

Chapter 5 - CENTRAL MIXED GRASS PRAIRIE CONSERVATION REGION

Description

The Central Mixed Grass Prairie Conservation Region is located in the central part of Kansas. It is the transition area between the Shortgrass Prairie Conservation Region to the west and the Eastern Tallgrass Prairie Conservation Region to the east. It includes all or part of the High Plains, Smoky Hills, Arkansas River Lowlands, Wellington-McPherson Lowlands, Red Hills, Glaciated Region and Flint Hills physiographic regions (Figure 4).

The High Plains region is composed of sediment eroded from the Rocky Mountains. The flat, almost featureless plain is broken up by rugged breaks and valleys. The dominant grasses of this region are short stature and have large extensive root systems that can tolerate the dry climate. Trees are scarce and herbaceous species indicative of more arid environments are common.

The Smoky Hills, a large area of north central Kansas, is a transitional area between the drier High Plains to the west and the more mesic regions to the east. The Cretaceous bedrock of this region consists of sandstones, limestones, and shales deposited when the area was covered by stream channels and shallow seas (Wilson 1984). The thick deposits of Niobrara chalk, well known for their fossils, occur along the upper Smoky Hill River. The landscape varies from steep hills to gentle rolling hills and open plains (Savage 2004). Trees are more frequent in lowland or riparian areas.

The Arkansas Lowlands follows the Arkansas River and associated lowlands. The river bed is filled with sediments washed down from the Rocky Mountains by the river (Busby and Zimmerman 2001). The only river in Kansas that originates in the Mountains, the Arkansas River channel is wide and shallow, with much of the water moving through this system flowing underground through the porous sand (Madson 1985). The relatively flat terrain is disrupted by sand hills along the south side of the river. Wetlands were once prominent features in this region but, with the increase in irrigated crop land, the water table was lowered resulting in extensive loss of wetlands. Some large wetlands still persist and are found in Quivira National Wildlife Refuge and Cheyenne Bottoms.

The Wellington-McPherson Lowlands occur on either side of the lower portion of the Arkansas Lowlands. The gently rolling to level plains of this region was produced by the erosion of thick deposits of shale (Busby and Zimmerman 2001). The Wellington-McPherson Lowlands sit on top of one of the largest salt deposits in the world, known as the Hutchinson salt bed (Wilson and Bennett 1985). Another important underground feature is the Equus beds aquifer, providing water for Wichita, McPherson, Newton and the surrounding communities (Madson 1985). Sand dunes occur in many places throughout the region. For the most part, the dunes are covered with vegetation, preventing the sand from shifting (Physiographic 1997).

The Red Hills region is located at the southern edge of the Kansas Mixed Grass Prairie. The topography consists of rugged grassy hills, with buttes topped by flat mini-grasslands. The soils are bright red resulting from oxidized sandstone and shale (Wilson 1985). In Barber and eastern Comanche counties, caves have formed where thick gypsum deposits were eroded out. The gypsum deposit along with salt is responsible for the sinkholes common in the Red Hills (Busby and

Zimmerman 1985). Woodlands occur along major tributaries, with eastern red cedars invading the uplands.

The Glaciated Region occupies the north-east corner of the state. Only a very small portion of this region occurs in the Mixed Grass Prairie Conservation Region. Shaped by the repeated southern advance and then northern retreat of glaciers during the Quaternary period. Wind-blown deposit of loess, often associated with glaciation, occurs throughout the region and is thickest along the Nebraska border (Physiographic 1997). The region is intensively farmed today because of its fertile soil. Woodlands are confined to the bluffs along the Missouri River and other major stream courses protected from fire (Busby and Zimmerman 2001). The Flint Hills lie at the western edge of the Tallgrass prairie. Only a small portion of the Flint Hills occurs in the Mixed Grass Prairie Conservation Region. It is composed of flint-bearing limestone which is resistant to erosion (Busby and Zimmerman 2001). The topography consists of flat-topped hills which drop off steeply into valleys with rocky, clear-flowing streams. The soil is fertile but shallow and gravelly, discouraging the conversion of prairie to cropland. Forests occur along major tributaries and areas protected from fire; otherwise woody vegetation is scarce (Duncan 1978).

The functional boundaries of the Mixed Grass Prairie are at times inexact and can shift east or west depending on trends in precipitation and temperature (Coupland 1992). The amount of annual rainfall in the region is between 20-30 inches (Brooks 1985). Strong winds are common, particularly in the spring, which can increase evaporation. The climate is dry-sub humid to semi-arid, with individual years ranging from humid to arid. As the name suggests, this region contains a mixture of short-grass and tall-grass plants. Depending on soils, topographic position, grazing, fire, and weather, the composition of the mixed grass prairie can favor the tall-grass species of the east or the short-grass species of the west (Collins 1985). In times of little rainfall, plants more associated with the arid climate of western Kansas increase in abundance, while plants more accustomed to the moisture of eastern Kansas increase in abundance during wetter periods. It is in this region the plants reach their western or eastern limit (Brooks 1985). Woodlands and shrublands are restricted to lowlands adjacent to river systems and areas protected from fire.

The economy of the Mixed Grass region in Kansas is primarily agricultural. Land use is generally split between crop production and rangeland grazing. Often, gravelly or sandy soils are avoided for cropland production because of plowing difficulty and their inability to hold water. Extensive areas of cropland are planted to wheat, grain sorghum, and other crops. Areas with unsuitable soil for crop production and steep slopes, remain as native prairie mostly used for livestock grazing. Though adapted to grazing, a major concern for

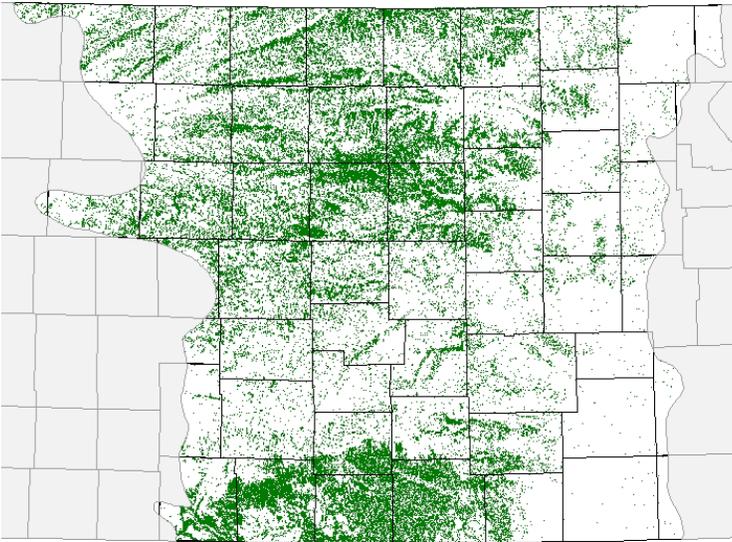


the health of the remaining grasslands is the intensity of grazing pressure allowed by landowners (Savage 2004). Although some large blocks of the natural mixed grass prairie still exist in rangelands, much of the area has been converted to farmland or significantly changed by grazing practices (Coupland 1992). The Mixed Grass region is more populated than the Shortgrass region. The smaller towns are relatively sparsely situated. The larger cities occur in the central, south-central portion of the region. Major rivers are the Republican and Solomon in the north, the central Saline and Smoky Hill, and Arkansas in the south.

Priority habitats in the Central Mixed Grass Prairie Conservation Region

Priority habitats in the region include: Mixed Prairie, Sand Prairie, Herbaceous Wetland, Aquatic (lotic), Seeps and Springs, and Eastern Large Rivers. Other habitats that occur within the region, but are not considered priority, are Sandsage Shrubland, CRP/Native, Bur Oak, Deciduous Floodplain, Cropland, Evergreen (cedar), Riparian Shrubland, Caves, Aquatic (lentic), and Cool Season Conservation Plantings.

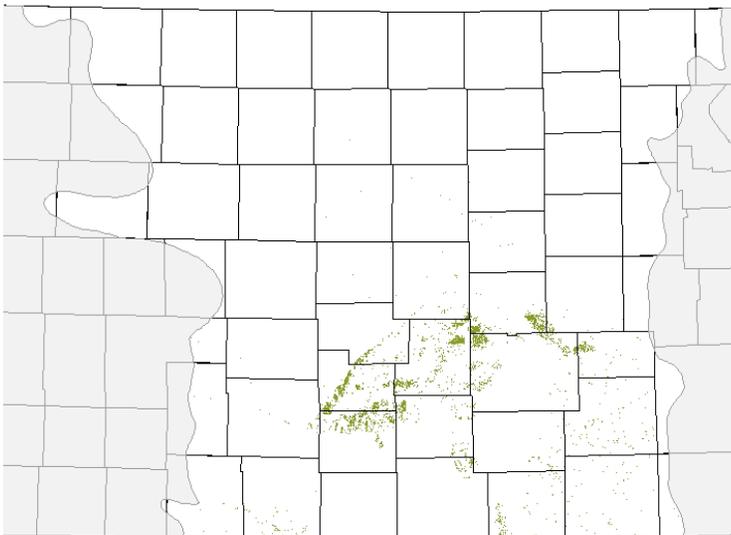
Mixed Prairie



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 (*Buchloe dactyloides*) and Blue Grama (*Bouteloua gracilis*), 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, and Smooth Sumac (*Rhus glabra*) (Thompson et al. 2011).

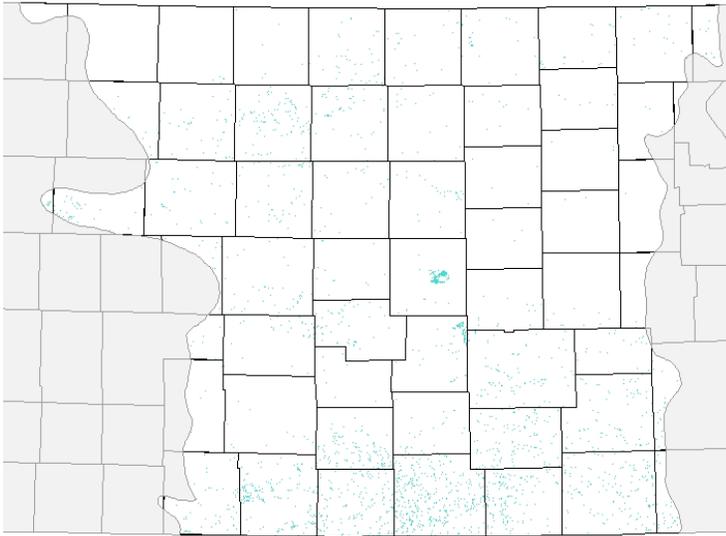
Sand Prairie



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. Sand Bluestem (*Andropogon hallii*), is the dominant plant species. Other common species are Prairie Sand Reed (*Calamovilfa longifolia*), Plains Sunflower (*Helianthus petiolaris*), Beebalm (*Monarda punctata*), Fourpoint Evening Primrose (*Oenothera rhombipetala*), Switchgrass (*Panicum virgatum*), Sand Hill Plum (*Prunus angustifolia*), and Little Bluestem (*Schizachyrium scoparium*). Eastern Red Cedar (*Juniperus virginiana*) is scattered

over the slopes, and small patches of woody growth including Hackberry, Elm, and Smooth Sumac occur in ravine bottoms (Thompson 2011).

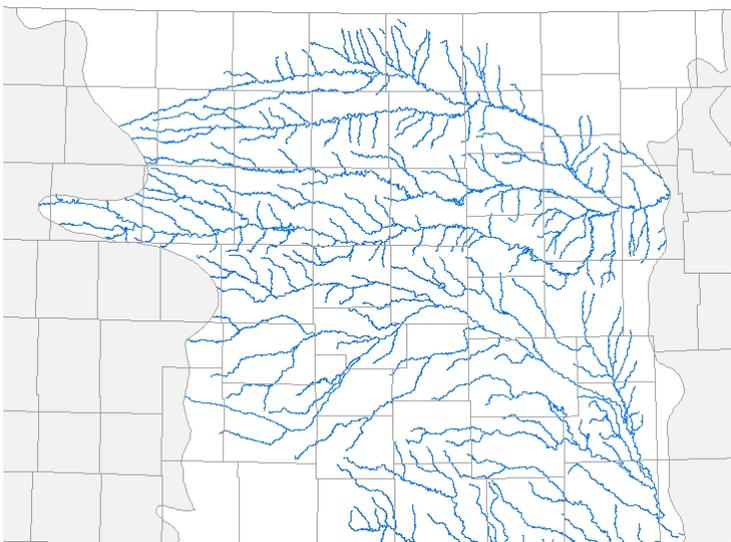
Herbaceous Wetland



The Herbaceous Wetland habitat in the Central Mixed Grass Prairie Conservation Region includes salt marsh/prairie, spikerush playa lake, playa lake, low or wet prairie, freshwater marsh, cattail marsh, and weedy marsh. The best known wetlands in the state 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, and cattails (*Typha* spp.) 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, spike-rush (*Eleocharis* spp.), and various forbs may be important; vegetation is usually of low to medium height (Thompson 2011).

Aquatic – Western Lotic



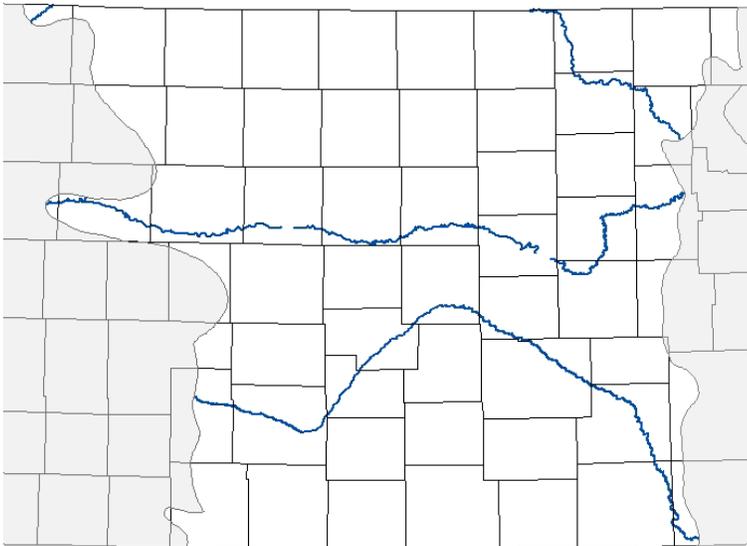
The Aquatic – Western Lotic (flowing water) habitat includes rivers, streams, and their tributaries in the Arkansas, Smoky Hill, Saline and Solomon River Basins of the Central Mixed Grass Conservation Region. These rivers and their flowing tributaries have sandy, shallow beds, with few deep chutes, sloughs, and oxbows. Many lakes in this region, such as Wilson Lake, Kanopolis Lake and Cedar Bluff Reservoir, were created by the construction of impoundments for flood control. Human activities have had the greatest effect on aquatic habitat, such as water consumption and agriculture, depleting the

water levels and polluting the remaining water (Cross 1995).

Seeps and Springs

Both seeps and springs are places where ground water moves naturally to the earth’s surface either into a body of water or onto land. Springs differ from seeps in that the ground water flows from the earth at a rate sufficient to form a current. With seeps, the ground water oozes out of the soil or rock without distinct flow. Beginning as precipitation that falls to the surface, spring water moves down into the subsurface by gravity until it reaches a less permeable layer of rock, such as shale. Many rock layers in Kansas slope subtly to the west. The ground water moves down the slope through permeable rock until it reaches a location where the rock has been exposed to the atmosphere by erosion. This type of spring is called a contact spring, the most common type of spring in Kansas. There are a few springs in Kansas, known as artesian springs, where water is forced to the surface by pressure rather than by gravity. Artesian springs were more common in the state before heavy pumping lowered the water table and lessened the pressure that might have created artesian conditions (Buchanan et al. 1998).

Aquatic – Eastern Large Rivers



The Aquatic – Eastern Large Rivers habitat is the portion of the Arkansas and the Kansas Rivers that flow through the Central Mixed Grass Conservation Region. These rivers have sandy bottoms with few deep chutes, sloughs, and oxbows. The wide, shallow banks are subject to seasonal flooding. Human activities have had the greatest effect on aquatic habitats such as water consumption and agriculture, depleting the water levels and polluting the remaining water (Cross 1995).

Ecological Focus Areas in the Central Mixed Grass Prairie Conservation Region

Terrestrial

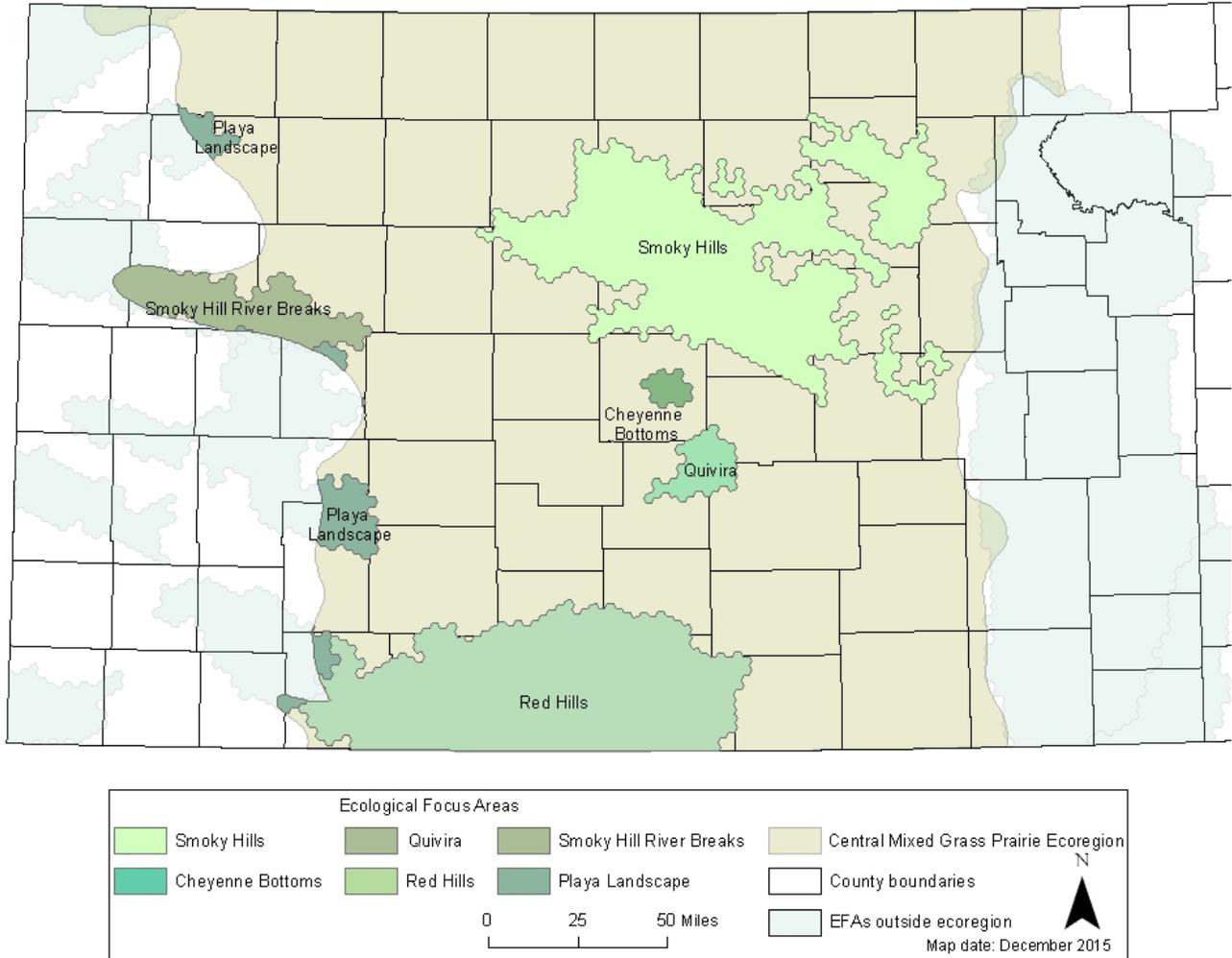
1. Playa Landscape
2. Smoky Hill River Breaks
3. Smoky Hills
4. Cheyenne Bottoms
5. Quivira
6. Red Hills

Aquatic

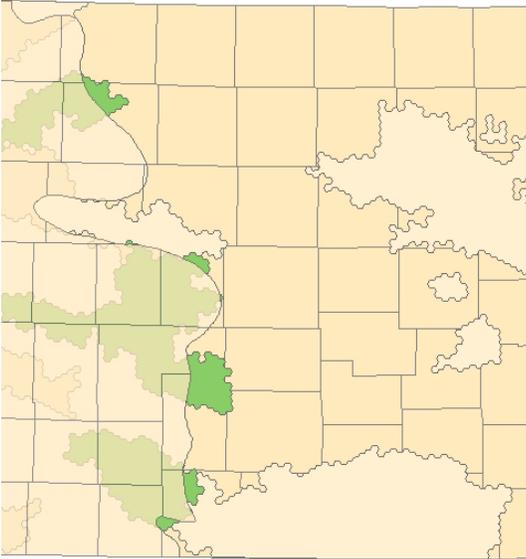
1. Kansas - Lower Republican
2. Lower Arkansas
3. Cimarron

Terrestrial EFAs

Figure 7. Terrestrial Ecological Focus Areas of the Central Mixed Grass Prairie Conservation Region. These EFAs represent landscapes where conservation actions can be applied for maximum benefit to Kansas wildlife. Each EFA includes a suite of SGCN and priority habitats



1. Playa Landscape



The Playa Landscape Ecological Focus Area 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. Grasslands and shrublands are the primary native habitat found within the playa clusters. This region is dominated by agricultural land uses such as crop cultivation and livestock grazing. Playas are threatened by agricultural and other land conversion activities that result in sedimentation and loss of function.

EFA Development

This EFA was created by overlaying occurrences of Tier 1 and Tier 2 SGCN on the PLJV playa clusters layer to identify priority landscapes.

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 draining wetlands and cropland cultivation can degrade water quality from runoff and increase sedimentation

Energy Production

- *Development and expansion of wind energy, solar arrays, and oil/gas fields infrastructure and activities also lead to fragmentation and habitat loss

- *Construction of infrastructure and associated roads negatively alters surface water runoff into playas

Natural system modifications

- *The use of surface water for irrigation and terraces built above playas to treat highly erodible land compliance requirements is lowering groundwater levels and degrading playa hydrology

- *Practices such as pitting of playas alter their natural wetland function and collected water is used for irrigation

Conservation Actions

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

- * Provide landowners incentives for maintaining and restoring Playas

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

Land/water management

- *Increase the heterogeneity of native habitats, as well as general landscapes by using greenways, corridors, buffer strips, refuges and the Conservation Reserve Program
- *Develop incentive programs and cost-effective practices for landowners and managers to protect and restore playa landscapes and to promote heterogeneity and diversity.
- *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 and implement methods to offset economic practices (*i.e.* wind farms, farm management systems encouraging overproduction, conversion of unsuitable lands into production, urbanization) that have negative environmental impacts.
- *Encourage water right and water quality regulations in appropriate watersheds to reduce aquifer depletion, increase overland flow to basins, and improve water quality
- *Develop and implement watershed management plans that approach playa landscape conservation from a holistic perspective.
- *Promote improved water quality standards for ground water aquifers.
- *Promote the use of permanent grass buffers around playa lakes.
- *Develop projects which inform management and policies to achieve conservation and inform landscape design

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
- *Develop or continue disease monitoring (Chytrid Fungus, Ranavirus, Avian Influenza and other potential diseases, etc.)
- *Investigate ways to determine water use (*i.e.*, implement metering and have fees based upon amount used).
- *Educate energy companies on reducing impacts to playas

Species of Greatest Conservation Need

Tier 1 SGCN

Birds	Lesser Prairie-Chicken	<i>Tympanuchus pallidicinctus</i>
Birds	Piping Plover	<i>Charadrius melodus</i>
Birds	Snowy Plover	<i>Charadrius alexandrinus</i>
Gastropods	Xeric Ambersnail	<i>Succinea vaginacontorta</i>
Insect	American Bumble Bee	<i>Bombus pensylvanicus</i>
Insect	Monarch	<i>Danaus plexippus</i>
Mammals	Eastern Spotted Skunk	<i>Spilogale putorius</i>

Tier 2 SGCN

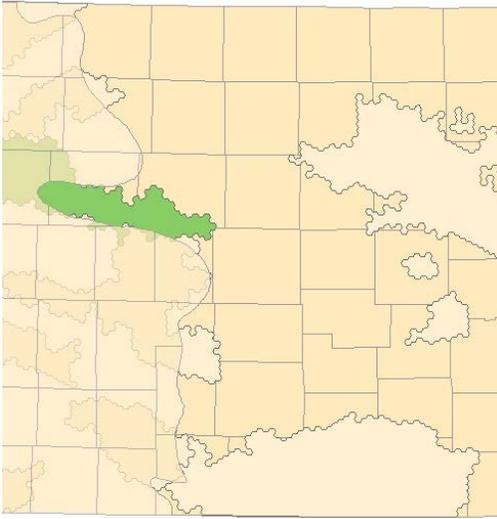
Amphibians	Tiger Salamander	<i>Ambystoma tigrinum</i>
Birds	American Avocet	<i>Recurvirostra americana</i>
Birds	American Golden-Plover	<i>Pluvialis dominica</i>
Birds	American Tree Sparrow	<i>Spizella arborea</i>
Birds	American White Pelican	<i>Pelecanus erythrorhynchos</i>
Birds	Baird's Sandpiper	<i>Calidris bairdii</i>
Birds	Barn Owl	<i>Tyto alba</i>
Birds	Black-bellied Plover	<i>Pluvialis squatarola</i>
Birds	Black-necked Stilt	<i>Himantopus mexicanus</i>
Birds	Buff-breasted Sandpiper	<i>Calidris subruficollis</i>
Birds	Bullock's Oriole	<i>Icterus bullockii</i>
Birds	Burrowing Owl	<i>Athene cunicularia</i>
Birds	Canvasback	<i>Aythya valisineria</i>
Birds	Chestnut-collared Longspur	<i>Calcarius ornatus</i>
Birds	Common Nighthawk	<i>Chordeiles minor</i>
Birds	Eastern Kingbird	<i>Tyrannus tyrannus</i>
Birds	Ferruginous Hawk	<i>Buteo regalis</i>

Tier 2 SGCN

Birds	Grasshopper Sparrow	<i>Ammodramus savannarum</i>
Birds	Greater Yellowlegs	<i>Tringa melanoleuca</i>
Birds	Lark Sparrow	<i>Chondestes grammacus</i>
Birds	Least Sandpiper	<i>Calidris minutilla</i>
Birds	Lesser Yellowlegs	<i>Tringa flavipes</i>
Birds	Loggerhead Shrike	<i>Lanius ludovicianus</i>
Birds	Long-billed Curlew	<i>Numenius americanus</i>
Birds	Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>
Birds	Marbled Godwit	<i>Limosa fedoa</i>
Birds	McCown's Longspur	<i>Rhynchopanes mccownii</i>
Birds	Mississippi Kite	<i>Ictinia mississippiensis</i>
Birds	Northern Pintail	<i>Anas acuta</i>
Birds	Pectoral Sandpiper	<i>Calidris melanotos</i>
Birds	Semipalmated Sandpiper	<i>Calidris pusilla</i>
Birds	Short-eared Owl	<i>Asio flammeus</i>
Birds	Stilt Sandpiper	<i>Calidris himantopus</i>
Birds	Swainson's Hawk	<i>Buteo swainsoni</i>
Birds	Upland Sandpiper	<i>Bartramia longicauda</i>
Birds	Western Kingbird	<i>Tyrannus verticalis</i>
Birds	White-rumped Sandpiper	<i>Calidris fuscicollis</i>
Birds	Wilson's Phalarope	<i>Phalaropus tricolor</i>
Gastropods	Mudbank Ambersnail	<i>Catinella vagans</i>
Insect	A dieunomia bee	<i>Dieunomia triangulifera</i>
Insect	A nomia bee	<i>Nomia universitatis</i>
Insect	A scarab beetle	<i>Tetraclipeoides dentigerulus</i>
Insect	A sweat bee	<i>Dieunomia apacha</i>
Insect	A callirhoe bee	<i>Melissodes intortus</i>
Insect	Black-and-gold Bumble Bee	<i>Bombus auricomus</i>
Insect	Regal Fritillary	<i>Argynnis idalia</i>
Insect	Southern Plains Bumble Bee	<i>Bombus fraternus</i>
Insect	Splendid Sweat Bee	<i>Agopostemon splendens</i>
Insect	Yellow Bumble Bee	<i>Bombus fervidus</i>
Mammals	Black-tailed Prairie Dog	<i>Cynomys ludovicianus</i>
Mammals	Swift Fox	<i>Vulpes velox</i>
Mammals	Yellow-faced Pocket Gopher	<i>Cratogeomys castanops</i>
Reptiles	Eastern Hog-nosed Snake	<i>Heterodon platirhinos</i>
Reptiles	Glossy Snake	<i>Arizona elegans</i>
Reptiles	Lesser Earless Lizard	<i>Holbrookia maculata</i>
Reptiles	Long-nosed Snake	<i>Rhinocheilus lecontei</i>
Reptiles	Western Massasauga	<i>Sistrurus tergeminus</i>
Reptiles	Plains Hog-nosed Snake	<i>Heterodon nasicus</i>
Reptiles	Prairie Rattlesnake	<i>Crotalus viridis</i>



2. Smoky Hill River Breaks



The Smoky Hill River Breaks Ecological Focus Area is within the High Plains and Smoky Hills physiographic regions and is primarily composed of shortgrass prairie vegetation.

Dramatic chalk badlands and bluffs overlook large expanses of rangeland and rocky ravines along the Smoky Hill River. The Smoky Hill River floodplain and its surrounding upland habitats provide valuable refugia to the biodiversity of the EFA. Actively grazed rangelands and haying are common practices 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 Green Toad. Prairie dog colonies provide

habitats for many SGCN including the Burrowing Owl, Swift Fox, and Black-footed Ferret.

EFA Development

This EFA captures a concentration of Large Natural Areas in the Chalk Bluffs area. It is similar to the TNC portfolio site “Chalk Bluffs” from the Central Shortgrass Prairie Ecoregional Plan but excludes the northeastern extent of that site which is dominated by agricultural land.

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

- *Conversion of 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 sedimentation

Energy Production

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

Natural system modifications

- *The use of surface water from rivers and streams for irrigation is lowering the water level

- *The suppression of fire has a negative impact on habitat heterogeneity

Invasive and other problematic species and genes

- *Sylvatic plague has the potential to impact black-tailed prairie dog populations

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

Pollution

- *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

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

Biological resource use

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

Conservation Actions

Land/water protection

- * 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
- *Promote field border programs and county road easements which are landowner and wildlife friendly.
- *Work with willing donors/sellers to prevent further prairie fragmentation and expand connectivity corridors by using conservation easements and other tools

Land/water management

- *Increase the heterogeneity of native habitats, as well as general landscapes by using greenways, corridors, buffer strips, refuges and the Conservation Reserve Program
- *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
- *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, prescribed fire, prescribed grazing)
- *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
- *Use CRP as a grass bank to allow recovery of native range.
- *Promote ecologically sound techniques for flood control, erosion control, non-point source pollution control, and bank stabilization

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
- *Research cover crop benefits for wildlife
- *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
- *Continued disease monitoring (Chytrid Fungus, Ranavirus, Snake Fungal Disease, Sylvatic Plague, etc.)

External capacity building

- *Work with other state agencies, to avoid, minimize, reduce and mitigate impacts to habitat resulting from their programs.
- *Partner with industrial, energy, and telecommunication companies as well as private landowners to reduce impacts on native grasslands and lesser prairie chicken by encouraging burial or rerouting of power lines and other structures around key lekking, nesting, and brood rearing habitats.

Species management

- *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
- *Continue to conduct population and distributional surveys of the Black-tailed Prairie Dog.
- *Develop and implement a Black-tailed Prairie Dog Management Plan

Species of Greatest Conservation Need

Tier 1 SGCN

Amphibians	Green Toad	<i>Anaxyrus debilis</i>
Birds	Lesser Prairie-Chicken	<i>Tympanuchus pallidicinctus</i>
Gastropods	A terrestrial snail	<i>Succinea pseudavara</i>
Gastropods	Xeric Ambersnail	<i>Succinea vaginacontorta</i>
Insect	A Cave Obligate Isopod	<i>Caecidotea tridentata</i>
Insect	American Bumble Bee	<i>Bombus pensylvanicus</i>
Insect	Arogos Skipper	<i>Atrytone arogos</i>
Insect	Monarch	<i>Danaus plexippus</i>
Insect	Robust Sunflower Leafcutter Bee	<i>Megachile fortis</i>
Insect	Scott Riffle Beetle	<i>Optioservus phaeus</i>
Mammals	Black-footed Ferret	<i>Mustela nigripes</i>
Mammals	Eastern Spotted Skunk	<i>Spilogale putorius</i>

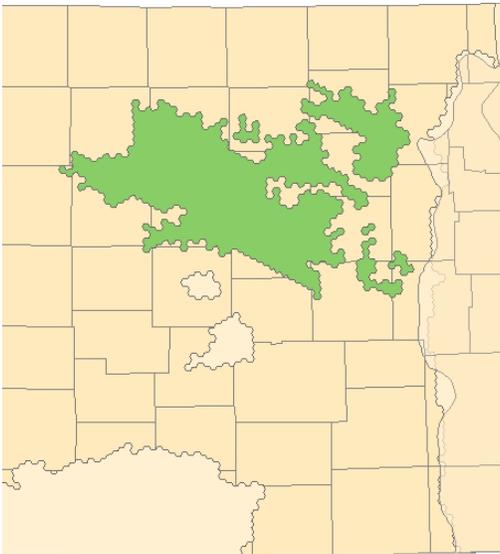
Tier 2 SGCN

Amphibians	Tiger Salamander	<i>Ambystoma tigrinum</i>
Birds	American Tree Sparrow	<i>Spizella arborea</i>
Birds	Baltimore Oriole	<i>Icterus galbula</i>
Birds	Barn Owl	<i>Tyto alba</i>
Birds	Bullock's Oriole	<i>Icterus bullockii</i>
Birds	Burrowing Owl	<i>Athene cunicularia</i>
Birds	Cassin's Sparrow	<i>Peucaea cassinii</i>
Birds	Chestnut-collared Longspur	<i>Calcarius ornatus</i>
Birds	Common Nighthawk	<i>Chordeiles minor</i>
Birds	Common Poorwill	<i>Phalaenoptilus nuttallii</i>
Birds	Eastern Kingbird	<i>Tyrannus tyrannus</i>
Birds	Ferruginous Hawk	<i>Buteo regalis</i>
Birds	Golden Eagle	<i>Aquila chrysaetos</i>
Birds	Grasshopper Sparrow	<i>Ammodramus savannarum</i>
Birds	Greater Prairie-Chicken	<i>Tympanuchus cupido</i>
Birds	Lark Bunting	<i>Calamospiza melanocorys</i>
Birds	Loggerhead Shrike	<i>Lanius ludovicianus</i>
Birds	Long-billed Curlew	<i>Numenius americanus</i>
Birds	McCown's Longspur	<i>Rhynchopanes mccownii</i>
Birds	Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>
Birds	Short-eared Owl	<i>Asio flammeus</i>
Birds	Swainson's Hawk	<i>Buteo swainsoni</i>
Birds	Western Kingbird	<i>Tyrannus verticalis</i>
Gastropods	Mudbank Ambersnail	<i>Catinella vagans</i>
Insect	A dieunomia bee	<i>Dieunomia triangulifera</i>
Insect	A digger bee	<i>Anthophora montana</i>
Insect	A leafcutter bee	<i>Megachile integra</i>
Insect	A leafcutter bee	<i>Megachile mucorosa</i>
Insect	A scarab beetle	<i>Geomyphilus insolitus</i>
Insect	A scarab beetle	<i>Orizabus pyriformis</i>
Insect	A scarab beetle	<i>Pardalosus neodistinctus</i>
Insect	A scarab beetle	<i>Strategus mormon</i>
Insect	A scarab beetle	<i>Tetraclipeoides dentigerulus</i>
Insect	A sweat bee	<i>Agopostemon coloradensis</i>
Insect	A sweat bee	<i>Dieunomia apache</i>
Insect	Aberrant Cellophane Bee	<i>Colletes aberrans</i>
Insect	Bald-spot Sweat Bee	<i>Lasioglossum paraforbesii</i>
Insect	Bicoloured Sweat Bee	<i>Agopostemon virescens</i>
Insect	Black-and-gold Bumble Bee	<i>Bombus auricomus</i>
Insect	Dotted Skipper	<i>Herperia attralus</i>
Insect	Ghost Tiger Beetle	<i>Ellipsoptera lepida</i>
Insect	Morrison's Bumble Bee	<i>Bombus morrisoni</i>
Insect	Ottoe Skipper	<i>Hesperia ottoe</i>

Tier 2 SGCN

Insect	Particular Small Dung Beetle	<i>Scabrostromus peculiaris</i>
Insect	Regal Fritillary	<i>Argynnis idalia</i>
Insect	Soapberry Hairstreak	<i>Phaeostrymon alcestis</i>
Insect	Southern Plains Bumble Bee	<i>Bombus fraternus</i>
Insect	Splendid Sweat Bee	<i>Agopostemon splendens</i>
Insect	Susan’s Plasterer Bee	<i>Colletes susannae</i>
Insect	The Unexpected Milkweed Moth	<i>Cynia inopinatus</i>
Insect	White-cloaked Tiger Beetle	<i>Eunota togata latilabris</i>
Insect	Whiteish Sweat Bee	<i>Agopostemon sericeus</i>
Insect	Yellow Bumble Bee	<i>Bombus fervidus</i>
Mammals	Black-tailed Prairie Dog	<i>Cynomys ludovicianus</i>
Mammals	Spotted Ground Squirrel	<i>Xerospermophilus spilosoma</i>
Mammals	Swift Fox	<i>Vulpes velox</i>
Mammals	Western Small-footed Myotis	<i>Myotis ciliolabrum</i>
Reptiles	Eastern Hog-nosed Snake	<i>Heterodon platirhinos</i>
Reptiles	Glossy Snake	<i>Arizona elegans</i>
Reptiles	Lesser Earless Lizard	<i>Holbrookia maculata</i>
Reptiles	Long-nosed Snake	<i>Rhinocheilus lecontei</i>
Reptiles	Plains Hog-nosed Snake	<i>Heterodon nasicus</i>
Reptiles	Prairie Rattlesnake	<i>Crotalus viridis</i>

3. Smoky Hills



The Smoky Hills Ecological Focus Area is within the Smoky Hills physiographic region, a 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 species transitioning into tallgrass prairie ecosystems 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 $\geq 50\%$ 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

*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

- *Conversion of 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 sedimentation

Energy Production

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

Natural system modifications

- *Suppression of fire alters composition of native grasslands
- *Improperly applied use of prescribed fire (including periodicity and seasonality of fire)
- *The use of surface water from rivers and streams for irrigation is lowering the water level

Invasive and other problematic species and genes

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

Pollution

- *Pollution from point and non-point sources includes runoff of pesticides, fertilizers, and other chemicals

Conservation Actions

Land/water protection

- *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
- *Offer incentives for constructing fences around seeps and springs to restrict livestock access

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 tool
- *Provide incentives for mechanical control of woody invasive species
- *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



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)
- *Research the effects of coal bed-methane extraction on wildlife and water quality
- *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
- *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)

External capacity building

- *Work with county zoning boards to implement well thought out planning procedures.
- *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

Species management

- *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
- *Continue to support population and distributional surveys of the Black-tailed Prairie Dog
- *Develop and implement a Black-tailed Prairie Dog Management Plan.
- *Initiate and continue distributional surveys of Greater and Lesser Prairie Chickens, and other declining grassland bird species
- *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

Species of Greatest Conservation Need

Tier 1 SGCN

Birds	Piping Plover	<i>Charadrius melodus</i>
Gastropods	A terrestrial snail	<i>Succinea pseudavara</i>
Gastropods	Ruidoso Snaggletooth	<i>Gastrocopta ruidosensis</i>
Gastropods	Xeric Ambersnail	<i>Succinea vaginacontorta</i>
Insect	A leafcutter bee	<i>Megachile integra</i>
Insect	A Cave Obligate Isopod	<i>Caecidotea tridentata</i>
Insect	American Bumble Bee	<i>Bombus pensylvanicus</i>
Insect	Arogos Skipper	<i>Atrytone arogos</i>
Insect	Monarch	<i>Danaus plexippus</i>
Insect	Robust Sunflower Leafcutter Bee	<i>Megachile fortis</i>
Mammals	Eastern Spotted Skunk	<i>Spilogale putorius</i>
Mammals	Northern Long-eared Bat	<i>Myotis septentrionalis</i>

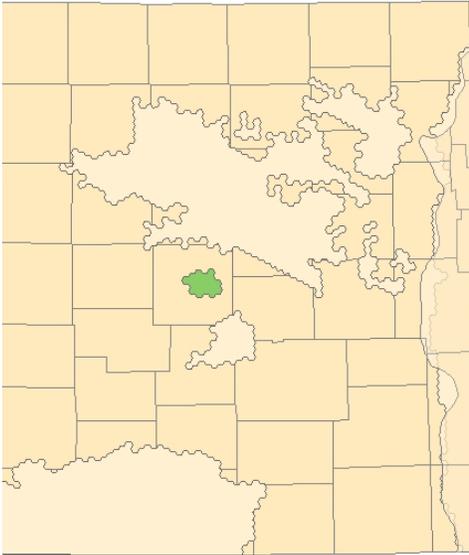
Tier 2 SGCN

Amphibians	Tiger Salamander	<i>Ambystoma tigrinum</i>
Birds	American Tree Sparrow	<i>Spizella arborea</i>
Birds	American White Pelican	<i>Pelecanus erythrorhynchos</i>
Birds	Baird's Sparrow	<i>Centronyx bairdii</i>
Birds	Bald Eagle	<i>Haliaeetus leucocephalus</i>
Birds	Baltimore Oriole	<i>Icterus galbula</i>
Birds	Barn Owl	<i>Tyto alba</i>
Birds	Bell's Vireo	<i>Vireo bellii</i>
Birds	Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>
Birds	Buff-breasted Sandpiper	<i>Calidris subruficollis</i>
Birds	Burrowing Owl	<i>Athene cunicularia</i>
Birds	Chestnut-collared Longspur	<i>Calcarius ornatus</i>
Birds	Common Nighthawk	<i>Chordeiles minor</i>
Birds	Common Poorwill	<i>Phalaenoptilus nuttallii</i>
Birds	Dickcissel	<i>Spiza americana</i>
Birds	Eastern Kingbird	<i>Tyrannus tyrannus</i>
Birds	Grasshopper Sparrow	<i>Ammodramus savannarum</i>
Birds	Greater Prairie-Chicken	<i>Tympanuchus cupido</i>
Birds	Harris's Sparrow	<i>Zonotrichia querula</i>
Birds	Henslow's Sparrow	<i>Centronyx henslowii</i>
Birds	Lark Sparrow	<i>Chondestes grammacus</i>
Birds	Loggerhead Shrike	<i>Lanius ludovicianus</i>
Birds	Northern Bobwhite	<i>Colinus virginianus</i>

Tier 2 SGCN

Birds	Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>
Birds	Rusty Blackbird	<i>Euphagus carolinus</i>
Birds	Short-eared Owl	<i>Asio flammeus</i>
Birds	Sprague's Pipit	<i>Anthus spragueii</i>
Birds	Swainson's Hawk	<i>Buteo swainsoni</i>
Birds	Upland Sandpiper	<i>Bartramia longicauda</i>
Birds	Western Kingbird	<i>Tyrannus verticalis</i>
Birds	Wilson's Phalarope	<i>Phalaropus tricolor</i>
Gastropods	Mudbank Ambersnail	<i>Catinella vagans</i>
Insect	A dieunomia bee	<i>Dieunomia triangulifera</i>
Insect	A leafcutter bee	<i>Megachile mucorosa</i>
Insect	A scarab beetle	<i>Geomyphilus insolitus</i>
Insect	A scarab beetle	<i>Orizabus pyriformis</i>
Insect	A scarab beetle	<i>Pardalosus neodistinctus</i>
Insect	A scarab beetle	<i>Strategus mormon</i>
Insect	A scarab beetle	<i>Tetraclipeoides dentigerulus</i>
Insect	A sweat bee	<i>Agopostemon coloradensis</i>
Insect	A sweat bee	<i>Dieunomia apacha</i>
Insect	Abberant Cellophane Bee	<i>Colletes aberrans</i>
Insect	Bald-spot Sweat Bee	<i>Lasioglossum paraforbesii</i>
Insect	Bicoloured Sweat Bee	<i>Agopostemon virescens</i>
Insect	Black-and-gold Bumble Bee	<i>Bombus auricomus</i>
Insect	Byssus Skipper	<i>Problema byssus</i>
Insect	Dotted Skipper	<i>Herperia attralus</i>
Insect	Ghost Tiger Beetle	<i>Ellipsoptera lepida</i>
Insect	Maritime Sunflower Borer Moth	<i>Papaipema maritima</i>
Insect	Morrison's Bumble Bee	<i>Bombus morrisoni</i>
Insect	Mottled Duskywing	<i>Erynnis martialis</i>
Insect	Occidental Digger Bee	<i>Anthophora occidentalis</i>
Insect	Ottoo Skipper	<i>Hesperia ottoe</i>
Insect	Pahaska Skipper	<i>Hesperia pahaska</i>
Insect	Particular Small Dung Beetle	<i>Scabrostonus peculiaris</i>
Insect	Soapberry Hairstreak	<i>Phaeostrymon alcestis</i>
Insect	Southern Plains Bumble Bee	<i>Bombus fraternus</i>
Insect	Splendid Sweat Bee	<i>Agopostemon splendens</i>
Insect	Susan's Plasterer Bee	<i>Colletes susannae</i>
Insect	Variable Cuckoo Bumble Bee	<i>Bombus variabilis</i>
Insect	The Unexpected Milkweed Moth	<i>Cynia inopinatus</i>
Insect	White-cloaked Tiger Beetle	<i>Eunota togata latilabris</i>
Insect	Whiteish Sweat Bee	<i>Agopostemon sericeus</i>
Insect	Yellow Bumble Bee	<i>Bombus fervidus</i>
Mammals	Black-tailed Prairie Dog	<i>Cynomys ludovicianus</i>
Mammals	Southern Bog Lemming	<i>Synaptomys cooperi</i>
Mammals	Tricolored Bat	<i>Perimyotis subflavus</i>
Mammals	Franklin's Gound Squirrel	<i>Poliocitellus franklinii</i>
Plants	Hancin's Dewberry	<i>Rubus hancinianus</i>
Plants	Kansas Arrowhead	<i>Sagittaria ambigua</i>
Plants	Missouri Mud-plantain	<i>Heteranthera missouriensis</i>
Reptiles	Eastern Hog-nosed Snake	<i>Heterodon platirhinos</i>
Reptiles	Ground-snake	<i>Sonora semiannulata</i>
Reptiles	Lesser Earless Lizard	<i>Holbrookia maculata</i>
Reptiles	Western Massasauga	<i>Sistrurus tergeminus</i>
Reptiles	Plains Hog-nosed Snake	<i>Heterodon nasicus</i>
Reptiles	Prairie Rattlesnake	<i>Crotalus viridis</i>
Reptiles	Texas Horned Lizard	<i>Phrynosoma cornutum</i>
Turtles	Smooth Softshell	<i>Apalone mutica</i>

4. Cheyenne Bottoms



The Cheyenne Bottoms Ecological Focus Area is located in Barton County, Kansas within the Arkansas River lowlands ecoregion. It occurs in a large natural basin that consists of native mixed grass prairies and 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

Natural system modifications

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

Invasive and other problematic species and genes

*Invasive woody and herbaceous species (e.g. Phragmites, cattail, etc.)

Pollution

*Pollution from point and non-point sources includes runoff of pesticides, fertilizers, and other chemicals

Conservation Actions

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.

External capacity building

*Cooperate with the National Audubon Society relative to the IBA (Important Birding Areas) program.

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.)

Species of Greatest Conservation Need

Tier 1 SGCN

Birds	Least Tern	<i>Sternula antillarum</i>
Birds	Piping Plover	<i>Charadrius melodus</i>
Birds	Snowy Plover	<i>Charadrius alexandrinus</i>
Birds	Whooping Crane	<i>Grus americana</i>
Gastropods	A terrestrial snail	<i>Succinea pseudavara</i>
Gastropods	Xeric Ambersnail	<i>Succinea vaginacontorta</i>
Insect	A leafcutter bee	<i>Megachile integra</i>
Insect	A Cave Obligate Isopod	<i>Caecidotea tridentata</i>
Insect	American Bumble Bee	<i>Bombus pensylvanicus</i>
Insect	Arogos Skipper	<i>Atrytone arogos</i>
Insect	Monarch	<i>Danaus plexippus</i>
Insect	Robust Sunflower Leafcutter Bee	<i>Megachile fortis</i>
Insect	Variable Cuckoo Bumble Bee	<i>Bombus variabilis</i>
Mammals	Eastern Spotted Skunk	<i>Spilogale putorius</i>

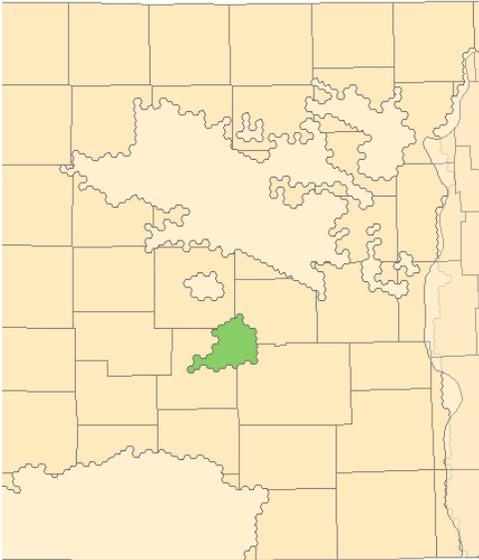
Tier 2 SGCN

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

Tier 2 SGCN

Birds	Peregrine Falcon	<i>Falco peregrinus</i>
Birds	Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>
Birds	Red Knot	<i>Calidris canutus rufa</i>
Birds	Rusty Blackbird	<i>Euphagus carolinus</i>
Birds	Scissor-tailed Flycatcher	<i>Tyrannus forficatus</i>
Birds	Semipalmated Sandpiper	<i>Calidris pusilla</i>
Birds	Sprague's Pipit	<i>Anthus spragueii</i>
Birds	Stilt Sandpiper	<i>Calidris himantopus</i>
Birds	Upland Sandpiper	<i>Bartramia longicauda</i>
Birds	Western Grebe	<i>Aechmophorus occidentalis</i>
Birds	Western Kingbird	<i>Tyrannus verticalis</i>
Birds	White-rumped Sandpiper	<i>Calidris fuscicollis</i>
Birds	Wilson's Phalarope	<i>Phalaropus tricolor</i>
Crustaceans	Fairy Shrimp	<i>Branchinecta mediospinosa</i>
Gastropods	Mudbank Ambersnail	<i>Catinella vagans</i>
Insect	A dieunomia bee	<i>Dieunomia triangulifera</i>
Insect	A leafcutter bee	<i>Megachile mucorosa</i>
Insect	A scarab beetle	<i>Geomyphilus insolitus</i>
Insect	A scarab beetle	<i>Orizabus pyriformis</i>
Insect	A scarab beetle	<i>Pardalosus neodistinctus</i>
Insect	A scarab beetle	<i>Strategus mormon</i>
Insect	A scarab beetle	<i>Tetraclipeoides dentigerulus</i>
Insect	A sweat bee	<i>Agopostemon coloradensis</i>
Insect	A sweat bee	<i>Dieunomia apache</i>
Insect	Aberrant Cellophane Bee	<i>Colletes aberrans</i>
Insect	Bald-spot Sweat Bee	<i>Lasioglossum paraforbesii</i>
Insect	Bicoloured Sweat Bee	<i>Agopostemon virescens</i>
Insect	Black-and-gold Bumble Bee	<i>Bombus auricomus</i>
Insect	Byssus Skipper	<i>Problema byssus</i>
Insect	Dotted Skipper	<i>Herperia attralus</i>
Insect	Ghost Tiger Beetle	<i>Ellipsoptera lepida</i>
Insect	Morrison's Bumble Bee	<i>Bombus morrisoni</i>
Insect	Occidental Digger Bee	<i>Anthophora occidentalis</i>
Insect	Ottoe Skipper	<i>Hesperia ottoe</i>
Insect	Particular Small Dung Beetle	<i>Scabrostonus peculiosis</i>
Insect	Regal Fritillary	<i>Argynnis idalia</i>
Insect	Soapberry Hairstreak	<i>Phaeostrymon alcestis</i>
Insect	Southern Plains Bumble Bee	<i>Bombus fraternus</i>
Insect	Splendid Sweat Bee	<i>Agopostemon splendens</i>
Insect	Susan's Plasterer Bee	<i>Colletes susannae</i>
Insect	The Unexpected Milkweed Moth	<i>Cynia inopinatus</i>
Insect	White-cloaked Tiger Beetle	<i>Eunota togata latilabris</i>
Insect	Whiteish Sweat Bee	<i>Agopostemon sericeus</i>
Insect	Yellow Bumble Bee	<i>Bombus fervidus</i>
Mammals	Black-tailed Prairie Dog	<i>Cynomys ludovicianus</i>
Mammals	Southern Bog Lemming	<i>Synaptomys cooperi</i>
Reptiles	Eastern Hog-nosed Snake	<i>Heterodon platirhinos</i>
Reptiles	Glossy Snake	<i>Arizona elegans</i>
Reptiles	Long-nosed Snake	<i>Rhinocheilus lecontei</i>
Reptiles	Western Massasauga	<i>Sistrurus tergeminus</i>
Reptiles	Plains Hog-nosed Snake	<i>Heterodon nasicus</i>
Reptiles	Prairie Rattlesnake	<i>Crotalus viridis</i>

5. Quivira



The Quivira Ecological Focus Area is located in Stafford, Reno, Barton, and Rice counties within the Arkansas River Lowlands ecoregion. Rare habitats include inland salt marshes and 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 vegetation 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 United States 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

Natural system modifications

*The use of surface water for irrigation is lowering the water level

Invasive and other problematic species and genes

*Invasive woody and herbaceous species (Phragmites, cattail, etc.)

Pollution

*Pollution from point and non-point sources includes runoff of pesticides, fertilizers, and other chemicals

Conservation Actions

Land/water management

*Implement procedures to discourage planting of invasive species and to encourage planting appropriate species.
*Plant vegetation strips or buffers around wetlands to reduce siltation and filter pollutants.

External capacity building

*Cooperate with the National Audubon Society relative to the IBA (Important Birding Areas) program.



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.)

Species of Greatest Conservation Need

Tier 1 SGCN

Birds	Least Tern	<i>Sternula antillarum</i>
Birds	Piping Plover	<i>Charadrius melodus</i>
Birds	Snowy Plover	<i>Charadrius alexandrinus</i>
Gastropods	A terrestrial snail	<i>Succinea pseudavara</i>
Gastropods	Xeric Ambersnail	<i>Succinea vaginacontorta</i>
Insect	A leafcutter bee	<i>Megachile integra</i>
Insect	A Cave Obligate Isopod	<i>Caecidotea tridentata</i>
Insect	Arogos Skipper	<i>Atrytone arogos</i>
Insect	American Bumble Bee	<i>Bombus pensylvanicus</i>
Insect	Monarch	<i>Danaus plexippus</i>
Insect	Robust Sunflower Leafcutter Bee	<i>Megachile fortis</i>
Insect	Variable Cuckoo Bumble Bee	<i>Bombus variabilis</i>

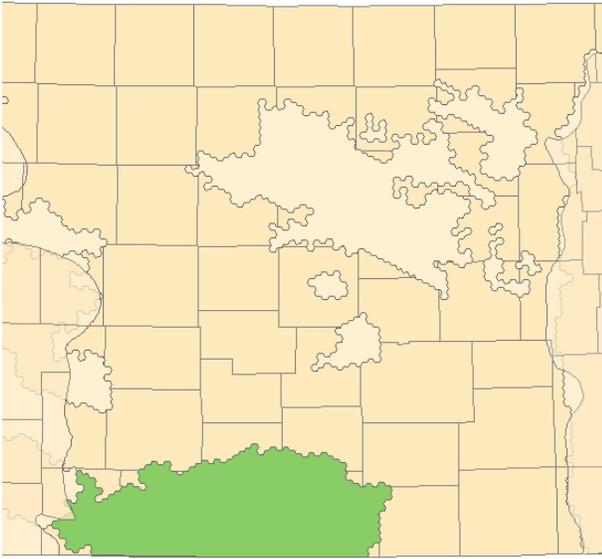
Tier 2 SGCN

Amphibians	Tiger Salamander	<i>Ambystoma tigrinum</i>
Birds	American Avocet	<i>Recurvirostra americana</i>
Birds	American Bittern	<i>Botaurus lentiginosus</i>
Birds	American Golden-Plover	<i>Pluvialis dominica</i>
Birds	American Tree Sparrow	<i>Spizella arborea</i>
Birds	American White Pelican	<i>Pelecanus erythrorhynchos</i>
Birds	Baird's Sandpiper	<i>Calidris bairdii</i>
Birds	Bald Eagle	<i>Haliaeetus leucocephalus</i>
Birds	Baltimore Oriole	<i>Icterus galbula</i>
Birds	Barn Owl	<i>Tyto alba</i>
Birds	Bell's Vireo	<i>Vireo bellii</i>
Birds	Black Rail	<i>Laterallus jamaicensis</i>
Birds	Black Tern	<i>Chlidonias niger</i>
Birds	Black-bellied Plover	<i>Pluvialis squatarola</i>
Birds	Black-necked Stilt	<i>Himantopus mexicanus</i>
Birds	Bobolink	<i>Dolichonyx oryzivorus</i>
Birds	Buff-breasted Sandpiper	<i>Calidris subruficollis</i>
Birds	Canvasback	<i>Aythya valisineria</i>
Birds	Common Nighthawk	<i>Chordeiles minor</i>
Birds	Dickcissel	<i>Spiza americana</i>
Birds	Eared Grebe	<i>Podiceps nigricollis</i>
Birds	Eastern Kingbird	<i>Tyrannus tyrannus</i>
Birds	Eastern Meadowlark	<i>Sturnella magna</i>
Birds	Forster's Tern	<i>Sterna forsteri</i>
Birds	Grasshopper Sparrow	<i>Ammodramus savannarum</i>
Birds	Greater Yellowlegs	<i>Tringa melanoleuca</i>
Birds	Harris's Sparrow	<i>Zonotrichia querula</i>
Birds	Hudsonian Godwit	<i>Limosa haemastica</i>
Birds	Lark Sparrow	<i>Chondestes grammacus</i>
Birds	Least Bittern	<i>Ixobrychus exilis</i>
Birds	Least Sandpiper	<i>Calidris minutilla</i>
Birds	Lesser Yellowlegs	<i>Tringa flavipes</i>
Birds	Loggerhead Shrike	<i>Lanius ludovicianus</i>
Birds	Long-billed Curlew	<i>Numenius americanus</i>
Birds	Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>
Birds	Marbled Godwit	<i>Limosa fedoa</i>
Birds	Mississippi Kite	<i>Ictinia mississippiensis</i>

Tier 2 SGCN

Birds	Northern Bobwhite	<i>Colinus virginianus</i>
Birds	Northern Pintail	<i>Anas acuta</i>
Birds	Pectoral Sandpiper	<i>Calidris melanotos</i>
Birds	Peregrine Falcon	<i>Falco peregrinus</i>
Birds	Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>
Birds	Red Knot	<i>Calidris canutus rufa</i>
Birds	Rusty Blackbird	<i>Euphagus carolinus</i>
Birds	Semipalmated Sandpiper	<i>Calidris pusilla</i>
Birds	Stilt Sandpiper	<i>Calidris himantopus</i>
Birds	Upland Sandpiper	<i>Bartramia longicauda</i>
Birds	Western Grebe	<i>Aechmophorus occidentalis</i>
Birds	Western Kingbird	<i>Tyrannus verticalis</i>
Birds	White-rumped Sandpiper	<i>Calidris fuscicollis</i>
Birds	Wilson's Phalarope	<i>Phalaropus tricolor</i>
Gastropods	Mudbank Ambersnail	<i>Catinella vagans</i>
Insect	A dieunomia bee	<i>Dieunomia triangulifera</i>
Insect	A leafcutter bee	<i>Megachile mucorosa</i>
Insect	A scarab beetle	<i>Geomyphilus insolitus</i>
Insect	A scarab beetle	<i>Orizabus pyriformis</i>
Insect	A scarab beetle	<i>Pardalosus neodistinctus</i>
Insect	A scarab beetle	<i>Strategus mormon</i>
Insect	A scarab beetle	<i>Tetraclipeoides dentigerulus</i>
Insect	A sweat bee	<i>Agopostemon coloradensis</i>
Insect	A sweat bee	<i>Dieunomia apache</i>
Insect	Aberrant Cellophane Bee	<i>Colletes aberrans</i>
Insect	Bald-spot Sweat Bee	<i>Lasioglossum paraforbesii</i>
Insect	Bicoloured Sweat Bee	<i>Agopostemon virescens</i>
Insect	Black-and-gold Bumble Bee	<i>Bombus auricomus</i>
Insect	Byssus Skipper	<i>Problema byssus</i>
Insect	Dotted Skipper	<i>Herperia attralus</i>
Insect	Ghost Tiger Beetle	<i>Ellipsoptera lepida</i>
Insect	Morrison's Bumble Bee	<i>Bombus morrisoni</i>
Insect	Occidental Digger Bee	<i>Anthophora occidentalis</i>
Insect	Ottoo Skipper	<i>Hesperia ottoe</i>
Insect	Particular Small Dung Beetle	<i>Scabrostonus peculiaris</i>
Insect	Regal Fritillary	<i>Argynnis idalia</i>
Insect	Soapberry Hairstreak	<i>Phaeostrymon alcestis</i>
Insect	Southern Plains Bumble Bee	<i>Bombus fraternus</i>
Insect	Splendid Sweat Bee	<i>Agopostemon splendens</i>
Insect	Susan's Plasterer Bee	<i>Colletes susannae</i>
Insect	The Unexpected Milkweed Moth	<i>Cynia inopinatus</i>
Insect	White-cloaked Tiger Beetle	<i>Eunota togata latilabris</i>
Insect	Whiteish Sweat Bee	<i>Agopostemon sericeus</i>
Insect	Yellow Bumble Bee	<i>Bombus fervidus</i>
Mammals	Southern Bog Lemming	<i>Synaptomys cooperi</i>
Plants	Great Plains Ladies'-tresses	<i>Spiranthes magnicamporum</i>
Plants	Kansas Arrowhead	<i>Sagittaria ambigua</i>
Plants	Prairie Fumeflower	<i>Talinum rugospermum</i>
Reptiles	Western Massasauga	<i>Sistrurus tergeminus</i>
Reptiles	Plains Hog-nosed Snake	<i>Heterodon nasicus</i>

6. Red Hills



The Red Hills Ecological Focus Area 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 sand-sage prairie communities 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 ecoregion (Southwestern Tablelands).

Conservation Issues

Agriculture

- *Conversion of 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, and oil/gas fields infrastructure and activities in native grasslands—impacting grassland and migratory birds, bats, and other wildlife

Natural system modifications

- *Suppression of fire alters composition of native grasslands
- *Improperly applied use of prescribed fire (including periodicity and seasonality of fire)
- *The use of surface and ground-water for irrigation is lowering the groundwater level

Invasive and other problematic species and genes

- *Invasive woody and herbaceous species (e.g. Eastern Red Cedar, Tamarisk, Old World Bluestem, etc.)

Pollution

- *Pollution from point and non-point sources includes runoff of pesticides, fertilizers, and other chemicals

Conservation Actions

Land/water protection

- *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
- *Offer incentives for constructing fences around seeps and springs to keep livestock out

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 tool
- *Provide incentives for mechanical control of woody invasive species
- *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
- *Develop and implement a Kansas invasive species plan
- *Promote ecologically sound techniques for flood control, erosion control, non-point source pollution control, and bank stabilization

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. White Nose Syndrome, Chytrid Fungus, Ranavirus, etc.)
- *Research the effects of coal bed methane extraction on wildlife and water quality
- *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
- *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)

External capacity building

- *Work with county zoning boards to implement well thought out planning procedures
- *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

Species management

- *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.
- *Continue to support population and distributional surveys of the Black-tailed Prairie Dog.
- *Develop and implement a Black-tailed Prairie Dog Management Plan.
- *Initiate and continue distributional surveys of bats, Lesser Prairie Chickens, Northern Bobwhite quail and other SGCN
- *For mammals, describe habitat associations and measure trends in habitat distribution and quality in coordination with conservation societies



Species of Greatest Conservation Need

Tier 1 SGCN

Amphibians	Strecker's Chorus Frog	<i>Pseudacris streckeri</i>
Birds	Least Tern	<i>Sternula antillarum</i>
Birds	Lesser Prairie-Chicken	<i>Tympanuchus pallidicinctus</i>
Birds	Snowy Plover	<i>Charadrius alexandrinus</i>
Gastropods	A terrestrial snail	<i>Succinea pseudavara</i>
Gastropods	Xeric Ambersnail	<i>Succinea vaginacontorta</i>
Insect	A leafcutter bee	<i>Megachile amica</i>
Insect	A leafcutter bee	<i>Megachile integra</i>
Insect	A wool-carder bee	<i>Anthidium michenerorum</i>
Insect	A Cave Obligate Isopod	<i>Caecidotea tridentata</i>
Insect	American Bumble Bee	<i>Bombus pensylvanicus</i>
Insect	Monarch	<i>Danaus plexippus</i>
Insect	Robust Sunflower Leafcutter Bee	<i>Megachile fortis</i>
Insect	Variable Cuckoo Bumble Bee	<i>Bombus variabilis</i>
Insect	Whitney's Underwing	<i>Catocala whitneyi</i>
Reptiles	Checkered Garter-snake	<i>Thamnophis marcianus</i>
Reptiles	New Mexico Threadsnake	<i>Rena dissectus</i>

Tier 2 SGCN

Amphibians	Red-spotted Toad	<i>Anaxyrus punctatus</i>
Amphibians	Tiger Salamander	<i>Ambystoma tigrinum</i>
Birds	American Avocet	<i>Recurvirostra americana</i>
Birds	American Tree Sparrow	<i>Spizella arborea</i>
Birds	American White Pelican	<i>Pelecanus erythrorhynchos</i>
Birds	Baird's Sparrow	<i>Centronyx bairdii</i>
Birds	Baltimore Oriole	<i>Icterus galbula</i>
Birds	Barn Owl	<i>Tyto alba</i>
Birds	Bell's Vireo	<i>Vireo bellii</i>
Birds	Black Rail	<i>Laterallus jamaicensis</i>
Birds	Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>
Birds	Black-necked Stilt	<i>Himantopus mexicanus</i>
Birds	Bullock's Oriole	<i>Icterus bullockii</i>
Birds	Burrowing Owl	<i>Athene cunicularia</i>
Birds	Cassin's Sparrow	<i>Peucaea cassinii</i>
Birds	Chestnut-collared Longspur	<i>Calcarius ornatus</i>
Birds	Chuck-will's-widow	<i>Antrostomus carolinensis</i>
Birds	Common Nighthawk	<i>Chordeiles minor</i>
Birds	Common Poorwill	<i>Phalaenoptilus nuttallii</i>
Birds	Dickcissel	<i>Spiza americana</i>
Birds	Eastern Kingbird	<i>Tyrannus tyrannus</i>
Birds	Eastern Meadowlark	<i>Sturnella magna</i>
Birds	Golden Eagle	<i>Aquila chrysaetos</i>
Birds	Grasshopper Sparrow	<i>Ammodramus savannarum</i>
Birds	Harris's Sparrow	<i>Zonotrichia querula</i>
Birds	Lark Sparrow	<i>Chondestes grammacus</i>
Birds	Least Bittern	<i>Ixobrychus exilis</i>
Birds	Loggerhead Shrike	<i>Lanius ludovicianus</i>
Birds	McCown's Longspur	<i>Rhynchopanes mccownii</i>
Birds	Mississippi Kite	<i>Ictinia mississippiensis</i>
Birds	Northern Bobwhite	<i>Colinus virginianus</i>
Birds	Painted Bunting	<i>Passerina ciris</i>
Birds	Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>
Birds	Rusty Blackbird	<i>Euphagus carolinus</i>
Birds	Scissor-tailed Flycatcher	<i>Tyrannus forficatus</i>
Birds	Short-eared Owl	<i>Asio flammeus</i>

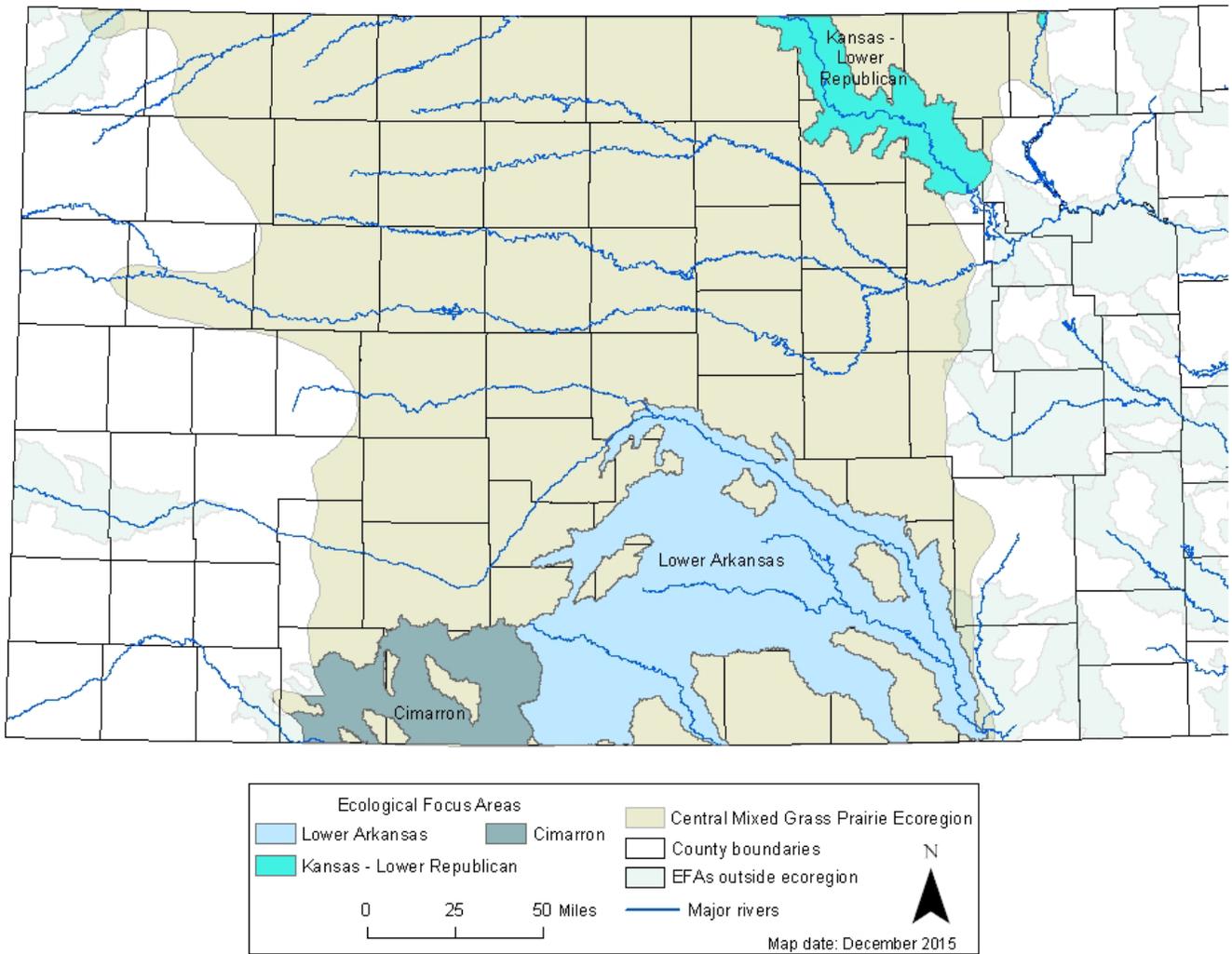
Tier 2 SGCN

Birds	Sprague's Pipit	<i>Anthus spragueii</i>
Birds	Swainson's Hawk	<i>Buteo swainsoni</i>
Birds	Upland Sandpiper	<i>Bartramia longicauda</i>
Birds	Western Kingbird	<i>Tyrannus verticalis</i>
Gastropods	Mudbank Ambersnail	<i>Catinella vagans</i>
Gastropods	Texas Liptooth	<i>Lininsa texasiana</i>
Insect	A callirhoe bee	<i>Melissodes intortus</i>
Insect	A dieunomia bee	<i>Dieunomia triangulifera</i>
Insect	A leafcutter bee	<i>Megachile mucorosa</i>
Insect	A longhorned beetle	<i>Tetraopes pilosus</i>
Insect	An oil-collecting bee	<i>Centris (Paracentris) lanosus</i>
Insect	A scarab beetle	<i>Alloblackburneus cynomysi</i>
Insect	A scarab beetle	<i>Cryptoscatomaseter paulseni</i>
Insect	A scarab beetle	<i>Cryptoscatomaseter salsburyi</i>
Insect	A scarab beetle	<i>Geomyphilus insolitus</i>
Insect	A scarab beetle	<i>Geomyphilus kiowensis</i>
Insect	A scarab beetle	<i>Geomyphilus viceversus</i>
Insect	A scarab beetle	<i>Onthophagus cynomysi</i>
Insect	A scarab beetle	<i>Orizabus pyriformis</i>
Insect	A scarab beetle	<i>Oscarinus pseudabusus</i>
Insect	A scarab beetle	<i>Pardalosus neodistinctus</i>
Insect	A scarab beetle	<i>Scabrostomus sepultus</i>
Insect	A scarab beetle	<i>Strategus mormon</i>
Insect	A scarab beetle	<i>Tetraclipeoides dentigerulus</i>
Insect	A sweat bee	<i>Agopostemon coloradensis</i>
Insect	A sweat bee	<i>Dieunomia apache</i>
Insect	A wool-carder bee	<i>Anthidium psoraleae</i>
Insect	Aberrant Cellophane Bee	<i>Colletes aberrans</i>
Insect	Arogos Skipper	<i>Atrytone arogos</i>
Insect	Bald-spot Sweat Bee	<i>Lasioglossum paraforbesii</i>
Insect	Bicoloured Sweat Bee	<i>Agopostemon virescens</i>
Insect	Black-and-gold Bumble Bee	<i>Bombus auricomus</i>
Insect	Burrow Small Dung Beetle	<i>Geomyphilus thomomysi</i>
Insect	Dotted Skipper	<i>Hesperia attalus attalus</i>
Insect	Ghost Tiger Beetle	<i>Ellipsoptera lepida</i>
Insect	Morrison's Bumble Bee	<i>Bombus morrisoni</i>
Insect	Mottled Duskywing	<i>Erynnis martialis</i>
Insect	Occidental Digger Bee	<i>Anthophora occidentalis</i>
Insect	Orange-bellied Sweat Bee	<i>Agopostemon melliventris</i>
Insect	Ottoo Skipper	<i>Hesperia ottoe</i>
Insect	Pahaska Skipper	<i>Hesperia pahaska</i>
Insect	Particular Small Dung Beetle	<i>Scabrostonus peculiaris</i>
Insect	Red Satyr	<i>Megisto rubricata</i>
Insect	Regal Fritillary	<i>Argynnis idalia</i>
Insect	Soapberry Hairstreak	<i>Phaeostrymon alcestis</i>
Insect	Southern Plains Bumble Bee	<i>Bombus fraternus</i>
Insect	Splendid Sweat Bee	<i>Agopostemon splendens</i>
Insect	Susan's Plasterer Bee	<i>Colletes susannae</i>
Insect	The Unexpected Milkweed Moth	<i>Cynia inopinatus</i>
Insect	White-cloaked Tiger Beetle	<i>Eunota togata latilabris</i>
Insect	Whiteish Sweat Bee	<i>Agopostemon sericeus</i>
Insect	Yellow Bumble Bee	<i>Bombus fervidus</i>
Mammals	Black-tailed Prairie Dog	<i>Cynomys ludovicianus</i>
Mammals	Fulvous Harvest Mouse	<i>Reithrodontomys fulvescens</i>
Mammals	Pallid Bat	<i>Antrozous pallidus</i>
Mammals	Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>
Mammals	Tricolored Bat	<i>Perimyotis subflavus</i>
Plants	Great Plains Ladies'-tresses	<i>Spiranthes magnicamporum</i>

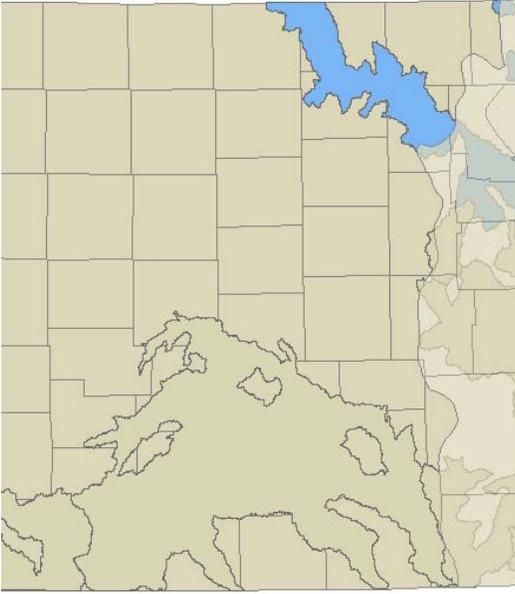
Tier 2 SGCN		
Plants	Oklahoma Phlox	<i>Phlox oklahomensis</i>
Plants	Sand-dune Broomspurge	<i>Euphorbia carunculata</i>
Reptiles	Chihuahuan Night-snake	<i>Hypsiglena jani</i>
Reptiles	Eastern Hog-nosed Snake	<i>Heterodon platirhinus</i>
Reptiles	Glossy Snake	<i>Arizona elegans</i>
Reptiles	Ground-snake	<i>Sonora semiannulata</i>
Reptiles	Lesser Earless Lizard	<i>Holbrookia maculata</i>
Reptiles	Long-nosed Snake	<i>Rhinocheilus lecontei</i>
Reptiles	Western Massasauga	<i>Sistrurus tergeminus</i>
Reptiles	Plains Hog-nosed Snake	<i>Heterodon nasicus</i>
Reptiles	Prairie Rattlesnake	<i>Crotalus viridis</i>
Reptiles	Texas Horned Lizard	<i>Phrynosoma cornutum</i>

Aquatic EFAs

Figure 8. Aquatic Ecological Focus Areas of the Central Mixed Grass Prairie Conservation Region. These EFAs represent landscapes where conservation actions can be applied for maximum benefit to Kansas wildlife. Each EFA includes a suite of SGCN and priority habitats.



1. Kansas - Lower Republican



The Kansas - Lower Republican Ecological Focus Area 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. This EFA is broadly distributed among the following ecoregions: Rolling Plains and Breaks, Smoky Hills, Flint Hills, Loess and Glacial Drift Hills, and Osage Cuestas. 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

Residential and commercial development

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

Agriculture

- *Farming near stream channels impacts riparian habitats, resulting in erosion, sedimentation, and nutrients issues
- *Intense grazing regimes can degrade riparian habitats
- *Livestock access to streams can increase nutrient input

Natural system modifications

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

Invasive and other problematic species and genes

- *Invasive species, such as White Perch, Bighead Carp, and Silver Carp, negatively impact native aquatic species and habitat.
- *Introduced predatory species can impact populations of native aquatic species

Pollution

- *Overuse/misapplication of pesticides and fertilizer also contribute to water quality degradation from runoff
- *Urban runoff contains industrial and lawn chemicals that impact water quality
- *The outflows from sewage plants of cities and towns impact water quality

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

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
- *Encourage conservation easements on high quality habitats

Land/water management

- *Encourage sand acquisition from off-channel sources such as the Kansas River valley and/or reservoirs to reduce impacts to the river channel
- *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 improved water quality standards
- *Promote effective instream flow management through the development and implementation of ecologically appropriate flow regimes
- *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
- *Promote ecologically sound techniques for flood control, erosion control, nonpoint source pollution control, and bank stabilization
- *Encourage engineering techniques that promote high habitat diversity
- *Encourage the use of fences where necessary to manage riparian corridors, and otherwise conduct proper grazing management
- *Maximize habitat diversity for wildlife species
- *Develop plans to prevent the invasion and spread of Aquatic Nuisance Species
- *Promote restoration of stream channels through natural stream design
- *Promote restoration projects that increase floodplain connectivity in incised streams
- *Promote conservation and restoration of oxbow habitats
- *Promote fish passage designs for new in-stream structures and retro-fit old structures to allow passage
- *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

Species management

- *Propagate imperiled species for reintroduction and population augmentation efforts
- *Work with landowners and partners to identify appropriate reintroduction sites for imperiled species

Education and awareness

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

- *Investigate contaminant effects on reptilian and amphibian populations
- *Continued disease monitoring (Chytrid Fungus, Ranavirus, etc.)
- *Inform landowners and managers of and promote best management practices
- *Research and develop engineering techniques for effective river and stream management
- *Educate the public about the value of wetlands and streams, including riparian corridors, so they will support increased funding
- *Educate landowners and managers on the value of rare species
- *Educate the public regarding the importance of preventing the spread of invasive species
- *Study the impact of Bighead Carp, Silver Carp, and other introduced species on native species
- *Inventory perched culverts and other structures that are preventing aquatic organism passage
- *Educate public and developers on the effects of impervious surfaces and the potential for Low Impact Development
- *Educate public about eco-friendly lawn care and effects of lawn chemicals on aquatic systems

External capacity building

- *Promote and encourage formation of coalitions/associations such as The Comanche Pool Prairie Resource Foundation
- *Work with other states and federal agencies to gain assurance that no species are being transported in Kansas
- *Promote sound water quality standards and their enforcement through education and continued coordination with the Kansas Department of Health and Environment
- *Work with county road departments and Kansas Department of Transportation to identify and replace structures that are preventing aquatic organism passage
- *Promote the use of conservation culverts that retain natural stream bed features
- *Improve the coordination of mitigation activities with the Army Corps of Engineers
- *Coordinate with Watershed Restoration and Protection Strategy groups to improve water quality and habitat
- *Work with the county zoning boards to implement good urban planning procedures
- *Work with city and county public works to improve storm water management

Livelihood, economic and other incentives

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

Species of Greatest Conservation Need

Tier 1 SGCN

Fish	Blackside Darter	<i>Percina maculata</i>
Fish	Pallid Sturgeon	<i>Scaphirhynchus albus</i>
Fish	Plains Minnow	<i>Hybognathus placitus</i>
Fish	Shoal Chub	<i>Macrhybopsis hyostoma</i>
Fish	Sicklefin Chub	<i>Macrhybopsis meeki</i>
Fish	Silver Chub	<i>Macrhybopsis storeriana</i>
Fish	Sturgeon Chub	<i>Macrhybopsis gelida</i>
Fish	Topeka Shiner	<i>Notropis topeka</i>
Fish	Western Silvery Minnow	<i>Hybognathus argyritis</i>
Insect	A mayfly	<i>Apobaetis lakota</i>
Insect	A mayfly	<i>Heterocloeon grande</i>
Insect	A small minnow mayfly	<i>Plauditus texanus</i>
Mussels	Snuffbox	<i>Epioblasma triquetra</i>

Tier 2 SGCN

Fish	American Eel	<i>Anguilla rostrata</i>
Fish	Black Buffalo	<i>Ictiobus niger</i>
Fish	Blue Sucker	<i>Cycleptus elongatus</i>

Tier 2 SGCN

Fish	Brassy Minnow	<i>Hybognathus hankinsoni</i>
Fish	Cardinal Shiner	<i>Luxilus cardinalis</i>
Fish	Chestnut Lamprey	<i>Ichthyomyzon castaneus</i>
Fish	Common Shiner	<i>Luxilus cornutus</i>
Fish	Golden Redhorse	<i>Moxostoma erythrurum</i>
Fish	Highfin Carpsucker	<i>Carpionodes velifer</i>
Fish	Johnny Darter	<i>Etheostoma nigrum</i>
Fish	Lake Sturgeon	<i>Acipenser fulvescens</i>
Fish	Northern Plains Killifish	<i>Fundulus kansae</i>
Fish	Orangethroat Darter	<i>Etheostoma spectabile</i>
Fish	Ozark Logperch	<i>Percina caprodes fulvitaenia</i>
Fish	Paddlefish	<i>Polyodon spathula</i>
Fish	Quillback	<i>Carpionodes cyprinus</i>
Fish	River Redhorse	<i>Moxostoma carinatum</i>
Fish	River Shiner	<i>Notropis blennioides</i>
Fish	Shorthead Redhorse	<i>Moxostoma macrolepidotum</i>
Fish	Shovelnose Sturgeon	<i>Scaphirhynchus platyrhynchus</i>
Fish	Slender Madtom	<i>Noturus exilis</i>
Fish	Slenderhead Darter	<i>Percina phoxocephala</i>
Fish	Southern Redbelly Dace	<i>Chrosomus erythrogaster</i>
Fish	Stonecat	<i>Noturus flavus</i>
Fish	White Sucker	<i>Catostomus commersonii</i>
Insect	A longhorned caddisfly	<i>Ceraclea spongillovorax</i>
Insect	A sand-filtering mayfly	<i>Homoeoneuria ammophila</i>
Mussels	Creeper	<i>Strophitus undulatus</i>
Mussels	Fatmucket	<i>Lampsilis siliquoidea</i>
Mussels	Fawnsfoot	<i>Truncilla donaciformis</i>
Mussels	Lilliput	<i>Toxolasma parvum</i>
Mussels	Pink Heelsplitter	<i>Potamilus alatus</i>
Mussels	Plain Pocketbook	<i>Lampsilis cardium</i>
Mussels	Pondhorn	<i>Unio merus tetralasmus</i>
Mussels	Wabash Pigtoe	<i>Fusconaia flava</i>
Mussels	Yellow Sandshell	<i>Lampsilis teres</i>
Turtles	Smooth Softshell	<i>Apalone mutica</i>

2. Lower Arkansas



The Lower Arkansas Ecological Focus Area continues 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 part of the Central Great Plains and is primarily made up of the undulating to rolling sand plains of the Great Bend Sand Prairie and the flat lowland topography of the Wellington-McPherson Lowlands. Center pivot irrigation is implemented to a greater degree in the Great Bend Sand Prairie than surrounding regions. Loess and river valley deposits support extensive cropland agriculture of winter wheat and grain sorghum in the Wellington-McPherson 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

Residential and commercial development

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

Agriculture

- *Farming near stream channels impacts riparian habitats, resulting in erosion, sedimentation, and nutrient issues
- *Intense grazing regimes can degrade riparian habitats
- *Livestock access to streams can increase nutrient input

Natural system modifications

- *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
- *Structures that alter the water from its natural drainage are impacting natural hydrology of streams
- *Bank destabilization (due to riparian management, headcuts, etc.) and some subsequent stabilization methods can cause stream incision and loss of riparian habitat.
- *Fragmentation from low-head dams and other impoundments impedes aquatic organism movement and reproduction
- *Channelization reduces stream habitat, and causes stream incision which reduces floodplain connectivity

Invasive and other problematic species and genes

- *Introduced species such as White Perch, Zebra Mussels, negatively impact native aquatic species and habitat
- *Introduced predatory species can impact populations of native aquatic species, fisheries management as it relates to stocking game fish can be detrimental to native species
- *Eastern Red Cedar has reduced flows in many streams of the Lower Arkansas Basin
- *Other invasive plants impact riparian areas

Pollution

- *Overuse/misapplication of pesticides and fertilizer also contribute to water quality degradation from runoff
- *Urban runoff contains industrial and lawn chemicals that impact water quality
- *The outflows from sewage plants of cities and towns impact water quality

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

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
- *Encourage conservation easements on high quality habitats

Land/water management

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

- *Promote ecologically sound techniques for flood control, erosion control, nonpoint source pollution control and bank stabilization
- *Encourage engineering techniques that promote high habitat diversity
- *Encourage the use of fences where necessary to manage riparian corridors, and otherwise conduct proper grazing management
- *Promote improved water quality standards
- *Promote effective instream flow management through the development and implementation of ecologically appropriate flow regimes
- *Maximize habitat diversity for wildlife species
- *Develop plans to prevent the invasion and spread of Aquatic Nuisance Species
- *Expand cooperative programs that supply technical and direct assistance for non-native species removal
- *Promote removal of Eastern Red Cedar
- *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
- *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
- *Promote restoration of stream channels through natural stream design
- *Promote restoration projects that increase floodplain connectivity in incised streams
- *Promote conservation and restoration of oxbow habitats
- *Promote fish passage designs for new in-stream structures and retro-fit old structures to allow passage

Species management

- *Propagate imperiled species for reintroduction and population augmentation efforts
- *Work with landowners and partners to identify appropriate reintroduction sites for imperiled species

Education and awareness

- *Inform landowners and managers of and promote best management practices
- *Investigate contaminant effects on reptilian and amphibian populations
- *Conduct wildlife surveys that are rigorous, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics
- *Continued disease monitoring (Chytrid Fungus, Ranavirus, etc.)
- *Research and develop engineering techniques for effective river and stream management
- *Study the impact of introduced species on native species
- *Educate the public regarding the importance of preventing the spread of invasive species
- *Educate the public about the value of wetlands and streams, including riparian corridors, so they will support increased funding
- *Educate landowners and managers on the value of rare species
- *Inventory perched culverts and other structures that are preventing aquatic organism passage
- *Educate landowners on the benefits of Eastern Red Cedar removal
- *Educate public and developers on the effects of impervious surfaces and the potential for Low Impact Development
- *Educate public about eco-friendly lawn care and effects of lawn chemicals on aquatic systems

External capacity building

- *Promote and encourage formation of coalitions/associations such as the Comanche Pool Prairie Resource Foundation
- *Work with neighboring states to gain compliance of interstate compacts in regard to water rights
- *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
- *Work with city and county public works to improve storm water management

- *Promote the use of conservation culverts that retain natural stream bed features
- *Improve the coordination of mitigation activities with the Army Corps of Engineers
- *Coordinate with Watershed Restoration and Protection Strategy groups to improve water quality and habitat

Livelihood, economic and other incentives

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

Species of Greatest Conservation Need

Tier 1 SGCN

Amphibians	Strecker’s Chorus Frog	<i>Pseudacris streckeri</i>
Fish	Arkansas Darter	<i>Etheostoma cragini</i>
Fish	Arkansas River Shiner	<i>Notropis girardi</i>
Fish	Peppered Chub	<i>Macrhybopsis tetranema</i>
Fish	Plains Minnow	<i>Hybognathus placitus</i>
Fish	Silver Chub	<i>Macrhybopsis storeriana</i>
Insect	A mayfly	<i>Heterocloeon grande</i>
Insect	A small minnow mayfly	<i>Plauditus texanus</i>

Tier 2 SGCN

Amphibians	Red-spotted Toad	<i>Anaxyrus punctatus</i>
Fish	Black Buffalo	<i>Ictiobus niger</i>
Fish	Channel Darter	<i>Percina copelandi</i>
Fish	Freckled Madtom	<i>Noturus nocturnus</i>
Fish	Golden Redhorse	<i>Moxostoma erythrurum</i>
Fish	Northern Plains Killifish	<i>Fundulus kansae</i>
Fish	Orangethroat Darter	<i>Etheostoma spectabile</i>
Fish	Ozark Logperch	<i>Percina caprodes fulvitaenia</i>
Fish	Pealip Redhorse	<i>Moxostoma pisolabrum</i>
Fish	Quillback	<i>Carpiodes cyprinus</i>
Fish	Shorthead Redhorse	<i>Moxostoma macrolepidotum</i>
Fish	Slenderhead Darter	<i>Percina phoxocephala</i>
Fish	Southern Redbelly Dace	<i>Chrosomus erythrogaster</i>
Fish	Warmouth	<i>Lepomis gulosus</i>
Insect	A longhorned caddisfly	<i>Ceraclea spongillovorax</i>
Mussels	Bleufer	<i>Potamilus purpuratus</i>
Mussels	Lilliput	<i>Toxolasma parvum</i>
Mussels	Pondhorn	<i>Unio merus tetralasmus</i>
Plants	Hall’s Bulrush	<i>Schoenoplectiella hallii</i>
Plants	Missouri Mud-plaintain	<i>Heteranthera missouriensis</i>
Turtles	Smooth Softshell	<i>Apalone mutica</i>



Success Story – Fish Passage

Riverine habitat has been fragmented throughout the Great Plains and Kansas via drought and man-made structures such as low-head dams. This fragmentation has led to declines and extirpations of several fish species, particularly those that require long reaches of continuous habitat for reproduction. Fishways are a common mitigation technique to attempt to restore the longitudinal connectivity broken up by human-engineered structures. Most fishways have been built on high gradient, rocky streams that serve as migration routes for diadromous (migrating between fresh and saltwater) fishes. The Lincoln Street Fishway is one of the first of its kind, built on a low-gradient, sand-fed, Great Plains river for the use of smaller-bodied fishes such as Plains Minnow, Silver Chub, Peppered Chub, Arkansas River Shiner, and Arkansas Darter. Monitoring programs are not often implemented after fishways are installed, and because of this most fishway designs reflect those targeted at salmonids. Information from monitoring programs is vital to improve fishway designs and conservation efforts for imperiled small-bodied, warm-water species.

The Lincoln Street Fishway, which was partially funded by the State Wildlife Grant (SWG) program, was built on the Arkansas River alongside the Lincoln Street Dam in Wichita, KS. Concerted efforts from several partners were required for the funding, design, construction, and monitoring of the fishway (Kansas Department of Wildlife and Parks, U.S. Fish and Wildlife Service, City of Wichita, MKEC Engineering, Federal Highway Administration, Kansas Department of Transportation, U.S. Coast Guard, University of Illinois – Ven Te Chow Hydrosystems Laboratory, and Kansas State University). Construction was initially completed in 2012, but due to high flows and structural flaws the fishway remained in various states of repair until January of 2015. Beginning in March 2015, a SWG grant funded a graduate student at Kansas State University to conduct research on fish community use of the fishway. Preliminary results from sampling events throughout the summer of 2015 have documented 27 species and over 30,000 individuals using the fishway. Sampling of the fish community upstream of the dam and fishway has documented the return of Emerald Shiner to a reach of river from which it had previously disappeared. The City of Wichita conducted regular fish community sampling in the Arkansas River throughout the city including multiple reaches upstream of the dam from 1991-2008. Emerald Shiner were never collected above the dam during that 17-year period. In 2013, three individuals were collected directly upstream of the dam while repairs were being conducted on the fishway, and have been consistently found in upstream samples in 2015. Several species that were once abundant have been extirpated from the Arkansas River in Kansas due to the effects of fragmentation and habitat loss. The return of the Emerald Shiner to reaches upstream of the fishway is promising news, and showcases the role that fishways can play in restoring connectivity for small-bodied fishes in fragmented rivers. Lessons learned from the design and implementation of this unique fishway will guide future conservation of stream fishes in Kansas and the Great Plains.



Lincoln Street Fishway

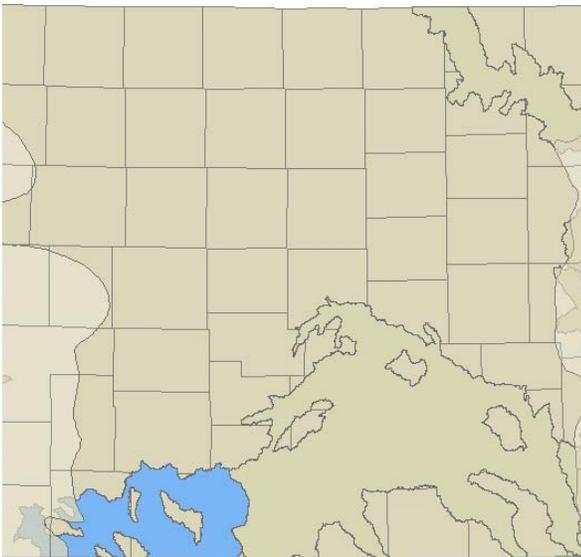
Additional efforts to restore fish passage have been completed throughout the state. Over time stream crossings such as culverts often become perched above water levels, creating a barrier for upstream movement of aquatic organisms. Several Kansas counties have used Fish Passage funding from the U.S. Fish and Wildlife Service to replace aging structures with “fish friendly” designs that reconnect stream habitats.

(Continued on next page)

Replacement of perched culverts with a span bridge on Clear Fork Creek, Pottawatomie County



3. Cimarron



The Cimarron Ecological Focus Area is part of the Southwestern Tablelands comprised of the Cimarron Breaks and the Flatlands Tablelands and Valleys region. The Cimarron Breaks can be described as 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 Tablelands and Valleys region of this area. The region has many spring-fed streams, and 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 presumed extirpated Arkansas River Shiner, Arkansas Darter and Plains Minnow.

Conservation Issues

Agriculture

- *Farming near stream channels impacts riparian habitats, resulting in erosion, sedimentation, and nutrient issues
- *Intense grazing regimes can degrade riparian habitats
- *Livestock access to streams can increase nutrient input

Natural system modifications

- *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
- *Structures that alter the water from its natural drainage are impacting natural hydrology of streams
- *Bank destabilization (due to riparian management, headcuts, etc.) and some subsequent stabilization methods can cause stream incision and loss of riparian habitat.

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

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

Invasive and other problematic species and genes

- *Invasive species such as Red River Pupfish and Red River Shiner negatively impact native aquatic species and habitat

- *Introduced predatory species can impact populations of native aquatic species, fisheries management as it relates to stocking game fish can be detrimental to native species

- *Salt Cedar (*Tamarix* spp) has become well-established in riparian areas of the Cimarron River Basin, and impacts stream habitats by reducing flows and armoring banks

- *Other invasive plants impact riparian areas

Pollution

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

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

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

- *Encourage conservation easements on high quality habitats

Land/water management

- *Promote removal and control of Salt Cedar

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

- *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 improved water quality standards

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

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

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

- *Encourage engineering techniques that promote high habitat diversity

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

- *Maximize habitat diversity for wildlife species

- *Develop plans to prevent the invasion and spread of Aquatic Nuisance Species

- *Promote restoration of stream channels through natural stream design

- *Promote restoration projects that increase floodplain connectivity in incised streams

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

Species management

- *Propagate imperiled species for reintroduction and population augmentation efforts
- *Work with landowners and partners to identify appropriate reintroduction sites for imperiled species

Education and awareness

- *Educate landowners on Salt Cedar control methods and the benefits of Salt Cedar removal
- *Inform landowners and managers of and promote best management practices
- *Investigate contaminant effects on reptilian and amphibian populations
- *Conduct wildlife surveys that are rigorous, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics
- *Continued disease monitoring (Chytrid Fungus, Ranavirus, etc.)
- *Research and develop engineering techniques for effective river and stream management
- *Study the impact of Red River Pupfish, Red River Shiner, and other introduced species on native species
- *Educate the public regarding the importance of preventing the spread of invasive species
- *Educate the public about the value of wetlands and streams, including riparian corridors, so they will support increased funding
- *Educate landowners and managers on the value of rare species
- *Inventory perched culverts and other structures that are preventing aquatic organism passage

External capacity building

- *Promote and encourage formation of coalitions/associations such as the Comanche Pool Prairie Resource Foundation
- *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
- *Work with county road departments and Kansas Dept. of Transportation to identify and replace structures that are preventing aquatic organism passage
- *Promote the use of conservation culverts that retain natural stream bed features
- *Improve the coordination of mitigation activities with the Army Corps of Engineers
- *Coordinate with Watershed Restoration and Protection Strategy groups to improve water quality and habitat

Livelihood, economic and other incentives

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

Species of Greatest Conservation Need

Tier 1 SGCN		
Fish	Arkansas Darter	<i>Etheostoma cragini</i>
Fish	Arkansas River Shiner	<i>Notropis girardi</i>
Fish	Plains Minnow	<i>Hybognathus placitus</i>
Tier 2 SGCN		
Amphibians	Red-spotted Toad	<i>Anaxyrus punctatus</i>
Arachnida	An aquatic mite	<i>Tyrrellia hibbardi</i>
Fish	Golden Redhorse	<i>Moxostoma erythrurum</i>
Fish	Northern Plains Killifish	<i>Fundulus kansae</i>
Mussels	Lilliput	<i>Toxolasma parvum</i>
Mussels	Pondhorn	<i>Unio merus tetralasmus</i>

Central Mixed Grass Prairie Conservation Region Partners (not listed on Statewide List)

- Bird Conservancy of the Rockies
- Comanche Pool Prairie Resource Foundation
- Great Plains Landscape Conservation Cooperative
- Great Plains Nature Center
- Kansas Prescribed Burn Association (local associations)
- Playa Lakes Joint Venture
- McConnell Air Force Base
- Smoky Hill Grazers

Success Story - Helping Private Landowners Conserve Wildlife Habitat

Kansas’ Wildlife Action Plan identifies fragmentation of grasslands by agriculture and encroachment of woody species into native prairies as high priority threats to wildlife. KDWP developed the Private Landowner Incentive Program and subsequent Private Landowner Habitat Program to address these issues on private land for Species of Greatest Conservation Need. Creating conservation partnerships with private landowners is a high priority in Kansas’ wildlife action plan as 97% of Kansas land is privately-owned and more than 90% of the state’s endangered species are found on private land.

KDWP’s Landowner Incentive and Private Lands Habitat programs were developed to provide financial and technical assistance to private landowners to help restore, enhance, and/or preserve habitat for wildlife. These initial programs focused implementation in the Shortgrass and Mixed grass ecoregions. To date, over 100 projects have been funded on over 50,000 privately owned acres with technical service provided to numerous other private landowners. Prescribed grazing, invasive tree/plant removal, prescribed burning, and perimeter fencing on expired CRP fields directly benefit over 25 at-risk species. These actions also benefit more common species that use the same resources, helping to conserve them before they become more vulnerable.

