Chapter 6 -
EASTERN TALLGRASS PRAIRIE CONSERVATION REGION

Description

The Eastern Tallgrass Prairie Conservation Region is located in the eastern third of Kansas. It includes the Flint Hills, Glaciated Region, Osage Cuestas, Chautauqua Hills, Cherokee Lowlands, and Ozark Plateau physiographic regions (Figure 4).

The Flint Hills, the largest contiguous area of tallgrass prairie in the country (Duncan 1978), lies at the western edge of the tall-grass prairie. It is composed of flint-bearing limestone which is resistant to erosion. 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. Woody vegetation is scarce. Forests occur along stream and river bottoms, and areas protected from fire (Busby and Zimmerman 2001; Kucera 1992).

The Glaciated Region occupies the northeast corner of the state. Shaped by the repeated southern advance and then northern retreat of glaciers during the Quaternary period, a 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 Osage Cuestas region occupies a large portion of eastern Kansas south of the Kansas River. The landscape of ridges and valleys were created by the weathering of the underlying deposits of limestone and shale. The weather resistant limestone makes up the east facing ridges, while the softer shale erodes away to form the valleys on the west facing side (Wilson 1984). The soils are mainly silt and clay loams. Steep slopes and land that isn't as fertile have been allowed to revert to woodland and shrubland. The forest in this region lies at the western edge of the Eastern Deciduous Forest. Woodlands are found along stream valleys and fire protected slopes. Also occurring along streams and rivers are marshes, oxbow lakes and wet prairies (Physiographic 1997).

The Chautauqua Hills region consists of a narrow band of hills that extend northeastward into Kansas from Oklahoma. The sediment of this region is composed mostly of sandstone. The more permeable soils support abundant tree growth. A savanna-type ecosystem, the dominant woody species are drought tolerant, fire adapted oak trees. The understory of the woodlands is primarily composed of prairie grasses. The major land use of the region is livestock grazing as the hills are too steep for crop production (Kansas Geological Survey 1997).

The Cherokee Lowlands lie in the southeast corner of Kansas. Developed on easily eroded shales and sandstone, the gently rolling landscape is crossed by shallow stream valleys (Busby and Zimmerman 2001). With relatively flat topography and deep, rich soils, this region is good for crop production. Trees generally grow only on hill slopes, large stream banks, and in abandoned mining areas (Kansas Geological Survey 1997). The Cherokee Lowlands have the most extensive coal deposits in the state, and as such coal mining is another important industry of the region.

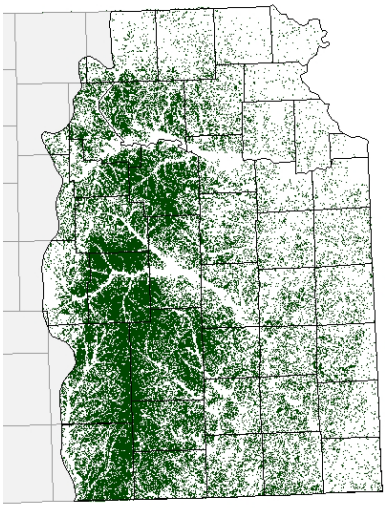
The Ozark Plateau region occurs in the extreme southeast corner of Kansas, and is part of the Ozarks of Missouri, Oklahoma, and Arkansas. Under this region lay thick deposits of limestone, creating the clear, high-gradient streams, springs, and extensive caves, the Ozarks are known for. The landscape consists of steep hills covered with hardwood forests along with other trees, shrubs, and vines. The thin rocky soil along with the steep terrain makes this region unsuitable for farming. Crop production is restricted to valley floors of rivers and streams. Some areas have also been cleared for pasture, but much of the Ozark Plateau still remains forested with little disturbance by human activity (Kansas Geological Survey 1997).

The Eastern Tallgrass Prairie Region is mostly prairie in the western portion, while the eastern portion is a mixture of prairie, woodlands and forests (Brooks 1985). The annual average rainfall is between 30 and 42 inches. The higher amount of rainfall in this region supports the growth and development of forests (Duncan 1978). The most common tree community in the deciduous forest region of Kansas is dominated by oak and hickory species (*Quercus/Carya spp)* (Brooks 1985). Historically, fire played an important role in preventing shrubby growth from invading, maintaining the tallgrass prairie. Today controlled burning and mowing are implemented to keep shrubby growth in check. This region is defined by the dominant tall grass species that occur in higher abundance than in the other conservation regions. The soil of this region is extremely fertile, but not always easily accessible for crop production (Kucera 1992). Farming still occurs over a large portion of this region but not to the same degree as the other regions. Crop production relies less on irrigation than in the western regions to produce crops such as corn, grain sorghum, and wheat (Duncan 1978). Population in this region is higher than in the Mixed Grass Prairie Conservation Region. There are a greater number of larger cities situated relatively close together. Major rivers are the Kansas and the Missouri in the north, the Marais des Cygnes in the middle, and the Neosho and Verdigris in the south.

A. Priority habitats in the Eastern Tallgrass Prairie Conservation Region

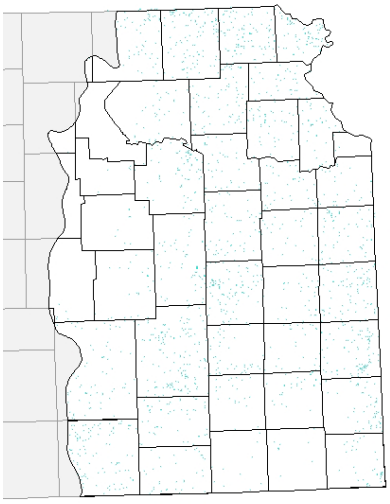
Priority habitats in the region include Tallgrass Prairie, Herbaceous Wetland, Eastern Streams/Small Rivers, Deciduous Forest, Eastern Large Rivers, and Deciduous Floodplain. The Tallgrass Prairie habitat is the primary habitat within this conservation region. Other habitats occurring in the region, but are not considered priority are: Evergreen (Cedar), CRP/Native, CRP/Cool Season, Cropland, Caves, Eastern Lentic, and Seeps and Springs.

Tallgrass Prairie



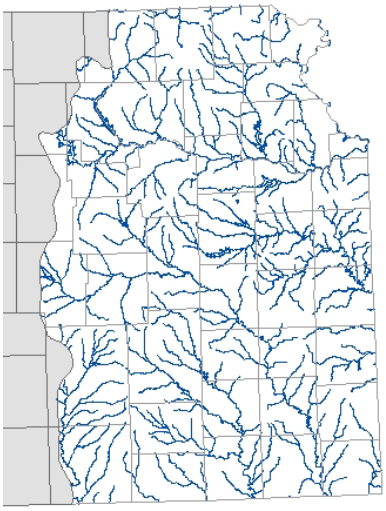
Tallgrass Prairie habitat is a core habitat in need of special emphasis. This habitat is dominated by warm-season grasses such as Big Bluestem (*Andropogon gerardii*), Switchgrass (*Panicum virgatum*), Little Bluestem (*Schizachyrium scoparium*), and Indian grass (*Sorghastrum nutans*) (Thompson 2011). Wildflowers such as violets (*Viola* spp.), *Echinacea* spp, *Oenothera* spp, *Lobelia* spp, beardtongues (*Penstemon* spp.), and sunflowers (Heliantheae tribe) can be found throughout the Tallgrass Prairie habitat. The largest remaining undisturbed tracts of the habitat occur in the Flint Hill Uplands, where the soils are too shallow to plow (Brooks 1985). East of the Flint Hills small tracts of tallgrass prairie still exist in areas not yet disrupted by agriculture.

Herbaceous Wetland Habitat



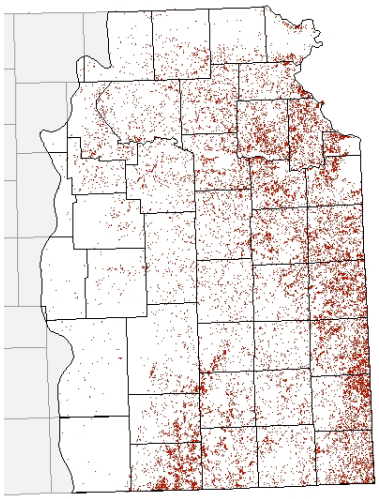
The Herbaceous Wetland habitat in the Eastern Tallgrass Prairie Conservation Region is comprised of low or wet Prairie, freshwater marsh, cattail marsh, and weedy marsh. These habitats are located in the floodplains along rivers and streams, in swales associated with rivers, or as margins of lakes and impoundments. These are mostly seasonal and permanent wetlands. The dominant species include Softstem Bulrush, (*Scirpus validus*), Spike Rush (*Eleocharis spp.*), and Sedges (*Carex spp.*). Prairie Cordgrass (*Spartina pectinata*) thrives in the low or wet prairies. Many bulrush (*Scirpus* spp.) and cattail (*Typha* spp.) species are found in freshwater and cattail marshes. Ragweeds (*Ambrosia* spp.) and Sorrel (*Rumex* spp.) dominate weedy marshes. The condition of the Herbaceous Wetlands can be significantly impacted by pollution from fertilizer and pesticide runoff from surrounding farm and pasture lands.

Aquatic-Eastern Streams/Small Rivers Habitat



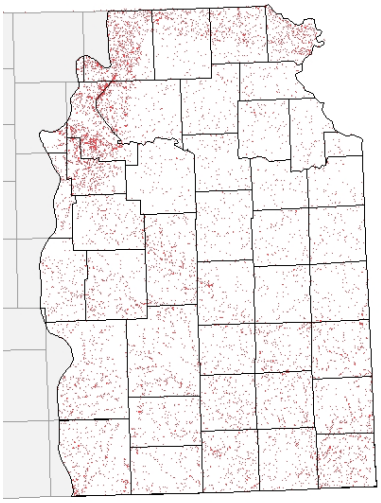
Aquatic-Eastern Streams/Small Rivers habitat includes the small rivers, streams and their tributaries in the Neosho, Missouri, Verdigris, Eastern Arkansas, Kansas, and Marais des Cygnes river basins in eastern Kansas. The relative quality and quantity of the Aquatic-Eastern Streams/Small Rivers Habitat is declining.

Deciduous Forest Habitat



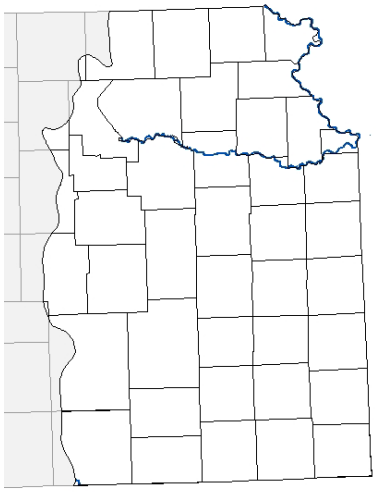
The Deciduous Forest habitat is a westward extension of the Eastern Deciduous Forest. The multi-layered forests are dominated by oaks and hickory species complemented by an understory of shrubs and herbaceous plants. Oak-hickory forests are composed primarily of black and red oaks and bitternut and shagbark hickories. Open groves of blackjack oak (*Quercus marilandica*) and post oak (*Quercus stellata*) occur in the southern portion on upland sandstone soils. Along the Missouri River bluffs, sugar maple (*Acer saccharum*) and basswood (*Tilia americana*) form an important part of the canopy community (Brooks 1985). Eastern cottonwoods (*Populus deltoids*) and black willows (*Salix nigra*) are common in lowland areas. Other common tree species are: White Oak (*Quercus alba*), Chinkapin Oak (*Quercus muehlenbergii*), Slippery Elm (*Ulmus rubra*), Osage Orange (*Malura pomifera*), and Honeylocust (*Gleditsia triacanthos*). The understory of the forest is composed of a number of shrubs and forbs. Grasses and grass-like plants are not common in the woodlands and when they occur, they are confined to scattered clumps (Brooks 1985).

Deciduous Floodplain Habitat



The Deciduous Floodplains are temporarily flooded habitats. In areas that often experience flooding from torrential rains that scour the ground, eastern cottonwoods (*Populus deltoids*) and willows (*Salix* spp.) are able to establish themselves quickly and thrive. Other dominant species are; Pecan (*Carya illinoinensis*), Bur Oak (*Quercus macrocarpa*), Green Ash (*Fraxinus pennsylvanica*), American Elm (*Ulmus americana*), Sugar Maple (*Acer saccharum*), River Birch (*Betula nigra*), and Hackberry (*Celtis occidentalis*). The understory varies depending on how well the woodlands drain after rainfall. Sedges, scouring rush, and weedy nettles can be found with common shrubs and forbs.

Aquatic Eastern Large Rivers Habitat



Aquatic Eastern Large Rivers habitat includes those portions of the Missouri, Arkansas, and Kansas rivers that either border or flow through the Eastern Tallgrass Prairie Conservation Region. The Missouri River is the largest stream in Kansas. It has a wide, shallow bed over which the stream flows in braided channels divided by sand islands. The water is often muddy with channels varying in depth and speed of current, from swift chutes to calm sloughs, backwaters, and oxbows. The Kansas and Arkansas rivers are small editions of the Missouri River, but with fewer deep chutes, sloughs, and oxbows. 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).

B. Ecological Focus Areas in the Eastern Tallgrass Prairie Conservation Region

Terrestrial

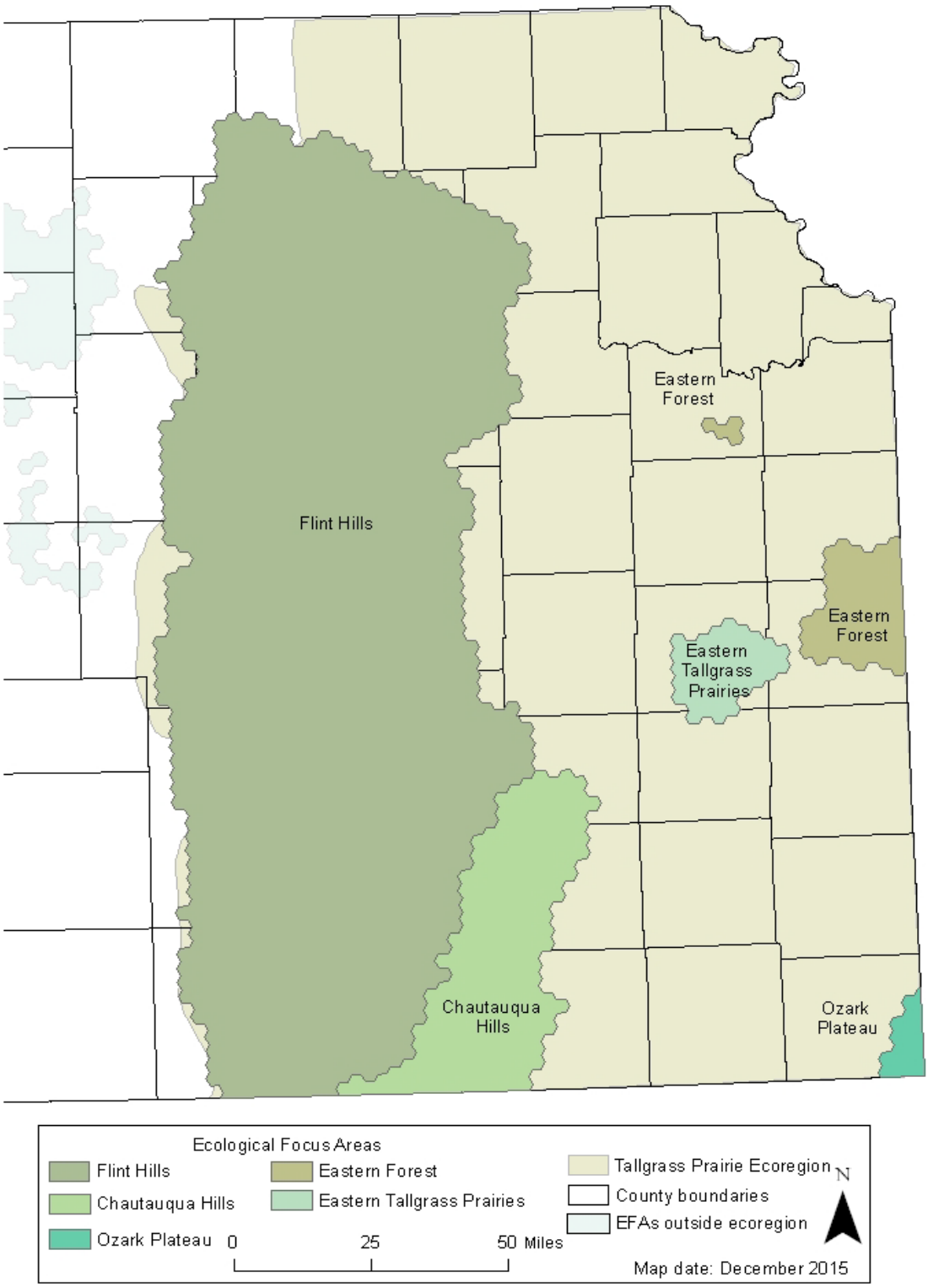
1. Flint Hills
2. Chautauqua Hills
3. Eastern Forest
4. Eastern Tallgrass Prairies
5. Ozark Plateau
3. Smoky Hill
4. Marais des Cygnes
5. Neosho
6. Verdigris
7. Walnut

Aquatic

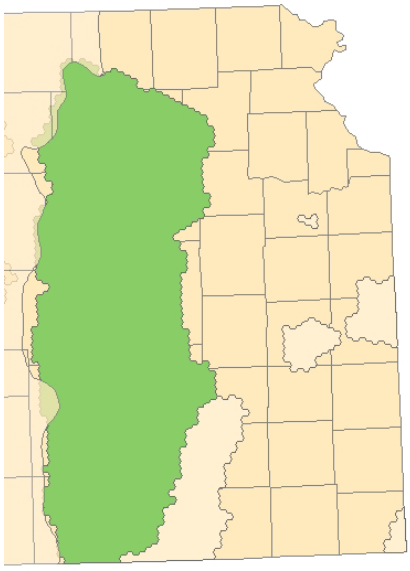
1. Missouri River
2. Kansas - Lower Republican

Terrestrial EFAs

Figure 9. Terrestrial Ecological Focus Areas of the Tallgrass 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. Flint Hills



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

EFA Development

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

Conservation Issues

Residential and commercial development

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

Agriculture

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

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

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

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

*Hydrological changes in the watersheds impacting the quality of wetlands

Invasive and other problematic species and genes

*Sericea lespedeza (*Lespedeza cuneata*) and Old World bluestems pose a serious threat to the biodiversity through competitive interaction with native species

*Woody species such as Osage orange and honey locust continue to encroach on native prairie

Pollution

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

Conservation Actions

Land/water protection

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

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

*Provide landowners incentives to maintain wetlands

*Acquire water rights for wetlands as advisable and possible.

Land/water management

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

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

Education and awareness – actions directed at people to improve understanding and skills, and influence behavior

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

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

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

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

External capacity building – actions to build the infrastructure to do better conservation

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

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

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

Species of Greatest Conservation Need

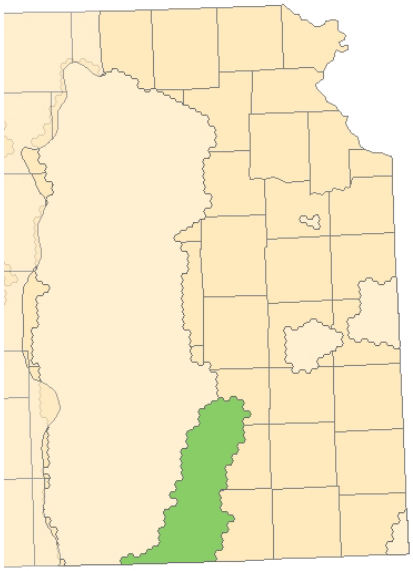
Tier 1 SGCN		
Amphipod	Kansas Well Amphipod	*Bactrurus hubrichti*
Birds	Least Tern	*Sternula antillarum*
Birds	Piping Plover	*Charadrius melodus*
Gastropods	Delta hydrobe	*Probythinella emarginata*
Gastropods	Xeric Ambersnail	*Succinea vaginacontorta*
Insect	A Cave Obligate Isopod	*Caecidotea tridentata*
Insect	A Cave Obligate Isopod	*Caecidotea metcalfi*
Insect	American Bumble Bee	*Bombus pensylvanicus*
Insect	Konza Prairie Mayfly	*Leptophlebia konza*
Insect	Monarch	*Danaus plexippus*
Insect	Sage Sphinx	*Lintneria eremitoides*
Insect	Variable Cuckoo Bumble Bee	*Bombus variabilis*
Mammals	Eastern Spotted Skunk	*Spilogale putorius*
Planarians	Kansas Planarian	*Sphalloplana kansensis*
Plants	Mead's Milkweed	*Asclepias meadii*
Plants	Running Buffalo Clover	*Trifolium stoloniferum*
Plants	Western Prairie White-fringed Orchid	*Platanthera praeclara*

Tier 2 SGCN		
Amphibians	Common Mudpuppy	*Necturus maculosus*
Amphibians	Crawfish Frog	*Lithobates areolatus*
Amphibians	Tiger Salamander	*Ambystoma tigrinum*
Amphipod	Clanton's Cave Amphipod	Stygobromus clantoni
Amphipod	Onondaga Cave Amphipod	*Stygobromus onondagaensis*
Arachnida	a trap door spider	*Ummidia beatula*
Birds	American Golden-Plover	*Pluvialis dominica*
Birds	American Tree Sparrow	*Spizella arborea*

Tier 2 SGCN		
Birds	American White Pelican	*Pelecanus erythrorhynchos*
Birds	Baird's Sparrow	*Centronyx bairdii*
Birds	Bald Eagle	*Haliaeetus leucocephalus*
Birds	Baltimore Oriole	*Icterus galbula*
Birds	Bell's Vireo	*Vireo bellii*
Birds	Black-billed Cuckoo	*Coccyzus erythropthalmus*
Birds	Bobolink	*Dolichonyx oryzivorus*
Birds	Buff-breasted Sandpiper	*Calidris subruficollis*
Birds	Burrowing Owl	*Athene cunicularia*
Birds	Chuck-will's-widow	*Antrostomus carolinensis*
Birds	Common Nighthawk	*Chordeiles minor*
Birds	Common Poorwill	*Phalaenoptilus nuttallii*
Birds	Dickcissel	*Spiza americana*
Birds	Eastern Kingbird	*Tyrannus tyrannus*
Birds	Eastern Meadowlark	*Sturnella magna*
Birds	Eastern Wood-Pewee	*Contopus virens*
Birds	Grasshopper Sparrow	*Ammodramus savannarum*
Birds	Greater Prairie-Chicken	*Tympanuchus cupido*
Birds	Harris's Sparrow	*Zonotrichia querula*
Birds	Henslow's Sparrow	*Centronyx henslowii*
Birds	Least Bittern	*Ixobrychus exilis*
Birds	Loggerhead Shrike	*Lanius ludovicianus*
Birds	Mississippi Kite	*Ictinia mississippiensis*
Birds	Northern Bobwhite	*Colinus virginianus*
Birds	Painted Bunting	*Passerina ciris*
Birds	Prothonotary Warbler	*Protonotaria citrea*
Birds	Red-headed Woodpecker	*Melanerpes erythrocephalus*
Birds	Rusty Blackbird	*Euphagus carolinus*
Birds	Scissor-tailed Flycatcher	*Tyrannus forficatus*
Birds	Smith's Longspur	*Calcarius pictus*
Birds	Sprague's Pipit	*Anthus spragueii*
Birds	Upland Sandpiper	*Bartramia longicauda*
Birds	Western Kingbird	*Tyrannus verticalis*
Birds	Yellow Rail	*Coturnicops noveboracensis*
Crustaceans	Ringed Crayfish	*Faxonius neglectus*
Gastropods	Mudbank Ambersnail	*Catinella vagans*
Insect	A nomia bee	*Nomia universitatis*
Insect	A scarab beetle	*Trox paulseni*
Insect	A sweat bee	*Agopostemon coloradensis*
Insect	Abbreviated Underwing	*Catocala abbreviatella*
Insect	Abberrant Cellophane Bee	*Colletes aberrans*
Insect	Arogos Skipper	*Atrytone arogos*
Insect	Bald-spot Sweat Bee	*Lasioglossum paraforbesii*
Insect	Bell's Roadside-Skipper	*Amblyscirtes belli*
Insect	Black-and-gold Bumble Bee	*Bombus auricomus*
Insect	Byssus Skipper	*Problema byssus*
Insect	Dotted Skipper	*Hesperia attalus attalus*
Insect	Maritime Sunflower Borer Moth	*Papaipema maritima*
Insect	Mottled Duskywing	*Erynnis martialis*
Insect	Occidental Digger Bee	*Anthophora occidentalis*
Insect	Ottoe Skipper	*Hesperia ottoe*
Insect	Prairie Mole Cricket	*Gryllotalpa major*
Insect	Regal Fritillary	*Speyeria idalia*
Insect	Southern Plains Bumble Bee	*Bombus fraternus*
Insect	Whiteish Sweat Bee	*Agopostemon sericeus*
Insect	Yellow Bumble Bee	*Bombus fervidus*
Isopod	Steeve’s Cave Isopod	*Caecidotea steevesi*
Mammals	Franklin’s Ground Squirrel	*Poliocitellus franklinii*

Tier 2 SGCN		
Mammals	Gray Fox	*Urocyon cinereoargenteus*
Mammals	Southern Bog Lemming	*Synaptomys cooperi*
Mammals	Southern Flying Squirrel	*Glaucomys volans*
Mammals	Tricolored Bat	*Perimyotis subflavus*
Plants	Bush's Poppy-mallow	*Callirhoe bushii*
Plants	Great Plains Ladies'-tresses	*Spiranthes magnicamporum*
Plants	Hancin's Dewberry	*Rubus hancinianus*
Plants	Missouri Mud-plantain	*Heteranthera missouriensis*
Plants	Narrowleaf Morning-glory	*Ipomoea shumardiana*
Plants	Oklahoma Phlox	*Phlox oklahomensis*
Plants	Osage Plains False Foxglove	*Agalinis densiflora*
Plants	Taper-tip Dodder	*Cuscuta attenuata*
Plants	Topeka Purple-coneflower	*Echinacea atrorubens*
Plants	Western Prairie White-fringed Orchid	*Platanthera praeclara*
Reptiles	Eastern Hog-nosed Snake	*Heterdon platirhinos*
Reptiles	Glossy Snake	*Arizona elegans*
Reptiles	Ground-snake	*Sonora semiannulata*
Reptiles	Lesser Easrless Lizard	*Holbrookia maculata*
Reptiles	Western Massasauga	*Sistrurus tergeminus*
Reptiles	Plains Hog-nosed Snake	*Heterodon nasicus*
Reptiles	Rough Earthsnake	*Haldea striatula*
Reptiles	Texas Horned Lizard	*Phrynosoma cornutum*
Reptiles	Timber Rattlesnake	*Crotalus horridus*
Turtles	Smooth Softshell	*Apalone mutica*

2. Chautauqua Hills



The Chautauqua Hills Ecological Focus Area is located in southeast Kansas just east of the Flint Hills. The area is the Kansas portion of a larger area often referred to as the Cross Timbers that extends south through Oklahoma and into Texas. The Chautauqua Hills are rolling uplands with sandstone bedrock underneath. Blackjack and post oaks are interspersed throughout the tallgrass prairie habitat. An open savannah landscape was probably more common before fire suppression occurred and may have kept the oak stands from becoming dense.

EFA Development

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

Conservation Issues

Residential and commercial development

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

Agriculture

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

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

Natural system modifications

*Management of floodplain water levels by diking

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

Invasive and other problematic species and genes

*Spread of woody numerous invasive plant species, including: Eastern Red Cedar, Osage Orange, Sericea lespedeza (*Lespedeza cuneata*) and Old World Bluestems

*Invasive insect pests damaging habitats

Pollution

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

Biological resource use

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

Conservation Actions

Land/water protection

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

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

*****Acquire water rights for wetlands as advisable and possible

Land/water management

*Promote the use of USDA Agriculture Conservation Easement Program and other conservation easement programs to reverse trend of conversion of grassland to cropland, targeting efforts toward habitat that is being or has been degraded

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

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

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

Education and awareness

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

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

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

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

External capacity building

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

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

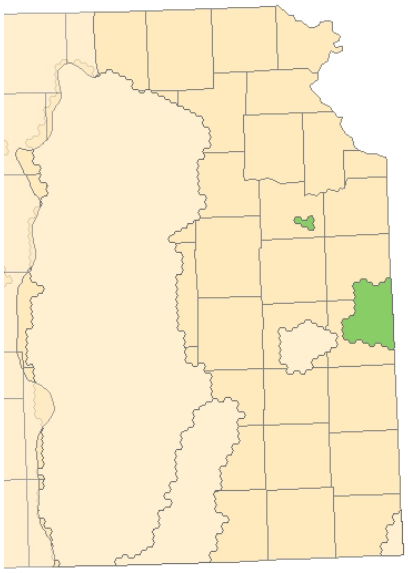
*Work with Kansas Dept. of Transportation to determine appropriate species to plant along roads

Species of Greatest Conservation Need

Tier 1 SGCN		
Gastropods	Delta Hydrobe	*Probythinella emarginata*
Gastropods	Slope Ambersnail	*Catinella wandae*
Gastropods	Xeric Ambersnail	*Succinea vaginacontorta*
Insect	American Burying Beetle	*Nicrophorus americanus*
Insect	Monarch	*Danaus plexippus*
Mammals	Eastern Spotted Skunk	*Spilogale putorius*
Tier 2 SGCN		
Amphibians	Crawfish Frog	*Lithobates areolatus*
Amphibians	Common Mudpuppy	*Necturus maculosus*
Amphipod	Kansas Well Amphipod	*Bactrurus hubrichti*
Arachnida	a trap door spider	*Ummidia beatula*
Birds	American Golden-Plover	*Pluvialis dominica*
Birds	American Tree Sparrow	*Spizella arborea*
Birds	American White Pelican	*Pelecanus erythrorhynchos*
Birds	Bald Eagle	*Haliaeetus leucocephalus*
Birds	Baltimore Oriole	*Icterus galbula*
Birds	Bell's Vireo	*Vireo bellii*
Birds	Buff-breasted Sandpiper	*Calidris subruficollis*
Birds	Chuck-will's-widow	*Antrostomus carolinensis*
Birds	Common Nighthawk	*Chordeiles minor*
Birds	Dickcissel	*Spiza americana*
Birds	Eastern Kingbird	*Tyrannus tyrannus*
Birds	Eastern Meadowlark	*Sturnella magna*
Birds	Eastern Wood-Pewee	*Contopus virens*
Birds	Grasshopper Sparrow	*Ammodramus savannarum*
Birds	Greater Prairie-Chicken	*Tympanuchus cupido*
Birds	Henslow's Sparrow	*Centronyx henslowii*
Birds	Kentucky Warbler	*Geothlypis formosa*
Birds	Lark Sparrow	*Chondestes grammacus*
Birds	Loggerhead Shrike	*Lanius ludovicianus*
Birds	Northern Bobwhite	*Colinus virginianus*
Birds	Painted Bunting	*Passerina ciris*
Birds	Prothonotary Warbler	*Protonotaria citrea*
Birds	Red-headed Woodpecker	*Melanerpes erythrocephalus*
Birds	Rusty Blackbird	*Euphagus carolinus*
Birds	Smith's Longspur	*Calcarius pictus*
Birds	Yellow-throated Warbler	*Setophaga dominica*
Gastropods	Mudbank Ambersnail	*Catinella vagans*
Insect	A scarab beetle	*Trox paulseni*
Insect	Bell's Roadside-Skipper	*Amblyscirtes belli*
Insect	Black-and-gold Bumble Bee	*Bombus auricomus*
Insect	Byssus Skipper	*Problema byssus*
Insect	Dotted Skipper	*Hesperia attalus attalus*
Insect	Gray Petaltail	*Tachopteryx thoreyi*
Insect	Lichen Grasshopper	*Trimerotropis saxatilis*
Insect	Ozark Emerald	*Somatochlora ozarkensis*
Insect	Prairie Mole Cricket	*Gryllotalpa major*
Insect	Regal Fritillary	*Argynnis idalia*
Insect	Southern Plains Bumble Bee	*Bombus fraternus*
Insect	Yellow Bumble Bee	*Bombus fervidus*
Mammals	Fulvous Harvest Mouse	*Reithrodontomys fulvescens*
Mammals	Gray Fox	*Urocyon cinereoargenteus*
Mammals	Southern Flying Squirrel	*Glaucomys volans*
Mammals	Texas Deermouse	*Peromyscus attwateri*
Plants	Buffalo Clover	*Trifolium reflexum*
Plants	Earleaf False Foxglove	*Agalinis auriculata*

Tier 2 SGCN		
Plants	Great Plains Ladies'-tresses	*Spiranthes magnicamporum*
Plants	Hancin's Dewberry	*Rubus hancinianus*
Plants	Kansas Arrowhead	*Sagittaria ambigua*
Plants	Oklahoma Phlox	*Phlox oklahomensis*
Plants	Pale False Foxglove	*Agalinis skinneriana*
Plants	Topeka Purple-coneflower	*Echinacea atrorubens*
Reptiles	Coal Skink	*Plestiodon anthracinus*
Reptiles	Eastern Hog-nosed Snake	*Heterodon platirhinos*
Reptiles	Ground-snake	*Sonora semiannulata*
Reptiles	Western Massasauga	*Sistrurus tergeminus*
Reptiles	Plains Hog-nosed Snake	*Heterodon nasicus*
Reptiles	Rough Earthsnake	*Haldea striatula*
Reptiles	Texas Horned Lizard	*Phrynosoma cornutum*
Reptiles	Timber Rattlesnake	*Crotalus horridus*

3. Eastern Forest



The Eastern Forest Ecological Focus Area is comprised of two areas in eastern Kansas; the Baldwin Woods section in Douglas County and the Marais des Cygnes section in Miami and Linn counties. Both sections occur within the Osage Cuestas physiographic province (Kansas Geological Survey 1997) and include isolated tallgrass prairie remnants, fragmented oak/hickory forests and oak savannah ecosystems; the Marais des Cygnes section also includes the Marais des Cygnes River and its associated floodplain and wetlands. The Baldwin Woods section includes over 1000 acres of priority deciduous forest habitat which are being actively managed and protected through Landscape Forest Stewardship planning and the Forest Legacy Program. These protection efforts capitalize on partnerships among many public and private entities. The Marais des Cygnes section includes La Cygne Wildlife Area and La Cygne Lake, Marais des Cygnes Wildlife Area, and Marais des Cygnes Wildlife Refuge. The Kansas Department of Wildlife and Parks and the U.S. Fish and Wildlife Service implement native tree plantings, invasive species removal, and prescribed fires to manage the woodland habitats. Common threats include invasive species, miss-management, and fragmentation of intact native woodlands.

EFA Development

This EFA captures high-quality forest habitat that occurs in areas that were forested prior to European settlement and that are in the range of forest-dependent Tier 1 species. To create the boundary of the Marais des Cygnes section we selected 2.5 km hexagons that intersect one of the following: Marais des Cygnes Wildlife Area or National Wildlife Refuge; locations of Tier 1 species; or forested areas at La Cygne Lake WA or along Big Sugar Creek. To create the Baldwin Woods section, we selected 2.5 km hexagons that intersect the historic forest polygon that contains the currently protected areas.

Conservation Issues

Residential and commercial development

*The increase of urban, suburban and exurban/rural homes is reducing and fragmenting forests

Agriculture

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

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

Natural system modifications

*Floodplain hydrology has been modified by dikes and impoundments. Reduced flooding has allowed conversion to agriculture and changed ecological conditions for remaining floodplain forests

*Increased fire suppression or lack of well-planned fire management changes species dominance (fewer oaks) and forest structure (savanna has become very rare)

Invasive and other problematic species and genes

*Spread of invasive species affecting understory and canopy

* Invasive insect pests are damaging habitats

Pollution

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

Biological resource use

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

Success Story – Collaboration with Private Landowners

Bill Sproul is a rancher in Chautauqua County who was presented the first Aldo Leopold Conservation Award in Kansas in 2015. He earned this honor due to his tireless efforts to treat the land he owns, manages, and leases as a community and not as a commodity. By community, Bill includes all native plants and wildlife plus people that work the land or consume products resulting from his labors. Bill encourages plant and wildlife surveys and research on the Sproul Ranch including plant transect sampling, livestock exclosures, and annual nesting bird surveys. In addition, Bill allows pollinator research, insect, reptile and amphibian surveys on the ranch. He does this to develop a better understanding of the entire biotic community.

Regarding the importance of wildlife community, Bill likes to use the lowly dung beetle as an example. This insect provides services to the ranching community by breaking up and redistributing cow patties on the ranch. By doing so, dung beetles are spreading fertilizer, assisting with rainfall infiltration into the soil profile, enhancing seed germination of native grasses, and breaking the horn fly cycle that develops in cow patties. Horn flies are a serious pest to grazing cattle and the dung beetle helps to keep them in check.

Bill has implemented, and is constantly evaluating, a patch burn grazing system on the Sproul Ranch. The burning of 1/3 of the pasture each year provides nesting cover for some grassland birds that are in national decline. Data from past Sproul Ranch bird surveys show that Northern Bobwhites have increased dramatically, are the third most detected bird species on the ranch, nearly as common as the abundant Dickcissel and Eastern Meadowlark. Even species considered rare are found on the Sproul Ranch and are probably benefiting from the patch-burn grazing regime. These include the Henslow's Sparrow and the American Burying Beetle.

Bill Sproul's curiosity about the wildlife community and his ability to communicate this to the outside world in his unique cowboy rancher way makes Bill a conservation spokesman and a fitting recipient of the first Aldo Leopold Conservation Award given in Kansas.

Conservation Actions

Land/water protection

*****Identify and conserve large forests tracts through landowner friendly methods, such as conservation forestry incentive programs and conservation easements. Identify opportunities to connect large forest tracts

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

Land/water management

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

*Assess dike removal and other structural modifications needed to return floodplains to their natural hydrology

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

Education and awareness

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

*Continue disease monitoring (White Nose Syndrome, Chytrid Fungus, Ranavirus, etc.)

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

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

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

External capacity building

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

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

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

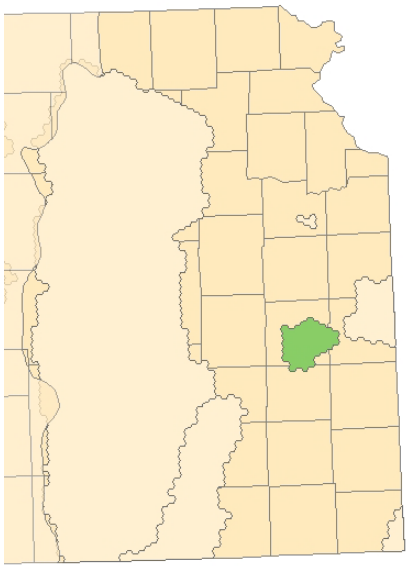
Species of Greatest Conservation Need

Tier 1 SGCN		
Amphibians	Eastern Newt	*Notophthalmus viridescens*
Gastropods	Xeric Ambersnail	*Succinea vaginacontorta*
Insect	American Bumble Bee	*Bombus pensylvanicus*
Insect	Monarch	*Danaus plexippus*
Plants	Running Buffalo Clover	*Trifolium stoloniferum*
Reptiles	Broad-headed Skink	*Plestiodon laticeps*
Turtles	Northern Map Turtle	*Graptemys geographica*

Tier 2 SGCN		
Amphibians	Crawfish Frog	*Lithobates areolatus*
Amphibians	Spring Peeper	*Pseudacris crucifer*
Birds	American Tree Sparrow	*Spizella arborea*
Birds	American White Pelican	*Pelecanus erythrorhynchos*
Birds	Bald Eagle	*Haliaeetus leucocephalus*
Birds	Baltimore Oriole	*Icterus galbula*
Birds	Bell's Vireo	*Vireo bellii*
Birds	Black-billed Cuckoo	*Coccyzus erythropthalmus*
Birds	Cerulean Warbler	*Setophaga cerulea*
Birds	Chuck-will's-widow	*Antrostomus carolinensis*

Tier 2 SGCN		
Birds	Dickcissel	*Spiza americana*
Birds	Eastern Kingbird	*Tyrannus tyrannus*
Birds	Eastern Meadowlark	*Sturnella magna*
Birds	Eastern Whip-poor-will	*Antrostomus vociferus*
Birds	Eastern Wood-Pewee	*Contopus virens*
Birds	Harris's Sparrow	*Zonotrichia querula*
Birds	Henslow's Sparrow	*Centronyx henslowii*
Birds	Kentucky Warbler	*Geothlypis formosa*
Birds	Least Bittern	*Ixobrychus exilis*
Birds	Loggerhead Shrike	*Lanius ludovicianus*
Birds	Northern Bobwhite	*Colinus virginianus*
Birds	Prothonotary Warbler	*Protonotaria citrea*
Birds	Red-headed Woodpecker	*Melanerpes erythrocephalus*
Birds	Rusty Blackbird	*Euphagus carolinus*
Birds	Scissor-tailed Flycatcher	*Tyrannus forficatus*
Birds	Yellow Rail	*Coturnicops noveboracensis*
Birds	Yellow-throated Warbler	*Setophaga dominica*
Gastropods	Mudbank Ambersnail	*Catinella vagans*
Insect	A scarab beetle	*Trox paulseni*
Insect	Black-and-gold Bumble Bee	*Bombus auricomus*
Insect	Regal Fritillary	*Argynnis idalia*
Insect	Southern Plains Bumble Bee	*Bombus fraternus*
Insect	Yellow Bumble Bee	*Bombus fervidus*
Mammals	Franklin’s Ground Squirrel	*Poliocitellus franklinii*
Mammals	Gray Fox	*Urocyon cinereoargenteus*
Mammals	Southern Flying Squirrel	*Glaucomys volans*
Mammals	Tricolored Bat	*Perimyotis subflavus*
Reptiles	Coal Skink	*Plestiodon anthracinus*
Reptiles	Eastern Hog-nosed Snake	*Heterodon platirhinos*
Reptiles	Red-bellied Snake	*Storeria occipitomaculata*
Reptiles	Smooth Earthsnake	*Virginia valeriae*
Reptiles	Timber Rattlesnake	*Crotalus horridus*
Turtles	Smooth Softshell	*Apalone mutica*

4. Eastern Tallgrass Prairies



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

EFA Development

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

Conservation Issues

Agriculture

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

*Inappropriate grazing and haying practices on native ranglands decreases habitat heterogeneity and can change vegetative community composition

Natural system modifications

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

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

Invasive and other problematic species and genes

*Spread of invasive species, particularly Sericea Lespedeza, Eastern Red Cedar, and Osage Orange

Pollution

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

Conservation Actions

Land/water protection

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

Land/water management

*Provides incentives to landowners for conservation management through State and USDA programs.

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

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

Education and awareness

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

*Continue disease monitoring (e.g. Chytrid Fungus, Ranavirus, White Nose Syndrome and other potential diseases)

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

External capacity building

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

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

*Encourage formation of a local grazing association to address and inform land management issues.

*Continue to communicate and initiate planning efforts with public and private organizations that are involved with land management issues

Species of Greatest Conservation Need

Tier 1 SGCN		
Amphipod	Kansas Well Amphipod	*Bactrurus hubrichti*
Gastropods	Kaw Whitelip	*Webbhelix chadwicki*
Gastropods	Slope Ambersnail	*Catinella wandae*
Gastropods	Xeric Ambersnail	*Succinea vaginacontorta*
Insect	A leafcutter bee	*Megachile amica*

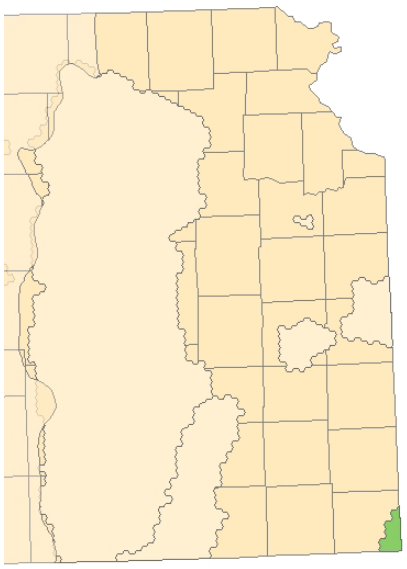
Insect	A leafcutter bee	*Megachile integra*
Insect	A Cave Obligate Isopod	*Caecidotea tridentata*
Insect	A Spur-throat Grasshopper	*Melanoplus beameri*
Insect	American Bumble Bee	*Bombus pensylvanicus*
Insect	Arogos Skipper	*Atrytone arogos*
Insect	Fedor Digger Bee	*Anthophora fedorica*
Insect	Linda's Roadside Skipper	*Amblyscirtes linda*
Insect	Monarch	*Danaus plexippus*
Insect	Robust Sunflower Leafcutter Bee	*Megachile fortis*
Insect	Variable Cuckoo Bumble Bee	*Bombus variabilis*
Mammals	Eastern Spotted Skunk	*Spilogale putorius*
Plants	Mead's Milkweed	*Asclepias meadii*
Plants	Western Prairie White-fringed Orchid	*Platanthera praeclara*

Tier 2 SGCN

Amphibians	Crawfish Frog	*Lithobates areolata*
Amphipod	Clanton's Cave Amphipod	*Stygobromus clantoni*
Arachnida	a trap door spider	*Antrodiaetus lincolnianus*
Arachnida	a trap door spider	*Sphodros fitchi*
Arachnida	a trap door spider	*Ummidia beatula*
Birds	American Golden-Plover	*Pluvialis dominica*
Birds	American Tree Sparrow	*Spizella arborea*
Birds	Baltimore Oriole	*Icterus galbula*
Birds	Bell's Vireo	*Vireo bellii*
Birds	Black-billed Cuckoo	*Coccyzus erythropthalmus*
Birds	Buff-breasted Sandpiper	*Calidris subruficollis*
Birds	Chuck-will's-widow	*Antrostomus carolinensis*
Birds	Dickcissel	*Spiza americana*
Birds	Eastern Kingbird	*Tyrannus tyrannus*
Birds	Eastern Meadowlark	*Sturnella magna*
Birds	Eastern Whip-poor-will	*Antrostomus vociferus*
Birds	Eastern Wood-Pewee	*Contopus virens*
Birds	Grasshopper Sparrow	*Ammodramus savannarum*
Birds	Greater Prairie-Chicken	*Tympanuchus cupido*
Birds	Harris's Sparrow	*Zonotrichia querula*
Birds	Henslow's Sparrow	*Centronyx henslowii*
Birds	Kentucky Warbler	*Geothlypis formosa*
Birds	Loggerhead Shrike	*Lanius ludovicianus*
Birds	Northern Bobwhite	*Colinus virginianus*
Birds	Painted Bunting	*Passerina ciris*
Birds	Red-headed Woodpecker	*Melanerpes erythrocephalus*
Birds	Rusty Blackbird	*Euphagus carolinus*
Birds	Scissor-tailed Flycatcher	*Tyrannus forficatus*
Birds	Smith's Longspur	*Calcarius pictus*
Birds	Upland Sandpiper	*Bartramia longicauda*
Gastropods	Domed Supercoil	*Paravitera significans*
Gastropods	Mudbank Ambersnail	*Catinella vagans*
Gastropods	Texas Liptooth	*Lininsa texasiana*
Gastropods	Oldfield Coil	*Lucilla inermis*
Gastropods	Ozark Threetooth	*Triodopsis neglecta*
Gastropods	Ozark Whitelip	*Neohelix divesta*
Insect	A leafcutter bee	*Megachile mucorosa*
Insect	A nomia bee	*Nomia universitatis*
Insect	A scarab beetle	*Onthophagus knausi*
Insect	A scarab beetle	*Phyllophaga albina*
Insect	A scarab beetle	*Trox paulseni*
Insect	An underwing moth	*Catocala frederici*
Insect	An underwing moth	*Catocala nuptialis*
Insect	Bald-spot Sweat Bee	*Lasioglossum paraforbesii*

Tier 2 SGCN		
Insect	Black-and-gold Bumble Bee	*Bombus auricomus*
Insect	Byssus Skipper	*Problema byssus*
Insect	Columbine Duskywing	*Erynnis lucilius*
Insect	Delilah Underwing	*Catocala delilah*
Insect	Interrupted Cuckoo Nomad Bee	*Epeolis interruptus*
Insect	Low-ridged Pygmy Grasshopper	*Nomotettix parvus*
Insect	Maculated Flower Chafer	*Gnorimella maculosa*
Insect	Morrison's Bumble Bee	*Bombus morrisoni*
Insect	Mottled Duskywing	*Erynnis martialis*
Insect	Ottoe Skipper	*Hesperia ottoe*
Insect	Prairie Mole Cricket	*Gryllotalpa major*
Insect	Regal Fritillary	*Argynnis idalia*
Insect	Southern Plains Bumble Bee	*Bombus fraternus*
Insect	Whiteish Sweat Bee	*Agopostemon sericeus*
Insect	Yellow Bumble Bee	*Bombus fervidus*
Mammals	Gray Fox	*Urocyon cinereoargenteus*
Plants	Buffalo Clover	*Trifolium reflexum*
Plants	Bush's Poppy-mallow	*Callirhoe bushii*
Plants	Earleaf False Foxglove	*Agalinis auriculata*
Plants	Great Plains Ladies-tresses	*Spiroanthes magnicamporum*
Plants	Kansas Arrowhead	*Sagittaria ambigua*
Plants	Missouri Mud-plantain	*Heteranthera missouriensis*
Plants	Osage Plains False Foxglove	*Agalinis densiflora*
Plants	Pale False Foxglove	*Agalinis skinneriana*
Plants	Topeka Purple-coneflower	*Echinacea atrorubens*
Reptiles	Western Massasauga	*Sistrurus tergeminus*
Reptiles	Smooth Earthsnake	*Virginia valeriae*
Reptiles	Texas Horned Lizard	*Phrynosoma cornutum*
Reptiles	Timber Rattlesnake	*Crotalus horridus*

5. Ozark Plateau



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

EFA Development

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

Conservation Issues

Residential and commercial development

*The increase of urban, suburban and exurban/rural homes and development reduces and fragments native habitat

Natural system modifications

*Management of floodplain water levels by diking

Invasive and other problematic species and genes

*Spread of invasive plant species

*Invasive insect pests damage habitats

Pollution

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

Conservation Actions

Land/water protection

*****Provide landowners incentives and education to properly maintain and manage wetlands

*****Work with willing donors/sellers to acquire/protect important habitats, especially wetlands, by using conservation easements and other tools

*Acquire water rights for wetlands as advisable and possible

Land/water management

*****Increase funding for USDA Agricultural Conservation Easement Program and other easement programs to reverse trend of conversion of grassland to cropland, targeting efforts toward habitat that is being or has been degraded

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

*Develop an invasive species task force to create state invasive plant and animal management plans.

*****Increase funding for USDA Agricultural Conservation Easement Program and other easement programs to reverse trend of conversion of grassland to cropland, targeting efforts toward habitat that is being or has been degraded

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

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

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

Education and awareness

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

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

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

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

External capacity building

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

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

*Work with Kansas Dept. of Transportation to determine appropriate species to plant along roads

Species of Greatest Conservation Need

Tier 1 SGCN		
Amphibians	Cave Salamander	*Eurycea lucifuga*
Amphibians	Eastern Narrowmouth Toad	*Gastrophryne carolinensis*
Amphibians	Eastern Newt	*Notophthalmus viridescens*
Amphibians	Green Frog	*Lithobates clamitans*
Amphibians	Grotto Salamander	*Eurycea spelaea*
Amphibians	Long-tailed Salamander	*Eurycea longicauda*
Gastropods	Sharp Hornsnail	*Pleurocera acuta*
Gastropods	Slope Ambersnail	*Catinella wandae*
Gastropods	Xeric Ambersnail	*Succinea vaginacontorta*
Insect	American Bumble Bee	*Bombus pensylvanicus*
Insect	Monarch	*Danaus plexippus*
Insect	Spring Plains Groundwater Isopod	*Caecidotea simulator*
Plants	Kansas Arrowhead	*Sagittaria ambigua*
Plants	Oklahoma Grass-pink	*Calopogon oklahomensis*
Reptiles	Broad-headed Skink	*Plestiodon laticeps*
Turtles	Northern Map Turtle	*Graptemys geographica*

Tier 2 SGCN		
Amphibians	Crawfish Frog	*Lithobates areolatus*
Amphibians	Spring Peeper	*Pseudacris crucifer*
Birds	American Tree Sparrow	*Spizella arborea*
Birds	Baltimore Oriole	*Icterus galbula*
Birds	Bell's Vireo	*Vireo bellii*
Birds	Chuck-will's-widow	*Antrostomus carolinensis*
Birds	Dickcissel	*Spiza americana*
Birds	Eastern Kingbird	*Tyrannus tyrannus*
Birds	Eastern Meadowlark	*Sturnella magna*
Birds	Eastern Whip-poor-will	*Antrostomus vociferus*
Birds	Eastern Wood-Pewee	*Contopus virens*
Birds	Harris's Sparrow	*Zonotrichia querula*
Birds	Kentucky Warbler	*Geothlypis formosa*
Birds	Lark Sparrow	*Chondestes grammacus*
Birds	Loggerhead Shrike	*Lanius ludovicianus*
Birds	Northern Bobwhite	*Colinus virginianus*
Birds	Prothonotary Warbler	*Protonotaria citrea*
Birds	Red-headed Woodpecker	*Melanerpes erythrocephalus*
Birds	Rusty Blackbird	*Euphagus carolinus*
Birds	Scissor-tailed Flycatcher	*Tyrannus forficatus*
Birds	Yellow-throated Warbler	*Setophaga dominica*
Crustaceans	Neosho Midget Crayfish	*Faxonius macrus*
Crustaceans	Ringed Crayfish	*Faxonius neglectus*
Crustaceans	White River Crawfish	*Procambarus acutus*
Gastropods	Mudbank Ambersnail	*Catinella vagans*
Gastropods	Ozark Threetooth	*Triodopsis neglecta*
Insect	A scarab beetle	*Trox paulseni*
Insect	Bell's Roadside-Skipper	*Amblyscirtes belli*
Insect	Black-and-gold Bumble Bee	*Bombus auricomus*
Insect	Mottled Duskywing	*Erynnis martialis*
Insect	Southern Plains Bumble Bee	*Bombus fraternus*
Insect	Steeve’s Cave Isopod	*Caecidotea steevesi*
Insect	Yellow Bumble Bee	*Bombus fervidus*
Isopods	Steeve's Cave Isopod	Caecidotea steevesi
Mammals	Fulvous Harvest Mouse	*Reithrodontomys fulvescens*
Mammals	Gray Fox	*Urocyon cinereoargenteus*
Mammals	Southern Flying Squirrel	*Glaucomys volans*

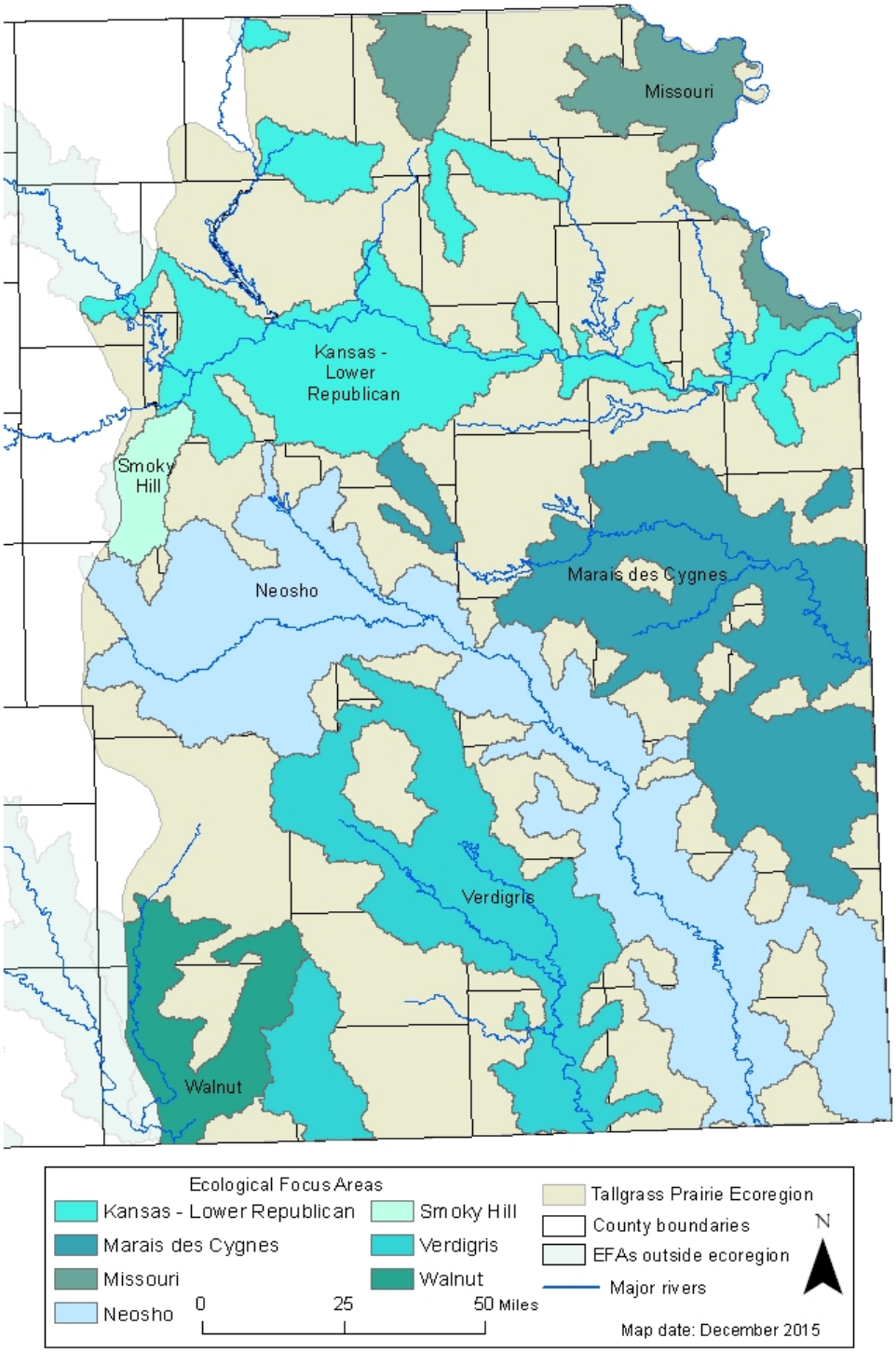
Tier 2 SGCN		
Mammals	Tricolored Bat	*Perimyotis subflavus*
Plants	Buffalo Clover	*Trifolium reflexum*
Plants	Delta Bulrush	*Schoenoplectus deltarum*
Plants	Royal Catchfly	*Silene regia*
Reptiles	Coal Skink	*Plestiodon anthracinus*
Reptiles	Red-bellied Snake	*Storeria occipitomaculata*
Reptiles	Rough Earthsnake	*Haldea striatula*

Success Story – Collaboration with Conservation Partners

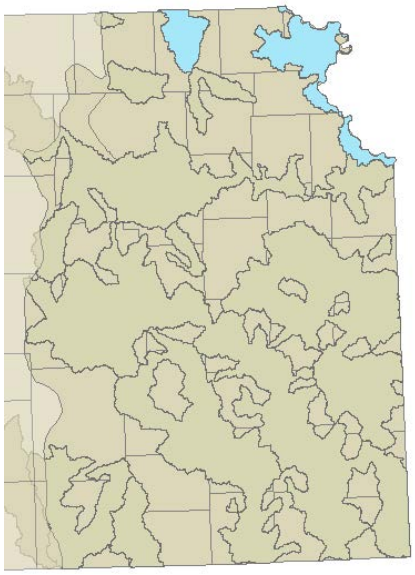
The Rabbitsfoot mussel is a Species of Greatest Conservation Need in Oklahoma's wildlife action plan and a species recently listed as a threatened species by the U.S. Fish and Wildlife Service. The Oklahoma Department of Wildlife Conservation has partnered with the Kansas Department of Wildlife and Parks, Oklahoma State University, and Missouri State University to re-establish the Rabbitsfoot in the upper Verdigris River. The recent discovery of a reproducing Rabbitsfoot population in the Oklahoma portion of the Verdigris River provides an opportunity to collect juvenile mussels in Oklahoma to raise and release in Kansas. Restoring the Rabbitsfoot mussel will benefit the health of wildlife and people and may prevent the need to keep this species federally listed as threatened.

Aquatic EFAs

Figure 10. Aquatic Ecological Focus Areas of the Tallgrass 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. Missouri River



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

Conservation Issues

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

*Commercial barge shipping practices impact the hydrology of these rivers

Agriculture

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

Natural system modifications

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

*Dredging the Missouri River for commercial barge traffic and flood capacity impacts bed and bank stability, riparian areas, and tributaries

*The management strategies of other states in the watershed impact this habitat

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

Invasive and other problematic species and genes

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

Pollution

*Runoff of pesticides and fertilizers have negative impacts on the flora and fauna

*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 use of permeable asphalt or pavement and Low Impact Development practices to improve storm water management by increasing infiltration of water and decrease/replace 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
*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
*Expand cooperative programs that supply technical and direct assistance for non-native species removal
*Develop plans to prevent the invasion and spread of Aquatic Nuisance Species
*Promote mechanical removal of non-native, invasive plant species by utilizing local habitat partnerships
*Promote restoration of stream channels through natural stream design
*Promote restoration projects that increase floodplain connectivity in incised streams
*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 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

*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
*Investigate contaminant effects on reptilian and amphibian populations
*Continue disease monitoring (Chytrid Fungus, Ranavirus, etc.)
*Educate the public regarding the importance of preventing the spread of invasive species
*Inventory perched culverts and other structures that are preventing aquatic organism passage
*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
*Study impacts of Bighead Carp and Silver Carp on native species

External capacity building

*Promote sound water quality standards and their enforcement through education and continued coordination with the Kansas Department of Health and Environment

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

*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

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

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

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

Livelihood, economic and other incentives

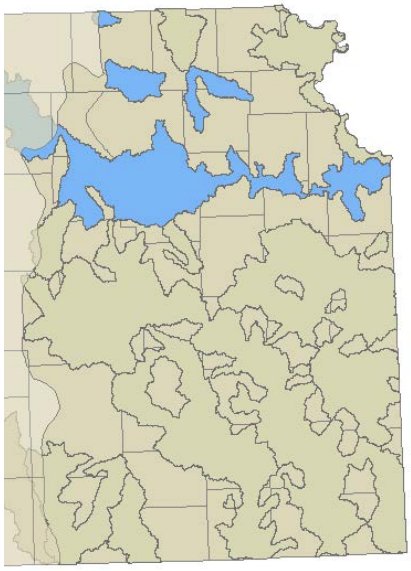
*Offer incentive to private landowners to preserve native habitats, remove invasive species, and use best management practices that benefit stream and riparian habitats

*Develop practices that provide benefits to landowners and to wildlife

Species of Greatest Conservation Need

Tier 1 SGCN		
Fish	Flathead Chub	*Platygobio gracilis*
Fish	Pallid Sturgeon	*Scaphirhynchus albus*
Fish	Plains Minnow	*Hybognathus placitus*
Fish	Shoal Chub	*Macrhybopsis hyostoma*
Fish	Sicklefin Chub	*Macrhybopsis meeki*
Fish	Silver Chub	*Macrhybopsis storeriana*
Fish	Sturgeon Chub	*Macrhybopsis gelida*
Fish	Western Silvery Minnow	*Hybognathus argyritis*
Insect	Whiting's Flat-headed Mayfly	*Heptagenia whitingi*
Tier 2 SGCN		
Fish	American Eel	*Anguilla rostrata*
Fish	Black Buffalo	*Ictiobus niger*
Fish	Blue Sucker	*Cycleptus elongatus*
Fish	Brassy Minnow	*Hybognathus hankinsoni*
Fish	Johnny Darter	*Etheostoma nigrum*
Fish	Quillback	*Carpiodes cyprinus*
Fish	River Shiner	*Notropis blennius*
Fish	Shorthead Redhorse	*Moxostoma macrolepidotum*
Fish	Shovelnose Sturgeon	*Scaphirhynchus platorynchus*
Fish	Silverband Shiner	*Notropis shumardi*
Fish	Spotted Gar	*Lepisosteus oculatus*
Fish	Stonecat	*Noturus flavus*
Fish	White Sucker	*Catostomus commersonii*
Mussels	Creeper	*Strophitus undulatus*
Mussels	Fatmucket	*Lampsilis siliquoidea*
Mussels	Lilliput	*Toxolasma parvum*
Mussels	Pink Heelsplitter	*Potamilus alatus*
Mussels	Pondhorn	*Uniomerus tetralasmus*
Mussels	Spectaclecase	*Cumberlandia monodonta*
Mussels	Wabash Pigtoe	*Fusconaia flava*
Mussels	Yellow Sandshell	*Lampsilis teres*

2. 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 nutrient 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

*Introduced species, such as Bighead and Silver Carp, negatively impact native aquatic species and habitat.

*Introduced predatory species can impact populations of native aquatic species

Pollution

*Runoff of pesticides and fertilizers have negative impacts on the flora and fauna

*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 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 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
*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

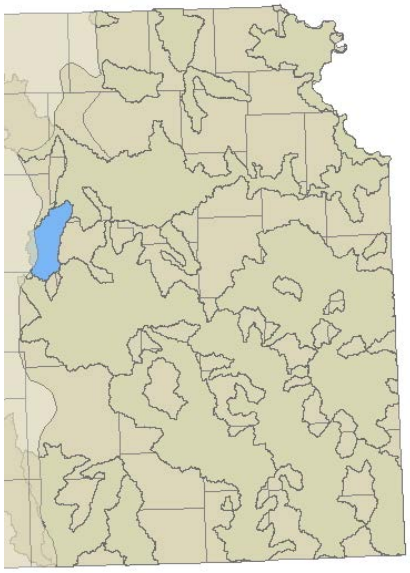
*Offer incentive to private landowners to preserve native habitats, remove invasive species, and use best management practices that benefit stream and riparian habitats
*Develop practices that provide benefits to landowners and to wildlife

Species of Greatest Conservation Need

Tier 1 SGCN		
Fish	Blackside Darter	*Percina maculata*
Fish	Pallid Sturgeon	*Scaphirhynchus albus*
Fish	Plains Minnow	*Hybognathus placitus*
Fish	Shoal Chub	*Macrhybopsis hyostoma*
Fish	Sicklefin Chub	*Macrhybopsis meeki*
Fish	Silver Chub	*Macrhybopsis storeriana*
Fish	Sturgeon Chub	*Macrhybopsis gelida*
Fish	Topeka Shiner	*Notropis topeka*
Fish	Western Silvery Minnow	*Hybognathus argyritis*
Insect	A mayfly	*Apobaetis lakota*
Insect	A mayfly	*Heterocloeon grande*
Insect	A small minnow mayfly	*Plauditus texanus*
Insect	Konza Prairie Mayfly	*Leptophlebia konza*
Mussels	Snuffbox	*Epioblasma triquetra*
Plants	Narrowleaf Morning-glory	*Ipomoea shumardiana*
Tier 2 SGCN		
Fish	American Eel	*Anguilla rostrata*
Fish	Black Buffalo	*Ictiobus niger*
Fish	Blue Sucker	*Cycleptus elongatus*
Fish	Brassy Minnow	*Hybognathus hankinsoni*
Fish	Cardinal Shiner	*Luxilus cardinalis*

Tier 2 SGCN		
Fish	Chestnut Lamprey	*Ichthyomyzon castaneus*
Fish	Common Shiner	*Luxilus cornutus*
Fish	Golden Redhorse	*Moxostoma erythrurum*
Fish	Highfin Carpsucker	*Carpiodes velifer*
Fish	Johnny Darter	*Etheostoma nigrum*
Fish	Lake Sturgeon	*Acipenser fulvescens*
Fish	Northern Plains Killifish	*Fundulus kansae*
Fish	Orangethroat Darter	*Etheostoma spectabile*
Fish	Ozark Logperch	*Percina caprodes fulvitaenia*
Fish	Paddlefish	*Polyodon spathula*
Fish	Quillback	*Carpiodes cyprinus*
Fish	River Redhorse	*Moxostoma carinatum*
Fish	River Shiner	*Notropis blennius*
Fish	Shorthead Redhorse	*Moxostoma macrolepidotum*
Fish	Shovelnose Sturgeon	*Scaphirhynchus platorynchus*
Fish	Slender Madtom	*Noturus exilis*
Fish	Slenderhead Darter	*Percina phoxocephala*
Fish	Southern Redbelly Dace	*Chrosomus erythrogaster*
Fish	Spotfin Shiner	*Cyprinella spiloptera*
Fish	Stonecat	*Noturus flavus*
Fish	White Sucker	*Catostomus commersonii*
Insect	A longhorned caddisfly	*Ceraclea spongillovorax*
Insect	A sand-filtering mayfly	*Homoeoneuria ammophilasmo*
Insect	Wallace's Deepwater Mayfly	*Spinadis simplex*
Insect	Rock Island Springfly	*Isogenoides varians*
Mussels	Creeper	*Strophitus undulatus*
Mussels	Fatmucket	*Lampsilis siliquoidea*
Mussels	Fawnsfoot	*Truncilla donaciformis*
Mussels	Lilliput	*Toxolasma parvum*
Mussels	Pink Heelsplitter	*Potamilus alatus*
Mussels	Plain Pocketbook	*Lampsilis cardium*
Mussels	Pondhorn	*Uniomerus tetralasmus*
Mussels	Wabash Pigtoe	*Fusconaia flava*
Mussels	Yellow Sandshell	*Lampsilis teres*
Plants	Missouri Mud-plantain	*Heteranthera missouriensis*
Turtles	Smooth Softshell	*Apalone mutica*

3. Smoky Hill River



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

Conservation Issues

Agriculture

*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

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

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, stream incision, 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 negatively impact native aquatic species and habitat (i.e Zebra Mussels)

*Introduced predatory species can impact populations of native aquatic species

Pollution

*Runoff of pesticides and fertilizers have negative impacts on the flora and fauna

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 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

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

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

*Promote mechanical removal of non-native, invasive plant species by utilizing local habitat partnerships
*Promote restoration of stream channels through natural stream design
*Promote restoration projects that increase floodplain connectivity in incised streams
*Promote fish passage designs for new in-stream structures and retro-fit old structures to allow passage
*Identify pollution problem areas and improve conditions detrimental to biodiversity and endangered species
*Promote improved water quality standards
*Coordinate with NRCS and other partners to develop and implement grazing and land management practices that benefit stream and riparian habitats

Species management

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

Education and awareness

*Inform landowners and managers of and promote best management practices
*Conduct wildlife surveys that are rigorous, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics
*Continue disease monitoring (Chytrid Fungus, Ranavirus, etc.)
*Investigate contaminant effects on reptilian and amphibian populations
*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
*Study the impact of introduced species on native species
*Educate the public regarding the importance of preventing the spread of invasive species
*Inventory perched culverts and other structures that are preventing aquatic organism passage

External capacity building

*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 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

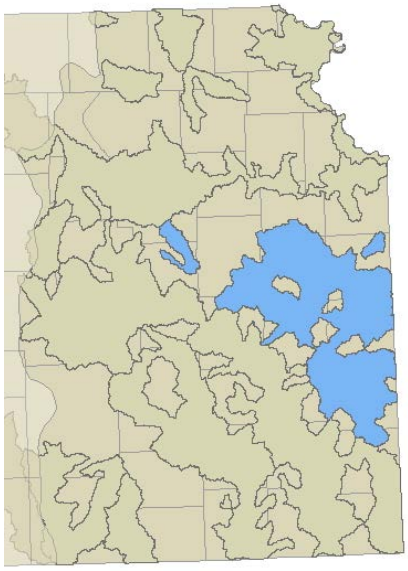
*Offer incentive to private landowners to preserve native habitats, remove invasive species, and use best management practices that benefit stream and riparian habitats
*Develop practices that provide benefits to landowners and to wildlife

Species of Greatest Conservation Need

Tier 1 SGCN		
Fish	Topeka Shiner	*Notropis topeka*
Tier 2 SGCN		
Fish	Common Shiner	*Luxilus cornutus*
Fish	Johnny Darter	*Etheostoma nigrum*
Fish	Orangethroat Darter	*Etheostoma spectabile*
Fish	Ozark Logperch	*Percina caprodes fulvitaenia*
Fish	Shorthead Redhorse	*Moxostoma macrolepidotum*

Tier 2 SGCN		
Fish	Slender Madtom	*Noturus exilis*
Fish	Southern Redbelly Dace	*Chrosomus erythrogaster*
Fish	Stonecat	*Noturus flavus*
Fish	White Sucker	*Catostomus commersonii*
Insect	A sand-filtering mayfly	*Homoeoneuria ammophila*
Mussels	Creeper	*Strophitus undulatus*
Mussels	Pink Heelsplitter	*Potamilus alatus*
Mussels	Pondhorn	*Uniomerus tetralasmus*
Mussels	Wabash Pigtoe	*Fusconaia flava*

4. Marais des Cygnes



The Marais des Cygnes Ecological Focus Area is located in east-central and southeast Kansas. The Marmaton and Little Osage rivers join the Marais des Cygnes River in Missouri, but make up a considerable portion of the watershed in Kansas. Stream substrates in this system are mostly gravel. Most of the Marais des Cygnes EFA occurs in the Osage Cuestas and Wooded Osage Plains ecoregions, but small portions lie within the Flint Hills and Cherokee Plains. The landscape of the area ranges from a mosaic of Tallgrass Prairie and Oak-Hickory Forest in the west, to dense woodlands in the east. One of the most prevalent impacts in this EFA is fragmentation of river systems due to large reservoirs (Melvern, Pomona, and Hillsdale) and heavy construction of watershed impoundments that continues today. Agricultural inputs have also led to high loads of nutrient and oxygen demanding pollutants. The Marais des Cygnes EFA contains several SGCN species including fish, mussels, and herpetofauna.

Conservation Issues

Agriculture

*Land management practices within the watershed are impacting water quality

*Livestock access to streams can increase nutrient input

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

Natural system modifications

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

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

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

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

Invasive and other problematic species and genes

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

Pollution

*Runoff of pesticides and fertilizers have negative impacts on the flora and fauna

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 of aging watershed dams to increase stream connectivity
*Promote alternatives to watershed impoundments for flood control such as off-channel wetlands, high quality riparian buffers, etc.
*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
*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
*Expand cooperative programs that supply technical and direct assistance for non-native species removal
*Develop plans to prevent the invasion and spread of Aquatic Nuisance Species
*Promote mechanical removal of non-native, invasive plant species by utilizing local habitat partnerships
*Promote restoration of stream channels through natural stream design
*Promote restoration projects that increase floodplain connectivity in incised streams
*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 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

*Study the effects of removing watershed impoundments and reservoirs
*Educate landowners on the benefits of natural stream restoration and wetland creation for flood control
*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
*Inform landowners and managers of and promote best management practices
*Study the impact of introduced species on native species
*Conduct wildlife surveys. Surveys should be rigorous, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics
*Investigate contaminant effects on reptilian and amphibian populations
*Continue disease monitoring (Chytrid Fungus, Ranavirus, etc.)

*Educate the public regarding the importance of preventing the spread of invasive species
*Inventory perched culverts and other structures that are preventing aquatic organism passage

External capacity building

*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 Dept. of Transportation to identify and replace structures that are preventing aquatic organism passage
*Work with Watershed Management Districts to update and improve Watershed Management Plans to include ecologically sound flood control practices like off-channel wetlands
*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
*Encourage and incentivize use of flood control practices that do not fragment stream habitat such as creating off-channel wetlands, high quality riparian areas, etc.

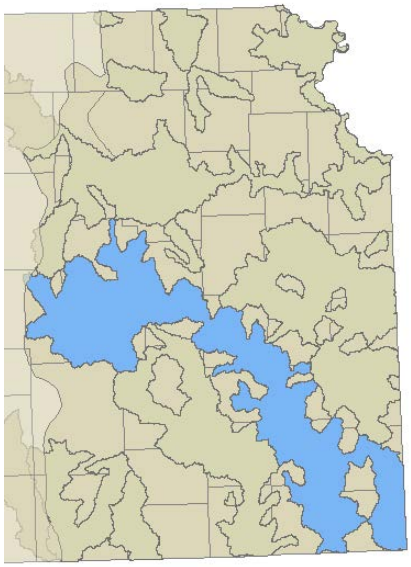
Species of Greatest Conservation Need

Tier 1 SGCN		
Amphibians	Spring Peeper	*Pseudacris crucifer*
Fish	Hornyhead Chub	*Nocomis biguttatus*
Gastropods	Sharp Hornsnail	*Campeloma crassulum*
Mussels	Butterfly	*Ellipsaria lineolata*
Mussels	Flat Floater	*Utterbackiana suborbiculata*
Mussels	Flutedshell	*Lasmigona costata*
Mussels	Mucket	*Actinonaias ligamentina*
Mussels	Rock-Pocketbook	*Arcidens confragosus*
Mussels	Snuffbox	*Epioblasma triquetra*
Plants	Kansas Arrowhead	*Sagittaria ambigua*
Turtles	Northern Map Turtle	*Graptemys geographica*

Tier 2 SGCN		
Amphibians	Common Mudpuppy	*Necturus maculosus*
Fish	Black Buffalo	*Ictiobus niger*
Fish	Fantail Darter	*Etheostoma flabellare*
Fish	Freckled Madtom	*Noturus nocturnus*
Fish	Golden Redhorse	*Moxostoma erythrurum*
Fish	Greenside Darter	*Etheostoma blennioides*
Fish	Johnny Darter	*Etheostoma nigrum*
Fish	Orangethroat Darter	*Etheostoma spectabile*
Fish	Ozark Logperch	*Percina caprodes fulvitaenia*
Fish	Paddlefish	*Polyodon spathula*
Fish	Pealip Redhorse	*Moxostoma pisolabrum*
Fish	Quillback	*Carpiodes cyprinus*
Fish	Shorthead Redhorse	*Moxostoma macrolepidotum*
Fish	Slender Madtom	*Noturus exilis*
Fish	Slenderhead Darter	*Percina phoxocephala*
Fish	Spotted Gar	*Lepisosteus oculatus*
Fish	Spotted Sucker	*Minytrema melanops*
Fish	Stonecat	*Noturus flavus*
Fish	Warmouth	*Lepomis gulosus*

Tier 2 SGCN		
Fish	White Sucker	*Catostomus commersonii*
Insect	A microcaddisfly	*Neotrichia falca*
Insect	A Prongill Mayfly	*Paraleptophlebia calcarica*
Mussels	Creeper	*Strophitus undulatus*
Mussels	Deertoe	*Truncilla truncata*
Mussels	Fatmucket	*Lampsilis siliquoidea*
Mussels	Fawnsfoot	*Truncilla donaciformis*
Mussels	Lilliput	*Toxolasma parvum*
Mussels	Pink Heelsplitter	*Potamilus alatus*
Mussels	Plain Pocketbook	*Lampsilis cardium*
Mussels	Pondhorn	*Uniomerus tetralasmus*
Mussels	Purple Wartyback	*Cyclonaias tuberculata*
Mussels	Round Pigtoe	*Pleurobema sintoxia*
Mussels	Spike	*Eurynia dilatata*
Mussels	Wabash Pigtoe	*Fusconaia flava*
Mussels	Wartyback	*Quadrula nodulata*
Mussels	Washboard	*Megalonaias nervosa*
Mussels	Yellow Sandshell	*Lampsilis teres*
Plants	Missouri Mud-plantain	*Heteranthera missouriensis*
Turtles	Smooth Softshell	*Apalone mutica*

5. Neosho River



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

Conservation Issues

Agriculture

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

*Livestock access to streams can increase nutrient input

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

Natural system modifications

*Bank destabilization (due to riparian management, stream incision, headcuts, etc.) and some subsequent stabilization methods can cause stream incision and loss of riparian habitat
*Gravel dredging affects stream morphology and spawning habitats
*Structures that alter the water from its natural drainage are impacting natural hydrology of streams
*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 Zebra Mussels, impact native aquatic species and habitat

Pollution

*Runoff of pesticides and fertilizers have negative impacts on the flora and fauna

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 ecologically sound techniques for flood control, erosion control, nonpoint source pollution control, and bank stabilization
*Encourage engineering techniques that promote high habitat diversity
*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
*Encourage the use of fences where necessary to manage riparian corridors, and otherwise conduct proper grazing management
*Expand cooperative programs that supply technical and direct assistance for non-native species removal
*Develop plans to prevent the invasion and spread of Aquatic Nuisance Species
*Promote mechanical removal of non-native, invasive plant species by utilizing local habitat partnerships
*Promote restoration of stream channels through natural stream design
*Promote restoration projects that increase floodplain connectivity in incised streams
*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 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

*Inform landowners and managers of and promote best management practices

*Conduct wildlife surveys that are rigorous, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics
*Continue disease monitoring (Chytrid Fungus, Ranavirus, etc.)
*Investigate contaminant effects on reptilian and amphibian populations
*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
*Study the impact of introduced species on native species
*Educate the public regarding the importance of preventing the spread of invasive species
*Inventory perched culverts and other structures that are preventing aquatic organism passage

External capacity building

*****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 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

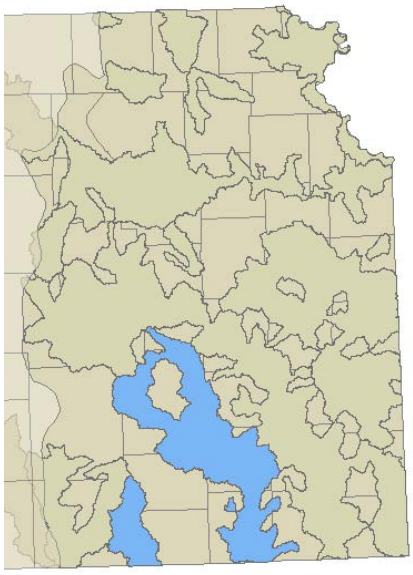
*Offer incentive to private landowners to preserve native habitats, remove invasive species, and use best management practices that benefit stream and riparian habitats
*Develop practices that provide benefits to landowners and to wildlife

Species of Greatest Conservation Need

Tier 1 SGCN		
Amphibians	Green Frog	*Lithobates clamitans*
Amphibians	Spring Peeper	*Pseudacris crucifer*
Fish	Arkansas Darter	*Etheostoma cragini*
Fish	Neosho Madtom	*Noturus placidus*
Fish	Redspot Chub	*Nocomis asper*
Fish	Topeka Shiner	*Notropis topeka*
Insect	A mayfly	*Heterocloeon grande*
Mussels	Butterfly	*Ellipsaria lineolata*
Mussels	Elktoe	*Alasmidonta marginata*
Mussels	Ellipse	*Venustaconcha ellipsiformis*
Mussels	Flat Floater	*Utterbackiana suborbiculata*
Mussels	Flutedshell	*Lasmigona costata*
Mussels	Neosho Mucket	*Lampsilis rafinesqueana*
Mussels	Ouachita Kidneyshell	*Ptychobranchus occidentalis*
Mussels	Rabbitsfoot	*Theliderma cylindrica*
Mussels	Western Fanshell	*Cyprogenia aberti*
Plants	Kansas Arrowhead	*Sagittaria ambigua*
Plants	Narrowleaf Morning-glory	*Ipomoea shumardiana*
Turtles	Northern Map Turtle	*Graptemys geographica*
Tier 2 SGCN		
Fish	Banded Darter	*Etheostoma zonale*
Fish	Banded Sculpin	*Cottus carolinae*
Fish	Bigeye Shiner	*Notropis boops*
Fish	Black Buffalo	*Ictiobus niger*
Fish	Black Redhorse	*Moxostoma duquesnei*
Fish	Blue Sucker	*Cycleptus elongatus*

Tier 2 SGCN		
Fish	Bluntnose Darter	*Etheostoma chlorosoma*
Fish	Brindled Madtom	*Noturus miurus*
Fish	Cardinal Shiner	*Luxilus cardinalis*
Fish	Channel Darter	*Percina copelandi*
Fish	Common Shiner	*Luxilus cornutus*
Fish	Fantail Darter	*Etheostoma flabellare*
Fish	Freckled Madtom	*Noturus nocturnus*
Fish	Golden Redhorse	*Moxostoma erythrurum*
Fish	Gravel Chub	*Erimystax x-punctatus*
Fish	Greenside Darter	*Etheostoma blennioides*
Fish	Highfin Carpsucker	*Carpiodes velifer*
Fish	Highland Darter	*Etheostoma teddyroosevelt*
Fish	Johnny Darter	*Etheostoma nigrum*
Fish	Northern Hog Sucker	*Hypentelium nigricans*
Fish	Orangethroat Darter	*Etheostoma spectabile*
Fish	Ozark Logperch	*Percina caprodes fulvitaenia*
Fish	Ozark Minnow	*Notropis nubilus*
Fish	Paddlefish	*Polyodon spathula*
Fish	Pealip Redhorse	*Moxostoma pisolabrum*
Fish	Redfin Darter	*Etheostoma whipplei*
Fish	River Darter	*Percina shumardi*
Fish	River Redhorse	*Moxostoma carinatum*
Fish	Shorthead Redhorse	*Moxostoma macrolepidotum*
Fish	Slender Madtom	*Noturus exilis*
Fish	Slenderhead Darter	*Percina phoxocephala*
Fish	Slough Darter	*Etheostoma gracile*
Fish	Southern Redbelly Dace	*Chrosomus erythrogaster*
Fish	Spotfin Shiner	*Cyprinella spiloptera*
Fish	Spotted Gar	*Lepisosteus oculatus*
Fish	Spotted Sucker	*Minytrema melanops*
Fish	Stonecat	*Noturus flavus*
Fish	Striped Shiner	*Luxilus chrysocephalus*
Fish	Sunburst Darter	*Etheostoma mihileze*
Fish	Warmouth	*Lepomis gulosus*
Fish	White Sucker	*Catostomus commersonii*
Insect	A longhorned caddisfly	*Ceraclea spongillovorax*
Insect	A spiny crawler mayfly	*Ephemera traverae*
Insect	A primitive minnow mayfly	*Siphlonurus minnoi*
Insect	Ozark Springfly	*Helopicus nalatus*
Insect	Ouachita Stripetail	*Isoperla ouachita*
Mussels	Bleufer	*Potamilus purpuratus*
Mussels	Creeper	*Strophitus undulatus*
Mussels	Deertoe	*Truncilla truncata*
Mussels	Fatmucket	*Lampsilis siliquoidea*
Mussels	Fawnsfoot	*Truncilla donaciformis*
Mussels	Lilliput	*Toxolasma parvum*
Mussels	Plain Pocketbook	*Lampsilis cardium*
Mussels	Pondhorn	*Uniomerus tetralasmus*
Mussels	Round Pigtoe	*Pleurobema sintoxia*
Mussels	Spike	*Eurynia dilatata*
Mussels	Wabash Pigtoe	*Fusconaia flava*
Mussels	Wartyback	*Quadrula nodulata*
Mussels	Washboard	*Megalonaias nervosa*
Mussels	Yellow Sandshell	*Lampsilis teres*
Mussels	Alligator Snapping Turtle	*Macrochelys temminckii*
Plants	Missouri Mud-plantain	*Heteranthera missouriensis*
Turtles	Smooth Softshell	*Apalone mutica*

6. Verdigris



The Verdigris Ecological Focus Area is comprised of the Central Oklahoma/Texas Plains and part of the Central Irregular Plains. The Central Oklahoma/Texas Plains are considered a transitional area between prairie vegetation to the west and forested regions to the south. Kansas contains the northern extent of the region. The Cross Timbers area separates this region from the tallgrass prairie of the Flint Hills, and the mosaic of oak-hickory forest and tallgrass prairie of the Osage Cuestas to the east. The Verdigris, Fall, and Elk rivers are the major aquatic systems in this EFA. The Ouachita Kidneyshell mussel is listed as threatened in the Caney River while the Brindled Madtom, Redfin Darter, and Spotted Sucker are all species in need of conservation (SINC) within this area.

Conservation Issues

Agriculture

*Land management practices within the watershed are impacting water quality
*Livestock access to streams can increase nutrient input
*Fisheries management, as it relates to stocking game fish, can be detrimental to native species

Natural system modifications

*Structures that alter the water from its natural drainage are impacting natural hydrology of streams
*Bank destabilization (due to riparian management, stream incision, 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 negatively impact native aquatic species and habitat

Pollution

*Runoff of pesticides and fertilizers have negative impacts on the flora and fauna

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

*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
*Expand cooperative programs that supply technical and direct assistance for non-native species removal
*Develop plans to prevent the invasion and spread of Aquatic Nuisance Species
*Promote mechanical removal of non-native, invasive plant species by utilizing local habitat partnerships
*Promote restoration of stream channels through natural stream design
*Promote restoration projects that increase floodplain connectivity in incised streams
*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 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

*Inform landowners and managers of and promote best management practices
*Study the impact of removing watershed impoundments and reservoirs
*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
*Continue disease monitoring (Chytrid Fungus, Ranavirus, etc.)
*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
*Study the impact of introduced species on native species
*Educate the public regarding the importance of preventing the spread of invasive species
*Inventory perched culverts and other structures that are preventing aquatic organism passage

External capacity building

*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 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

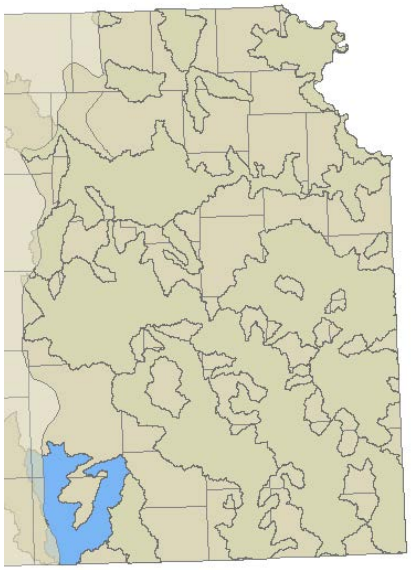
Livelihood, economic and other incentives

*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		
Insect	A mayfly	*Heterocloeon grande*
Insect	Grey Petaltail	*Tachopteryx thoreyi*
Mussels	Butterfly	*Ellipsaria lineolata*
Mussels	Neosho Mucket	*Lampsilis rafinesqueana*
Mussels	Ouachita Kidneyshell	*Ptychobranchus occidentalis*
Mussels	Western Fanshell	*Cyprogenia aberti*
Plants	Kansas Arrowhead	*Sagittaria ambigua*
Tier 2 SGCN		
Amphibians	Common Mudpuppy	*Necturus maculosus*
Fish	Banded Darter	*Etheostoma zonale*
Fish	Bigeye Shiner	*Notropis boops*
Fish	Black Buffalo	*Ictiobus niger*
Fish	Brindled Madtom	*Noturus miurus*
Fish	Channel Darter	*Percina copelandi*
Fish	Fantail Darter	*Etheostoma flabellare*
Fish	Freckled Madtom	*Noturus nocturnus*
Fish	Golden Redhorse	*Moxostoma erythrurum*
Fish	Highfin Carpsucker	*Carpiodes velifer*
Fish	Orangethroat Darter	*Etheostoma spectabile*
Fish	Ozark Logperch	*Percina caprodes fulvitaenia*
Fish	Pealip Redhorse	*Moxostoma pisolabrum*
Fish	Quillback	*Carpiodes cyprinus*
Fish	Redfin Darter	*Etheostoma whipplei*
Fish	Slenderhead Darter	*Percina phoxocephala*
Fish	Slough Darter	*Etheostoma gracile*
Fish	Spotted Gar	*Lepisosteus oculatus*
Fish	Spotted Sucker	*Minytrema melanops*
Fish	Stonecat	*Noturus flavus*
Fish	Warmouth	*Lepomis gulosus*
Insect	A longhorned caddisfly	*Ceraclea spongillovorax*
Insect	A midge	*Oliveridia hugginsi*
Insect	A Prongill Mayfly	*Paraleptophlebia calcarica*
Insect	Gray Petaltail	*Tachopteryx thoreyi*
Insect	Ozark Emerald	*Somatochlora ozarkensis*
Mussels	Bleufer	*Potamilus purpuratus*
Mussels	Creeper	*Strophitus undulatus*
Mussels	Deertoe	*Truncilla truncata*
Mussels	Fatmucket	*Lampsilis siliquoidea*
Mussels	Fawnsfoot	*Truncilla donaciformis*
Mussels	Lilliput	*Toxolasma parvum*
Mussels	Plain Pocketbook	*Lampsilis cardium*
Mussels	Pondhorn	*Uniomerus tetralasmus*
Mussels	Round Pigtoe	*Pleurobema sintoxia*
Mussels	Wabash Pigtoe	*Fusconaia flava*
Mussels	Wartyback	*Quadrula nodulata*
Mussels	Washboard	*Megalonaias nervosa*
Mussels	Yellow Sandshell	*Lampsilis teres*
Turtles	Alligator Snapping Turtle	*Macrochelys temminckii*

7. Walnut



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

Conservation Issues

Residential and commercial development

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

*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

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

Natural system modifications

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

*Bank destabilization (due to riparian management, stream incision, 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 impact native aquatic species and habitat.

*Introduced predatory species can impact populations of native aquatic species

Pollution

*Runoff of pesticides and fertilizers have negative impacts on the flora and fauna

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

*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
*Expand cooperative programs that supply technical and direct assistance for non-native species removal
*Develop plans to prevent the invasion and spread of Aquatic Nuisance Species
*Promote mechanical removal of non-native, invasive plant species by utilizing local habitat partnerships
*Promote restoration of stream channels through natural stream design
*Promote restoration projects that increase floodplain connectivity in incised streams
*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 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 decrease/replace impervious surfaces

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
*Conduct wildlife surveys that are rigorous, quantifiable, and focused on species/habitat relationships, population demography, and community dynamics
*Continue disease monitoring (Chytrid Fungus, Ranavirus, etc.)
*Investigate contaminant effects on reptilian and amphibian populations
*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
*Study the impact of introduced species on native species
*Educate the public regarding the importance of preventing the spread of invasive species
*Inventory perched culverts and other structures that are preventing aquatic organism passage
*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 sound water quality standards and their enforcement through education and continue coordination with the Kansas Department of Health and Environment

*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

*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	Arkansas Darter	*Etheostoma cragini*
Tier 2 SGCN		
Fish	Bigeye Shiner	*Notropis boops*
Fish	Black Buffalo	*Ictiobus niger*
Fish	Channel Darter	*Percina copelandi*
Fish	Freckled Madtom	*Noturus nocturnus*
Fish	Golden Redhorse	*Moxostoma erythrurum*
Fish	Orangethroat Darter	*Etheostoma spectabile*
Fish	Ozark Logperch	*Percina caprodes fulvitaenia*
Fish	Pealip Redhorse	*Moxostoma pisolabrum*
Fish	Slenderhead Darter	*Percina phoxocephala*
Fish	Spotted Sucker	*Minytrema melanops*
Fish	Stonecat	*Noturus flavus*
Mussels	Bleufer	*Potamilus purpuratus*
Mussels	Creeper	*Strophitus undulatus*
Mussels	Fatmucket	*Lampsilis siliquoidea*
Mussels	Lilliput	*Toxolasma parvum*
Mussels	Plain Pocketbook	*Lampsilis cardium*
Mussels	Pondhorn	*Uniomerus tetralasmus*
Mussels	Round Pigtoe	*Pleurobema sintoxia*
Mussels	Wabash Pigtoe	*Fusconaia flava*
Mussels	Yellow Sandshell	*Lampsilis teres*

Success Story – Freshwater Mussel Surveys

Survey and research regarding freshwater mussels of Kansas rivers and streams have led to several discoveries and conservation successes in the last 25 years. Because freshwater mussels are deemed one of the most imperiled groups of aquatic organisms, research into their life cycle is critical in the development of strategies to conserve the ecological integrity of Kansas' aquatic systems.

One of the national leaders in the reproductive research of freshwater mussels has been Dr. Chris Barnhart of Missouri State University. He and his students have discovered fish hosts required for development of larval mussels (glochidia) for several species considered threatened or endangered. Prior to his research, fish hosts for the Kansas populations of Rabbitsfoot, Neosho Mucket, Western Fanshell and Ouachita Kidneyshell were unknown. The elaborate lures that females use to attract fish hosts were described. The need for sufficient water clarity so the fish host can see a visual lure is apparent and demonstrates the importance of watershed-level management.

Regarding management implications, this research led to techniques of propagating juvenile mussels in the lab and growing them to the point that they could be released into the wild. A conservation strategy of propagating mussels for reintroduction into rivers where a species has been extirpated, or simply to augment a low population, is now a viable option.

One example of a mussel propagation and reintroduction effort that is occurring regards the Neosho Mucket. This species uses a lure that is only successful if bass are attracted to it to act as the fish host. The tiny glochidia clamp onto the gill filaments of the bass (Largemouth, Smallmouth or Spotted) and encyst there for a few weeks until the glochidia metamorphose to the juvenile stage and drop off. To date, several thousand Neosho Mucket juveniles have been propagated and released into the Cottonwood River. Apparently, the Cottonwood River once had a good population of Neosho Muckets, evident from relic shells still found on gravel bars. Past pollution events and current improving water quality made this river a target for a reintroduction effort. It will probably take many years to determine whether or not this effort has been a success. Thanks to Dr. Barnhart's work on the life cycle of this mussel, a propagation and reintroduction conservation strategy is currently being implemented in an attempt to recover the endangered Neosho Mucket population.

Tallgrass Prairie Conservation Region Partners (not listed on Statewide List)

- Eastern Tallgrass and Big River Landscape Conservation Cooperative
- Friends of the Kaw
- Kaw Valley Heritage Alliance
- Konza Prairie Preserve
- Military Installations
- Missouri River Natural Resources Committee
- Mississippi Interstate Cooperative Resource Association
- Tallgrass Legacy Alliance
- Grassland Heritage Foundation
- Upper Mississippi Great Lakes Joint Venture
- Walnut Council