburst Darter	*Etheostoma mihileze*		SINC	2,5	G4	S1	NO	
Fish	Tadpole Madtom	*Noturus gyrinus*		SINC	2	G5	S2S3	MO, KLR, MC	
Fish	Topeka Shiner	*Notropis topeka*	E	T	1,2,3,5	G3	S2	KLR, SH, NO	
Fish	Warmouth	*Lepomis gulosus*			4	G5	S4S5	LA, MC, NO, VS	
Fish	Western Blacknose Dace	*Rhinichthys obtusus*		SINC	2	G5	S1	MO	
Fish	Western Silvery Minnow	*Hybognathus argyritis*		T	2	G4	S2	KLR, MO	
Fish	White Sucker	*Catostomus commersonii*			4	G5	S5	UR, UA, MO, KLR, SH, MC, NO	
Fish	Highland Darter	*Etheostoma teddyroosevelt*			2	GNR	S1S2	NO	

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Group	Common Name	Scientific Name	Federal Status	State Status	Selection Criteria	G-rank (Rounded)	S-rank	Aquatic EFA	Terrestrial EFA
Gastropod	a terrestrial snail	*Succinea pseudavara*			3	G1Q	SNR		WRB, SH, CB, QA, RH
Gastropod	Delta Hydrobe	*Probythinella emarginata*		T	2	G5	S1		FH, CH
Gastropod	Domed Supercoil	*Paravitrea significans*			3	G3	SNR		ETP
Gastropod	Kaw Whitelip	*Webbhelix chadwicki*			3	G1Q	SNR		ETP
Gastropod	Mudbank Ambersnail	*Mediappendix vagans*			3	G3	SNR		All terrestrial EFAs
Gastropod	Oilfield Coil	*Lucilla scintilla*			5	G4	SNR		ETP
Gastropod	Ozark Liptooth	*Daedalochila jacksoni*			3	G3	SNR		CH, ETP, OP
Gastropod	Ozark Threetooth	*Triodopsis neglecta*			3	G3	SNR		ETP, OP
Gastropod	Ozark Whitelip	*Neohelix divesta*			3	G3	SNR		ETP
Gastropod	Ponderous Campeloma	*Campeloma crassulum*			4,5	G5	SNR		
Gastropod	Ruidoso Snaggletooth	*Gastrocopta ruidosensis*			3	G1	SH		SH, CB
Gastropod	Sharp Hornsnail	*Pleurocera acuta*		T	2	G5	S1	MC	OP
Gastropod	Slender Walker	*Pomatiopsis lapidaria*		E	2	G5	S1		
Gastropod	Slope Ambersnail	*Mediappendix wandae*			3	G3Q	SNR		ETP, OP
Gastropod	Texas Liptooth	*Linisa texasiana*			3	G3	SNR		RH, ETP
Gastropod	Xeric Ambersnail	*Succinea vaginacontorta*			3	G2Q	SNR		All terrestrial EFAs
Insect	A callirhoe bee	*Melissodes intortus*			4	GNR	SNR		PL, RH, ETP
Insect	A dieunomia bee	*Dieunomia triangulifera*			3	G3	SNR		PL, ARSP, WRB, SH, CB, QA, RH, ETP
Insect	A digger bee	*Anthophora montana*			5	G4	SH		WRB
Insect	A leafcutter bee	*Megachile amica*			3	G2	SH		RH, ETP
Insect	A leafcutter bee	*Megachile deflexa*			3	G2	SH		WRB
Insect	A leafcutter bee	*Megachile integra*			3	G2	SNR		WRB, SH, CB, QA, RH, ETP
Insect	A leafcutter bee	*Megachile mucorosa*			3	G3	SNR		WRB, SH, CB, QA, RH, ETP
Insect	A milkweed longhorn beetle	*Tetraopes pilosus*			5	GNR	SNR		ARSP, CG, RH
Insect	A longhorned caddisfly	*Ceraclea spongillovorax*			3	G3	S3S4	KLR, LA, NO, VS	

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Insect	A mayfly	*Apobaetis lakota*			3	G2	S2S3	KLR	
Insect	A mayfly	*Heterocloeon grande*			3	G2	SNR	KLR, LA, NO, VS	
Insect	A microcaddisfly	*Neotrichia falca*			3	G3	SNR	MC	
Insect	A midge	*Oliveridia hugginsi*			5	GNR	S1	VS	
Insect	A nomia bee	*Nomia universitatis*			3	G3	SNR		PL, CG, FH, ETP
Insect	A primitive minnow mayfly	*Siphlonurus minnoi*			3	G3	S1S2	NO	
Insect	A prongill mayfly	*Paraleptophlebia calcarica*			3,5	G1	S1	MC, VS	
Insect	A sand-filtering mayfly	*Homoeoneuria ammophila*			3	G4	S1	KLR, SH	
Insect	A scarab beetle	*Alloblackburneus cynomysi*			5	GNR	SNR		RH
Insect	A scarab beetle	*Cryptoscatomaseter paulseni*			5	GNR	SNR		CG, RH
Insect	A scarab beetle	*Cryptoscatomaseter salsburyi*			5	GNR	SNR		RH
Insect	A scarab beetle	*Geomyphilus insolitus*			5	GNR	SNR		WRB, SH, CB, QA RH
Insect	A scarab beetle	*Geomyphilus kiowensis*			5	GNR	SNR		AB, PL, WRB, ARSP, CG, RH
Insect	A scarab beetle	*Geomyphilus viceversus*			5	GNR	SNR		CG, RH
Insect	A scarab beetle	*Onthophagus cynomysi*			5	GNR	SNR		RH
Insect	A scarab beetle	*Onthophagus knausi*			5	GNR	SNR		AB, PL, WRB, ARSP, CG, ETP
Insect	A scarab beetle	*Orizabus pyriformis*			5	GNR	SNR		AB, WRB, SH, CB, QA, RH
Insect	A scarab beetle	*Oscarinus pseudabusus*			5	GNR	SNR		RH
Insect	A scarab beetle	*Pardalosus neodistinctus*			5	GNR	SNR		AB, PL, WRB, ARSP, CG, SH, CB, QA, RH
Insect	A scarab beetle	*Phyllophaga albina*			5	GNR	SNR		ETP
Insect	A scarab beetle	*Scabrostomus sepultus*			5	GNR	SNR		RH
Insect	A scarab beetle	*Strategus mormon*			5	GNR	SNR		WRB, SH, CB, QA, RH
Insect	A dung beetle	*Tetraclipeoides dentigerulus*			5	GNR	SNR		AB, PL, AHRB, ARSP, CG, SH, CB, QA, RH

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Group	Common Name	Scientific Name	Federal Status	State Status	Selection Criteria	G-rank (Rounded)	S-rank	Aquatic EFA	Terrestrial EFA
Insect	A scarab beetle	*Trox paulseni*			5	GNR	SNR		AB, PL, AHRB, ARSP, CG, FH, CH, EF, ETP, OP
Insect	A small minnow mayfly	*Plauditus texanus*			3	G2	S2S3	KLR, LA	
Insect	A spiny crawler mayfly	*Ephemera traverae*			5	G4	SNR	NO	
Insect	A Spur-throat Grasshopper	*Melanoplus beameri*			3,5	G2	SNR		ETP
Insect	A sweat bee	*Agopostemon coloradensis*			5	G4	SNR		AHRB, ARSP, SH, CB, QA, RH, FH
Insect	A sweat bee	*Dieunomia apacha*			3	G3	SNR		AB, PL, WRB, ARSP, CG, SH, CB, QA, RH
Insect	A wool-carder bee	*Anthidium maculosum*			5	G5	SNR		AB, PL, WRB, ARSP, CG
Insect	A wool-carder bee	*Anthidium michenerorum*			3	G2	SNR		RH
Insect	A wool-carder bee	*Anthidium psoraleae*			3	G3	SNR		RH
Insect	Abbreviated Underwing	*Catocala abbreviatella*			3,4	G3	SNR		FH
Insect	Aberrant Cellophane Bee	*Colletes aberrans*			4	GNR	SNR		ARSP, WRB, SH, CB, QA, RH, FH
Insect	American Bumble Bee	*Bombus pensylvanicus*	UR		3	G3	SNR		All terrestrial EFAs
Insect	American Burying Beetle	*Nicrophorus americanus*	T	E	1,2,3	G2	S1		CH
Insect	An oil-collecting bee	*Centris lanosas*			5	GNR	SNR		RH
Insect	An underwing moth	*Catocala frederici*			3	G3	SNR		ETP
Insect	An underwing moth	*Catocala texanae*			3	G3	SNR		ETP
Insect	Arogos Skipper	*Atrytone arogos*			3	G2	S3S4		CG, WRB, SH, CB, QA, RH, FH, ETP
Insect	Austin Springfly	*Hydroperla fugitans*			3	G4	SNR		
Insect	Bald-spot Sweat Bee	*Lasioglossum paraforbesii*			4	G5	SNR		WRB, SH, CB, QA, RH, FH, ETP
Insect	Bell's Roadside Skipper	*Amblyscirtes belli*			3	G4	S2S3		RH, FH, CH, OP
Insect	Bicoloured Sweat Bee	*Agopostemon virescens*			5	G5	SNR		WRB, SH, CB, QA, RH
Insect	Black-and-gold Bumble Bee	*Bombus auricomus*			4	G5	SNR		All terrestrail EFAs
Insect	Bleached Skimmer	*Libellula composita*			3	G3	S2S2		

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Group	Common Name	Scientific Name	Federal Status	State Status	Selection Criteria	G-rank (Rounded)	S-rank	Aquatic EFA	Terrestrial EFA
Insect	Burrow Small Dung Beetle	*Geomyphilus thomomysi*			5	GNR	SNR		CG, RH
Insect	Byssus Skipper	*Problema byssus*			3	G4	S2S3		SH, CB, QA, FH, CH, ETP
Insect	Columbine Duskywing	*Erynnis lucilius*			3, 4	G3	SNR		ETP
Insect	Delilah Underwing	*Catocala delilah*			3	G3	SNR		ETP
Insect	Dotted Skipper	*Hesperia attralus*			3,5	G3	S2S3		WRB, SH, CB, QA, RH, FH, CH
Insect	Evening Primrose Leafcutter Bee	*Megachile anograe*			3	G3	SNR		WRB
Insect	Fedor Digger Bee	*Anthophora fedorica*			3	G2	SNR		ETP
Insect	Frosted Elfin	*Callophrys irus*			3, 4	G3	SNR		
Insect	Ghost Tiger Beetle	*Ellipsoptera lepida*			3, 5	G3	S2?		WRB, SH, CB, QA, RH
Insect	Globe Mallow Bee	*Diadasia diminuta*			5	GNR	SNR		ARSP
Insect	Gray Petaltail	*Tachopteryx thoreyi*	C	SINC	2	G4	S1	VS	
Insect	Great Plains Giant Tiger Beetle	*Amblycheila cylindriformis*			5	G4	S3?		WRB
Insect	Hunt's Bumble Bee	*Bombus huntii*			5	G5	SNR		AB
Insect	Interrupted Cuckoo Nomad Bee	*Epeolus interruptus*			4	GNR	SNR		ETP
Insect	Konza Prairie Mayfly	*Leptophlebia konza*			3,5	G1	S1?	KLR	
Insect	Lichen Grasshopper	*Trimerotropis saxatilis*			3	G3	SNR		CH
Insect	Linda's Roadside Skipper	*Amblyscirtes linda*	UR		3,5	G2	S1?		ETP
Insect	Low-ridged Pygmy Grasshopper	*Nomotettix parvus*			3	G3	SNR		ETP
Insect	Maculated Flower Chafer	*Gnorimella maculosa*			5	GNR	SNR		ETP
Insect	Maritime Sunflower Borer Moth	*Papaipema maritima*			3	G3?	SNR		SH, FH
Insect	Married Underwing	*Catocala nuptialis*			3	G3	SNR		
Insect	Monarch	*Danaus plexippus*	C		4	G4	S5B		AB, PL, WRB, ARSP, CG
Insect	Morrison’s Bumble Bee	*Bombus morrisoni*			3	G3	SNR		AHRB, SH, CB, QA, RH, ETP

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Insect	Mottled Duskywing	*Erynnis martialis*			3	G3	S2		SH, FH, ETP
Insect	Nevada Bumble Bee	*Bombus nevadensis*			5	G4	SNR		PL
Insect	Occidental Digger Bee	*Anthophora occidentalis*			3	G3	SNR		SH, CB, QA, RH, FH
Insect	Old World Swallowtail	*Papilio machaon*			5	G5	SNR		AB, PL
Insect	Orange-bellied Sweat Bee	*Agopostemon melliventris*			5	G5	SNR		PL, ARSP, RH
Insect	Ottoe Skipper	*Hesperia ottoe*			3	G3	S2S3		AB, WRB, CG, SH, CB, QA, RH, FH, ETP
Insect	Ouachita Stripetail	*Isoperla ouachita*			3,5	G3	SNR	NO	
Insect	Ozark Emerald	*Somatochlora ozarkensis*		SINC	2,3,5	G3	S1	VS	
Insect	Ozark Springfly	*Helopicus nalatus*			3	G3	SNR	NO	
Insect	Pahaska Skipper	*Hesperia pahaska*			5	G5	SNR		SH, RH
Insect	Particular Small Dung Beetle	*Scabrostonus peculiosis*			5	GNR	SNR		WRB, SH, CB, QA, RH
Insect	Pocket Gopher Flower Beetle	*Euphoria discicollis*			5	G2	SNR		AB, PL, WRB, ARSP, CG
Insect	Prairie Mole Cricket	*Gryllotalpa major*		SINC	2,3,5	G3	S3		ETP
Insect	Punctured Small Dung Beetle	*Cryptoscatomaseter punctissimus*			5	GNR	SNR		CG, RH
Insect	Red Satyr	*Cissia rubricata*			5	GNR	S2		RH
Insect	Red-belted Bumble Bee	*Bombus rufocinctus*			5	G5	SNR		PL
Insect	Regal Fritillary	*Argynnis idalia*	UR		3	G3	S4		AR, PL, WRB, ARSP
Insect	Robust Sunflower Leafcutter Bee	*Megachile fortis*			3	G2	SNR		WRB, SH, CB, QA, RH, ETP
Insect	Rock Island Springfly	*Isogenoides varians*			3	G3	SNR	KLP	
Insect	Sage Sphinx	*Lintneria eremitoides*			3,5	G2	SNR		ARSP, CG, FH
Insect	Scott Riffle Beetle	*Optioservus phaeus*		E	2,3,5	G1	S1		WRB
Insect	Soapberry Hairstreak	*Phaeostrymon alcestis*			5	G4	S3		WRB, SH, CB, QA, RH
Insect	Southern Chimney Bee	*Diadasia australis*			5	GNR	SNR		WRB, CG

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Group	Common Name	Scientific Name	Federal Status	State Status	Selection Criteria	G-rank (Rounded)	S-rank	Aquatic EFA	Terrestrial EFA
Insect	Southern Plains Bumble Bee	*Bombus fraternus*	UR		3, 4	G3	SNR		All terrestrial EFAs
Insect	Splendid Sweat Bee	*Agopostemon splendens*			5	G5	SNR		AB, PL, WRB, ARSP, CG, SH, CB, QA, RH
Insect	Susan's Plasterer Bee	*Colletes susannae*			4	GNR	SNR		WRB, SH, CB, QA, RH
Insect	The Unexpected Milkweed Moth	*Cycnia inopinatus*			5	G4	SNR		WRB, SH, CB, QA, RH, FH, ETP
Insect	Two-spotted Skipper	*Euphyes bimacula*			4	G4	S1?		AB
Insect	Variable Cuckoo Bumble Bee	*Bombus variabilis*	UR		3, 4	G1	SNR		SH, CB, QA, RH, FH, ETP
Insect	Wallace's Deepwater Mayfly	*Spinadis simplex*			3	G3	SNR	KLP	
Insect	White-cloaked Tiger Beetle	*Eunota togata latilabris*			5	G5	S5		WRB, SH, CB, QA, RH
Insect	Whitish Sweat Bee	*Agopostemon sericeus*			5	G5	SNR		WRB, SH, CB, QA, RH, FH, ETP
Insect	Whiting's Flat-headed Mayfly	*Heptagenia whitingi*			3	G2	SNR	MO	
Insect	Whitney's Underwing	*Catocala whitneyi*			3	G3	SNR		RH
Insect	Wiest's Sphinx Moth	*Euproserpinus wiesti*			3	G3	SNR		
Insect	Yellow Bumble Bee	*Bombus fervidus*			3	G3	SNR		All terrestrial EFAs
Isopods	A Cave Obligate Isopod	*Caecidotea metcalfi*			3,5	G1	SNR		FH
Isopods	A Cave Obligate Isopod	*Caecidotea tridentata*			3,5	G1	SNR		WRB, SH, CB, QA, RD, FH, ETP
Isopods	Spring Plain Groundwater Isopod	*Caecidotea simulator*			3,5	G2	SNR		OP
Isopods	Steeve’s Cave Isopod	*Caecidotea steevesi*			3,5	G3	SNR		OP
Mammals	Black-footed Ferret	*Mustela nigripes*	E	E	1,2,3	G1	S1		WRB
Mammals	Black-tailed Prairie Dog	*Cynomys ludovicianus*			4	G4	S3		AB, PL, WRB, ARSP, CG, SH, CB, RH
Mammals	Cougar	*Puma concolor*			4	G5	SNA		
Mammals	Plains Spotted Skunk	*Spilogale interrupta*		T	2	G4	S1		PL, WRB, SH, CB, FH, CH, ETP

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Group	Common Name	Scientific Name	Federal Status	State Status	Selection Criteria	G-rank (Rounded)	S-rank	Aquatic EFA	Terrestrial EFA
Mammals	Franklin's Ground Squirrel	*Poliocitellus franklinii*		SINC	2	G5	S2		SH, CB, FH, EF
Mammals	Fulvous Harvest Mouse	*Reithrodontomys fulvescens*			4	G5	S3		RH, CH, OP
Mammals	Gray Fox	*Urocyon cinereoargenteus*			4	G5	S3		FH, CH, EF, ETP, OP
Mammals	Gray Myotis	*Myotis grisescens*	E	E	1,2,3	G4	S1B		OP
Mammals	Little Brown Myotis	*Myotis lucifugus*	UR		4	G3	S3		FH
Mammals	Northern Myotis	*Myotis septentrionalis*	E	SINC	2,3	G2	S3		SH, CB
Mammals	Pallid Bat	*Antrozous pallidus*		SINC	2	G4	S1		RH
Mammals	Southern Bog Lemming	*Synaptomys cooperi*		SINC	2	G5	S4		SH, CB, QA, FH
Mammals	Southern Flying Squirrel	*Glaucomys volans*		SINC	2	G5	S3		FH, CH, EF, OP
Mammals	Spotted Ground Squirrel	*Xerospermophilus spilosoma*			4	G5	S3		ARSP, CG
Mammals	Swamp Rabbit	*Sylvilagus aquaticus*			4	G5	SH		CH
Mammals	Swift Fox	*Vulpes velox*			3	G3	S3		PL, WRB, ARSP, CG
Mammals	Texas Deermouse	*Peromyscus attwateri*		SINC	2,5	G5	S2		CH
Mammals	Townsend's Big-eared Bat	*Corynorhinus townsendii*		SINC	2,3	G3	S2		RH
Mammals	Tricolored Bat	*Perimyotis subflavus*	PE		3	G3	S4		SH, CB, RH, FH, EF, OP
Mammals	Western Small-footed Myotis	*Myotis ciliolabrum*			4	G5	S2S3B		AB, WRB
Mammals	Yellow-faced Pocket Gopher	*Cratogeomys castanops*			4,5	G5	S3		PL, ARSP
Mussels	Bleufer	*Potamilus purpuratus*			4	G5	S3	LA, NO, VS, WT	
Mussels	Butterfly	*Ellipsaria lineolata*		T	2	G4	S1	MC	
Mussels	Creeper	*Strophitus undulatus*		SINC	2,4	G5	S2	KLR, MO, SH, MC, NO, VS, WT	
Mussels	Cylindrical Papershell	*Anodontoides ferussacianus*		E	2	G5	S1?		
Mussels	Deertoe	*Truncilla truncata*		SINC	2	G5	S1S2	MC, NO, VS	
Mussels	Elktoe	*Alasmidonta marginata*		E	2	G4	S1	NO	
Mussels	Ellipse	*Venustaconcha ellipsiformis*		E	2	G4	S1	NO	
Mussels	Fatmucket	*Lampsilis siliquoidea*		SINC	2	G5	S1S2	KLR, MO, MC, NO, VS, WT	

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Mussels	Fawnsfoot	*Truncilla donaciformis*		SINC	2	G5	S2	KLR, MC, NO, VS, WT	
Mussels	Flat Floater	*Utterbackiana suborbiculata*		E	2	G5	S1	MC	
Mussels	Flutedshell	*Lasmigona costata*		T	2	G5	S1	MC	
Mussels	Lilliput	*Toxoplasma parvum*			4	G5	S2S3	KLR, LA, CN, MO, MC, NO, VS, WT	
Mussels	Mucket	*Actinonaias ligamentina*		E	2,4	G5	S1	MC	
Mussels	Neosho Mucket	*Lampsilis rafinesqueana*	E	E	1,2,3,4,5	G1	S1	NO, VS	
Mussels	Ouachita Kidneyshell	*Ptychobranchus occidentalis*		T	2,3,4,5	G3	S1	NO, VS	
Mussels	Pink Heelsplitter	*Potamilus alatus*			4	G5	S2S3	KLR, MO, SH	
Mussels	Plain Pocketbook	*Lampsilis cardium*			4	G5	S3	KLR, MC, NO, VS, WT	
Mussels	Pondhorn	*Uniomerus tetralasmus*			4	G5	S3S4	UR, KLR, LA, CN, MO, SH, MC, NO, VS, WT	
Mussels	Purple Wartyback	*Cyclonaias tuberculata*			4	G5	S1	MC	
Mussels	Rabbitsfoot	*Theliderma cylindrica*	T	E	1,2,3,4	G3	S1	NO	
Mussels	Rock-Pocketbook	*Arcidens confragosus*		T	2	G4	S1	MC	
Mussels	Round Pigtoe	*Pleurobema sintoxia*		SINC	2	G4	S2	MC, NO, VS, WT	
Mussels	Snuffbox	*Epioblasma triquetra*	E	SINC	1,2,3,4	G2	SX	KLR, MC	
Mussels	Spectaclecase	*Margaritifera monodonta*	E		1	G2	SX	MO	
Mussels	Spike	*Eurynia dilatata*		SINC	2	G5	S2S3	MC, NO	
Mussels	Wabash Pigtoe	*Fusconaia flava*			2	G5	S3	KLR, MO, SH, MC, NO, VS, WT	
Mussels	Wartyback	*Quadrula nodulata*		SINC	2	G4	S2	MC, NO, VS	
Mussels	Washboard	*Megalonaias nervosa*		SINC	2	G5	S2	MC, NO, VS	
Mussels	Western Fanshell	*Cyprogenia aberti*	T	E	2,3,4	G1	S1	NO, VS	
Mussels	Yellow Sandshell	*Lampsilis teres*		SINC	2	G5	S2S3	KLR, MO, MC, NO, VS, WT	
Planarians	Kansas Planarian	*Sphalloplana kansensis*			3,5	G1	S1S2		FH
Plants	American Ginseng	*Panax quinquefolius*			3	G3	S1		

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Plants	Buffalo Clover	*Trifolium reflexum*			3	G3	S2		CH, ETP, OP
Plants	Bush's Poppy-mallow	*Callirhoe bushii*			3,5	G3	S1		FH, ETP
Plants	Deceptive Leatherwood	*Dirca decipiens*			3	G1	S1		
Plants	Delta Twine-bulrush	*Schoenoplectus deltarum*			3	G3	S1		OP
Plants	Ear-leaf Agalinis	*Agalinis auriculata*			3	G3	S2		CH, ETP
Plants	Engelmann's Goldenweed	*Oonopsis engelmannii*			3	G3	S1		
Plants	Canadian Goldenseal	*Hydrastis canadensis*			3	G3	S1		
Plants	Great Plains Ladies'-tresses	*Spiranthes magnicamporum*			3	G3	S2		QA, RH, FH, CH, ETP
Plants	Hall's Bulrush	*Schoenoplectiella hallii*			3	G3	S1	LA	
Plants	Hancin's Dewberry	*Rubus hancinianus*			3,5	G3	S2		SH, FH, CH
Plants	Howard's Evening-primrose	*Oenothera howardii*			3	G3	S1		
Plants	Kansas Arrowhead	*Sagittaria ambigua*			3	G2	S2	MC, NO, VS, WT	SH, QA, CH, ETP, OP
Plants	Mead's Milkweed	*Asclepias meadii*	T		1,3	G2	S2		ETP
Plants	Missouri Mud-plantain	*Heteranthera missouriensis*			3	G5?	S2	LA, KLR, NO	SH, FH, ETP
Plants	Narrowleaf Morning-glory	*Ipomoea shumardiana*			3,5	G2	S1	KLR, MC, NO	FH
Plants	Oklahoma Grass-pink	*Calopogon oklahomensis*			3	G2	S1		
Plants	Oklahoma Phlox	*Phlox oklahomensis*			3,5	G3	S2		RH, FH, CH
Plants	Fine-leaf Agalinis	*Agalinis densiflora*			3,5	G3	S2		FH, ETP
Plants	Skinner's Agalinis	*Agalinis skinneriana*			3	G3	S1		CH, ETP
Plants	Rough-seed Fameflower	*Phemeranthus rugospermus*			3	G3	S2		QA
Plants	Royal Catchfly	*Silene regia*			3	G3	SX		
Plants	Running Buffalo Clover	*Trifolium stoloniferum*			1,3	G3	SH		EF
Plants	Sand-dune Mat-spurge	*Euphorbia carunculate*			3,5	G3	S1		RH
Plants	Sandhill Goosefoot	*Chenopodium cycloides*			3,5	G3	S2		ARSP, CG
Plants	Massive-spike Prairie-clover	*Dalea cylindriceps*			3,5	G3	S2		ARSP, CG
Plants	Northern Narrow-leaf Goosefoot	*Chenopodium subglabrum*			3	G3	SH		
Plants	Attenuate Dodder	*Cuscuta attenuata*			3,5	G2	SH		FH

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Plants	Texas Fescue	*Festuca versuta*			3,5	G3	S1		CH
Plants	Topeka Coneflower	*Echinacea atrorubens*			3,5	G3	SNR		FH, ETP
Plants	Western Prairie White-fringed Orchid	*Platanthera praeclara*	T		1,3	G3	S1		FH, ETP
Reptiles	Broad-headed Skink	*Plestiodon laticeps*		T	2	G5	S3		EF, OP
Reptiles	Checkered Gartersnake	*Thamnophis marcianus*		T	2,5	G5	S2		ARSP, RH
Reptiles	Chihuahuan Nightsnake	*Hypsiglena jani*		SINC	2,5	G5	S2		RH
Reptiles	Coal Skink	*Plestiodon anthracinus*			4	G5	S3		CH, EF, OP
Reptiles	Eastern Hog-nosed Snake	*Heterodon platirhinos*		SINC	2	G5	S4		PL, WRB, ARSP, SH, CB, RH, FH, CH, EF
Reptiles	Glossy Snake	*Arizona elegans*		SINC	2	G5	S4		AB, PL, WRB, ARSP, CG, CB, RH, FH, CH
Reptiles	Western Ground Snake	*Sonora episcopa*			4	GNR	S4		RH, FH
Reptiles	Common Lesser Earless Lizard	*Holbrookia maculata*			4	G5	S3		AB, PL, WRB, ARSP, CG, SH, CB, RH, FH
Reptiles	Long-nosed Snake	*Rhinocheilus lecontei*		SINC	2	G5	S4		PL, WRB, ARSP, CG, RH
Reptiles	New Mexico Threadsnake	*Rena dissecta*		T	2,5	G4	S3		CG, RH
Reptiles	Plains Hog-nosed Snake	*Heterodon nasicus*		SINC	2	G5	S5		AB, PL, ARSP, SH, CB, QA, RH, FH, CH
Reptiles	Prairie Rattlesnake	*Crotalus viridis*			4	G5	S5		AB, PL, WRB, ARSP, CG, SH, CB, RH
Reptiles	Red-bellied Snake	*Storeria occipitomaculata*		SINC	2	G5	S2		EF, OP
Reptiles	Rough Earthsnake	*Haldea striatula*		SINC	2	G5	S2		FH, CH, OP
Reptiles	Smooth Earthsnake	*Virginia valeriae*		SINC	2	G5	S3		EF, ETP
Reptiles	Smooth Greensnake	*Opheodrys vernalis*			4	G5	S1		FH
Reptiles	Texas Horned Lizard	*Phrynosoma cornutum*			4	G4	S4		ARSP, CG, SH, RH, FH, CH, ETP

Appendix 2
Species of Greatest Conservation Need

Group	Common Name	Scientific Name	Federal Status	State Status	Selection Criteria	G-rank (Rounded)	S-rank	Aquatic EFA	Terrestrial EFA
Reptiles	Timber Rattlesnake	*Crotalus horridus*		SINC	2	G4	S3		FH, CH, EF, ETP
Reptiles	Western Massasauga	*Sistrurus tergeminus*			3,4	G3	S4		PL, ARSP, SH, CB, QA, RH, FH, CH, ETP
Turtles	Alligator Snapping Turtle	*Macrochelys temminckii*		SINC	2,3	G3	SH	NO, VS	
Turtles	American Box Turtle	*Terrapene carolina*			4	G5	S4		FH, CH, EF, OP
Turtles	Northern Map Turtle	*Graptemys geographica*		T	2	G5	S3		EF, OP
Turtles	Ornate Box Turtle	*Terrapene ornata*			4	G5	S5		All terrestrial EFAs
Turtles	Smooth Softshell	*Apalone mutica*			4	G5	S4	UA, KLR, LA, MC, NO	SH, FH, EF

Appendix 3
Definitions of Natural Heritage conservation status ranks

Global Ranks (GRANK)

GRANKs are numeric ranks (G1 through G5) indicating the conservation status or relative endangerment globally of species or ecological communities. Primary factors used in determining rank for species are population size, number of occurrences, viability of occurrences, population trend, and threats. Secondary factors are geographic distribution, environmental specificity, protection and management, and intrinsic vulnerability.

G1 = **Critically imperiled –** At very high risk of extinction or elimination due to very restricted range, very few populations or occurrence, very steep declines, very severe threats, or other factors.

G2 = **Imperiled** – At high risk of extinctions or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.

G3 = **Vulnerable** – At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.

G4 = **Apparently Secure** – At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats or other factors.

G5 = **Secure** – At very low rick or extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.

GU = **Unrankable –** Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

GNR = **Unranked** – Global rank not yet assessed.

GQ = **Questionable taxonomy that may reduce conservation priority –** Distinctiveness of this entity as a taxon at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or inclusion of this taxon or type in another taxon or type, with resulting taxon having a lower-priority (numerically higher) conservation status rank.

State Ranks (SRANKS)

SRANKs are numeric ranks (S1 through S5) indicating the conservation status or relative endangerment within the state of species or ecological communities. Primary factors used in determining rank for species are population size, number of occurrences, viability of occurrences, population trend, and threats. Secondary factors are geographic distribution, environmental specificity, protection and management, and intrinsic vulnerability.

Appendix 3
Definitions of Natural Heritage conservation status ranks

S1 = **Critically imperiled** – At very high risk of extirpation in the state due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors. Typically 5 or fewer occurrences or very few remaining individuals in the state.

S2 = **Imperiled** – At high risk of extirpation in the state due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors. Typically 6-20 occurrences or few remaining individuals in the state.

S3 = **Vulnerable** – At moderate risk of extirpation in the state due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors. Typically 21 to 80 occurrences in the state.

S4 = **Apparently Secure** – At a fairly low risk of extirpation in the state due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors. Typically 81 to 300 occurrences in the state.

S5 = **Secure** – At very low or no risk of extirpation in the state due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats. More than 300 occurrences in the state.

S#S# = **Range Rank** – A numeric range rank (e.g. S2S3 or S1S3) is used to indicate any range of uncertainty about the status of the species.

SU = **Unrankable** – Currently unrankable due to lack or information or due to substantially conflicting information about status or trends.

SNR = **Unranked** – Subnational conservation status not yet assessed.

SNA = **Not Applicable** – A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

SX = **Presumed Extirpated** – Species or ecosystem is believed to be extirpated from the state.

SH = **Historical** – Species possibly extirpated from the state. Known from only historical records but still some hope of rediscovery.

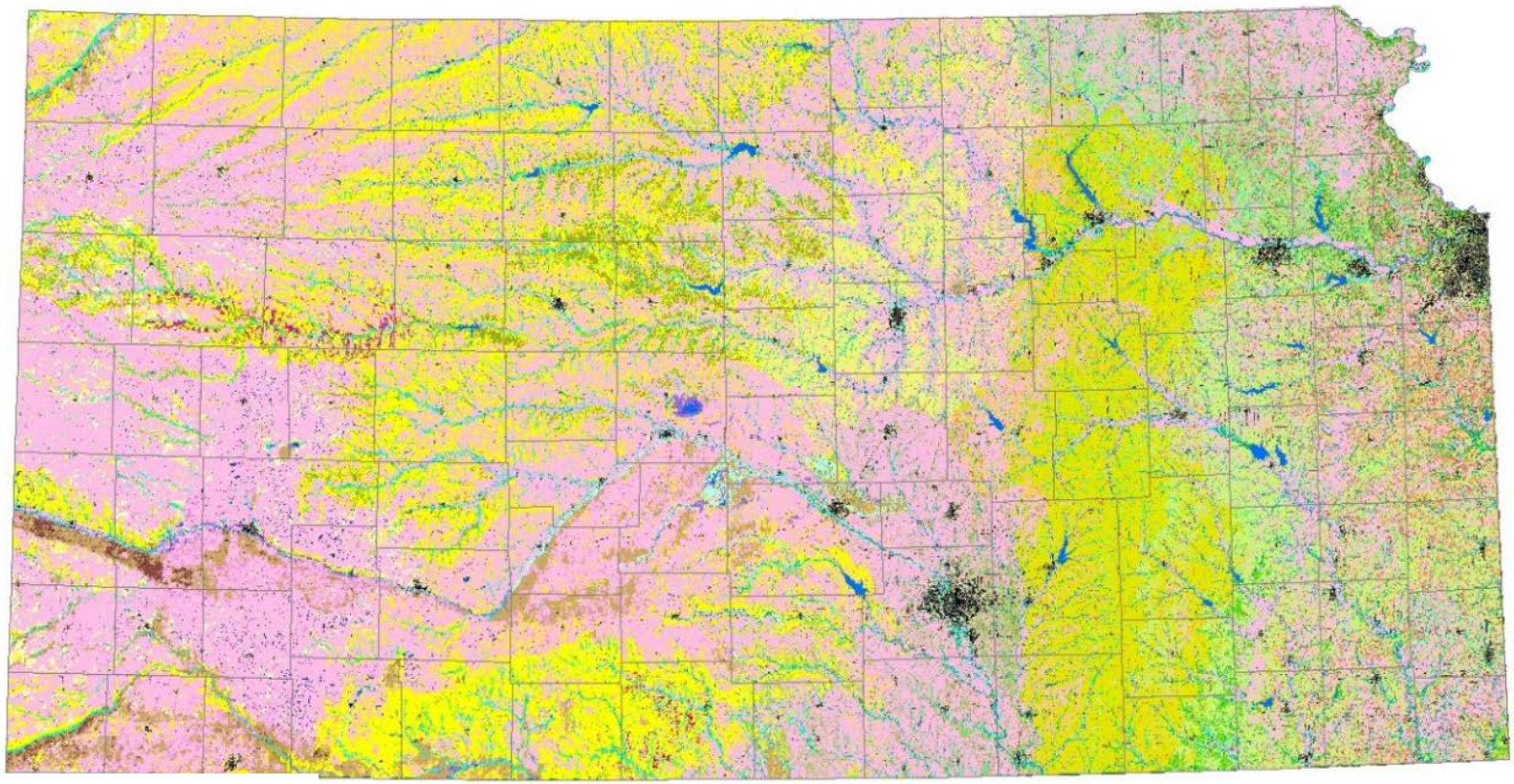
B = **Breeding** – Conservation status refers to the breeding population of the species in state.

N = **Non-breeding** – Conservation status refers to the non-breeding population of the species in the state.

M = **Migrant** – Migrant species occurring regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention. Conservation status refers to the aggregating transient populations of the species in the state.

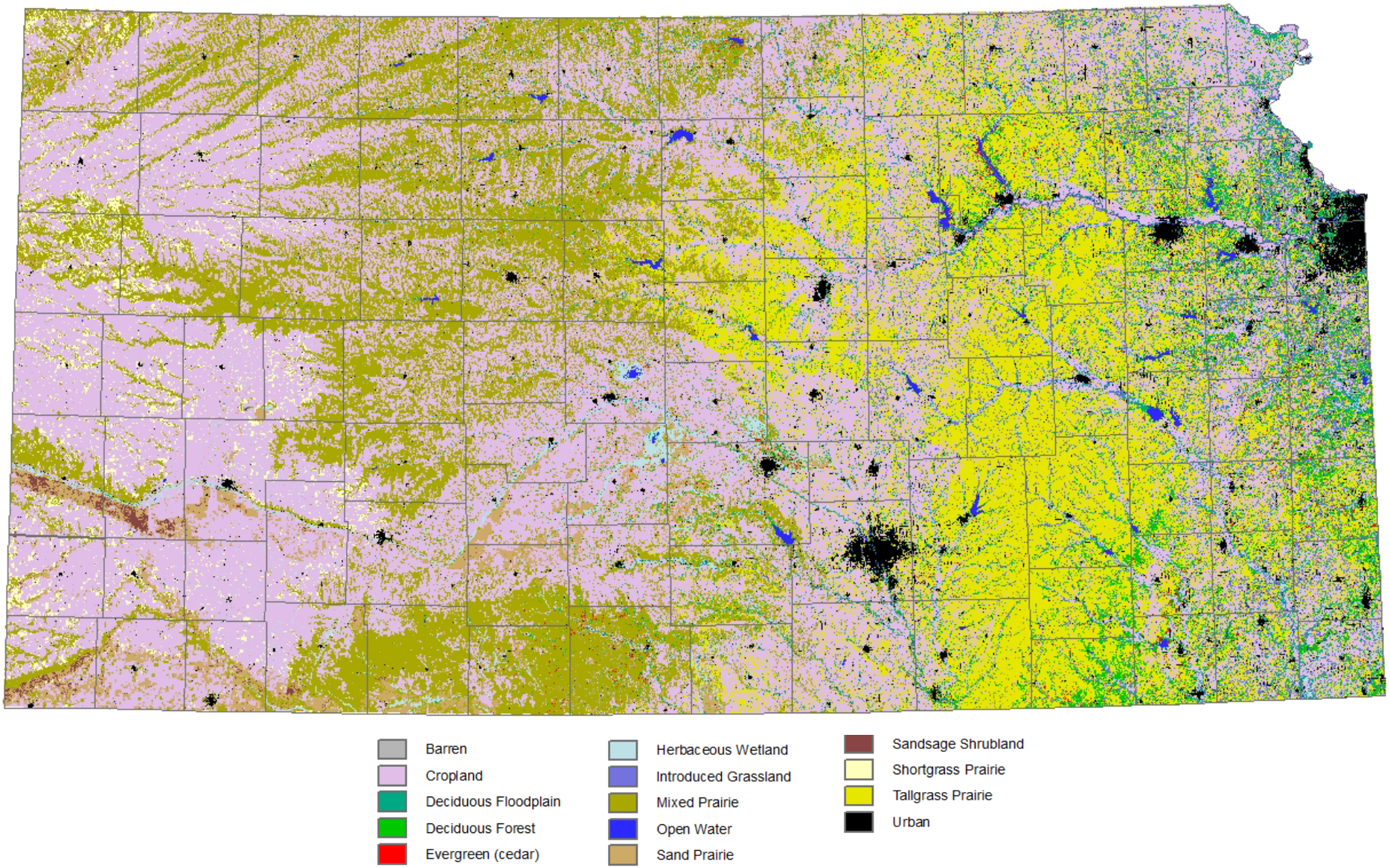
Appendix 4
Habitats and Descriptions

The original land cover categories of the Kansas Ecological Systems Map 2018. Kansas Department of Wildlife and Parks (KDWP), Kansas Biological Survey (KBS), and Missouri Resource Assessment Partnership (MoRAP).



Appendix 4
Habitats and Descriptions

Collapsed, broader categories



Appendix 4
Habitats and Descriptions

Habitat Descriptions

The Kansas Wildlife Action Plan habitats are described below. These habitats are based on the land cover categories from the Kansas Ecological Systems Map. Further information can be found in the Kansas Ecological Systems Map GIS layer and technical report: https://services.kars.geoplatform.ku.edu/download/Kansas_Ecological_Mapping_Systems/Kansas_Ecological_Mapping_Systems.zip

COLLAPSED, BROADER HABITAT CATAGORIES	ECOLOGICAL SYSTEMS NAMES
Deciduous Forest	The Deciduous Forest habitat is made up of Mixed Chinquapin Oak-Bur Oak Revine Woodland, Crosstimbers Woodland, Mixed Oak-Hickory Woodland and Forest, Ozark Woodland and Forest, Ruderal Deciduous Shrubland/Young Woodland, and Ruderal Deciduous Woodland. It comprises three percent of Kansas' lands.
Deciduous Floodplain	The Deciduous Floodplain habitat is comprised of the Smoky Hills Oak Woodland, Eastern Floodplain Forest (North), Eastern Floodplain Forest (South), Floodplain Sand Wash/Sandpit, Green Ash-Elm-Hackberry Canyon Bottomland Woodland, Western Floodplain Forest, and Western Floodplain Shrubland/Young Woodland habitats. It comprises two and a half percent of Kansas' lands.
Evergreen (cedar) Shrubland	The Evergreen (cedar) Shrubland habitat is comprised of Cimarron Break Redcedar Woodland/Shrubland, Mixedgrass Breaks Redcedar Woodland/Shrubland, Ruderal Redcedar Woodland/Shrubland, and Cimarron Breaks Deciduous Shrubland habitats. It comprises almost a half percent of Kansas' land.
Sandsage Shrubland	Sandsage Shrubland consists of Sandsage Shrubland/Grassland habitat and comprises about a quarter precent of Kansas' land.
Tallgrass Prairie	The Tallgrass Prairie habitat is made up of Ark River Tallgrass Prairie/Pasture, Flint Hills Tallgrass Prairie, Glaciated Upland Grassland, Smoky Hills Tallgrass Prairie, and Unglaciated Eastern Upland Grassland habitats. It comprises 18 percent of Kansas' land.
Sand Prairie	The Sand Prairie habitat is comprised of Sandhills Prairie, and Sparse and Barren Dunes habitat. It comprises almost three percent of Kansas' land.
Mixed Prairie	The Mixed Prairie habitat is a combination of the Great Plains Cliff and Outcrop, Salt Flat Barren, Chalkflat Mixedgrass Prairie, Cimarron Breaks Grassland, Mixedgrass Prairie, Mixedgrass Prairie Breaks Grassland, and Western Lowland Grassland habitats. It comprises 19 percent of Kansas' land.
Shortgrass Prairie	The Shortgrass Prairie habitat is made up of Cimarron Breaks Sparse Vegetation and Barren, and Shortgrass Prairie habitats. It comprises two percent of Kansas' land.

Appendix 4
Habitats and Descriptions

Herbaceous Wetland	The Herbaceous Wetland habitat is comprised of Eastern Wetland, Playa, Playa/Cropped, Saline Grassland and Marsh, and Western Wetland habitats. It comprises one percent of Kansas' land.
Cropland	The Cropland habitat includes Cropland (annual row and close-grown crops), and Western Center Pivot Grassland Corners. It comprises 44 percent of Kansas' land.
Urban Areas	The Urban Areas habitat includes Urban Grasses, Urban High Intensity, Urban Low Intensity, and Urban Trees and Shrubs habitat. It comprises almost two percent of Kansas' land.
Introduced Grassland	The Introduced Grassland habitat is comprised of Cool-season Grasses and Eastern Floodplain Ruderal Grassland habitats. It comprises three percent of Kansas' land.
Barren	This habitat includes both natural and human-caused barren or very sparsely vegetated areas. It comprises about a half percent of Kansas' land.
Aquatic-Flowing Waters	Rivers, streams, and their tributaries (stream orders 3 through 9)
Aquatic-Still Waters	Reservoirs and ponds

Appendix 5
Definitions

Aggressive – species are those that spread rapidly and can outcompete other species. They can be native or nonnative and may be aggressive in some situations, but not others. Eastern red cedar is an example of a native tree that can spread aggressively in open areas

Biodiversity – a contraction of "biological diversity", generally refers to the variety and variability of life on Earth. This can refer to genetic variation, ecosystem variation, or species variation with a specified region

Channelization – Mechanical redirecting a streambed in more or less a straight line

CRP – Conservation Reserve Program. A federal program that pays a yearly rental payment in exchange for farmers removing environmentally sensitive land from agricultural production and planting species that will improve environmental health and quality

Ecosystem – a biological community plus all of the abiotic factos influencing that community

Endangered species – species of plants or animals of concern that have the potential of becoming extinct

Endemic – native to or confined to a certain region. For this document, the term specifically refers to taxa that are limited to Kansas

Ephemeral – Channel or basin which carries water only during and immediately after periods of rainfall or snowmelt

Habitat – An ecological area inhabited by a particular organism, where the organism can find food, shelter, and reproductive opportunities

Invasive – species are aggressive, nonnative species whose presence causes or is likely to cause harm to the environment, economy, and/or human health. These species often grow, reproduce, and spread rapidly.

Issues – "Conservation issues" in this Plan is used in place of the term "conservation problems" whish was used by Congress in the legislation that authorized this program

Marsh – a type of wetland, featuring grasses, rushes, reeds, typhas, sedges, and other herbaceous plants in a context of shallow water

Native species – species occur within a region as the result of natural processes and are adapted to local environmental conditions. They have co-evolved with other native species and are critical to ecosystem functions

Nonnative species – species are those introduced to new place or new type of habitat. Historically, most of these introductions have resulted from human activities. Their presence can often have negative impacts on ecosystems. The words "exotic," "alien," and "introduced" are synonyms for "nonnative."

Nuisance – species are native to the local landscape but still can cause problems. For instance, raccoon are a native species but may become a problem when they repeatedly knock over your trash can or get into your chicken coop.

Appendix 5
Definitions

Playa – a desert basin with no outlet which periodically fills with water to form a temporary lake

Prescribed burning – planned burning by land management agencies under specific weather conditions to remove excess plant material and replicate natural fire regimes

Rare – species that occurs in very small numbers or at a very low density even within its primary habitat. These species are unlikely to be found in their habitat without extensive searching

Recruitment – reinforcement of a population of a species with new members through reproduction or immigration

Riparian habitat – transitional semiterrestrial areas regulary influenced by fresh water, usually extending from the edges of water bodies to the edges of upland communities

Seep – a generally small area where water percolates slowly to the ground surface, typically without a well-defined point of origin

Spring – the location where an underground source of water emerges from the ground, generally from a single point of origin

Strategy – strategies are termed “conservation actions” in this document

Threatened species – species of plants or animals of concern that have the potential of becoming endangered

Uncommon – species that occurs at a low to moderate density within its primary habitat. Often, these species require several hours of search time to locate within their occupied habitat

Watershed – also known as a catchment or basin, is a topographically delineated area drained by a stream system; that is, the total land area about some point on a stream or river than drains past the point

Wildlife – animals as a broad, all-inclusive group that live in the water or on land. They include arthropods, fish, reptiles, amphibians, freshwater mussels, birds, and mammals

Appendix 6
Road Map to 8 Required Elements

The following comments and passages describe how each required element was addressed in the revision of the State Wildlife Action Plan. Please refer to the following chapters and page numbers to examine how each required element was addressed.

Element 1	Chapter and Appendix	Tables and Figures	Comments
Information on the distribution and abundance of species of wildlife, including low and declining populations as the state deems appropriate, which are indicative of the diversity and health of the state's wildlife	Chapter 2-Statewide Perspective Chapters 5-29– Individual EFA chapters Appendix 2 – SGCN	SGCN Tables in each EFA chapter	Ch 2 provides a general distribution and abundance description of KS wildlife. Species distributions are specified in eacn EFA chapter with species listed in each EFA they occur. Appendix 2, SGCN table provides species Natural Heritage conservation ranks which incorporate distribution and abundance factors

Element 2	Chapter and Appendix	Tables and Figures	Comments
Description of locations and relative conditions of key habitats and community types essential to conservation of species identified in (1).	Chapter 3-Priority Species & Habitats Chapters 5-29-Individual EFA chapters Appendix 4	Figure 4. Figure 5. Figure 6. Figure 7.	Maps of all habitat types, and the descriptions and relative condition of individual priority habitat types are in Ch 3 and Appendix 4. EFA maps (Figures 6 & 7, and each EFA chapter) are considered priority landscapes for efficiently conserving KS biodiversity

Element 3	Chapter and Appendix	Tables and Figures	Comments
Description of problems which may adversely affect species identified in (1) or their habitats, and **priority research and survey efforts** needed to identify factors which may assist in restoration and improved conservation of these species and habitats.	Chapter 2-Statewide Conservation Issues Chapters 5-29-Individual EFA chapters		Ch 2 lists conservation issues occurring statewide that directly threaten biodiversity. It also lists issues that are not direct threats to biodiversity but hinder conservation efforts. The EFA chapters list more detailed issues considered priority for those areas.

Appendix 6
Road Map to 8 Required Elements

Element 4	Chapter and Appendix	Tables and Figures	Comments
Description of conservation actions proposed to conserve the identified species and habitats and priorities for implementing such actions.	Chapters 5-29-Individual EFA chapters		Conservation actions proposed to address conservation issues are found in EFA chapter.

Element 5	Chapter and Appendix	Tables and Figures	Comments
Proposed plans for monitoring species identified in (1) and their habitats, for monitoring the effectiveness of the conservation actions proposed in (4), and for adapting these conservation actions to respond appropriately to new information or changing conditions.	Chapters 5-29-Individual EFA chapters Chapter 30-Plan to Review & Monitoring		Ch 30 provides general approaches for monitoring and adaptive management. The EFA chapters provide details on monitoring species and habitats as conservation actions for those areas.

Element 6	Chapter and Appendix	Tables and Figures	Comments
Description of procedures to review the strategy at intervals not to exceed ten years.	Chapter 30-Plan to Review & Monitoring		Plan to review plan in 5 year intervals to address emerging issues, new information on changes in abundance, distribution, population trends, listing status of species, and habitat conditions

Appendix 6
Road Map to 8 Required Elements

Element 7	Chapter and Appendix	Tables and Figures	Comments
Plans for coordinating the development, implementation, review, and revision of the plan with Federal, State, and local agencies and Indian tribes that manage significant land and water areas within the state or administer programs that significantly affect the conservation of identified species and habitats.	Chapter 1-Introduction & Purpose		Ongoing collaboration with our SWAP partners occurred through out the revision process, by electronic correspondence and multiple in-person meetings.

Element 8	Chapter and Appendix	Tables and Figures	Comments
Provisions to ensure public participation in the development, revision, and implementation of projects and programs.	Chapter 1-Introduction & Purpose		Public participation was invited through news releases, exposure through Commission meetings, presentations at society meetings, and access to the plan on the Internet. Public review comments were evaluated by KDWP-Ecological Services Division with changes made by majority agreement. KDWP has and will maintain an open policy on submittal of projects for implementation