

Appendix 1
Selection and Ranking Criteria for
Species of Greatest Conservation Need

Step 1: Selection of Species of Greatest Conservation Need; a species must meet at least one or more of the following criteria.

1. Native species, which are classified as federally threatened, endangered or candidate under the Endangered Species Act (ESA).
2. Native species, which are classified as Kansas threatened, endangered, or Species In Need of Conservation (SINC).
3. Native species, which have been assigned a global conservation status rank of G1, G2 or G3 by NatureServe.*
4. Native species which have been identified as conservation priorities through a range wide status assessment, or assessment of large taxonomic divisions or which has significant conservation implication, or has major conservation contribution to the state; or are indicative of a diversity and health of the state's wildlife.
Assessments include: American Fisheries Society assessments of freshwater fish, freshwater mussels, and crayfish. Partners in Flight Conservation Plan, Playa Lakes Joint Venture, and the U.S. Fish and Wildlife Service Region 6 Priority Birds.
5. Native species, which are regionally endemic (distribution confined to central states) regardless of their conservation status.

Step 2: Ranking of Species of Greatest Conservation Need

1. Federal and/or Kansas threatened, endangered species, and/or with a global conservation status rank of G1 or G2 = Tier I species
2. Remaining Species of Greatest Conservation Need = Tier II species

Appendix 2
Species of Greatest Conservation Need

This table includes Kansas' Species of Greatest Conservation Need along with the selection criteria number, tier ranking, Global and State conservation status ranks, and the Conservation Region(s) in which the species occur. Codes following common names are as follows: T = Threatened, E = Endangered, C = Candidate SINC = Species In Need of Conservation, and X = extirpated.

Group	Common Name	Scientific Name	Federal Status	State Status	Selection Criteria	Tier	G Rank (Rounded)	S Rank	Conservation Region		
									Shortgrass Prairie	Central Mixed Grass Prairie	Eastern Tallgrass Prairie
Amphibians	Cave Salamander	<i>Eurycea lucifuga</i>		E	2	I	G5	S1			x
Amphibians	Crawfish Frog	<i>Lithobates areolata</i>		SINC	2	I	G4	S3			x
Amphibians	Eastern Narrow-mouthed Toad	<i>Gastrophryne carolinensis</i>		T	2	II	G5	S1			x
Amphibians	Eastern Newt	<i>Notophthalmus viridescens</i>		T	2	II	G5	S2			x
Amphibians	Green Frog	<i>Lithobates clamitans</i>		T	2	I	G5	S1			x
Amphibians	Green Toad	<i>Anaxyrus debilis</i>		T	2,5	I	G5	S2	x		
Amphibians	Grotto Salamander	<i>Eurycea spelaeas</i>		E	2,5	I	G4	S1			x
Amphibians	Long-tailed Salamander	<i>Eurycea longicauda</i>		T	2	I	G5	S2			x
Amphibians	Common Mudpuppy	<i>Necturus maculosus</i>			4	I	G5	S3			x
Amphibians	Red-spotted Toad	<i>Anaxyrus punctatus</i>		SINC	2	II	G5	S2		x	
Amphibians	Spring Peeper	<i>Pseudacris crucifer</i>		SINC	2	II	G5	S3			x
Amphibians	Strecker's Chorus Frog	<i>Pseudacris streckeri</i>		T	2,5	I	G5	S2		x	
Amphibians	Tiger Salamander	<i>Ambystoma tigrinum</i>			4	II	G5	S5	x	x	x
Amphipod	Clanton's Cave Amphipod	<i>Stygobromus clantoni</i>			4,5	II	G3	S2S3			x
Amphipod	Kansas Well Amphipod	<i>Baetris ruficornis</i>			5	I	G1	S3S4			x
Amphipod	Onondaga Cave Amphipod	<i>Stygobromus onondagaensis</i>			3	II	G3	SNR			x
Arachnida	A trap door spider	<i>Antrodiaetus lincolnianus</i>			5	II					x
Arachnida	A trap door spider	<i>Sphodros fitchi</i>			5	II					x
Arachnida	A trap door spider	<i>Ummidia beatula</i>			5	II					x
Arachnida	An aquatic mite	<i>Tyrrellia hibbardii</i>			5	II				x	
Birds	American Avocet	<i>Recurvirostra americana</i>			4	II	G5	S2BS3N	x	x	
Birds	American Bittern	<i>Botaurus lentiginosus</i>			4	II	G5	S1B	x	x	x
Birds	American Golden-Plover	<i>Pluvialis dominica</i>			4	II	G5	S3N	x	x	x
Birds	American Tree Sparrow	<i>Spizella arborea</i>			4	II	G5	S5N	x	x	x
Birds	American White Pelican	<i>Pelecanus erythrorhynchos</i>			4	II	G4	S5N	x	x	x
Birds	Baird's Sandpiper	<i>Calidris bairdii</i>			4	II	G5	S4N	x	x	x
Birds	Baird's Sparrow	<i>Centronyx bairdii</i>			4	II	G4	SNA	x	x	x
Birds	Bald Eagle	<i>Haliaeetus leucocephalus</i>			4	II	G5	S2BS4N	x	x	x
Birds	Baltimore Oriole	<i>Icterus galbula</i>			4	II	G5	S5B	x	x	x
Birds	Barn Owl	<i>Tyto alba</i>			4	II	G5	S3	x	x	x

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Group	Common Name	Scientific Name	Federal Status	State Status	Selection Criteria	Tier	G Rank (Rounded)	S Rank	Conservation Region		
									Shortgrass Prairie	Central Mixed Grass Prairie	Eastern Tallgrass Prairie
Birds	Bell's Vireo	<i>Vireo bellii</i>			4	II	G5	S4B	x	x	x
Birds	Black Rail	<i>Laterallus jamaicensis</i>	T	SINC	2,3	II	G3	S1B		x	
Birds	Black Tern	<i>Chlidonias niger</i>		SINC	2	II	G5	S1B	x	x	x
Birds	Black-bellied Plover	<i>Pluvialis squatarola</i>			4	II	G5	S3N	x	x	x
Birds	Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>			4	II	G5	S3B	x	x	x
Birds	Black-necked Stilt	<i>Himantopus mexicanus</i>			4	II	G5	S1B	x	x	
Birds	Bobolink	<i>Dolichonyx orzivorus</i>		SINC	2	II	G5	S1B		x	x
Birds	Buff-breasted Sandpiper	<i>Calidris subruficollis</i>			4	II	G4	SNA	x	x	x
Birds	Bullock's Oriole	<i>Icterus bullockii</i>			4	II	G5	S3B	x	x	
Birds	Burrowing Owl	<i>Athene cunicularia</i>			4	II	G4	S3B	x	x	
Birds	Canvasback	<i>Aythya valisineria</i>			4	II	G5	S3N	x	x	x
Birds	Cassin's Sparrow	<i>Peucaea cassinii</i>			4,5	II	G5	S3B	x	x	
Birds	Cerulean Warbler	<i>Setophaga cerulea</i>		SINC	2	II	G4	S1B			x
Birds	Chestnut-collared Longspur	<i>Calcarius ornatus</i>			4	II	G5	S3N	x	x	
Birds	Chihuahuan Raven	<i>Corvus cryptoleucus</i>		SINC	2,4	II	G5	S1	x		
Birds	Chuck-will's-widow	<i>Antrostomus carolinensis</i>			4	II	G5	S4B		x	x
Birds	Common Nighthawk	<i>Chordeiles minor</i>			4	II	G5	S5B	x	x	x
Birds	Common Poorwill	<i>Phalaenoptilus nuttallii</i>			4	II	G5	S3B	x	x	x
Birds	Curve-billed Thrasher	<i>Toxostoma curvirostre</i>		SINC	2	II	G5	S1B	x		
Birds	Dickcissel	<i>Spiza americana</i>			4	II	G5	S5B	x	x	x
Birds	Eared Grebe	<i>Podiceps nigricollis</i>			4	II	G5	S1B	x	x	
Birds	Eastern Kingbird	<i>Tyrannus tyrannus</i>			4	II	G5	S5B	x	x	x
Birds	Eastern Meadowlark	<i>Sturnella magna</i>			4	II	G5	S5BS3N	x	x	x
Birds	Eastern Whip-poor-will	<i>Antrostomus vociferus</i>		SINC	2	II	G5	S3B			x
Birds	Eastern Wood-Pewee	<i>Contopus virens</i>			4	II	G5	S5B		x	x
Birds	Ferruginous Hawk	<i>Buteo regalis</i>		SINC	2	II	G4	S2BS4N	x	x	
Birds	Forster's Tern	<i>Sterna forsteri</i>			4	II	G5	S1B	x	x	x
Birds	Golden Eagle	<i>Aquila chrysaetos</i>		SINC	2	II	G5	S1BS2N	x	x	
Birds	Grasshopper Sparrow	<i>Ammodramus savannarum</i>			4	II	G5	S5B	x	x	x
Birds	Greater Prairie-Chicken	<i>Tympanuchus cupido</i>			4	II	G4	S4	x	x	x
Birds	Greater Yellowlegs	<i>Tringa melanoleuca</i>			4	II	G5	S4N	x	x	x
Birds	Harris's Sparrow	<i>Zonotrichia querula</i>			4	II	G5	S4N			x
Birds	Henslow's Sparrow	<i>Centronyx henslowii</i>		SINC	2,4	II	G4	S3B		x	x
Birds	Hudsonian Godwit	<i>Limosa haemastica</i>			4	II	G4	S3N	x	x	x
Birds	Kentucky Warbler	<i>Geothlypis formosa</i>			4	II	G5	S3B			x

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									Shortgrass Prairie	Central Mixed Grass Prairie	Eastern Tallgrass Prairie
Birds	Ladder-backed Woodpecker	<i>Dryobates scalaris</i>		SINC	2	II	G5	S1	x		
Birds	Lark Bunting	<i>Calamospiza melanocorys</i>			4	II	G5	S5B	x	x	
Birds	Lark Sparrow	<i>Chondestes grammacus</i>			4	II	G5	S5B	x	x	x
Birds	Least Bittern	<i>Ixobrychus exilis</i>			4	II	G5	S2B	x	x	x
Birds	Least Sandpiper	<i>Calidris minutilla</i>			4	II	G5	S4N	x	x	x
Birds	Least Tern	<i>Sternula antillarum</i>	E	E	1,2,4	I	G4	S1B	x	x	x
Birds	Lesser Prairie-Chicken	<i>Tympanuchus pallidicinctus</i>		T	1,3,5	I	G3	S3	x	x	
Birds	Lesser Yellowlegs	<i>Tringa flavipes</i>			4	II	G5	S4N	x	x	x
Birds	Loggerhead Shrike	<i>Lanius ludovicianus</i>			4	II	G4	S4BS2N	x	x	x
Birds	Long-billed Curlew	<i>Numenius americanus</i>		SINC	2,4	II	G5	S1BS2N	x	x	
Birds	Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>			4	II	G5	S4N	x	x	x
Birds	Marbled Godwit	<i>Limosa fedoa</i>			4	II	G5	S3N	x	x	x
Birds	McCown's Longspur	<i>Rhynchopanes mccownii</i>			4	II	G4	S3N	x		
Birds	Mississippi Kite	<i>Ictinia mississippiensis</i>			4	II	G5	S4B	x	x	x
Birds	Mountain Plover	<i>Charadrius montanus</i>		SINC	2,3	II	G3	S1B	x		
Birds	Northern Bobwhite	<i>Colinus virginianus</i>			4	II	G5	S5	x	x	x
Birds	Northern Pintail	<i>Anas acuta</i>			4	II	G5	S1BS4N	x	x	x
Birds	Painted Bunting	<i>Passerina ciris</i>			4	II	G5	S4B		x	x
Birds	Pectoral Sandpiper	<i>Calidris melanotos</i>			4	II	G5	S4N	x	x	x
Birds	Peregrine Falcon	<i>Falco peregrinus</i>			4	II	G4	S1BS3N	x	x	x
Birds	Piping Plover	<i>Charadrius melodus</i>	T	T	1,2,3	I	G3	S1BS2N	x	x	x
Birds	Prothonotary Warbler	<i>Protonotaria citrea</i>			4	II	G5	S3B			x
Birds	Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>			4	II	G5	S5B	x	x	x
Birds	Red Knot	<i>Calidris canutus rufa</i>		T	1	I	G4	SNA		x	
Birds	Rusty Blackbird	<i>Euphagus carolinus</i>			4	II	G4	SNA	x	x	x
Birds	Scaled Quail	<i>Callipepla squamata</i>			4	II	G5	S2	x		
Birds	Scissor-tailed Flycatcher	<i>Tyrannus forficatus</i>			4,5	II	G5	S5B	x	x	x
Birds	Semipalmated Sandpiper	<i>Calidris pusilla</i>			4	II	G5	S4N	x	x	x
Birds	Short-eared Owl	<i>Asio flammeus</i>		SINC	2,4	II	G5	S2BS3N	x	x	
Birds	Smith's Longspur	<i>Calcarius pictus</i>			4	II	G5	S2S3N		x	x
Birds	Snowy Plover	<i>Charadrius nivosus</i>	T	T	2,3	I	G3	S1B	x	x	x
Birds	Spotted Towhee	<i>Pipilo maculatus</i>			4	II	G5	S2BS3N	x		
Birds	Sprague's Pipit	<i>Anthus spragueii</i>			4	II	G4	SNA	x	x	x
Birds	Stilt Sandpiper	<i>Calidris himantopus</i>			4	II	G5	S4N	x	x	x
Birds	Swainson's Hawk	<i>Buteo swainsoni</i>			4	II	G5	S4B	x	x	x

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									Shortgrass Prairie	Central Mixed Grass Prairie	Eastern Tallgrass Prairie
Birds	Upland Sandpiper	<i>Bartramia longicauda</i>			4	II	G5	S4B	x	x	x
Birds	Western Grebe	<i>Aechmophorus occidentalis</i>			4	II	G5	S1B	x	x	
Birds	Western Kingbird	<i>Tyrannus verticalis</i>			4	II	G5	S5B	x	x	x
Birds	White-rumped Sandpiper	<i>Calidris fuscicollis</i>			4	II	G5	S4N	x	x	x
Birds	Whooping Crane	<i>Grus americana</i>	E	E	1,2,3	I	G1	S1N	x	x	x
Birds	Wilson's Phalarope	<i>Phalaropus tricolor</i>			4	II	G5	S2BS4N	x	x	
Birds	Yellow Rail	<i>Coturnicops noveboracensis</i>			4	II	G4	SNA			x
Birds	Yellow-throated Warbler	<i>Setophaga dominica</i>		SINC	2	II	G5	S1B			x
Crustaceans	Calico Crayfish	<i>Faxonius immunis</i>			4	II	G5	S4			x
Crustaceans	Devil Crayfish	<i>Lacunicambarus diogenes</i>			4	II	G5	S3S4	x	x	x
Crustaceans	Golden Crayfish	<i>Faxonius luteus</i>			4,5	II	G5	S3S4			x
Crustaceans	Gray-speckled Crayfish	<i>Faxonius palmeri</i>			4	II	G5	S2?			x
Crustaceans	Kansas Fairy Shrimp	<i>Branchinecta mediospinosa</i>			4	II	GNR	S1		x	
Crustaceans	Neosho Midget Crayfish	<i>Faxonius macrus</i>			2,4,5	II	G4	S1			x
Crustaceans	Prairie Crayfish	<i>Procambarus gracilis</i>			4	II	G5	S5			x
Crustaceans	Ringed Crayfish	<i>Faxonius neglectus</i>			4	II	G5	S2S3	x	x	
Crustaceans	Southern Plains Crayfish	<i>Procambarus simulans</i>			4,5	II	G5	S5	x	x	x
Crustaceans	Virile Crayfish	<i>Faxonius virilis</i>			4	II	G5	S5			x
Crustaceans	Water Nymph Crayfish	<i>Faxonius nais</i>			4,5	II	G5	S5	x		x
Crustaceans	White River Crawfish	<i>Procambarus acutus</i>			5	II		S2			x
Fish	American Eel	<i>Anguilla rostrata</i>			4	II	G4	S2			x
Fish	Arkansas Darter	<i>Etheostoma cragini</i>		SINC	2,3,5	II	G3	S2	x	x	x
Fish	Arkansas River Shiner	<i>Notropis girardi</i>	T	T	1,2,3,4,5	I	G2	S1	x	x	x
Fish	Banded Darter	<i>Etheostoma zonale</i>		SINC	2	II	G5	S1			x
Fish	Banded Sculpin	<i>Cottus carolinae</i>		SINC	2	II	G5	S1			x
Fish	Bigeye Shiner	<i>Notropis boops</i>		SINC	4	II	G5	S2S3			x
Fish	Black Buffalo	<i>Ictiobus niger</i>			4	II	G5	S5		x	x
Fish	Black Redhorse	<i>Moxostoma duquesnei</i>		SINC	2	II	G5	S1			x
Fish	Blackside Darter	<i>Percina maculate</i>		T	2	I	G5	S1			x
Fish	Blue Sucker	<i>Cycleptus elongatus</i>		SINC	2,3	II	G3	S3			x
Fish	Bluntnose Darter	<i>Etheostoma chlorosoma</i>		SINC	2	II	G5	S2			x
Fish	Brassy Minnow	<i>Hybognathus hankinsoni</i>		SINC	2	II	G5	S1	x	x	x
Fish	Brindled Madtom	<i>Noturus miurus</i>		SINC	2	II	G5	S1			x
Fish	Cardinal Shiner	<i>Luxilus cardinalis</i>		SINC	2,4,5	II	G4	S3			x
Fish	Channel Darter	<i>Percina copelandi</i>			4	II	G4	S3			x

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									Shortgrass Prairie	Central MixedGrass Prairie	Eastern Tallgrass Prairie
Fish	Chestnut Lamprey	<i>Ichthyomyzon castaneus</i>		SINC	2	II	G4	S1S2		x	x
Fish	Common Shiner	<i>Luxilus cornutus</i>		SINC	2,4	II	G5	S3	x	x	x
Fish	Fantail Darter	<i>Etheostoma flabellare</i>			4	II	G5	S3			x
Fish	Flathead Chub	<i>Platygobio gracilis</i>		T	2	I	G5	S1	x	x	x
Fish	Freckled Madtom	<i>Noturus nocturnus</i>			4	II	G5	S4			x
Fish	Golden Redhorse	<i>Moxostoma erythrurum</i>			4	II	G5	S5		x	x
Fish	Gravel Chub	<i>Erimystax x-punctatus</i>		SINC	2	II	G4	S2S3			x
Fish	Greenside Darter	<i>Etheostoma blennioides</i>		SINC	2	II	G5	S2			x
Fish	Highfin Carpsucker	<i>Carpiodes velifer</i>		SINC	2	II	G4	S2			x
Fish	Highland Darter	<i>Etheostoma teddyroosevelt</i>			2	II	GNR	S1S2			x
Fish	Hornyhead Chub	<i>Nocomis biguttatus</i>		T	2	I	G5	S1			x
Fish	Johnny Darter	<i>Etheostoma nigrum</i>		SINC	2,4	II	G5	S3		x	x
Fish	Lake Sturgeon	<i>Acipenser fulvescens</i>		SINC	2	II	G3	SH			x
Fish	Least Darter	<i>Etheostoma microperca</i>			4	II	G5	SH			x
Fish	Neosho Madtom	<i>Noturus placidus</i>	T	T	1,2,3,5	I	G2	S2			x
Fish	Northern Hog Sucker	<i>Hypentelium nigricans</i>		SINC	2	II	G5	S1			x
Fish	Northern Plains Killifish	<i>Fundulus kansae</i>			4	II	G5	S3	x	x	
Fish	Orangethroat Darter	<i>Etheostoma spectabile</i>			4	II	G5	S5	x	x	x
Fish	Ozark Logperch	<i>Percina caprodes fulvitaenia</i>			4	II	G5	S5		x	x
Fish	Ozark Minnow	<i>Notropis nubilus</i>		SINC	2	II	G5	S1			x
Fish	Paddlefish	<i>Polyodon spathula</i>			4	II	G4	S3			x
Fish	Pallid Sturgeon	<i>Scaphirhynchus albus</i>	E	E	1,2,3	I	G2	S1			x
Fish	Pealip Redhorse	<i>Moxostoma pisolabrum</i>			4	II	G5	SNR		x	x
Fish	Peppered Chub	<i>Macrhybopsis tetranema</i>	E	E	1,2,3,4,5	I	G1	S1	x		
Fish	Plains Minnow	<i>Hybognathus placitus</i>		T	2	I	G4	S2S3	x	x	x
Fish	Quillback	<i>Carpiodes cyprinus</i>			4	II	G5	S3S4		x	x
Fish	Redfin Darter	<i>Etheostoma whipplei</i>		SINC	2,4,5	II	G4	S3			x
Fish	Redspot Chub	<i>Nocomis asper</i>		T	2,5	I	G4	S1			x
Fish	River Darter	<i>Percina shumardi</i>		SINC	2	II	G5	S1S2			x
Fish	River Redhorse	<i>Moxostoma carinatum</i>		SINC	2,4	II	G4	S1S2			x
Fish	River Shiner	<i>Notropis blennius</i>		SINC	2	II	G5	S3	x	x	x
Fish	Shoal Chub	<i>Macrhybopsis hyostoma</i>		T	2,4	I	G5	S3		x	x
Fish	Shorthead Redhorse	<i>Moxostoma macrolepidotum</i>			4	II	G5	S5		x	x
Fish	Shovelnose Sturgeon	<i>Scaphirhynchus platyrhynchus</i>			1,4	II	G4	S3			x
Fish	Sicklefin Chub	<i>Macrhybopsis meeki</i>		E	2,3	I	G3	S1			x

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									Shortgrass Prairie	Central Mixed Grass Prairie	Eastern Tallgrass Prairie
Fish	Silver Chub	<i>Macrhybopsis storeriana</i>		E	2	I	G5	S3		x	x
Fish	Silverband Shiner	<i>Notropis shumardi</i>		SINC	2	II	G5	SH			x
Fish	Slender Madtom	<i>Noturus exilis</i>			4	II	G5	S4			x
Fish	Slenderhead Darter	<i>Percina phoxocephala</i>			4	II	G5	S5			x
Fish	Slough Darter	<i>Etheostoma gracile</i>		SINC	2	II	G5	S1S2			x
Fish	Southern Redbelly Dace	<i>Chrosomus erythrogaster</i>		SINC	2,4	II	G5	S2S3		x	x
Fish	Speckled Darter	<i>Etheostoma stigmaeum</i>			2	II	G5	-			x
Fish	Spotfin Shiner	<i>Cyprinella spiloptera</i>		SINC	2	II	G5	S1			x
Fish	Spotted Gar	<i>Lepisosteus oculatus</i>			4	II	G5	S1S2			x
Fish	Spotted Sucker	<i>Minytrema melanops</i>		SINC	2	II	G5	S3			x
Fish	Stonecat	<i>Noturus flavus</i>			4	II	G5	S5	x	x	x
Fish	Striped Shiner	<i>Luxilus chrysocephalus</i>		SINC	2	II	G5	S1			x
Fish	Sturgeon Chub	<i>Macrhybopsis gelida</i>		T	2,3	I	G3	S1		x	x
Fish	Sunburst Darter	<i>Etheostoma mihileze</i>		SINC	2,5	II	G4	S1			x
Fish	Tadpole Madtom	<i>Noturus gyrinus</i>		SINC	2	II	G5	S2S3			x
Fish	Topeka Shiner	<i>Notropis topeka</i>	E	T	1,2,3,5	I	G3	S2	x	x	x
Fish	Warmouth	<i>Lepomis gulosus</i>			4	II	G5	S4S5			x
Fish	Western Blacknose Dace	<i>Rhinichthys obtusus</i>		SINC	2	II	G5	S1			x
Fish	Western Silvery Minnow	<i>Hybognathus argyritis</i>		T	2	I	G4	S2		x	x
Fish	White Sucker	<i>Catostomus commersonii</i>			4	II	G5	S5	x	x	x
Gastropod	A snail	<i>Lucilla inermis</i>			5	II					x
Gastropod	A terrestrial snail	<i>Succinea pseudavara</i>			3	I	G1	SNR		x	
Gastropod	Delta hydrobe	<i>Probythinella emarginata</i>		T	2	I	G5	S1			x
Gastropod	Domed Supercoil	<i>Paravitrea significans</i>			3	II	G3	SNR			x
Gastropod	Kaw Whitelip	<i>Webbhelix chadwicki</i>			3	I	G1	SNR			x
Gastropod	Mudbank Ambersnail	<i>Catinella vagans</i>			3	II	G3	SNR	x	x	x
Gastropod	Ozark Liptoath	<i>Daedalochila jacksoni</i>			3	II	G3	SNR			x
Gastropod	Ozark Threetooth	<i>Triodopsis neglecta</i>			3	II	G3	SNR			x
Gastropod	Ozark Whitelip	<i>Neohelix divesta</i>			3	II	G3	SNR			x
Gastropod	Ponderous Campeloma	<i>Campeloma crassulum</i>			4,5	II	G5	SNR			
Gastropod	Ruidoso Snaggletooth	<i>Gastrocopta ruidosensis</i>			3	I	G1	SH		x	
Gastropod	Sharp Hornsnail	<i>Pleurocera acuta</i>		T	2	I	G5	S1		x	x
Gastropod	Slender Walker	<i>Pomatiopsis lapidaria</i>		E	2	I	G5	S1			x
Gastropod	Slope Ambersnail	<i>Catinella wandae</i>			3	I	G2	SNR			x
Gastropod	Texas Liptoath	<i>Linisa texasiana</i>			3	II	G3	SNR		x	x

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Group	Common Name	Scientific Name	Federal Status	State Status	Selection Criteria	Tier	G Rank (Rounded)	S Rank	Conservation Region		
									Shortgrass Prairie	Central Mixed Grass Prairie	Eastern Tallgrass Prairie
Gastropod	Xeric Ambersnail	<i>Succinea vaginacontorta</i>			3	I	G2	SNR	x	x	x
Insect	A callirhoe bee	<i>Melissodes intortus</i>			4	II			x	x	x
Insect	A dieunomia bee	<i>Dieunomia triangulifera</i>			3	II	G3	SNR	x	x	x
Insect	A digger bee	<i>Anthophora montana</i>			5	II				x	
Insect	A leafcutter bee	<i>Megachile amica</i>			3	I	G2	SH		x	x
Insect	A leafcutter bee	<i>Megachile deflexa</i>			3	I	G2	SH		x	
Insect	A leafcutter bee	<i>Megachile integra</i>			3	I	G2	SNR		x	x
Insect	A leafcutter bee	<i>Megachile mucorosa</i>			3	II	G3	SNR		x	x
Insect	A longhorned beetle	<i>Tetraopes pilosus</i>			5	II			x	x	
Insect	A longhorned caddisfly	<i>Ceraclea spongillovorax</i>			3	II	G3	SNR		x	x
Insect	A mayfly	<i>Apobaetis lakota</i>			3	I	G2	SNR		x	x
Insect	A mayfly	<i>Heterocloeon grande</i>			3	I	G2	SNR		x	x
Insect	A microcaddisfly	<i>Neotrichia falca</i>			3	II	G3	SNR			x
Insect	A midge	<i>Oliveridia hugginsi</i>			5	II					x
Insect	A nomia bee	<i>Nomia universitatis</i>			3	II	G3	SNR	x	x	x
Insect	A primitive minnow mayfly	<i>Siphonurus minnoi</i>			3	II	G3	S1S2			x
Insect	A prongill Mayfly	<i>Paraleptophlebia calcarica</i>			3,5	I	G1	SNR			x
Insect	A sand-filtering mayfly	<i>Homoeoneuria ammophila</i>			3	II		S1		x	x
Insect	A scarab beetle	<i>Alloblackburneus cynomyisi</i>			5	II				x	
Insect	A scarab beetle	<i>Cryptoscatomaseter paulseni</i>			5	II			x	x	
Insect	A scarab beetle	<i>Cryptoscatomaseter salsburyi</i>			5	II				x	
Insect	A scarab beetle	<i>Geomyphilus insolitus</i>			5	II				x	
Insect	A scarab beetle	<i>Geomyphilus kiowensis</i>			5	II			x	x	
Insect	A scarab beetle	<i>Geomyphilus viceversus</i>			5	II			x	x	
Insect	A scarab beetle	<i>Onthophagus cynomyisi</i>			5	II				x	
Insect	A scarab beetle	<i>Onthophagus knausi</i>			5	II			x		x
Insect	A scarab beetle	<i>Orizabus pyriformis</i>			5	II			x	x	
Insect	A scarab beetle	<i>Oscarinus pseudabusus</i>			5	II				x	
Insect	A scarab beetle	<i>Pardalosus neodistinctus</i>			5	II			x	x	
Insect	A scarab beetle	<i>Phyllophaga albina</i>			5	II					x
Insect	A scarab beetle	<i>Scabrostomus sepultus</i>			5	II				x	
Insect	A scarab beetle	<i>Strategus mormon</i>			5	II				x	
Insect	A scarab beetle	<i>Tetraclipeoides dentigerulus</i>			5	II			x	x	
Insect	A scarab beetle	<i>Trox paulseni</i>			5	II			x		x
Insect	A small minnow mayfly	<i>Plauditus texanus</i>			3	I	G2	SNR		x	x

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Group	Common Name	Scientific Name	Federal Status	State Status	Selection Criteria	Tier	G Rank (Rounded)	S Rank	Conservation Region			
									Shortgrass Prairie	Central Mixed Grass Prairie	Eastern Tallgrass Prairie	
Insect	A spiny crawler mayfly	<i>Ephemera traverae</i>			5	II	G4	SNR				x
Insect	A spur-throated grasshopper	<i>Melanoplus beameri</i>			3,5	I	G2	SNR				x
Insect	A sweat bee	<i>Agopostemon coloradensis</i>			5	II			x		x	x
Insect	A sweat bee	<i>Dieunomia apacha</i>			3	II	G3	SNR	x		x	
Insect	A wool-carder bee	<i>Anthidium maculosum</i>			5	II			x			
Insect	A wool-carder bee	<i>Anthidium michenerorum</i>			3	I	G2	SNR			x	
Insect	A wool-carder bee	<i>Anthidium psoraleae</i>			3	II	G3				x	
Insect	Abbreviated Underwing	<i>Catocala abbreviatella</i>			3,4	II	G3	SNR				x
Insect	Aberrant Cellophane Bee	<i>Colletes aberrans</i>			4	II			x		x	x
Insect	American Bumble Bee	<i>Bombus pensylvanicus</i>	C		3	I	G3	SNR	x		x	x
Insect	American Burying Beetle	<i>Nicrophorus americanus</i>	T	E	1,2,3	I	G2	S1				x
Insect	An oil-collecting bee	<i>Centris (Paracentris) lanosus</i>			5	II					x	
Insect	An underwing moth	<i>Catocala frederici</i>			3	II	G3	SNR				x
Insect	An underwing moth	<i>Catocala texanae</i>			3	II	G3	SNR				
Insect	Arogos Skipper	<i>Atrytone arogos</i>			3	I	G2	S3S4			x	x
Insect	Austin Springfly	<i>Hydroperla fugitans</i>			3	II	G4	SNR			x	x
Insect	Bald-spot Sweat Bee	<i>Lasioglossum paraforbesii</i>			4	II					x	x
Insect	Bell's Roadside Skipper	<i>Amblyscirtes belli</i>			3	II	G4	S2S3				x
Insect	Bicoloured Sweat Bee	<i>Agopostemon virescens</i>			5	II		SNR	x		x	
Insect	Black-and-gold Bumble Bee	<i>Bombus auricomus</i>			4	II		SNR	x		x	x
Insect	Bleached Skimmer	<i>Libellula composita</i>			3	II	G3	S2S2				x
Insect	Burrow Small Dung Beetle	<i>Geomyphilus thomomysi</i>			5	II			x		x	
Insect	Byssus Skipper	<i>Problema byssus</i>			3	II	G4	S2S3				x
Insect	Columbine Duskywing	<i>Erynnis lucilius</i>			3, 4	II	G3	SNR				x
Insect	Delilah Underwing	<i>Catocala delilah</i>			3	II	G3	SNR				x
Insect	Dotted Skipper	<i>Hesperia attralus</i>			3,5	II	G3	S2S3			x	
Insect	Evening Primrose Leafcutter Bee	<i>Megachile anograe</i>			3	II	G3	SNR	x		x	
Insect	Fedor Digger Bee	<i>Anthophora fedorica</i>			3	I	G2	SNR				x
Insect	Frosted Elfin	<i>Callophrys irus</i>			3, 4	I	G2	SNR				
Insect	Ghost Tiger Beetle	<i>Ellipsoptera lepida</i>			3, 5	II	G3	S4	x		x	x
Insect	Globe Mallow Bee	<i>Diadasia diminuta</i>			5	II			x			
Insect	Gray Petaltail	<i>Tachopteryx thoreyi</i>		SINC	2	II	G4	S1				x
Insect	Great Plains Giant Tiger Beetle	<i>Amblycheila cylindriformis</i>			5	II		S5	x			
Insect	Hunt's Bumble Bee	<i>Bombus huntii</i>			5	II		SNR	x			
Insect	Interrupted Cuckoo Nomad Bee	<i>Epeolus interruptus</i>			4	II						x

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									Shortgrass Prairie	Central Mixed Grass Prairie	Eastern Tallgrass Prairie
Insect	Konza Prairie Mayfly	<i>Leptophlebia konza</i>			3,5	I	G1	S1?			x
Insect	Lichen Grasshopper	<i>Trimerotropis saxatilis</i>			3	II		SNR			x
Insect	Linda's Roadside Skipper	<i>Amblyscirtes linda</i>			3,5	I	G2	S1?			x
Insect	Low-ridged Pygmy Grasshopper	<i>Nomotettix parvus</i>			3	II	G3	SNR			x
Insect	Maculated Flower Chafer	<i>Gnorimella maculosa</i>			5	II					x
Insect	Maritime Sunflower Borer Moth	<i>Papaipema maritima</i>			3	II	G3	SNR		x	x
Insect	Married Underwing	<i>Catocala nuptialis</i>			3	II	G3	SNR			x
Insect	Monarch	<i>Danaus plexippus</i>	C		4	II	G4	S5B	x	x	x
Insect	Morrison's Bumble Bee	<i>Bombus morrisoni</i>			3	II	G3	SNR	x	x	x
Insect	Mottled Duskywing	<i>Erynnis martialis</i>			3	II	G3	S2		x	x
Insect	Nevada Bumble Bee	<i>Bombus nevadensis</i>			5	II	G4	SNR	x		
Insect	Occidental Digger Bee	<i>Anthophora occidentalis</i>			3	II	G3	SNR		x	x
Insect	Old World Swallowtail	<i>Papilio machaon</i>			5	II	G5	SNR	x		
Insect	Orange-bellied Sweat Bee	<i>Agopostemon melliventris</i>			5	II	G5	SNR	x	x	
Insect	Ottoe Skipper	<i>Hesperia ottoe</i>			3	II	G3	S2S3			x
Insect	Ouachita Stripetail	<i>Isoperla ouachita</i>			3,5	II	G3				x
Insect	Ozark Emerald	<i>Somatochlora ozarkensis</i>		SINC	2,3,5	II	G3	S1			x
Insect	Ozark Springfly	<i>Helopicus nalatus</i>			3	II	G3	SNR			x
Insect	Pahaska Skipper	<i>Hesperia pahaska</i>			5	II	G5	SNR		x	
Insect	Paricular Small Dung Beetle	<i>Scabrostonus peculiosis</i>			5	II				x	
Insect	Pocket Gopher Flower Beetle	<i>Euphoria discicollis</i>			5	II			x		
Insect	Prairie Mole Cricket	<i>Gryllotalpa major</i>		SINC	2,3,5	II	G3	S3			x
Insect	Punctured Small Dung Beetle	<i>Cryptoscatomaseter punctissimus</i>			5	II			x	x	
Insect	Red Satyr	<i>Megisto rubricata</i>			5	II	G5	S2		x	
Insect	Red-belted Bumble Bee	<i>Bombus rufocinctus</i>			5	II	G5	SNR	x		
Insect	Regal Fritillary	<i>Speyeria idalia</i>			3	II	G3	S4	x	x	x
Insect	Robust Sunflower Leafcutter Bee	<i>Megachile fortis</i>			3	I	G2	SNR		x	x
Insect	Rock Island Springfly	<i>Isogenoides varians</i>			3	II	G3	SNR			x
Insect	Sage Sphinx	<i>Lintneria eremitoides</i>			3,5	I	G2	SNR	x		x
Insect	Scott Riffle Beetle	<i>Optioservus phaeus</i>		E	2,3,5	I	G1	S1	x		
Insect	Soapberry Hairstreak	<i>Phaeostrymon alcestis</i>			5	II	G5	S3		x	
Insect	Southern Chimney Bee	<i>Diadasia australis</i>			5	II			x		
Insect	Southern Plains Bumble Bee	<i>Bombus fraternus</i>			3,4	II	G3	SNR	x	x	x
Insect	Splendid Sweat Bee	<i>Agopostemon splendens</i>			5	II	G5	SNR	x	x	
Insect	Susan's Plasterer Bee	<i>Colletes susannae</i>			4	II				x	

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									Shortgrass Prairie	Central MixedGrass Prairie	Eastern Tallgrass Prairie
Insect	The Unexpected Milkweed Moth	<i>Cycnia inopinatus</i>			5	II				x	x
Insect	Two-spotted Skipper	<i>Euphyes bimacula</i>			4	II	G4	S1?	x	x	x
Insect	Variable Cuckoo Bumble Bee	<i>Bombus variabilis</i>			3, 4	I	G1	SNR		x	x
Insect	Wallace's Deepwater Mayfly	<i>Spinadis simplex</i>			3	II	G3	SNR			x
Insect	White-cloaked Tiger Beetle	<i>Eunota togata latilabris</i>			5	II	G5	S5		x	
Insect	Whiteish Sweat Bee	<i>Agopostemon sericeus</i>			5	II	G5	SNR		x	x
Insect	Whiting's Flat-headed Mayfly	<i>Heptagenia whitingi</i>			3	I	G2	SNR			x
Insect	Whitney's Underwing	<i>Catocala whitneyi</i>			3	II	G3	SNR		x	
Insect	Wiest's Sphinx Moth	<i>Euproserpinus wiesti</i>			3	II	G3	SNR			
Insect	Yellow Bumble Bee	<i>Bombus fervidus</i>			3	II	G3	SNR	x	x	x
Isopod	A cave obligate isopod	<i>Caecidotea metcalfi</i>			3,5	I	G1	SNR			x
Isopod	A cave obligate isopod	<i>Caecidotea tridentata</i>			3,5	I	G1	SNR			x
Isopod	Spring Plain Groundwater Isopod	<i>Caecidotea simulator</i>			3,5	I	G2	SNR			x
Isopod	Steeve's Cave Isopod	<i>Caecidotea steevesi</i>			3	II	G3	SNR			x
Mammals	Black-footed Ferret	<i>Mustela nigripes</i>	E	E	1,2,3	I	G1	S1	x	x	
Mammals	Black-tailed Prairie Dog	<i>Cynomys ludovicianus</i>			4	II	G4	S3	x	x	
Mammals	Cougar	<i>Puma concolor</i>			4	II	G5		x	x	x
Mammals	Eastern Spotted Skunk	<i>Spilogale putorius</i>		T	2	I	G4	S1	x	x	x
Mammals	Franklin's Ground Squirrel	<i>Poliocitellus franklinii</i>		SINC	2	II	G5	S2		x	x
Mammals	Fulvous Harvest Mouse	<i>Reithrodontomys fulvescens</i>			4	II	G5	S3			x
Mammals	Gray Fox	<i>Urocyon cinereoargenteus</i>			4	II	G5	S3			x
Mammals	Gray Myotis	<i>Myotis grisescens</i>	E	E	1,2,3	I	G4	S1B			x
Mammals	Little Brown Myotis	<i>Myotis lucifugus</i>			4	II	G3	S3			x
Mammals	Northern Long-eared Bat	<i>Myotis septentrionalis</i>	T	SINC	2,3	I	G1	S3		x	x
Mammals	Pallid Bat	<i>Antrozous pallidus</i>		SINC	2	II	G4	S1		x	
Mammals	Southern Bog Lemming	<i>Synaptomys cooperi</i>		SINC	2	II	G5	S4	x	x	x
Mammals	Southern Flying Squirrel	<i>Glaucomys volans</i>		SINC	2	II	G5	S3			x
Mammals	Spotted Ground Squirrel	<i>Xerospermophilus spilosoma</i>			4	II	G5	S3	x		
Mammals	Swamp Rabbit	<i>Sylvilagus aquaticus</i>			4	II	G5	SH			x
Mammals	Swift Fox	<i>Vulpes velox</i>			3	II	G3	S3	x	x	
Mammals	Texas Deermouse	<i>Peromyscus attwateri</i>		SINC	2,5	II	G5	S2			x
Mammals	Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>		SINC	2,3	II	G3	S2		x	
Mammals	Tricolored Bat	<i>Perimyotis subflavus</i>			3	I	G2	S4		x	x
Mammals	Western Small-footed Myotis	<i>Myotis ciliolabrum</i>			4	II	G5	S2S3B	x		
Mammals	Yellow-faced Pocket Gopher	<i>Cratogeomys castanops</i>			4,5	II	G5	S3	x		

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									Shortgrass Prairie	Central Mixed Grass Prairie	Eastern Tallgrass Prairie
Mussels	Bleufer	<i>Potamilus purpuratus</i>			4	II	G5	S3			x
Mussels	Butterfly	<i>Ellipsaria lineolata</i>		T	2	I	G4	S1			x
Mussels	Creeper	<i>Strophitus undulatus</i>		SINC	2,4	II	G5	S2			x
Mussels	Cylindrical Papershell	<i>Anodontoides ferussacianus</i>		E	2	I	G5	S1?	x	x	
Mussels	Deertoe	<i>Truncilla truncata</i>		SINC	2	II	G5	S1S2			x
Mussels	Elktoe	<i>Alasmidonta marginata</i>		E	2	I	G4	S1			x
Mussels	Ellipse	<i>Venustaconcha ellipsiformis</i>		E	2	I	G4	S1			x
Mussels	Fatmucket	<i>Lampsilis siliquoidea</i>		SINC	2	II	G5	S1S2			x
Mussels	Fawnsfoot	<i>Truncilla donaciformis</i>		SINC	2	II	G5	S2		x	x
Mussels	Flat Floater	<i>Utterbackiana suborbiculata</i>		E	2	I	G5	S1			x
Mussels	Flutedshell	<i>Lasmigona costata</i>		T	2	I	G5	S1		x	x
Mussels	Lilliput	<i>Toxoplasma parvum</i>			4	II	G5	S2S3			x
Mussels	Mucket	<i>Actinonaias ligamentina</i>		E	2,4	I	G5	S1			x
Mussels	Neosho Mucket	<i>Lampsilis rafinesqueana</i>	E	E	1,2,3,4,5	I	G1	S1			x
Mussels	Ouachita Kidneyshell	<i>Ptychobranthus occidentalis</i>		T	2,3,4,5	I	G3	S1			x
Mussels	Pink Heelsplitter	<i>Potamilus alatus</i>			4	II	G5	S2S3			x
Mussels	Plain Pocketbook	<i>Lampsilis cardium</i>			4	II	G5	S3			x
Mussels	Pondhorn	<i>Unio merus tetralasmus</i>			4	II	G5	S3S4	x	x	
Mussels	Purple Wartyback	<i>Cyclonaias tuberculata</i>			4	II	G5	S1			x
Mussels	Rabbitsfoot	<i>Theliderma cylindrica</i>	T	E	1,2,3,4	I	G3	S1			x
Mussels	Rock-Pocketbook	<i>Arcidens confragosus</i>		T	2	I	G4	S1			x
Mussels	Round Pigtoe	<i>Pleurobema sintoxia</i>		SINC	2	II	G4	S2			x
Mussels	Snuffbox	<i>Epioblasma triquetra</i>	E	SINC	1,2,3,4	I	G3	SX			x
Mussels	Spike	<i>Eurynia dilatata</i>		SINC	2	II	G5	S2S3			x
Mussels	Spectaclecase	<i>Cumberlandia monodonta</i>	E		1	I	G3	SX			
Mussels	Wabash Pigtoe	<i>Fusconaia flava</i>			2	II	G5	S3		x	x
Mussels	Wartyback	<i>Quadrula nodulata</i>		SINC	2	II	G4	S2			x
Mussels	Washboard	<i>Megalonaias nervosa</i>		SINC	2	II	G5	S2			x
Mussels	Western Fanshell	<i>Cyprogenia aberti</i>	C	E	1,2,3,4	I	G2	S1			x
Mussels	Yellow Sandshell	<i>Lampsilis teres</i>		SINC	2	II	G5	S2S3		x	x
Planarians	Kansas Planarian	<i>Sphalloplana kansensis</i>			3,5	I	G1	S1S2			x
Plants	American Ginseng	<i>Panax quinquefolius</i>			3	II	G3	S1			x
Plants	Buffalo Clover	<i>Trifolium reflexum</i>			3	II	G3	S2			x
Plants	Bush's Poppy-mallow	<i>Callirhoe bushii</i>			3,5	II	G3	S1			x
Plants	Deceptive Leatherwood	<i>Dirca decipiens</i>			3	I	G1	S1			x

Appendix 2
Species of Greatest Conservation Need

Group	Common Name	Scientific Name	Federal Status	State Status	Selection Criteria	Tier	G Rank (Rounded)	S Rank	Conservation Region		
									Shortgrass Prairie	Central MixedGrass Prairie	Eastern Tallgrass Prairie
Plants	Delta Bulrush	<i>Schoenoplectus deltarum</i>			3	II	G3	S1			x
Plants	Earleaf False Foxglove	<i>Agalinis auriculata</i>			3	II	G3	S2			x
Plants	Engelmann's Goldenweed	<i>Oenopsis engelmannii</i>			3	II	G3	S1	x	x	
Plants	Goldenseal	<i>Hydrastis canadensis</i>			3	II	G3	S1			x
Plants	Great Plains Ladies'-tresses	<i>Spiranthes magnicamporum</i>			3	II	G3	S2		x	x
Plants	Hall's Bulrush	<i>Schoenoplectiella hallii</i>			3	II	G3	S1	x		
Plants	Hancin's Dewberry	<i>Rubus hancinianus</i>			3,5	II	G3	S2		x	x
Plants	Howard's Evening-primrose	<i>Oenothera howardii</i>			3	II	G3	S1	x		
Plants	Kansas Arrowhead	<i>Sagittaria ambigua</i>			3	I	G2	S2		x	x
Plants	Mead's Milkweed	<i>Asclepias meadii</i>	T		1,3	I	G2	S2			x
Plants	Missouri Mud-plantain	<i>Heteranthera missouriensis</i>			3	II	G3	S2		x	x
Plants	Narrowleaf Morning-glory	<i>Ipomoea shumardiana</i>			3,5	I	G2	S1			x
Plants	Oklahoma Grass-pink	<i>Calopogon oklahomensis</i>			3	I	G2	S1			x
Plants	Oklahoma Phlox	<i>Phlox oklahomensis</i>			3,5	II	G3	S2		x	x
Plants	Osage Plains False Foxglove	<i>Agalinis densiflora</i>			3,5	II	G3	S2			x
Plants	Pale False Foxglove	<i>Agalinis skinneriana</i>			3	II	G3	S1			x
Plants	Prairie Fameflower	<i>Talinum rugospermum</i>			3	II	G3	S2		x	
Plants	Royal Catchfly	<i>Silene regia</i>			3	II	G3	SH			x
Plants	Running Buffalo Clover	<i>Trifolium stoloniferum</i>	E		1,3	I	G3	SH			x
Plants	Sand-dune Broomspurge	<i>Chamaesyce carunculate</i>			3,5	II	G3	S1		x	
Plants	Sandhill Goosefoot	<i>Chenopodium cycloides</i>			3,5	II	G3	S2	x		
Plants	Sandsage Prairie-clover	<i>Delea cylindriceps</i>			3,5	II	G3	S2	x		
Plants	Smooth Goosefoot	<i>Chenopodium subglabrum</i>			3	II	G3	SH	x	x	
Plants	Taper-tip Dodder	<i>Cuscuta attenuate</i>			3,5	I	G2	SH			x
Plants	Texas Fescue	<i>Festuca versuta</i>			3,5	II	G3	S1			x
Plants	Topeka Purple-coneflower	<i>Echinacea atrorubens</i>			3,5	II	G3	SNR			x
Plants	Western Prairie White-fringed Orchid	<i>Platanthera praeclara</i>	T		1,3	I	G3	S1			x
Reptiles	Broad-headed Skink	<i>Plestiodon laticeps</i>		T	2	I	G5	S2			x
Reptiles	Checked Garter-snake	<i>Thamnophis marcianus</i>		T	2,5	I	G5	S2	x	x	
Reptiles	Chihuahuan Night-snake	<i>Hypsiglena jani</i>		SINC	2,5	II	G5	S2		x	
Reptiles	Coal Skink	<i>Plestiodon anthracinus</i>			4	II	G5	S3			x
Reptiles	Eastern Hog-nosed Snake	<i>Heterodon platirhinos</i>		SINC	2	II	G5	S4	x	x	x
Reptiles	Glossy Snake	<i>Arizona elegans</i>		SINC	2	II	G5	S4	x	x	
Reptiles	Ground-snake	<i>Sonora semiannulata</i>			4	II	G5	S3	x	x	
Reptiles	Lesser Earless Lizard	<i>Holbrookia maculata</i>			4	II	G5	S3	x	x	

Appendix 2
Species of Greatest Conservation Need

Group	Common Name	Scientific Name	Federal Status	State Status	Selection Criteria	Tier	G Rank (Rounded)	S Rank	Conservation Region		
									Shortgrass Prairie	Central MixedGrass Prairie	Eastern Tallgrass Prairie
Reptiles	Long-nosed Snake	<i>Rhinocheilus lecontei</i>		SINC	2	II	G5	S3	x	x	
Reptiles	Western Massasauga	<i>Sistrurus tergeminus</i>			3,4	II	G3	S3S4	x	x	x
Reptiles	New Mexico Threadsnake	<i>Rena dissecta</i>		T	2,5	I	G4	S3	x	x	
Reptiles	Plains Hog-nosed Snake	<i>Heterodon nasicus</i>		SINC	2	II	G5	S5	x	x	x
Reptiles	Prairie Rattlesnake	<i>Crotalus viridis</i>			4	II	G5	S5	x	x	
Reptiles	Red-bellied Snake	<i>Storeria occipitomaculata</i>		SINC	2	II	G5	S2			x
Reptiles	Rough Earthsnake	<i>Haldea striatula</i>		SINC	2	II	G5	S2			x
Reptiles	Smooth Earthsnake	<i>Virginia valeriae</i>		SINC	2	II	G5	S3			x
Reptiles	Smooth Greensnake	<i>Opheodrys vernalis</i>			4	II	G5	S1		x	x
Reptiles	Texas Horned Lizard	<i>Phrynosoma cornutum</i>			4	II	G4	S4	x	x	x
Reptiles	Timber Rattlesnake	<i>Crotalus horridus</i>			2	II	G4	S3			x
Turtles	Alligator Snapping Turtle	<i>Macrochelys temminckii</i>		SINC	2,3	II	G3	-		x	x
Turtles	Northern Map Turtle	<i>Graptemys geographica</i>		T	2	I	G5	S2			x
Turtles	Smooth Softshell	<i>Apalone mutica</i>			4	II	G5	S4	x	x	x

Appendix 3
Definitions of Natural Heritage conservation status ranks

Global Ranks (GRANK)

GRANKs are numeric ranks (G1 through G5) indicating the conservation status or relative endangerment globally of species or ecological communities. Primary factors used in determining rank for species are population size, number of occurrences, viability of occurrences, population trend, and threats. Secondary factors are geographic distribution, environmental specificity, protection and management, and intrinsic vulnerability.

G1 = Critically imperiled – At very high risk of extinction or elimination due to very restricted range, very few populations or occurrence, very steep declines, very severe threats, or other factors.

G2 = Imperiled – At high risk of extinctions or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.

G3 = Vulnerable – At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.

G4 = Apparently Secure – At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats or other factors.

G5 = Secure – At very low risk of extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.

GU = Unrankable – Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

GNR = Unranked – Global rank not yet assessed.

State Ranks (SRANKS)

SRANKs are numeric ranks (S1 through S5) indicating the conservation status or relative endangerment within the state of species or ecological communities. Primary factors used in determining rank for species are population size, number of occurrences, viability of occurrences, population trend, and threats. Secondary factors are geographic distribution, environmental specificity, protection and management, and intrinsic vulnerability.

S1 = Critically imperiled – At very high risk of extirpation in the state due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors. Typically 5 or fewer occurrences or very few remaining individuals in the state.

S2 = Imperiled – At high risk of extirpation in the state due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors. Typically 6-20 occurrences or few remaining individuals in the state.

Appendix 3
Definitions of Natural Heritage conservation status ranks

S3 = Vulnerable – At moderate risk of extirpation in the state due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors. Typically 21 to 80 occurrences in the state.

S4 = Apparently Secure – At a fairly low risk of extirpation in the state due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors. Typically 81 to 300 occurrences in the state.

S5 = Secure – At very low or no risk of extirpation in the state due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats. More than 300 occurrences in the state.

S#S# = Range Rank – A numeric range rank (e.g. S2S3 or S1S3) is used to indicate any range of uncertainty about the status of the species.

SU = Unrankable – Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

SNR = Unranked – Subnational conservation status not yet assessed.

SNA = Not Applicable – A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

SX = Presumed Extirpated – Species or ecosystem is believed to be extirpated from the state.

SH = Historical – Species possibly extirpated from the state. Known from only historical records but still some hope of rediscovery.

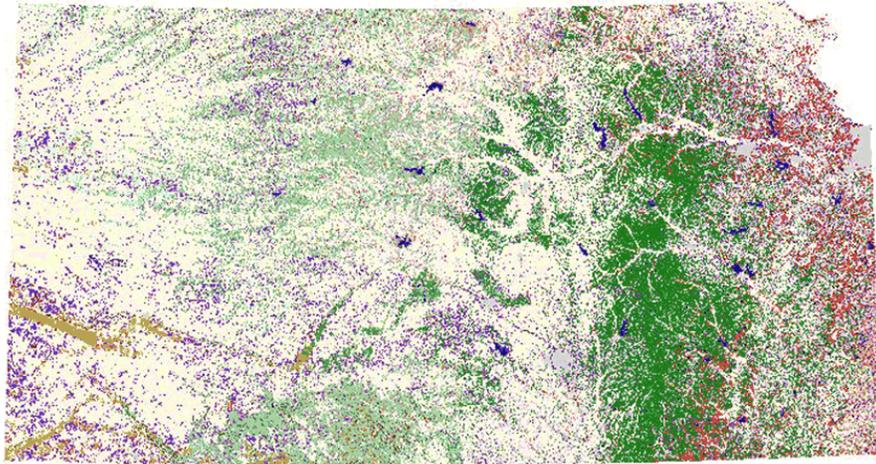
B = Breeding – Conservation status refers to the breeding population of the species in state.

N = Non-breeding – Conservation status refers to the non-breeding population of the species in the state.

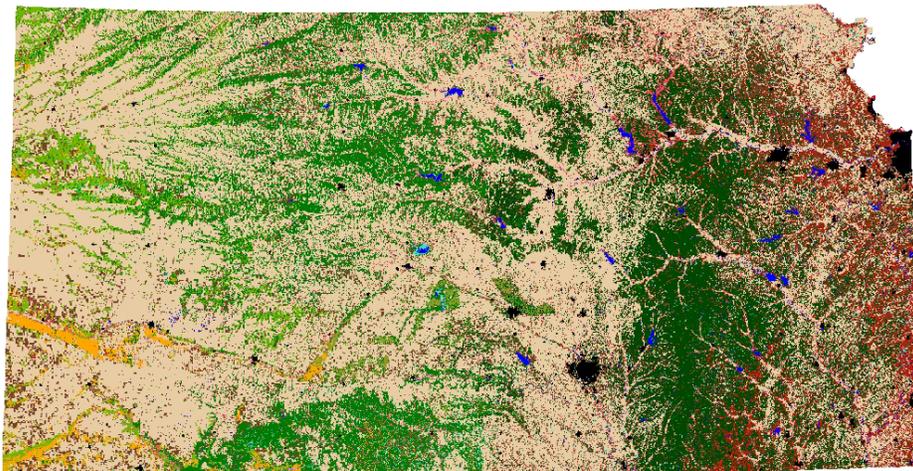
M = Migrant – Migrant species occurring regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention. Conservation status refers to the aggregating transient populations of the species in the state.

Appendix 4 Habitats and Descriptions

The original land cover categories of the Kansas Landcover Map from the Kansas GAP Analysis Project provided by the Kansas Applied Remote Sensing Program. 2002. Kansas Biological Survey, University of Kansas, Lawrence.



The collapsed broader categories of habitat types used for the Kansas Wildlife Action Plan.



Appendix 4
Habitats and Descriptions

Habitat Descriptions

The Kansas Wildlife Action Plan habitats are described below. These habitats are based on the land cover types in the Final Report of the Kansas GAP Analysis Project. Further information can be found in Appendix 2.2 of the GAP Final Report.

Deciduous Forest	The Deciduous Forest habitat is made up of the Maple – Basswood Forest, Oak- Hickory Forest, Deciduous Forest-Mined Land, Mixed Oak Ravine, Oak Savanna and Deciduous Woodland habitats. Together, they comprise two percent of Kansas’ lands.
Bur Oak Woodland	The Bur Oak Woodland habitat is dominated by Bur Oak, Big Bluestem and Porcupine Needlegrass, mostly in small or linear patches, located in floodplains or adjacent to rivers and streams, in the Shortgrass and Central Mixed-grass Prairie Regions.
Deciduous Floodplain	The Deciduous Floodplain habitat is comprised of Pecan Floodplain Forest, Mixed Oak Floodplain Forest, Ash-Elm-Hackberry Floodplain Forest, Cottonwood Floodplain Forest, Maple Floodplain Forest, and the Cottonwood Floodplain Woodlands. These are temporarily flooded habitats. They comprise four percent of Kansas’ lands.
Evergreen (cedar)	The Evergreen (cedar) habitat is Kansas GAP Forest Alliance habitat of Evergreen Forest – Disturbed Land. It consists of abandoned or neglected cropland upland sites in eastern and central KS that have been invaded by Eastern red cedar (<i>Juniperus virginiana</i>).
Sandsage Shrubland	Sand Sage, <i>Artemisia filifolia</i> is a primary species of the Sandsage Shrubland habitat. It comprises one percent of Kansas’ lands.
Riparian Shrubland	The Riparian Shrubland habitat is a combination of Willow Shrubland (temporarily flooded), the (invasive) Salt Cedar or Tamarisk Shrubland of western KS, and Buttonbush Swamp (semi-permanently flooded).
Tallgrass Prairie	The Tallgrass Prairie habitat is comprised of the Tallgrass Prairie and Sandstone Glade/Prairie habitats located primarily in eastern Kansas. They comprise 13 percent of Kansas’ lands.
Sand Prairie	The Sand Prairie habitat is located primarily in the central portion of Kansas. Sand Bluestem, <i>Andropogon hallii</i> , is a primary species.
Mixed Prairie	The Mixed Prairie habitat is a combination of the Western Wheatgrass Prairie, Mixed Prairie and the Mixed Prairie – Disturbed. Located primarily in the Smoky Hill and High Plains regions of Kansas, this habitat type comprises 12 percent of Kansas’ lands.
Shortgrass Prairie	The Shortgrass Prairie habitat is made up of the Shortgrass Prairie and Alkali Sacaton Prairie. Located in the High Plains region of Kansas, they comprise three percent of Kansas’ lands.

Appendix 4
Habitats and Descriptions

CRP Native Upland	The CRP Native Upland habitat is the former cultivated areas re-seeded with (usually) native tall and mid-tall grasses. The dominant plants are: <i>Andropogon gerardii</i> , <i>Schizachyrium scoparium</i> , <i>Sorghastrum nutans</i> , and <i>Panicum virgatum</i> . This habitat is found statewide, but is primarily in southwestern Kansas.
CRP Introduced Grass	The CRP/Introduced Grass habitat is made up of the Non-Native Grassland and CRP (Conservation Reserve Program). This habitat type covers 10 percent of Kansas' lands.
Herbaceous Wetland	The Herbaceous Wetland habitat is comprised of the KS-GAP Wetland Alliances of Grass Playa Lake, Salt Marsh/Prairie, Spikerush Playa Lake, Playa Lake, Low or Wet Prairie, Freshwater marsh, Cattail Marsh, Forb Playa Lake, Cordgrass and Weedy Marsh.
Cropland	The Cropland habitat includes all lands in active agricultural production, including row crops and hay. Cropland covers 48 percent of Kansas' lands.
Urban Areas	The Urban Areas habitat includes city, town and subdivisions. It also includes man-made features, such as road cuts, abandoned structures, bridges, storm sewers, mining operations, oil fields, farm buildings, strip pits, landfills, airports, and railroad and road Right of Ways. They comprise one percent of Kansas' lands.
Cave	Subterranean caverns, including Karst formations in Lower Permian limestone, located primarily in the southern part of Kansas, and gypsum caves in the Flint Hills.
Aquatic-Western Lotic (flowing waters)	Rivers, streams, and their tributaries in the Arkansas, Smoky Hill, Saline, Solomon and Republican River Basins in Western Kansas.
Aquatic-Western Lentic (still waters)	Ponds, lakes, oxbows, and reservoirs in the Arkansas, Smoky Hill, Saline, Solomon and Republican River Basins in western Kansas.
Aquatic-Eastern Streams/Small Rivers	Small rivers, streams, and their tributaries in the Neosho, Missouri, Verdigris, Eastern Walnut, Kansas, and Marais des Cygnes River Basins in eastern Kansas.
Aquatic-Eastern Lentic (still waters)	Ponds, lakes, oxbows, and reservoirs in the Missouri, Neosho, Verdigris, eastern Walnut, Kansas, and Marais des Cygnes River Basins in eastern Kansas.
Aquatic-Eastern Large Rivers	Large rivers such as the Missouri, Arkansas and Kansas Rivers.
Seeps and Springs	Sources of water that come from the ground. Seeps usually ooze slowly from between rock strata. They are found throughout Kansas.

Appendix 5
NatureServe Climate Change Vulnerability Index - 2015
Assessment Results for the Species of Greatest Conservation Need

Vulnerability to climate change has three principle components; sensitivity (innate characteristics of a species or system, considers tolerance to changes temp, precip, fire etc), exposure (extrinsic factors, magnitude and rate of change species/system experiences), and adaptive capacity (ability to accommodate with climate change impacts with minimal disruption).

Climate change vulnerability assessments provide two essential contributions to adaptation planning. Specifically, they help in: identifying *which* species or systems are likely to be more strongly affected by projected changes; and understanding *why* these resources are likely to be vulnerable, including the interaction between climate shifts and existing stressors. Determining which resources are most vulnerable enable managers to better set priority for conservation action, while understanding why they are vulnerable provides a basis for developing appropriate management and conservation responses. Climate change vulnerability assessments are intended to support decision-making. Possible adaptation approaches exists ranging from 1) building resistance to climate-related stressors 2) enhancing resilience in order to better change for accommodating change, and 3) anticipating and facilitating ecological transitions that reflect the changing environmental conditions.

NatureServe Climate Change Vulnerability Index (CCVI)

An assessment of the relative vulnerability, and the relative importance of factors contributing to that vulnerability was conducted for a number of the Species of Greatest Conservation Need (SGCN) using the NatureServe Climate Change Vulnerability Index (CCVI). This Microsoft Excel-based tool was chosen for this vulnerability assessment because it is time efficient, cost effective, easy to use, and the results are presented in a way that allows grouping of taxa or sensitivity factors. The Index uses a scoring system that integrates a species' predicted exposure to climate change within an assessment area and three sets of factors associated with climate change sensitivity, each supported by published studies: 1) indirect exposure to climate change, 2) species-specific factors (including dispersal ability, temperature and precipitation sensitivity, physical habitat specificity, interspecific interactions and genetic factors), and 3) documented response to climate change. The tool weighs each sensitivity score depending on the magnitude of projected climate change and calculates a final vulnerability index score (i.e., Extremely Vulnerable, Highly Vulnerable, Moderately Vulnerable, Not Vulnerable/Presumed Stable, or Not Vulnerable/Increase Likely), and a measure of confidence of the score (Very High, High, Moderate, Low). This confidence relates specifically to the level of uncertainty indicated by the assessor based on the range of values given for each factor.

The CCVI does not include factors that are already considered in existing conservation status assessments. Factors such as population size, range size, and demographic factors influence both conservation status and vulnerability to climate change. To avoid duplicating these factors, the NatureServe CCVI does not consider them. Conservation status ranks should therefore be used in concert with the Index output to aid in the interpretation of the results.

Complex interactions such as shifts in competitive, predator-prey, or host-parasite interaction are likely to be important as well, but they are not included in this rapid assessment because of the difficulty and unpredictability inherent in the simultaneous evaluation of climate change on interacting species.

Appendix 5
NatureServe Climate Change Vulnerability Index - 2015
Assessment Results for the Species of Greatest Conservation Need

Applying the CCVI to SGCN

Assessments were completed for at least 30% of species in each taxonomic group, choosing species with a variation in geographic location and habitat uses. A total of 83 of the SWAP second edition 285 SGCN were assessed using the CCVI. A detailed table of CCVI results, including the scores for each factor, the overall vulnerability score, and confidence for each species, is included in Table 2.

Species' range maps and natural history information were obtained from a number of sources including the Catalogue of American Amphibians and Reptiles (SSAR), Kansas Herpetofaunal Atlas, Kansas Mammal Atlas, KDWP Stream Survey and Assessment Database, Kansas Fishes (Kansas Fishes Committee 2014), FishMap.org, NatureServe Explorer, USGS GAP Species Maps, published articles and expert input.

Of the SGCN analyzed, many of the species that received a vulnerable index score (extreme, highly or moderately) were fish and mussels (Table 1.). The most common factors that influenced those fish species' vulnerability to climate change were; the distribution relative to barriers (anthropogenic and natural), impact of land use changes resulting from climate change mitigation, physiological hydrological niche, dependence on specific disturbance regime, and restriction to uncommon geological features. The vulnerable mussel species were influenced by the same factors as the fish, but their vulnerability to climate change was also influenced by their dependence on other species for propagule dispersal. In general species most vulnerable to climate change are typically considered specialist. They are dependent on certain habitats, climate conditions, and interactions with other species. A species mobility or ability to disperse also can greatly influence its vulnerability to climate change.

Climate Change Adaptation Strategies

Since it is difficult to make detailed recommendations given the uncertainties of; magnitude, rate, and nature of future climate change, uncertainties about how climate change will interact with other species/ecosystem stressors and the limited understanding of how species and ecosystems will respond to changes, the initial adaptation strategies listed here are fairly broad. As climate predictions become more developed and knowledge of species' responses to climate change increase, more detailed strategies can be developed.

(from the NFWP Climate Adaptation Strategy 2012)

1. Conserve habitat to support healthy fish, wildlife, and plant populations and ecosystem functions in a changing climate.
2. Manage species and habitats to protect ecosystem functions and provide sustainable cultural, subsistence, recreational, and commercial use in a changing climate.
3. Enhance capacity for effective management in a changing climate.
4. Support adaptive management in a changing climate through integrated observation and monitoring and use of decision support tools

Appendix 5
 NatureServe Climate Change Vulnerability Index - 2015
 Assessment Results for the Species of Greatest Conservation Need

5. Increase knowledge and information on impacts and responses of fish, wildlife, and plants to a changing climate
6. Increase awareness and motivate action to safeguard fish, wildlife, and plants in a changing climate.
7. Reduce non-climate stressors to help fish, wildlife, plants and ecosystems adapt to a changing climate.

Table 1. Species of Greatest Conservation Need with a vulnerable (extreme, highly or moderately) NatureServe Climate Change Vulnerability Index score.

TAXA	COMMON NAME	SCIENTIFIC NAME
Extremely Vulnerable		
Fish	Hornyhead Chub	<i>Nocomis biguttatus</i>
Invert-Insect	Scott Riffle Beetle	<i>Optioservus phaeus</i>
Invert-Mollusk	Sharp Hornsnail	<i>Pleurocera acuta</i>
Invert-Other	Butterfly	<i>Ellipsaria lineolata</i>
Invert-Other	Cylindrical Papershell	<i>Anodontoides ferussacianus</i>
Invert-Other	Flat Floater	<i>Utterbackiana suborbiculata</i>
Invert-Other	Lilliput	<i>Toxolasma parvus</i>
Invert-Other	Mucket	<i>Actinonaias ligamentina</i>
Invert-Other	Neosho Mucket	<i>Lampsilis rafinesqueana</i>
Invert-Other	Pink Heelsplitter	<i>Potamilus alatus</i>
Invert-Other	Washboard	<i>Megalonaias nervosa</i>
Invert-Other	Western Fanshell	<i>Cyprogenia aberti</i>
Invert-Other	Yellow Sandshell	<i>Lampsilis teres</i>
Highly Vulnerable		
Bird	Bobolink	<i>Dolichonyx oryzivorus</i>
Fish	Brindled Madtom	<i>Noturus miurus</i>
Fish	Silver Chub	<i>Macrhybopsis storeriana</i>
Fish	Southern Redbelly Dace	<i>Chrosomus erythrogaster</i>
Fish	Topeka Shiner	<i>Notropis topeka</i>
Fish	Blue Sucker	<i>Cycleptus elongatus</i>
Fish	Common Shiner	<i>Luxilus cornutus</i>
Fish	Neosho Madtom	<i>Noturus placidus</i>
Invert-Mollusk	Delta Hydrobe	<i>Probythinella emarginata</i>
Invert-Mollusk	Slender Walker	<i>Potatiopsis lapidaria</i>
Mammal	Southern Flying Squirrel	<i>Glaugomys volans</i>
Moderately Vulnerable		
Bird	American Avocet	<i>Recurvirostra americana</i>
Fish	Northern Hog Sucker	<i>Hypentelium nigricans</i>
Fish	Paddlefish	<i>Polyodon spathula</i>
Fish	Redfin Darter	<i>Etheostoma whipplei</i>

Appendix 5
 NatureServe Climate Change Vulnerability Index - 2015
 Assessment Results for the Species of Greatest Conservation Need

Fish	Shovelnose Sturgeon	<i>Scaphirhynchus platyrhynchus</i>
Fish	Brassy Minnow	<i>Hybognathus hankinsoni</i>
Fish	Plains Minnow	<i>Hybognathus placitus</i>
Fish	Spotted Gar	<i>Lepisosteus oculatus</i>
Fish	Spotted Sucker	<i>Minytrema melanops</i>
Fish	Orangethroat Darter	<i>Ethoestoma spectabile</i>
Fish	Stonecat	<i>Noturus flavus</i>
Invert-Insect	American Burying Beetle	<i>Nicrophorus americanus</i>
Invert-Insect	Arogos Skipper	<i>Atrytone arogos</i>
Invert-Insect	Gray Petaltail	<i>Tachopteryx thoreyi</i>
Mammal	Yellowfaced Pocket Gopher	<i>Cratogeomys castanops</i>

The following articles are good sources of additional information on potential impacts of climate change on species and ecosystems, and possible conservation strategies.

- AFWA (Association of Fish and Wildlife Agencies). 2009. Voluntary guidance for state to incorporate climate change into state wildlife action plans and other management plans. 42 pp.
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- Stein, B.A, P. Glick, N. Edelson, and A. Staudt. Eds. 2014. Climate smart conservation: putting adaptation principles into practice. National Wildlife Federation. Washington, D.C.

Appendix 5
NatureServe Climate Change Vulnerability Index
Assessment Results for the Species of Greatest Conservation Need

Table 2. The results of NatureServe Climate Change Vulnerability Index on the selection of Species of Greatest Conservation Need including the scores for each factor, the overall vulnerability score, and confidence for each species

Group	Species	English Name	GRank	SRank	Natl barriers	Anth barriers	CC mitigation	Dispersal/Movement	historical thermal niche	physiological thermal niche	historical hydrological niche	physiological hydrological niche	Disturbance	Ice/snow	Phys habitat	Other spp for hab	Diet	Pollinators	Other spp disp	Other spp interaction	Genetic var	Gen bottleneck	Phenol response	Doc response	Modeled change	Modeled overlap	Protected Areas	Index	Conf.
Amphibian	<i>Ambystoma tigrinum</i>	Tiger Salamander	G5	G5	N	N	SD	N	N	N	N	SI-N	N	N	SD	N	N	N/A	N	N	SI-N	N/A	U	N	U	U	U	PS	Mod
Amphibian	<i>Pseudacris streckeri</i>	Strecker's Chorus Frog	G5	S2	N	N	SD	N	N	N-SD	N	SI-N	N	N	N	N	N-SD	N/A	N	N	SI-N	N/A	N	N	U	U	U	IL	Low
Bird	<i>Centronyx henslowii</i>	Henslow's Sparrow	G4	S3B	N	N	Dec	N	SI	N	SI	SI-N	N	SD	N	N	N/A	N	N	N	N	N/A	U	U	SI-N	U	U	PS	VH
Bird	<i>Ammodramus savannarum</i>	Grasshopper Sparrow	G5	S5B	N	N	Dec	N	SI	SI-N	SI	N	N	SD	N	N	N/A	N	N	U	N	U	U	SI	U	U	PS	VH	
Bird	<i>Anas acuta</i>	Northern Pintail	G5	S1BS5N	N	N	Dec	N	N	SI-N	Inc	N	N	SD	N	N	N/A	N	N	SD	N/A	N	SI	U	U	U	IL	VH	
Bird	<i>Antrostomus vociferous</i>	Eastern Whip-poor-will	G5	S3B	N	N	Dec	N	N	N-SD	SI	N	N	SD	N	N	N/A	N	N	U	N	U	U	N	U	U	IL	VH	
Bird	<i>Athene cunicularia</i>	Burrowing Owl	G4	S3B	N	N	Dec	N	N	SI-N	SD	N	N	SD	SI	N	N/A	N	N	N	N	N/A	U	U	U	Inc	PS	VH	
Bird	<i>Bartramia longicauda</i>	Upland Sandpiper	G5	S4B	N	N	SI	Dec	N	SI	SI-N	U	U	SD	N	N	N/A	N	N	U	U	U	U	U	U	U	PS	VH	
Bird	<i>Botaurus lentiginosus</i>	American Bittern	G4	S1B	N	N	Dec	N	N	SI-N	Inc-SI	N	N	N	N	N	N/A	N	N	U	N	N	U	U	U	U	PS	VH	
Bird	<i>Buteo regalis</i>	Ferruginous Hawk	G4	S2BS4N	N	N	SI	Dec	N	SI	SI-N	SD	N	SI-N	N	SI	N/A	N	N	U	N	U	U	U	U	U	PS	VH	
Bird	<i>Calamospiza melanocorys</i>	Lark Bunting	G5	S5B	N	N	SI	Dec	N	SI	SI-N	N	N	SD	N	N	N/A	N	N	U	N	U	U	U	U	U	PS	VH	
Bird	<i>Calidris fuscicollis</i>	White-rumped Sandpiper	G5	S4N	N	N	Dec	N	N	SI-N	U	N	N	SD	N	N	N/A	N	N	U	U	U	U	U	U	U	IL	VH	
Bird	<i>Charadrius nivosus</i>	Snowy Plover	G3	S1B	N	N	Dec	N	N	N	SI-SD	SI-SD	N	SI-N	N	N	N/A	N	N	U	N	N	U	U	U	U	IL	Low	
Bird	<i>Dolichonyx oryzivorus</i>	Bobolink	G5	S1B	N	N	Dec	N	SI	SI-N	SI	N	N	SD	N	N	N/A	N	N	U	N	U	U	GI	GI	Inc	HV	VH	

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Bird	<i>Geothlypis formosa</i>	Kentucky Warbler	G5	S3B	N	N	N	Dec	N	N	N-SD	SI-N	N	N	SD	N	N	N/A	N	N	U	N	U	U	N	N	U	IL	VH
Bird	<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S2BS4N	N	N	N	Dec	N	SI-N	SI-N	SI	N	SI	SD	N	N	N/A	N	N	U	N	N	U	U	U	U	PS	VH
Bird	<i>Icterus galbula</i>	Baltimore Oriole	G5	S5B	N	N	N	Dec	N	SI	SI-N	N	N	N	Dec	N	N	N/A	N	N	U	N	U	U	U	U	U	IL	VH
Bird	<i>Laterallus jamaicensis</i>	Black Rail	G3	S1BS1N	N	N	N	Dec	N	N	N	GI	SI	N	SI-N	N	SD	N/A	N	N	U	U	N	U	U	U	U	PS	VH
Bird	<i>Limosa haemastica</i>	Hudsonian Godwit	G4	S3N	N	N	SI	Dec	N	N	N	Inc-SI	N	N	SI	N	N	N/A	N	N	U	N	N	U	U	U	U	PS	VH
Bird	<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	G5	S5B	N	N	N	Dec	N	N	SI-N	SI	N	N	SD	N	N	N/A	N	N	U	N	U	U	SI	U	U	IL	Low
Bird	<i>Numenius americanus</i>	Long-billed Curlew	G5	S1BS2N	N	N	SI-N	Dec	N-SD	N	SI	SI	N	N	SD	N	N	N/A	N	N	U	N	U	U	U	U	U	PS	Mod
Bird	<i>Passerina ciris</i>	Painted Bunting	G5	S4B	N	N	N	Dec	N	SD	N	N	N	N	SD	N	SD	N/A	N	N	U	N	U	U	SD-Dec	SI	U	IL	VH
Bird	<i>Recurvirostra americana</i>	American Avocet	G5	S2BS3N	N	N	N	Dec	N	N	SI-N	GI	SI-N	N	SI	N	N	N/A	N	N	U	N	N	U	U	U	U	MV	Mod
Bird	<i>Sternella magna</i>	Eastern Meadowlark	G5	S5	N	N	SI-N	Dec	N	N	N	SI	N	N	SD	N	SD	N/A	N	N	U	N	U	U	SI	N	U	IL	VH
Bird	<i>Sternula antillarum</i>	Least Tern	G4	S1B	N	N	N	Dec	N	SI-N	N	SI	SI	N	N	N	N	N/A	N	N	U	U	N	U	U	U	U	PS	VH
Bird	<i>Tympanuchus cupido</i>	Greater Prairie-chicken	G4	S4	N	N	Inc-SI	Dec	N-SD	N	N	SI-N	SI-N	N	SD	N	SD	N/A	N	N	N	N/A	N	U	N	N	U	IL	Mod
Bird	<i>Tyrannus forficatus</i>	Scissor-tailed Flycatcher	G5	S4B	N	N	N	Dec	N	SD	N	N	N	N	SD	N	N	N/A	N	N	U	N	U	U	N	N	Inc	PS	VH
Bird	<i>Tyrannus verticalis</i>	Western Kingbird	G5	S5B	N	N	N	Dec	N	SI-N	SI-N	SD	N	N	SD	N	N	N/A	N	N	N	N/A	U	U	U	U	U	IL	VH
Bird	<i>Vireo bellii</i>	Bell's Vireo	G5	S4B	N	N	N	Dec	N	N	SI-N	N	N	N	SD	N	N	N/A	N	N	U	N	U	U	SD	N	U	IL	VH
Bird	<i>Zonotrichia querula</i>	Harris's Sparrow	G5	S4N	N	N	N	Dec	N	SI	SI-N	SI-N	N	N	SD	N	N	N/A	N	N	U	N	U	U	U	U	U	PS	Mod
Fish	<i>Chrosomus erythrogaster</i>	Southern Redbelly Dace	G5	S2S3	GI-Inc	GI-Inc	SI-N	N	N	SI	N	SI-N-SD	SI-N	N	SI-N	SI-N	SD	N/A	N	N	U	N	N	N	U	U	U	HV	Mod
Fish	<i>Cycleptus elongatus</i>	Blue Sucker	G3	S3	GI-Inc	GI-Inc	SI-N	SD-Dec	N	N-SD	N	Inc-SI	SI-N	N	N	N	N	N/A	N	N	U	N	U	U	U	U	U	HV	Low
Fish	<i>Etheostoma cragini</i>	Arkansas Darter	G3	S2	Inc	Inc	SD	N-SD	N	SI	N	SI	N	N	N	N	N	N/A	N	N	U	U	N	SI	U	U	U	PS	VH
Fish	<i>Etheostoma whipplei</i>	Redfin Darter	G4	S3	Inc	Inc	SI-N	N-SD	N	N	N-SD	SI-N	SI-N	N	SI	N	N	N/A	N	N	U	N	U	N	U	U	U	MV	Mod
Fish	<i>Etheostoma spectabile</i>	Orangethroat Darter	G5	S5	SI	SI	N	N	N	N	N	SI	SI-N	N	N	N	N	N/A	N	U	N	N/A	N	N	U	U	U	MV	VH
Fish	<i>Fundulus kansae</i>	Northern Plains Killifish	G5	S3	SI	SI	SI	SD	N	N-SD	SI-N	N	SI	N	SD	N	N	N/A	N	N	U	N	N	SI	U	U	U	PS	Mod
Fish	<i>Hybognathus hankinsoni</i>	Brassy Minnow	G5	S1	Inc	Inc	N	N	N	N	SI-N	N	SI-N	N	SD	N	N	N/A	N	N	U	N	U	N	U	U	U	MV	VH
Fish	<i>Hybognathus placitus</i>	Plains Minnow	G4	S2S3	Inc	Inc	N-SD	SD-Dec	N	N	SI-N	Inc	Inc	N	SD	N	N	N/A	N	N	N	N/A	SD	U	U	U	U	MV	Low

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Fish	<i>Hypentelium nigricans</i>	Northern Hog Sucker	G5	S1	Inc	Inc	SI-N	SD	N	N	N-SD	SI-N	SI-N	N	SI	N	N	N/A	N	N	U	N	U	N	U	U	U	MV	Mod
Fish	<i>Lepisosteus oculatus</i>	Spotted Gar	G5	S1S2	Inc-SI	Inc-SI	SI-N	SD-Dec	N	N	N-SD	SI-N	SI-N	N	N-SD	SI-N	N	N/A	N	N	U	N	U	N	U	U	U	MV	Low
Fish	<i>Luxilus cornutus</i>	Common Shiner	G5	S4	Inc	Inc	N	N-SD	N	N	N	SI-N	SI	N	SI	SI-N	N	N/A	N	N	U	SI	N	SI	U	U	U	HV	High
Fish	<i>Macrhybopsis storeriana</i>	Silver Chub	G5	S3S4	Inc	Inc	SI-SD	SD-Dec	N	N	U	GI-Inc-SI	Inc-SI	N	N-SD	N	N	N/A	N	N	U	SI	SI	Inc	U	U	U	HV	VH
Fish	<i>Minytrema melanops</i>	Spotted Sucker	G5	S3	Inc	Inc	SI-N	SD-Dec	N	N	N	SI-N	SI-N	N	N-SD	N	SD	N/A	N	N	U	N	U	N	U	U	U	MV	Low
Fish	<i>Moxostoma erythrurum</i>	Golden Redhorse	G5	S5	Inc	Inc	SI-N	SD-Dec	N	N	N	SI-N	SI-N	N	SD-Dec	N	N	N/A	N	N	U	N	U	N	U	U	U	PS	Low
Fish	<i>Nocomis biguttatus</i>	Hornyhead Chub	G5	S1	Inc	Inc	SI-N	N	N	SI-N	N	SI	SI-N	N	SI-N	N	N-SD	N/A	N	SI-N	U	N	U	U	U	U	U	EV	Mod
Fish	<i>Notropis topkea</i>	Topeka Shiner	G3	S2	GI	GI	SI-SD	SI-N	N	SI	N	SI	SI	N	SI	SI	N	N/A	N	N	U	SI	U	SI	U	U	U	HV	VH
Fish	<i>Noturus flavus</i>	Stonecat	G5	S5	SI	SI	N	SI-N	N	N	N	SI	SI-N	N	SI-N	N	N	N/A	N	N	U	N	N	SI-N	U	U	U	MV	VH
Fish	<i>Noturus miurus</i>	Brindled Madtom	G5	S2	Inc	Inc	SI-N	N	N	N	N	SI-N	SI-N	N	SI-N	N	N	N/A	N	N	U	SI-N	U	SI-N	U	U	U	HV	High
Fish	<i>Noturus placidus</i>	Neosho Madtom	G2	S2	GI	GI	N	SI-N	N	N	N	Inc	SI	N	SI	N	N	N/A	N	N	U	N	N	N	U	U	U	HV	VH
Fish	<i>Polyodon spathula</i>	Paddlefish	G4	S3	Inc	Inc	SI-SD	Dec	N	N	N	Inc	SI-SD	N	N-SD	N	SI	N/A	N	N	U	N	U	N	U	U	U	MV	High
Fish	<i>Scaphirhynchus platyrhynchus</i>	Shovelnose Sturgeon	G4	S3	Inc	Inc	SI-N	SD-Dec	N	N	N	SI	N	N	N	N	N	N/A	N	N	U	SI	U	N	U	U	U	MV	VH
Invert-Insect	<i>Atrytone arogos</i>	Arogos Skipper	G3	S3S4	N	N	N	SD	N	N	SI-N	SI-N	SI-N	N	N-SD	Inc	SI	N/A	N	N	U	SI	U	U	U	U	Inc	MV	Mod
Invert-Insect	<i>Danaus plexippus</i>	Monarch	G5	S5B	N	N	N	Dec	N	N	SI-N	SI	N	N	SD	SI	SI	N/A	N	N	SD	N/A	N	U	U	U	U	PS	VH
Invert-Insect	<i>Gryllotalpa major</i>	Prairie Mole Cricket	G3	S3	N	N	SI	SD	N	N	N	SI	N	N	SI	N	N	N/A	N	N	U	N	N	U	U	U	U	PS	VH
Invert-Insect	<i>Hesperia ottoe</i>	Ottoe Skipper	G3	S2S3	N	N	N	SD	N	SI-N	SI-N	SI-N	N	N	SD	N	SI-N	N/A	N	N	U	N	U	U	U	U	U	PS	VH
Invert-Insect	<i>Nicrophorus americanus</i>	American Burying Beetle	G2	S1	N	N	N	SD	N	N	N-SD	SI	N	N	SI	N	SI-N	N/A	N	N	U	Inc	N	U	U	U	Inc	MV	VH
Invert-Insect	<i>Optioservus phaeus</i>	Scott Riffle Beetle	G1	S1	N	N	N	SD	GI	SI	SI	N	N	Inc	N	SI	N/A	N	N	U	Inc	N	U	U	U	U	EV	VH	
Invert-Insect	<i>Somatochlora ozarkensis</i>	Ozark Emerald Dragonfly	G3	S1	N	N	N	SD	N	N	N	SI	SI-N	N	SI	N	N	N/A	N	N	U	N	N	U	U	U	U	PS	VH
Invert-Insect	<i>Speyeria idalia</i>	Regal Fritillary	G3	S4	N	N	N	SD	N	Inc	N	SI	N	N	SD	N	SI	N/A	N	N	N	N/A	U	U	U	U	U	PS	VH
Invert-Insect	<i>Tachopteryx thoreyi</i>	Gray Petaltail	G4	S1	N	N	N	SD	N	N	N	GI	N	N	Inc	N	N	N/A	N	N	U	SI	N	U	U	U	U	MV	VH
Invert-Mollusk	<i>Pleurocera acuta</i>	Sharp Hornsnail	G5	S1	Inc	Inc	N	Inc	N	SI	N	Inc	N	N	SI	N	N	N/A	N	N	U	U	U	U	U	U	U	EV	VH
Invert-Mollusk	<i>Potatiopsis lapidaria</i>	Slender Walker	G5	S1	GI	GI	N	GI	N	GI	N	GI	N	N	Inc	Inc	SI	N/A	N	N	U	U	U	U	U	U	U	HV	VH

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Invert-Mollusk	<i>Probythinella emarginata</i>	Delta Hydrobe	G5	SNR	GI	GI	N	GI	N	GI	N	GI	N	N	Inc	Inc	SI	N/A	N	N	U	U	U	U	U	U	U	U	U	HV	VH
Invert-Other	<i>Actinonaias ligamentina</i>	Mucket	G5	S1	GI	GI	N	N	N	SI	N	Inc	SI	N	N	N	N	N/A	SI	N	U	N	N	U	U	U	U	U	EV	VH	
Invert-Other	<i>Utterbackiana suborbiculata</i>	Flat Floater	G5	S1	Inc	Inc	N	N	N	N	N	GI	SI	N	SI	N	N	N/A	N	N	U	N	N	U	U	U	U	U	EV	VH	
Invert-Other	<i>Anodontoides ferussacianus</i>	Cylindrical Papershell	G5	S1?	GI	GI	N	Inc	N	Inc	N	Inc	SI	N	N	N	N	N/A	SI	N	U	N	N	U	U	U	U	EV	VH		
Invert-Other	<i>Cyprogenia aberti</i>	Western Fanshell	G2	S1	GI	GI	N	N	N	N	N	Inc	SI	N	N	N	N	N/A	Inc	N	U	N	N	U	U	U	U	EV	VH		
Invert-Other	<i>Ellipsaria lineolata</i>	Butterfly	G4	S1	Inc	Inc	N	N	N	N	N-SD	Inc	SI	N	N	N	N	N/A	Inc	N	U	N	N	U	U	U	U	EV	VH		
Invert-Other	<i>Lampsilis rafinesqueana</i>	Neosho Mucket	G2	GS1	GI	GI	N	N	N	N	N	Inc	SI	N	N	N	N	N/A	Inc	N	U	N	N	U	U	U	U	EV	VH		
Invert-Other	<i>Lampsilis teres</i>	Yellow Sandshell	G5	S2S3	Inc	Inc	N	N	N	N	N	Inc	SI	N	N	N	N	N/A	SI	N	U	N	N	U	U	U	U	EV	VH		
Invert-Other	<i>Megalonaias nervosa</i>	Washboard	G5	S2	Inc	Inc	N	N	N	N	N	Inc	SI	N	N	N	N	N/A	SI	N	U	N	N	U	U	U	U	EV	VH		
Invert-Other	<i>Potamilus alatus</i>	Pink Heelsplitter	G5	S2S3	GI	GI	N	N	N	N	N	Inc	SI	N	N	N	N	N/A	Inc	N	U	N	N	U	U	U	U	EV	VH		
Invert-Other	<i>Toxolasma parvus</i>	Lilliput	G5	S2S3	Inc	Inc	N	N	N	N	N	Inc	SI	N	N	N	N	N/A	SI	N	U	N	N	U	U	U	U	EV	VH		
Mammal	<i>Corynorhinus townsendii</i>	Townsend's Bigeared Bat	G3	S2	SI	SI	Inc	SD	N	Inc	N	SI-N	SI-N	N	Inc	N	N	N/A	N	N	SI	N/A	U	U	U	U	U	U	PS	Mod	
Mammal	<i>Cratogeomys castanops</i>	Yellowfaced Pocket Gopher	G5	S3	Inc	Inc	SI-SD	SI-N	N-SD	SD	N	SI-N	SD	N	N	N	N	N/A	N	N	N	N/A	U	U	U	U	U	U	MV	Mod	
Mammal	<i>Glaugomys volans</i>	Southern Flying Squirrel	G5	S3	SI	SI	SI-N	SI	N	N	N	Inc-SI	N	SD	SI	N-SD	N/A	N	N	SI	N/A	U	U	U	U	U	U	U	HV	Low	
Mammal	<i>Myotis grisescens</i>	Gray Myotis	G3	S1B	N	N	Inc-SI	Dec	N	SI-N	SD	SI-N	SI-N	N	Inc	N	SI-N	N/A	U	N	U	U	U	U	U	U	U	PS	VH		
Mammal	<i>Spilogale putorius</i>	Eastern Spotted Skunk	G4	S1	N	N	N	SD	N	N	SI-N	N	N	N	Dec	N	N-SD	N/A	N	N	U	U	U	U	U	U	U	U	IL	VH	
Reptile	<i>Apalone mutica</i>	Smooth Softshell	G5	S3	N	N	N	N-SD	N	N-SD	N	SI-N	SI-N	N	SI-N	N	N-SD	N/A	N	N	SD	N/A	U	N	U	U	U	U	PS	Mod	
Reptile	<i>Phrynosoma cornutum</i>	Texas Horned Lizard	G4	S3S4	N	N	N-SD	N	N	SD	N	N-SD	N	N	SD	N	SI	N/A	N	N	SD	N/A	U	N	U	U	U	U	IL	VH	
Reptile	<i>Plestiodon laticeps</i>	Broad-headed Skink	G5	S2	Inc-SI	Inc-SI	SI-SD	SI-N	N	SD	N-SD	SD	SI-N	N	SI-N	N	N	N/A	N	N	U	U	U	N	U	U	U	U	PS	Low	
Reptile	<i>Rhinocheilus lecontei</i>	Long-nosed Snake	G5	G3	N	N	SD	N	N	N-SD	SI-N	N	SI-N	N	SD	N	SI-N	N/A	N	N	U	U	U	N	U	U	U	U	IL	Low	
Reptile	<i>Sistrurus catenatus</i>	Massasuaga	G3	S3S4	N	N	SD	N-SD	N	N-SD	N	SI-N-SD	SI-SD	N	SD	N	N	N/A	N	N	SD	N/A	U	N	U	U	U	U	IL	VH	

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Factor Scores:

GI – Greatly Increase Vulnerability
Inc – Increase Vulnerability
SI – Somewhat Increase Vulnerability
N – Neutral
SD – Somewhat Decrease Vulnerability
Dec – Decrease Vulnerability
U – Unknown

Index Scores:

EV – Extremely Vulnerable: Abundance and/or range extent within geographical area assessed extremely likely to substantially decrease or disappear by 2050.
HV – Highly Vulnerable: Abundance and/or range extent within geographical area assessed likely to decrease significantly by 2050.
MV – Moderately Vulnerable: Abundance and/or range extent within geographical area assessed likely to decrease by 2050.
PS – Not Vulnerable/Presumed Stable: Available evidence does not suggest that abundance and/or range extent within the geographical area assessed will change (increase/decrease) substantially by 2050. Actual range boundaries may change.
IL – Not Vulnerable/Increase Likely: Available evidence suggests that abundance and/or range extent within geographical area assessed is likely to increase by 2050.
Confidence (in species information):
VH – Very High confidence
High – High confidence
Mod – Moderate confidence
Low – Low confidence

Color coding highlights factors that influence climate change vulnerability:

Red – Greatest influence in increasing vulnerability
Yellow – Moderate influence in increasing vulnerability
Green – Contributes to decrease in vulnerability

Success Story – Arkansas Darter

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



Success Story – Lincoln Street Dam – Fish Passage Construction

Riverine habitat in Kansas has been highly fragmented in part because of barriers such as low-head dams. This fragmentation has led to the decline of several native fish species and very dissimilar fish assemblages about and below impoundments. A fishway was constructed as part of the renovation of the Lincoln Street Dam on the Arkansas River in the City of Wichita, with consultation from Kansas Department of Wildlife and Parks. The fishway was the first of its kind, built for passage of smaller-bodied fishes including multiple Species of Greatest Conservation Need recognized in the SWAP. Species benefitting from the construction of the dam include the Plains Minnow, Silver Chub, Pepered Chub, Arkansas River Shiner, and the Arkansas Darter. Emerald Shiners were found upstream of the dam for the first time in 20 years. Post-construction monitoring of the fish community in the Arkansas River adjacent to the fish passage has documented 27 species of the fish using the passageway. The upstream fish assemblage more resembled the downstream assemblage not long after completion of the passageway.

Engineers were able to incorporate aesthetic improvements and canoe and kayak passage as well. A project of this scope required considerable funding, as well as permits and zoning across multiple jurisdictions. Post construction monitoring was funded through the State Wildlife Grants Program. Project partners included City of Wichita, U.S. Fish and Wildlife Service, MKEC Engineering, Federal Highway Administration, Kansas Department of Transportation, U.S. Coast Guard, University of Illinois – Ven Te Chow Hydrosystems Laboratory, and Kansas State University.

Success Story – Bald Eagles in Kansas

KDWP and a group of interested partners started a three-year study to collect information that will give wildlife managers and energy developers the data to make scientifically based decisions to address potential conflict between Bald Eagles and energy development infrastructure. The primary way to acquire these vital data is to telemeter Bald Eagles in Kansas to produce highly detailed data on where they fly and how they use airspace. The data will subsequently be analyzed in the context of topography, weather, land cover, and energy infrastructure, to gain an understanding of what environmental conditions and eagle responses to those conditions that may put them at risk from wind turbines, powerlines, and associated features.

In early May 2021, project partners came together to band and affix GPS transmitters on thirteen Bald Eagle nestlings in five different counties. The seven to nine-week nestlings were captured in the nest, lowered to the ground in bags, and fitted with both identification leg bands and GPS transmitters. These units will provide data on the bird's location, including altitude at intervals of 3-5 seconds in flight and 15 minutes at roost. The data collected will provide intimate details of eagle travel and flight response to topography, land cover, and weather.



Success Story – Restoring Kansas River Connectivity

Stream fragmentation from in-stream barriers has been implicated as a primary cause in the decline of many aquatic species. These effects are particularly impactful to fishes with pelagic spawning reproductive strategies. The Kansas River is formed by the confluence of the Smoky Hill and Republican rivers and is home to 19 Species of Greatest Conservation Need, several of which are pelagic spawning minnows like the Shoal Club, Silver Chub, and Plains Minnow. The Kansas River contains 3 barriers: the Topeka Weir (Topeka, KS), Bowersock Dam (Lawrence, KS), and WaterOne Weir (Kansas City, KS). To improve riverine habitat connectivity in the Kansas-Lower Republican Ecological Focus Area, Kansas Department of Wildlife and Parks partnered with the City of Topeka to alter their water supply weir to include fish passage. This effort was in conjunction with safety improvements to the low-head dam, as the Kansas River continues to see increased recreational use. Providing passage at the Topeka Weir combines 2 fragments (86 and 35 miles) of the Kansas River to form a larger fragment of 121 connected river miles. Such restoration efforts should improve reproduction and recruitment of SGCN species in the river and are necessary to make recovery possible for pelagic spawning species.



Success Story – Neosho Madtom in the Spring River

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

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



Appendix 7 Definitions

Aggressive – species are those that spread rapidly and can outcompete other species. They can be native or nonnative and may be aggressive in some situations, but not others. Eastern red cedar is an example of a native tree that can spread aggressively in open areas

Biodiversity – a contraction of “biological diversity”, generally refers to the variety and variability of life on Earth. This can refer to genetic variation, ecosystem variation, or species variation with a specified region

Channelization – Mechanical redirecting a streambed in more or less a straight line

CRP – Conservation Reserve Program. A federal program that pays a yearly rental payment in exchange for farmers removing environmentally sensitive land from agricultural production and planting species that will improve environmental health and quality

Ecosystem – a biological community plus all of the abiotic factors influencing that community

Endangered species – species of plants or animals of concern that have the potential of becoming extinct

Endemic – native to or confined to a certain region. For this document, the term specifically refers to taxa that are limited to Kansas

Ephemeral – Channel or basin which carries water only during and immediately after periods of rainfall or snowmelt

Habitat – An ecological area inhabited by a particular organism, where the organism can find food, shelter, and reproductive opportunities

Invasive – species are aggressive, nonnative species whose presence causes or is likely to cause harm to the environment, economy, and/or human health. These species often grow, reproduce, and spread rapidly.

Issues – “Conservation issues” in this Plan is used in place of the term “conservation problems” which was used by Congress in the legislation that authorized this program

Marsh – a type of wetland, featuring grasses, rushes, reeds, typhas, sedges, and other herbaceous plants in a context of shallow water

Native species – species occur within a region as the result of natural processes and are adapted to local environmental conditions. They have co-evolved with other native species and are critical to ecosystem functions

Nonnative species – species are those introduced to new place or new type of habitat. Historically, most of these introductions have resulted from human activities. Their presence can often have negative impacts on ecosystems. The words “exotic,” “alien,” and “introduced” are synonyms for “nonnative.”

Nuisance – species are native to the local landscape but still can cause problems. For instance, raccoon are a native species but may become a problem when they repeatedly knock over your trash can or get into your chicken coop.

Appendix 7 Definitions

Playa – a desert basin with no outlet which periodically fills with water to form a temporary lake

Prescribed burning – planned burning by land management agencies under specific weather conditions to remove excess plant material and replicate natural fire regimes

Rare – species that occurs in very small numbers or at a very low density even within its primary habitat. These species are unlikely to be found in their habitat without extensive searching

Recruitment – reinforcement of a population of a species with new members through reproduction or immigration

Riparian habitat – transitional semiterrestrial areas regularly influenced by fresh water, usually extending from the edges of water bodies to the edges of upland communities

Seep – a generally small area where water percolates slowly to the ground surface, typically without a well-defined point of origin

Spring – the location where an underground source of water emerges from the ground, generally from a single point of origin

Strategy – strategies are termed “conservation actions” in this document

Threatened species – species of plants or animals of concern that have the potential of becoming endangered

Uncommon – species that occurs at a low to moderate density within its primary habitat. Often, these species require several hours of search time to locate within their occupied habitat

Watershed – also known as a catchment or basin, is a topographically delineated area drained by a stream system; that is, the total land area about some point on a stream or river than drains past the point

Wildlife – animals as a broad, all-inclusive group that live in the water or on land. They include arthropods, fish, reptiles, amphibians, freshwater mussels, birds, and mammals

Appendix 8
Road Map to 8 Required Elements

The following comments and passages describe how each required element was addressed in the revision of the State Wildlife Action Plan. Please refer to the following chapters and page numbers to examine how each required element was addressed.

Element 1	Chapter and Appendix	Tables and Figures	Comments
Information on the distribution and abundance of species of wildlife , including low and declining populations as the state deems appropriate, which are indicative of the diversity and health of the state's wildlife	Chapter 3 – Statewide Perspective	Appendix 2 Table	Ch 4 provides a general distribution and abundance description of KS wildlife. Species distributions are specified in each ecoregion chapter (4-6) with species listed in each EFA they occur. Appendix 2 table provides species Natural Heritage conservation ranks which incorporate distribution and abundance factors
	Chapter 4 – Shortgrass Prairie		
	Chapter 5 – Mixed Grass Prairie		
	Chapter 6 – Tallgrass Prairie Appendix 2 – SGCN		

Element 2	Chapter and Appendix	Tables and Figures	Comments
Description of locations and relative conditions of key habitats and community types essential to conservation of species identified in (1).	Chapter 2-Methods	Figure 2.	Maps of all habitat types are in Ch 2 and Appendix 4. Maps, descriptions and relative condition of individual priority habitat types are in each ecoregion chapter (4-6). EFA map (figures 3-8) are considered priority landscapes for efficiently conserving KS biodiversity
	Chapter 4-Shortgrass Prairie	Figure 3. Figure 4.	
	Chapter 5-Mixed Grass Prairie	Figure 5. Figure 6. Figure 7.	
	Chapter 6-Tallgrass Prairie	Figure 8.	
	Appendix 4		

Element 3	Chapter and Appendix	Tables and Figures	Comments
Description of problems which may adversely affect species identified in (1) or their habitats, and priority research and survey efforts needed to identify factors which may assist in restoration and improved conservation of these species and habitats.	Chapter 3-Statewide Perspective		Ch 3 lists conservation issues occurring statewide that directly threat biodiversity. It also lists issues that are not direct threats to biodiversity but hinder conservation efforts. The ecoregion chapters list more detailed issues considered priority for each EFA.
	Chapter 4-Shortgrass Prairie		
	Chapter 5-Mixed Grass Prairie		
	Chapter 6-Tallgrass Prairie		

Appendix 8
Road Map to 8 Required Elements

Element 4	Chapter and Appendix	Tables and Figures	Comments
Description of conservation actions proposed to conserve the identified species and habitats and priorities for implementing such actions.	Chapter 4-Shortgrass Prairie Chapter 5-Mixed Grass Prairie Chapter 6-Tallgrass Prairie		Conservation actions proposed to address conservation issues are found in the ecoregion chapter with each EFA section

Element 5	Chapter and Appendix	Tables and Figures	Comments
Proposed plans for monitoring species identified in (1) and their habitats, for monitoring the effectiveness of the conservation actions proposed in (4), and for adapting these conservation actions to respond appropriately to new information or changing conditions.	Chapter 2-Methods Chapter 4- Shortgrass Prairie Chapter 5- Mixed Grass Prairie Chapter 6 – Tallgrass Prairie		Ch 2 provides general approaches for monitoring and adaptive management. The ecoregion chapters (4-6) provide details on monitoring species and habitats as conservation actions

Element 6	Chapter and Appendix	Tables and Figures	Comments
Description of procedures to review the strategy at intervals not to exceed ten years.	Chapter 7		Plan to review plan in 5 year intervals to address emerging issues, new information on changes in abundance, distribution, population trends, listing status of species, and habitat conditions

Appendix 8
Road Map to 8 Required Elements

Element 7	Chapter and Appendix	Tables and Figures	Comments
<p>Plans for coordinating the development, implementation, review, and revision of the plan with Federal, State, and local agencies and Indian tribes that manage significant land and water areas within the state or administer programs that significantly affect the conservation of identified species and habitats.</p>	Chapter 2-Methods		<p>Ongoing collaboration with our SWAP partners occurred through out the revision process. The ecoregion chapters (4-6) list current and potential conservation partners with which to collaborate.</p>
	Chapter 4- Shortgrass Prairie		
	Chapter 5- Mixed Grass Prairie		
	Chapter 6 – Tallgrass Prairie		

Element 8	Chapter and Appendix	Tables and Figures	Comments
<p>Provisions to ensure public participation in the development, revision, and implementation of projects and programs.</p>	Chapter 2-Methods		<p>Public participation was invited through news releases, exposure through Commission meetings, presentations at society meetings, and access to the plan on the Internet. Public review comments were evaluated by the technical committee with changes made by majority agreement. KDWP has and will maintain an open policy on submittal of projects for implementation</p>