

Addendum 1. Modified components of South Dakota Wildlife Action Plan as part of minor revision of 2018 to add three species of greatest conservation need.

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Table 2-1. List of species of greatest conservation need as updated for the 2014 South Dakota Wildlife Action Plan. Amended during 2018 Minor Revision, with new species highlighted.

Common Name	Scientific Name	Federal Status ^a	State Status ^b	Global Rank ^c	State Rank ^d	2006 SGCN ^e	2006 Eval. ^f	2014 SGCN ^g	2014 Eval. ^h
BIRDS									
American Dipper	<i>Cinclus mexicanus</i>		T	G5	S2	Y	1	Y	1
American Three-toed Woodpecker	<i>Picoides dorsalis</i>			G5	S2	Y	3	Y	3
American White Pelican	<i>Pelecanus erythrorhynchos</i>			G4	S3B	Y	2	Y	2b
Baird's Sparrow	<i>Ammodramus bairdii</i>			G4	S2B	Y	2	Y	2a
Bald Eagle	<i>Haliaeetus leucocephalus</i>			G5	S1B, S2N	Y	1	Y	1
Black Tern	<i>Chlidonias niger</i>			G4	S3B	Y	2	Y	2a
Black-backed Woodpecker	<i>Picoides arcticus</i>			G5	S3	Y	3	Y	3
Burrowing Owl	<i>Athene cunicularia</i>			G4	S3S4B	Y	3	Y	3
Chestnut-collared Longspur	<i>Calcarius ornatus</i>			G5	S4B	Y	2	Y	2a
Ferruginous Hawk	<i>Buteo regalis</i>			G4	S4B	Y	3	Y	3
Golden Eagle	<i>Aquila chrysaetos</i>			G5	S3	N		Yes	3
Greater Prairie-Chicken	<i>Tympanuchus cupido</i>			G4	S4	Y	2	Y	2a
Greater Sage-Grouse	<i>Centrocercus urophasianus</i>			G3G4	S2	Y	3	Y	3
Lark Bunting	<i>Calamospiza melanocorys</i>			G5	S5B	Y	2	Y	2a
Le Conte's Sparrow	<i>Ammodramus leconteii</i>			G4	S1S2B	Y	3	Y	3
Least Tern	<i>Sternula antillarum</i>	E	E	G4T2Q	S2B	Y	1	Y	1
Lewis's Woodpecker	<i>Melanerpes lewis</i>			G4	S3B, S3N	Y	3	Y	3
Long-billed Curlew	<i>Numenius americanus</i>			G5	S3B	Y	2	Y	2a
Marbled Godwit	<i>Limosa fedoa</i>			G5	S5B	Y	2	Y	2a
Northern Goshawk	<i>Accipiter gentilis</i>			G5	S3B, S2N	Y	3	Y	3
Osprey	<i>Pandion haliaetus</i>		T	G5	S1B	Y	1	Y	1
Peregrine Falcon	<i>Falco peregrinus</i>		E	G4	SXB	Y	1	Y	1

Piping Plover	<i>Charadrius melodus</i>	T	T	G3	S2B	Y	1	Y	1
Ruffed Grouse	<i>Bonasa umbellus</i>			G5	S4B, S4N	N		Y	3
Sprague's Pipit	<i>Anthus spragueii</i>			G4	S2B	Y	2	Y	2a
Trumpeter Swan	<i>Cygnus buccinator</i>			G4	S3B, S3N	Y	2	Y	2b
White-winged Junco	<i>Junco hyemalis aikeni</i>			G5T4	S5B, S5N	Y	2	Y	2b
Whooping Crane	<i>Grus americana</i>	E	E	G1	SNA	Y	1	Y	1
Willet	<i>Tringa semipalmata</i>			G5	S5B	Y	2	Y	2b
Wilson's Phalarope	<i>Phalaropus tricolor</i>			G5	S4B	Y	2	Y	2b
GASTROPODS									
Callused Vertigo	<i>Vertigo arthuri</i>			G5	S2	Y	3	Y	3
Cooper's Rocky Mountainsnail	<i>Oreohelix strigosa cooperi</i>			G5T2T3Q	S2	Y	2	Y	2a
Frigid Ambersnail	<i>Catinella gelida</i>			G1	S1	y	3	Y	3
Mystery Vertigo	<i>Vertigo paradoxa</i>			G4G5Q	S1	Y	3	Y	3
AMPHIBIANS AND REPTILES									
Black Hills Redbelly Snake	<i>Storeria occipitomaculata pahasapae</i>			G5T4Q	S3	Y	2	Y	2b
Blanchard's Cricket Frog	<i>Acris blanchardi</i>			G5	S1	Y	3	Y	3
Cope's Gray Treefrog	<i>Hyla chrysoscelis</i>			G5	S2	Y	3	Y	3
Eastern Hognose Snake	<i>Heterodon platirhinos</i>		T	G5	S2	Y	1	Y	1
False Map Turtle	<i>Graptemys pseudogeographica</i>		T	G5	S3	Y	1	Y	1
Lesser Earless Lizard	<i>Holbrookia maculata</i>			G5	S2	Y	3	Y	3
Lined Snake	<i>Tropidoclonion lineatum</i>		E	G5	S1	Y	1	Y	1
Many-lined Skink	<i>Plestiodon multivirgatus</i>			G5	S1	Y	3	Y	3
Sagebrush Lizard	<i>Sceloporus graciosus</i>			G5	S2	N		Y	3
Short-horned Lizard	<i>Phrynosoma hernandesi</i>			G5	S2	Y	3	Y	3
Smooth Softshell	<i>Apalone mutica</i>			G5	S2	Y	3	Y	3
Western (Ornate) Box Turtle	<i>Terrapene ornata</i>			G5	S2	Y	3	Y	3

MAMMALS									
Black-footed Ferret	<i>Mustela nigripes</i>	E	E	G1	S1	Y	1	Y	1
Black Hills Red Squirrel	<i>Tamiasciurus hudsonicus dakotensis</i>			G5TNR	SNR	N		Y	2b
Franklin's Ground Squirrel	<i>Poliocitellus franklinii</i>			G5	S5	Y	2	Y	3
Fringe-tailed Myotis	<i>Myotis thysanodes pahasapensis</i>			G4T2	S2	Y	2	Y	2a
Northern Flying Squirrel	<i>Glaucomys sabrinus</i>			G5	S2	Y	2	Y	2b
Northern Myotis	<i>Myotis septentrionalis</i>	T		G2G3	S3	Y	3	Y	3
Northern River Otter	<i>Lontra canadensis</i>		T	G5	S2	Y	1	Y	1
Plains (Eastern) Spotted Skunk	<i>Spilogale putorius interrupta</i>			G4	S3	N		Y	3
Richardson's Ground Squirrel	<i>Urocyon richardsonii</i>			G5	S5	Y	2	Y	2b
Silver-haired Bat	<i>Lasiurus noctivagans</i>			G5	S4	N		Y	3
Swift Fox	<i>Vulpes velox</i>		T	G3	S1	Y	1	Y	1
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>			G3G4	S2S3	Y	3	Y	3
TERRESTRIAL INSECTS									
American Burying Beetle	<i>Nicrophorus americanus</i>	E		G2G3	S1	Y	1	Y	1
Dakota Skipper	<i>Hesperia dacotae</i>	T		G2	S2	Y	2	Y	2a
Great Plains Tiger Beetle	<i>Amblycheila cylindriformis</i>			G4G5	S1	Y	3	Y	3
Indian Creek Tiger Beetle	<i>Cicindela nevadica makosika</i>			G5T1	S1	N		Y	2a
Iowa Skipper	<i>Atrytone arogos iowa</i>			G3T3	S2	Y	3	Y	3
Little White Tiger Beetle	<i>Cicindela lepida</i>			G3G4	S1	Y	3	Y	3
Monarch	<i>Danaus plexippus</i>			G4	SNR	N		Y	3
Northern Sandy Tiger Beetle	<i>Cicindela limbata nympha</i>			G4T4	S4	N		Y	3
Ottoo Skipper	<i>Hesperia ottoe</i>			G3G4	S2	Y	2	Y	3
Pahasapa Fritillary	<i>Speyeria atlantis pahasapa</i>			G5T3	S3	Y	2	Y	3
Poweshiek Skipperling	<i>Oarisma poweshiek</i>	E		G1	S1	Y	2	Y	2a
Regal Fritillary	<i>Speyeria idalia</i>			G3	S3	Y	3	Y	2a

AQUATIC INSECTS									
A Mayfly	<i>Anaetris eximia</i>			G3	SNR	N		Y	3
Dakota Stonefly	<i>Perlesta dakota</i>			G3	SNR	N		Y	2a; 3
Dot-winged Baskettail	<i>Eitheca petechialis</i>			G4	SNR	N		Y	3
Elusive Clubtail	<i>Stylurus notatus</i>			G3	SNR	N		Y	3
FRESHWATER MUSSELS									
Creek Heelsplitter	<i>Lasmigona compressa</i>			G5	S1	Y	3	Y	3
Elktoe	<i>Alasmidonta marginata</i>			G4	S1	Y	3	Y	3
Hickorynut	<i>Obovaria olivaria</i>			G4	S1	Y	3	Y	3
Higgins Eye	<i>Lampsilis higginsii</i>	E		G1G2	S1	Y	1	Y	1
Mapleleaf	<i>Quadrula quadrula</i>			G5	S2	Y	3	Y	3
Pimpleback	<i>Quadrula pustulosa</i>			G5	S1	N		Y	3
Rock Pocketbook	<i>Arcidens confragosus</i>			G4	S1	Y	3	Y	3
Scaleshell	<i>Leptodea leptodon</i>	E		G1G2	S1	Y	1	Y	1
Yellow Sandshell	<i>Lampsilis teres</i>			G5	S1	N		Y	3
FISHES									
Banded Killifish	<i>Fundulus diaphanus</i>		E	G5	S1	Y	1	Y	1
Blacknose Shiner	<i>Notropis heterolepis</i>		E	G5	S1	Y	1	Y	1
Blackside Darter	<i>Percina maculata</i>			G5	S2	Y	3	Y	3
Blue Sucker	<i>Cycleptus elongus</i>			G3G4	S3	N		Y	3
Carmine Shiner	<i>Notropis percobromus</i>			G5	S2	Y	3	Y	3
Central Mudminnow	<i>Umbra limi</i>			G5	S2	Y	1	Y	3
Finescale Dace	<i>Chrosomus neogaeus</i>		E	G5	S1	Y	1	Y	1
Hornyhead Chub	<i>Nocomis biguttatus</i>			G5	S3	Y	3	Y	3
Lake Chub	<i>Couesius plumbeus</i>			G5	S1	Y	3	Y	3
Logperch	<i>Percina caprodes</i>			G5	S3	Y	3	Y	3
Longnose Sucker	<i>Catostomus catostomus</i>		T	G5	S1	Y	1	Y	1
Mountain Sucker	<i>Catostomus platyrhynchus</i>			G5	S3	Y	3	Y	3

Northern Pearl Dace	<i>Margariscus nachtriebi</i>		T	G5	S2	Y	1	Y	1
Northern Redbelly Dace	<i>Chrosomus eos</i>		T	G5	S2	Y	1	Y	1
Pallid Sturgeon	<i>Scaphirhynchus albus</i>	E	E	G2	S1	Y	1	Y	1
Shovelnose Sturgeon	<i>Scaphirhynchus platyrhynchus</i>	T		G4	S4	N		Y	1
Sicklefin Chub	<i>Macrhybopsis meeki</i>		E	G3	S1	Y	1	Y	1
Southern Redbelly Dace	<i>Chrosomus erythrogaster</i>			G5	S1	Y	3	Y	3
Sturgeon Chub	<i>Macrhybopsis gelida</i>		T	G3	S2	Y	1	Y	1
Topeka Shiner	<i>Notropis topeka</i>	E		G3	S2	Y	1	Y	1
Trout-perch	<i>Percopsis omiscomaycus</i>			G5	S2	Y	1	Y	3

^a Federal Status - E= Endangered, a species in danger of extinction throughout all or a significant portion of its range; T = Threatened, a species likely to become endangered in the foreseeable future

^b State Status - E= Endangered, a species in danger of extinction throughout all or a significant portion of its range in South Dakota; T = Threatened, a species likely to become endangered in the foreseeable future in South Dakota

^{c, d} Global/State Rank Definition (applied rangewide for global rank and statewide for state rank; these may change with new information)

G1 S1 = Critically imperiled because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.

G2 S2 = Imperiled because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.

G3 S3 = Either very rare and local throughout its range, or found locally (even abundantly at some of its locations) in a restricted range, or vulnerable to extinction throughout its range because of other factors; in the range of 21 of 100 occurrences.

G4 S4 = Apparently secure, though it may be quite rare in parts of its range, especially at the periphery. Cause for long term concern.

G5 S5 = Demonstrably secure, though it may be quite rare in parts of its range, especially at the periphery.

GU SU = Possibly in peril, but status uncertain, more information needed.

GH SH = Historically known, may be rediscovered.

GX SX = Believed extinct, historical records only.

GNR SNR = Not yet ranked

_T = Rank of subspecies or variety

_Q = Taxonomic status is questionable, rank may change with taxonomy

SZ = No definable occurrences for conservation purposes, usually assigned to migrants

SP = Potential exists for occurrence in the state, but no occurrences

SR = Element reported for the state but no persuasive documentation

SA = Accidental or casual

Bird species may have two state ranks, one for breeding (S#B) and one for nonbreeding seasons (S#N). Example: Ferruginous Hawk (S3B, SZN) indicates an S3 rank in breeding season and SZ in nonbreeding season.

^e2006 SGCN - SGCN selected for the 2006 SDWAP; "Y" = Yes, "N"=No

^f2006 Evaluation – criteria for selection as SGCN in 2006 SDWAP

1 = State or Federal listed species for which the State has a mandate for recovery

2 = Species for which SD represents a significant portion of the species overall range

3 = Species that are indicative of or depend upon a declining or unique habitat in SD

^g2014 SGCN - SGCN selected for the 2014 SD SDWAP; "Y" = Yes, "N"=No

^h2014 Evaluation = Criteria for selection as SGCN in 2014 SDWAP revision

1 = State or federally listed species for which the state has a mandate for recovery (listed as threatened or endangered);

2a = Species that are regionally or globally imperiled* and for which South Dakota represents an important portion of their remaining range;

2b = Species that are regionally or globally secure* and for which South Dakota represents an important portion of their remaining range; or

3 = Species with characteristics that make them vulnerable, including any of the following:

- are indicative of or depend on a unique or declining habitat in South Dakota;
- require large home ranges/use multiple habitats;
- depend on large habitat patch sizes;
- depend on an ecological process (such as fire) that no longer operates within the historical range of variation;
- are limited in their ability to recover on their own due to low dispersal ability or low reproductive rates;
- have a highly localized or restricted distribution (endemics); or

- concentrate their populations during some time of the year.

*Based, in part, on NatureServe conservation status ranking: <http://www.natureserve.org/explorer/index.htm>

Table 5-4. South Dakota species of greatest conservation need and their relationship to the native ecosystem diversity strategy and/or the aquatic gap analysis project strategy used in the South Dakota Wildlife Action Plan to improve or maintain habitat for a respective species. Amended during 2018 Minor Revision, with new species highlighted.

Common Name	Native Ecosystem Diversity Strategy		Aquatic GAP Strategy
	Terrestrial	Riparian-Wetland	
BIRDS			
American Dipper		X	X
American Three-toed Woodpecker	X		
American White Pelican		X	X
Baird's Sparrow	X	X	
Bald Eagle	X	X	X
Black Tern		X	
Black-backed Woodpecker	X		
Burrowing Owl	X		
Chestnut-collared Longspur	X		
Ferruginous Hawk	X		
Golden Eagle	X		
Greater Prairie-chicken	X	X	
Greater Sage-Grouse	X	X	
Interior Least Tern		X	
Lark Bunting	X		
Le Conte's Sparrow		X	
Lewis's Woodpecker	X		
Long-billed Curlew	X	X	
Marbled Godwit	X	X	
Northern Goshawk	X		
Osprey	X	X	X
Piping Plover		X	
Ruffed Grouse	X	X	
Sprague's Pipit	X		
Trumpeter Swan		X	X
White-winged Junco	X		
Whooping Crane		X	
Willet	X	X	
Wilson's Phalarope	X	X	
GASTROPODS			
Cooper's Rocky mountainsnail	X	X	
Dakota vertigo	X		
frigid ambersnail	X		

mystery vertigo	X		
AMPHIBIANS AND REPTILES			
Black Hills Redbelly Snake			
Blanchard's Cricket Frog		X	X
Cope's Gray Treefrog		X	X
Eastern Hognose Snake	X	X	
False Map Turtle		X	X
Lesser Earless Lizard	X	X	
Lined Snake	X		
Many-lined Skink	X		
Sagebrush Lizard	X		
Short-horned Lizard	X		
Smooth Softshell		X	X
Western Box Turtle	X		
MAMMALS			
Black Hills Red Squirrel	X		
Franklin's Ground Squirrel	X		
Fringe-tailed Myotis	X	X	
Northern Flying Squirrel	X	X	
Northern Myotis	X	X	
Northern River Otter		X	X
Plains (Eastern) Spotted Skunk	X		
Richardson's Ground Squirrel	X		
Silver-haired Bat	X	X	
Swift Fox	X		
Townsend's Big-eared Bat	X	X	
TERRESTRIAL INSECTS			
American Burying Beetle	X	X	
Dakota Skipper	X		
Great Plains Tiger Beetle	X		
Indian Creek Tiger Beetle		X	X
Iowa Skipper	X		
Little White Tiger Beetle	X	X	
Monarch	X		
Northern Sandy Tiger Beetle	X		
Ottoe Skipper	X		
Pahasapa Fritillary	X	X	
Poweshiek Skipperling	X		
Regal Fritillary	X		
AQUATIC INSECTS			
A Mayfly			X
Dakota Stonefly			X

Dot-winged Baskettail	X
Elusive Clubtail – A Dragonfly	X

FRESHWATER MUSSELS

Creek Heelsplitter	X
Elktoe	X
Hickorynut	X
Higgins Eye	X
Mapleleaf	X
Pimpleback	X
Rock Pocketbook	X
Scaleshell	X
Yellow Sandshell	X

FISHES

Banded Killifish	X
Blacknose Shiner	X
Blackside Darter	X
Blue Sucker	X
Carmine Shiner	X
Central Mudminnow	X
Finescale Dace	X
Hornyhead Chub	X
Lake Chub	X
Logperch	X
Longnose Sucker	X
Mountain Sucker	X
Northern Pearl Dace	X
Northern Redbelly Dace	X
Pallid Sturgeon	X
Shovelnose Sturgeon	X
Sicklefin Chub	X
Southern Redbelly Dace	X
Sturgeon Chub	X
Topeka Shiner	X
Trout-perch	X

Table 5-5. Expected effects of climate change on native ecosystems and habitat of terrestrial and riparian-wetland species of greatest conservation need in South Dakota and suggested mitigation actions where possible impacts are identified. Amended during 2018 Minor Revision to add three new species, highlighted at end of table.

Common Name	Expected Effects	Reason	Possible Mitigation Actions
American Burying Beetle	Neutral	Soil structure appears to be more important than vegetation structure or composition	Not Needed
American Dipper	Positive	In-stream flows may increase with increased winter/spring precipitation, improving early-mid nesting season habitat quality and quantity	Not Needed
American Three-toed Woodpecker	Positive	Increasing fire frequency and severity will increase habitat; at least for the short-term	Not Needed
American White Pelican	Neutral to negative	Neutral on riverine/lacustrine systems; negative on depressional systems	Known key depressional sites should be individually evaluated for possible mitigation actions
Bald Eagle	Neutral	More closely associated with riverine and lacustrine systems	Not Needed
Baird's Sparrow	Negative	Prefers cool season grass (C3) dominated conditions or mixed-cool/warm (C4) season conditions	Where possible, select for native warm season (C4) grass species that are taller in stature
Black-backed Woodpecker	Positive	Increasing temperatures will lead to increased fire frequency and severity resulting in more habitat for this species, at least for the short-term	Not Needed
Blanchard's Cricket Frog	Neutral to negative	Neutral for riverine/lacustrine systems; negative for depressional systems	Known key depressional sites should be individually evaluated for possible mitigation actions
black-footed ferret	Variable	This species is associated with prairie dog and ground squirrel populations, therefore, effect is dependant on applicable rodent species response	See black-tailed prairie dog, Richardson's ground squirrel, and Franklin's ground squirrel for possible actions
Black Hills Redbelly Snake	Negative	Prefers cool season grass (C3) dominated conditions or mixed-cool/warm (C4) season conditions	Where possible, select for native warm season (C4) grass species that are taller in stature

Common Name	Expected Effects	Reason	Possible Mitigation Actions
Black Hills red squirrel	Negative	Increasing fire frequency; forest management policies that do not allow adequate thinning will reduce late seral conditions and large trees in the landscape	Implement forest policy to allow ecosystem restoration based on historical reference conditions and climate change adjustments for species composition
Black Tern	Neutral to negative	Neutral for riverine/lacustrine systems; negative for depressional systems	Known key depressional sites should be individually evaluated for possible mitigation actions
Burrowing Owl	Variable	This species is associated with prairie dog and ground squirrel populations, therefore, climate change effect is dependant on their response	See black-tailed prairie dog, Richardson's ground squirrel, and Franklin's ground squirrel for possible actions
Chestnut-collared Longspur	Positive	Prefers warm season grass (C4) dominated conditions	Not Needed
Cope's Gray Treefrog	Neutral to negative	Neutral for riverine/lacustrine systems; negative for depressional systems	Known key depressional sites should be individually evaluated for possible mitigation actions
Cooper's rocky mountainsnail	Negative	Increasing temperatures will lead to increased fire frequency and severity, resulting in less habitat for this species	Forest stands that have the best potential for calcarous soils and future moist forest conditions should be protected
Dakota skipper	Positive	Prefers warm season grass (C4) dominated conditions	Not Needed
Dakota vertigo	Negative	Increasing fire frequency; forest management policies that do not allow adequate thinning will reduce late seral conditions and large trees in the landscape	Implement forest policy to allow ecosystem restoration based on historical reference conditions and climate change adjustments for species composition
Eastern Hognose Snake	Neutral to negative	Prey base: Neutral on riverine/lacustrine systems; negative on depressional systems	Known key depressional sites should be individually evaluated for possible mitigation actions
Ferruginous Hawk	Positive	More closely associated with warm season grass (C4) dominated conditions	Not Needed
Franklin's ground squirrel	Negative	Prefers cool season grass (C3) dominated conditions or mixed-cool/warm (C4) season conditions	Where possible, select for native warm season (C4) grass species that are taller in stature

Common Name	Expected Effects	Reason	Possible Mitigation Actions
False Map Turtle	Neutral to negative	Neutral for riverine/lacustrine systems; negative for depressional systems	Known key depressional sites should be individually evaluated for possible mitigation actions
frigid ambersnail	Negative	Increasing temperatures will lead to increased fire frequency and severity, resulting in less habitat for this species	Moist forest stands that are associated with limestone talus should be protected from fire or disturbance
fringe-tailed myotis	Negative	Increasing fire frequency; forest management policies that do not allow adequate thinning will reduce late seral conditions and large trees in the landscape	Implement forest policy to allow ecosystem restoration based on historical reference conditions and climate change adjustments for species composition
Greater Prairie-chicken	Neutral	Associated with both warm (C4) and cool (C3) season grass dominated conditions	Not Needed
Great Plains tiger beetle	Positive	Prefers warm season grass (C4) dominated conditions	Not Needed
Indian Creek tiger beetle	Neutral	Increased winter/spring precipitation may reduce impacts to intermittent streams	Not Needed
Iowa skipper	Negative	Prefers cool season grass (C3) dominated conditions or mixed-cool/warm (C4) season conditions	Where possible, select for native warm season (C4) grass species that are taller in stature
Lark Bunting	Positive	Prefers warm season grass (C4) dominated conditions	Not Needed
Long-billed Curlew	Positive	Prefers warm season grass (C4) dominated conditions	Not Needed
Le Conte's Sparrow	Neutral to negative	Neutral for riverine/lacustrine systems; negative for depressional systems	Known key depressional sites should be individually evaluated for possible mitigation actions
Lesser Earless Lizard	Positive	Prefers warm season grass (C4) dominated conditions	Not Needed
Interior Least Tern	Neutral to negative	Neutral on riverine/lacustrine systems; negative on depressional systems	Known key depressional sites should be individually evaluated for possible mitigation actions

Common Name	Expected Effects	Reason	Possible Mitigation Actions
Lewis's Woodpecker	Negative	Increasing fire frequency; forest management policies that do not allow adequate thinning will reduce late seral conditions and large trees in the landscape	Implement forest policy to allow ecosystem restoration based on historical reference conditions and climate change adjustments for species composition
Lined Snake	Negative	Prefers cool season grass (C3) dominated conditions or mixed-cool/warm (C4) season conditions	Where possible, select for native warm season (C4) grass species that are taller in stature
little white tiger beetle	Positive	Prefers warm season grass (C4) dominated conditions	Not Needed
Marbled Godwit	Neutral	Associated with both warm (C4) and cool (C3) season grass dominated conditions	Not Needed
Many-lined Skink	Positive	Prefers warm season grass (C4) dominated conditions	Not Needed
Mystery vertigo	Negative	Increasing temperatures will lead to increased fire frequency and severity, resulting in less habitat	Moist forest stands that are associated with limestone or schist substrates should be protected from fire or disturbance
northern flying squirrel	Negative	Increasing fire frequency; forest management policies that do not allow adequate thinning will reduce late seral conditions and large trees in the landscape	Implement forest policy to allow ecosystem restoration based on historical reference conditions and climate change adjustments for species composition
Northern Goshawk	Negative	Increasing fire frequency; forest management policies that do not allow adequate thinning will reduce late seral conditions and large trees in the landscape	Implement forest policy to allow ecosystem restoration based on historical reference conditions and climate change adjustments for species composition
northern myotis	Negative	Increasing fire frequency; forest management policies that do not allow adequate thinning will reduce late seral conditions and large trees in the landscape	Implement forest policy to allow ecosystem restoration based on historical reference conditions and climate change adjustments for species composition
northern river otter	Neutral	More closely associated with riverine and lacustrine systems	Not Needed

Common Name	Expected Effects	Reason	Possible Mitigation Actions
northern sandy tiger beetle	Positive	Prefers warm season grass (C4) dominated conditions	Not Needed
Osprey	Neutral	More closely associated with riverine and lacustrine systems	Not Needed
Ottoe skipper	Negative	Prefers cool season grass (C3) dominated conditions or mixed-cool/warm (C4) season conditions	Where possible, select for native warm season (C4) grass species that are taller in stature
pahasapa fritillary	Negative	Mid-to late summer depressional systems may be impacted	Known key depressional sites should be individually evaluated for possible mitigation actions; beaver ponds should be encouraged
Peregrine Falcon	Neutral	Associated with both warm (C4) and cool (C3) season grass dominated conditions	Not Needed
Piping Plover	Neutral	More closely associated with riverine and lacustrine systems	Not Needed
Powesheik skipperling	Negative	Prefers cool season grass (C3) dominated conditions	Where possible, select for native warm season (C4) grass species that are taller in stature as well as forbs in the sunflower family
regal fritillary	Negative	Prefers cool season grass (C3) dominated conditions	Where possible, select for native warm season (C4) grass species that are taller in stature as well as violets and nectar producing forbs
Richardson's ground squirrel	Positive	Prefers warm season grass (C4) dominated conditions	Not Needed
Ruffed Grouse	Positive	Increasing fires will create better aspen regeneration and multiple age-class conditions, at least for the short-term	Not Needed
Greater Sage-Grouse	Positive	Prefers warm season grass (C4) and shrub dominated conditions	Not Needed
Sagebrush Lizard	Positive	Increasing temperatures will lead to drier conditions, sparse vegetation, and increasing blowouts on sandy sites	Not Needed

Common Name	Expected Effects	Reason	Possible Mitigation Actions
silver-haired bat	Negative	Increasing fire frequency; forest management policies that do not allow adequate thinning will reduce late seral conditions and large trees in the landscape	Implement forest policy to allow ecosystem restoration based on historical reference conditions and climate change adjustments for species composition
Short-horned Lizard	Positive	Prefers warm season grass (C4) and shrub dominated conditions	Not Needed
Smooth Softshell	Neutral	More closely associated with riverine systems	Not Needed
Sprague's Pipit	Positive	Prefers warm season grass (C4) dominated conditions	Not Needed
swift fox	Positive	Prefers warm season grass (C4)/shrub conditions	Not Needed
Townsend's big-eared bat	Positive	Forages over warm season grass (C4) and shrub conditions	Not Needed
Trumpeter Swan	Neutral to negative	Neutral on riverine/lacustrine systems; negative on depressional systems	Known key depressional sites should be individually evaluated for possible mitigation actions
Western Box Turtle	Positive	Prefers warm season grass (C4) dominated conditions	Not Needed
Whooping Crane	Neutral	Prefers riverine systems	Not Needed
Willet	Neutral to negative	Neutral for riverine/lacustrine systems; negative for depressional systems	Known key depressional sites should be individually evaluated for possible mitigation actions
Wilson's Phalarope	Neutral to negative	Neutral for riverine/lacustrine systems; negative for depressional systems	Known key depressional sites should be individually evaluated for possible mitigation actions
White-winged Junco	Negative	Increasing fire frequency; forest management policies	Implement forest policy to allow ecosystem restoration based on historical reference conditions and climate change adjustments for species composition`
Golden Eagle	Positive	More closely associated with warm season (C4) dominated conditions	Not needed
Plains (Eastern) Spotted Skunk	Neutral	Habitat diversity likely more important than plant composition or vegetative structure.	Not needed
Monarch	Positive	Milkweeds associated with warm season (C4) dominated conditions	Not needed

Appendix C: Species profiles for species of greatest conservation need. Three new species added during 2018 Minor Revision are highlighted, and species profiles follow.

Terrestrial Species of Greatest Conservation Need

Information on each species can be found in the order listed.

Birds

[American Dipper](#)
[American Three-toed Woodpecker](#)
[American White Pelican](#)
[Baird's Sparrow](#)
[Bald Eagle](#)
[Black Tern](#)
[Black-backed Woodpecker](#)
[Burrowing Owl](#)
[Chestnut-collared Longspur](#)
[Ferruginous Hawk](#)
[Golden Eagle](#)
[Greater Prairie-Chicken](#)
[Greater Sage-Grouse](#)
[Lark Bunting](#)
[Least Tern](#)
[Le Conte's Sparrow](#)
[Lewis's Woodpecker](#)
[Long-billed Curlew](#)
[Marbled Godwit](#)
[Northern Goshawk](#)
[Osprey](#)
[Peregrine Falcon](#)
[Piping Plover](#)
[Ruffed Grouse](#)
[Sprague's Pipit](#)
[Trumpeter Swan](#)
[White-winged Junco](#)
[Whooping Crane](#)
[Willet](#)
[Wilson's Phalarope](#)

Mammals

[Black Hills Red Squirrel](#)
[Black-footed Ferret](#)
[Franklin's Ground Squirrel](#)
[Fringe-tailed Myotis](#)
[Northern Flying Squirrel](#)
[Northern Myotis](#)

Mammals continued

[Northern River Otter](#)
[Plains \(Eastern\) Spotted Skunk](#)
[Richardson's Ground Squirrel](#)
[Silver-haired Bat](#)
[Swift Fox](#)
[Townsend's Big-eared Bat](#)

Reptiles and Amphibians

[Black Hills Redbelly Snake](#)
[Blanchard's Cricket Frog](#)
[Cope's Gray Treefrog](#)
[Eastern Hognose Snake](#)
[False Map Turtle](#)
[Lesser Earless Lizard](#)
[Lined Snake](#)
[Many-lined Skink](#)
[Sagebrush Lizard](#)
[Short-horned Lizard](#)
[Smooth Softshell](#)
[Western \(Ornate\) Box Turtle](#)

Terrestrial Insects

[American Burying Beetle](#)
[Dakota Skipper](#)
[Great Plains Tiger Beetle](#)
[Indian Creek Tiger Beetle](#)
[Iowa Skipper](#)
[Little White Tiger Beetle](#)

Monarch

[Northern Sandy Tiger Beetle](#)
[Ottoe Skipper](#)
[Pahasapa Fritillary](#)
[Poweshiek Skipperling](#)
[Regal Fritillary](#)

Gastropods

[Cooper's Rocky Mountainsnail](#)
[Dakota Vertigo](#)
[Frigid Ambersnail](#)
[Mystery Vertigo](#)

Aquatic Species of Greatest Conservation Need

Information on each species can be found in the order listed.

Fishes

[Banded Killifish](#)
[Blacknose Shiner](#)
[Blackside Darter](#)
[Carmine Shiner](#)
[Central Mudminnow](#)
[Finescale Dace](#)
[Hornyhead Chub](#)
[Lake Chub](#)
[Logperch](#)
[Longnose Sucker](#)
[Mountain Sucker](#)
[Northern Pearl Dace](#)
[Northern Redbelly Dace](#)
[Pallid Sturgeon](#)
[Shovelnose Sturgeon](#)
[Sicklefin Chub](#)
[Southern Redbelly Dace](#)
[Sturgeon Chub](#)
[Topeka Shiner](#)
[Trout-Perch](#)

Freshwater Mussels

[Creek Heelsplitter](#)
[Elktoe](#)
[Hickorynut](#)
[Higgins Eye](#)
[Mapleleaf](#)
[Pimpleback](#)
[Rock Pocketbook](#)
[Scaleshell](#)
[Yellow Sandshell](#)

Aquatic Insects

[*Anaetris eximia* \(A Mayfly\)](#)
[Dakota Stonefly](#)
[Dot-winged Baskettail](#)
[Elusive Clubtail](#)

Description: Large raptor of open habitats that preys primarily on small mammals.

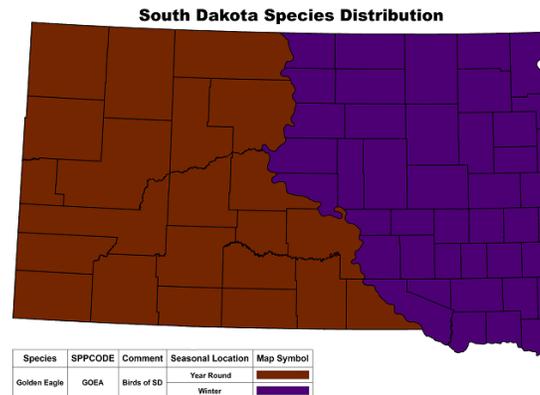
Protection Status:

Federal: None

State: None

Distribution and map:

This species nests in suitable habitats west of the Missouri River and in a few counties east of and adjacent to the Missouri River. Nesting is known from the following MLRAs: 68D, 65, 63A, 53C, 63B, 64, 60A, 62 and 61 and historically from portions of MLRAs 55C and 102C.



Key Habitats:

In South Dakota, Golden Eagles inhabit grasslands, cliffs, buttes, badlands, river corridor forests and upland woodlands. Also forages at prairie dog towns. Nesting sites are often on cliffs in open areas with potential hunting habitat nearby.

Conservation Challenges:

Habitat: see conservation challenges for native ecosystem diversity in Chapter 5

Non-habitat: disturbance at nest sites and illegal poisoning and shooting

Conservation Actions:

Habitat: Gather updated information on nesting locations, associated habitats and nest success

Non-habitat: Monitor impacts of new wind farm development near known nests; inform the public of appropriate activities near known nest locations

Current Monitoring & Inventory (Appendix E):

North American Breeding Bird Survey

Integrated Monitoring in Bird Conservation Regions

Fort Pierre National Grasslands winter raptor surveys

Inventories of nesting raptors

Christmas Bird Count

Bald Eagle Midwinter Survey

SD Ornithologists' Union's (SDOU) Seasonal Bird Observation Report System

Lower Brule Sioux Tribe Raptor Surveys

Monitored species in South Dakota Natural Heritage Database

SWG Accomplishments:

South Dakota Breeding Bird Atlas 2 (T-41)

Upgrade of SDOU's reporting system (T-69)

Breeding ecology of ferruginous hawks and golden eagles in northcentral and western South Dakota (T-58)

Priority Research and Monitoring Needs:

Updated information on nest occurrences and nest success

Existing Recovery Plans/Conservation Strategies:

U.S. Fish and Wildlife Service Western Gold Eagle Team activities (ongoing)

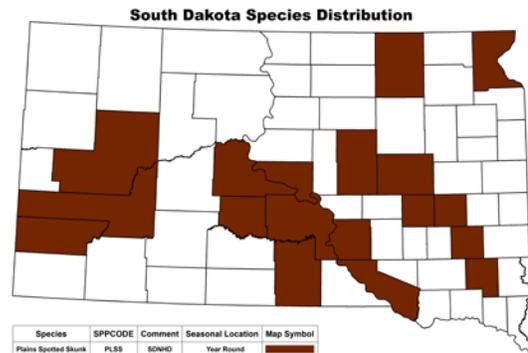
Description: Habitat generalist often associated with farmyards, farm buildings and adjacent fields.

Protection Status:

Federal: Under review for potential listing
State: None

Distribution and map:

Potentially occurs statewide, but current records concentrated in MLRAs 63A, 53C, 63B, 66, 55C, and 102B.



Key Habitats:

Farmsteads and other areas that provide escape cover, potential den sites and protection from predators and weather. May occupy buildings that have infrequent human use.

Conservation Challenges:

Habitat: see conservation challenges for native ecosystem diversity in Chapter 5
Non-habitat: localized loss of small, diverse farms due to urbanization and consolidation into “clean” intensively-farmed areas

Conservation Actions:

Habitat: Investigate the feasibility of conducting occupancy modelling
Non-habitat: Collect DNA samples opportunistically for genetics analysis and pesticide accumulation testing; develop survey or sampling methodology to update knowledge of state distribution and population status

Current Monitoring & Inventory (Appendix E):

Monitored species in South Dakota Natural Heritage Database; records used for environmental review and conservation planning

Priority Research and Monitoring Needs:

Updated information on where the species occurs and whether known “hotspots” are connected by suitable habitat to assist the U.S. Fish and Wildlife Service in making a listing decision and allow South Dakota to contribute to regional species conservation.

Description: Orange and black brushfoot butterfly with 3½ to 4" wingspan

Protection Status:

Federal: Under review for potential listing
State: None

Distribution and map:

Statewide distribution, although not documented by lepidopterist Gary Marrone in a few counties.

Key Habitats:

Larval monarchs require milkweeds, such as common, swamp and showy milkweeds, for their development. Adults nectar at many flowers, including milkweeds, thistles, gayfeathers, and garden flowers such as zinnias, cosmos, and marigolds.



Conservation Challenges:

Habitat: see conservation challenges for native ecosystem diversity in Chapter 5
Non-habitat: unknown extent of the following threats: harmful agrochemicals; impact of increased use of GMO crops to milkweed species; and climate change

Conservation Actions:

Habitat: assess status and distribution of milkweed habitat in South Dakota
Non-habitat: Participate in regional and national conservation planning efforts, such as the Mid-America Monarch Conservation Strategy, led by the Midwest Association of Fish and Wildlife Agencies, and related coordinated insect and habitat surveys

Current Monitoring & Inventory (Appendix E):

Presently limited primarily to opportunistic data collection by South Dakota lepidopterist Gary Marrone and other citizen scientists.

Priority Research and Monitoring Needs:

Determine and implement assessment of milkweed extent, particularly in eastern South Dakota
Determine relationship between monarch populations and habitat patch size and juxtaposition within areas that do not provide habitat for larvae or adults
Regional land management strategies that enhance pollinator habitat in a sustained and implementable way

Existing Recovery Plans/Conservation Strategies:

North American Monarch Conservation Plan. 2009. Commission for Environmental Cooperation, Montreal, Quebec, Canada. Accessed 27 Mar 2018:
https://monarchjointventure.org/images/uploads/documents/5431_Monarch_en.pdf

Appendix D. Species codes used in Wildlife Action Plan. Three new species and codes are highlighted.

Common Name	Scientific Name	Species Code
BIRDS		
American Dipper	<i>Cinclus mexicanus</i>	AMDI
American Three-toed Woodpecker	<i>Picoides dorsalis</i>	ATTW
American White Pelican	<i>Pelecanus erythrorhynchos</i>	AWPE
Baird's Sparrow	<i>Ammodramus bairdii</i>	BAIS
Bald Eagle	<i>Haliaeetus leucocephalus</i>	BAEA
Black Tern	<i>Chlidonias niger</i>	BLTE
Black-backed Woodpecker	<i>Picoides arcticus</i>	BBWO
Burrowing Owl	<i>Athene cunicularia</i>	BUOW
Chestnut-collared Longspur	<i>Calcarius ornatus</i>	CCLO
Ferruginous Hawk	<i>Buteo regalis</i>	FEHA
Golden Eagle	<i>Aquila chrysaetos</i>	GOEA
Greater Prairie-Chicken	<i>Tympanuchus cupido</i>	GRPC
Greater Sage-Grouse	<i>Centrocercus urophasianus</i>	SAGR
Interior Least Tern	<i>Sternula antillarum athalassos</i>	LETE
Lark Bunting	<i>Calamospiza melanocorys</i>	LARB
Le Conte's Sparrow	<i>Ammodramus leconteii</i>	LCSP
Lewis's Woodpecker	<i>Melanerpes lewis</i>	LEWO
Long-billed Curlew	<i>Numenius americanus</i>	LBCU
Marbled Godwit	<i>Limosa fedoa</i>	MAGO
Northern Goshawk	<i>Accipiter gentilis</i>	NOGO
Osprey	<i>Pandion haliaetus</i>	OSPR
Peregrine Falcon	<i>Falco peregrinus</i>	PEFA
Piping Plover	<i>Charadrius melodus</i>	PIPL
Ruffed Grouse	<i>Bonasa umbellus</i>	RUGR
Sprague's Pipit	<i>Anthus spragueii</i>	SPPI
Trumpeter Swan	<i>Cygnus buccinator</i>	TRUS
White-winged Junco	<i>Junco hyemalis aikeni</i>	WWJU
Whooping Crane	<i>Grus americana</i>	WHCR
Willet	<i>Tringa semipalmata</i>	WILL
Wilson's Phalarope	<i>Phalaropus tricolor</i>	WIPH
GASTROPODS		
Cooper's rocky mountainsnail	<i>Oreohelix strigosa cooperi</i>	CRMO
Callused (Dakota) vertigo	<i>Vertigo arthuri</i>	DAVE
frigid ambersnail	<i>Catinella gelida</i>	FRAM

mystery vertigo	<i>Vertigo paradoxa</i>	MYVE
AMPHIBIANS AND REPTILES		
Black Hills Redbelly Snake	<i>Storeria occipitomaculata pahasapae</i>	BHRS
Blanchard's Cricket Frog	<i>Acris blanchardi</i>	BCFR
Cope's Gray Treefrog	<i>Hyla chrysoscelis</i>	CGTR
Eastern Hognose Snake	<i>Heterodon platirhinos</i>	EHSN
False Map Turtle	<i>Graptemys pseudogeographica</i>	FMTU
Lesser Earless Lizard	<i>Holbrookia maculata</i>	LELI
Lined Snake	<i>Tropidoclonion lineatum</i>	LISN
Many-lined Skink	<i>Plestiodon multivirgatus</i>	MLSK
Sagebrush Lizard	<i>Sceloporus graciosus</i>	SALI
Short-horned Lizard	<i>Phrynosoma hernandesi</i>	SHLI
Smooth Softshell	<i>Apalone mutica</i>	SMSO
Western (Ornate) Box Turtle	<i>Terrapene ornata</i>	WBTU
MAMMALS		
Black Hills red squirrel	<i>Tamiasciurus hudsonicus dakotensis</i>	BHSQ
black-footed ferret	<i>Mustela nigripes</i>	BFFE
Franklin's ground squirrel	<i>Poliocitellus franklinii</i>	FGSQ
fringe-tailed myotis	<i>Myotis thysanodes pahasapensis</i>	FTMY
northern flying squirrel	<i>Glaucomys sabrinus</i>	NFSQ
northern myotis	<i>Myotis septentrionalis</i>	NOMY
northern river otter	<i>Lontra canadensis</i>	NROT
plains (eastern) spotted skunk	<i>Spilogale putorius interrupta</i>	PSSK
Richardson's ground squirrel	<i>Uroditellus richardsonii</i>	RGSQ
silver-haired bat	<i>Lasiurus noctivagus</i>	SHBA
swift fox	<i>Vulpes velox</i>	SWFO
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	TBBA
TERRESTRIAL INSECTS		
American burying beetle	<i>Nicrophorus americanus</i>	AMBE
Dakota skipper	<i>Hesperia dacotae</i>	DASK
Great Plains tiger beetle	<i>Amblycheila cylindriciformis</i>	GPTB
Indian Creek tiger beetle	<i>Cicindela nevadica makosika</i>	ICTB
Iowa skipper	<i>Atrytone arogos iowa</i>	IOSK
little white tiger beetle	<i>Cicindela lepida</i>	LWTB
monarch	<i>Danaus plexippus</i>	MONA
northern sandy tiger beetle	<i>Cicindela limbata nympha</i>	NSTB
Ottoe skipper	<i>Hesperia ottoe</i>	OTSK

pahasapa fritillary	<i>Speyeria atlantis pahasapa</i>	PAFR
Poweshiek skipperling	<i>Oarisma poweshiek</i>	POSK
regal fritillary	<i>Speyeria idalia</i>	REFR
AQUATIC INSECTS		
A Mayfly	<i>Anaetris eximia</i>	ANEX
Dakota Stonefly	<i>Perlesta dakota</i>	PEDA
Dot-winged Baskettail	<i>Epithea petechialis</i>	EPPE
Elusive Clubtail	<i>Stylurus notatus</i>	STNO
FRESHWATER MUSSELS		
Creek Heelsplitter	<i>Lasmigona compressa</i>	CRHE
Elktoe	<i>Alasmodonta marginata</i>	ELKT
Hickorynut	<i>Obovaria olivaria</i>	HICK
Higgins Eye	<i>Lampsilis higginsii</i>	HIEY
Mapleleaf	<i>Quadrula quadrula</i>	MAPL
Pimpleback	<i>Quadrula pustulosa</i>	PIMP
Rock Pocketbook	<i>Arcidens confragosus</i>	ROPO
Scaleshell	<i>Leptodea leptodon</i>	SCAL
Yellow Sandshell	<i>Lampsilis teres</i>	YESA
FISHES		
Banded Killifish	<i>Fundulus diaphanus</i>	BAKI
Blacknose Shiner	<i>Notropis heterolepis</i>	BLSH
Blackside Darter	<i>Percina maculata</i>	BLDA
Carmine Shiner	<i>Notropis percobromus</i>	CASH
Central Mudminnow	<i>Umbra limi</i>	CEMU
Finescale Dace	<i>Chrosomus neogaeus</i>	FIDA
Hornyhead Chub	<i>Nocomis biguttatus</i>	HOCH
Lake Chub	<i>Couesius plumbeus</i>	LACH
Logperch	<i>Percina caprodes</i>	LOGP
Longnose Sucker	<i>Catostomus catostomus</i>	LOSU
Mountain Sucker	<i>Catostomus platyrhynchus</i>	MOSU
Northern Pearl Dace	<i>Margariscus nachtriebi</i>	NPDA
Northern Redbelly Dace	<i>Chrosomus eos</i>	NRDA
Pallid Sturgeon	<i>Scaphirhynchus albus</i>	PAST
Shovelnose Sturgeon	<i>Scaphirhynchus platyrhynchus</i>	SHST
Sicklefin Chub	<i>Macrhybopsis meeki</i>	SICH
Southern Redbelly Dace	<i>Chrosomus erythrogaster</i>	SRDA
Sturgeon Chub	<i>Macrhybopsis gelida</i>	STCH
Topeka Shiner	<i>Notropis topeka</i>	TOSH
Trout-perch	<i>Percopsis omiscomaycus</i>	TRPE

Appendix G. Species-level research and survey needs identified during South Dakota Wildlife Action Plan revision to address conservation challenges. Amended during 2018 Minor Revision to add three species where appropriate, highlighted in table.

Conservation challenge	Future or ongoing survey needs Future research needs	Relevant SGCN	Related completed or ongoing projects
Diseases	Survey: <ul style="list-style-type: none"> Establish monitoring program to detect new occurrences of ranavirus by geographic area or watershed Monitor West Nile virus incidence and mortality (ND) Monitor white pelicans and associated colonial waterbirds for disease outbreaks (ND) 	<ul style="list-style-type: none"> Cope’s gray treefrog Blanchard’s cricket frog Greater Sage-Grouse American white pelican All SGCN terrestrial populations Golden Eagle 	<ul style="list-style-type: none"> Jake Kerby, USD, has documented ranavirus at several sites in the state and has recommended followup investigations.
	Research: <ul style="list-style-type: none"> Investigate prevalence of ranavirus in South Dakota amphibian species 		
	<ul style="list-style-type: none"> Investigate prevalence of West Nile virus and its effects on terrestrial populations, particularly birds (AK) 		<ul style="list-style-type: none"> USGS research
	<ul style="list-style-type: none"> Examine bacterial and viral species present in American pelican feces, determining strains of microorganisms that may be detrimental to populations (AK) 		
Exotic or introduced species impacts	Survey: <ul style="list-style-type: none"> Determine whether SDGFP AIS efforts should be expanded to additional areas with high levels of SGCN occurrence. 	<ul style="list-style-type: none"> all aquatic and multiple terrestrial SGCN 	<ul style="list-style-type: none"> SDGFP AIS work
Pollution/pesticides	Survey: <ul style="list-style-type: none"> Establish monitoring program for large white pelican colonies in South Dakota, in association with fish contaminant monitoring in areas 	<ul style="list-style-type: none"> American white pelican 	<ul style="list-style-type: none"> USGS research study on large white pelican colonies in the Northern Great Plains

	<p>near the largest colonies.</p> <ul style="list-style-type: none"> • Monitor pesticide and lead levels in raptors • Investigate impact of roundup-ready crops to milkweeds 	<ul style="list-style-type: none"> • Golden Eagle • Ferruginous Hawk • Monarch 	
	<p>Research:</p> <ul style="list-style-type: none"> • Secure and analyze white pelican chick mortalities for analysis of contaminant loads. 	<ul style="list-style-type: none"> • American white pelican 	<ul style="list-style-type: none"> • Smith, Brian E., and Hugh Quinn. 2012. Threats, management and suggested harvest and collection policy for herpetofauna of South Dakota. Report to South Dakota Game, Fish and Parks Department, Pierre, South Dakota.
	<p>Research:</p> <ul style="list-style-type: none"> • Analyze contaminant loads in eastern hog-nosed snakes, lined snakes, and greater short-horned lizards (HQ). 	<ul style="list-style-type: none"> • Eastern hog-nosed snake • lined snake • greater short-horned lizard 	<ul style="list-style-type: none"> •
Wetland quality (includes riparian strips)	<p>Research:</p> <ul style="list-style-type: none"> • Analyze contaminant levels in wetlands; assess damage to these areas (particularly grazing) (BS) 	<ul style="list-style-type: none"> • all amphibians • red-bellied snakes 	<ul style="list-style-type: none"> • Smith, Brian E., and Hugh Quinn. 2012. Threats, management and suggested harvest and collection policy for herpetofauna of South Dakota. Report to South Dakota Game, Fish and Parks Department, Pierre, South Dakota.
Damage to Black Hills meadows	<p>Research:</p> <ul style="list-style-type: none"> • Study effects of grazing on mesic meadows at higher elevations in the Black Hills (>4000 ft.) (BS) 	<ul style="list-style-type: none"> • Black Hills red-bellied snake 	<ul style="list-style-type: none"> • Smith, Brian E., and Hugh Quinn. 2012. Threats, management and suggested harvest and collection policy for herpetofauna of South Dakota. Report to South Dakota Game, Fish and Parks Department, Pierre, South Dakota.
Protection of habitats used by sagebrush lizards and greater short-horned lizards	<p>Research:</p> <ul style="list-style-type: none"> • Characterization of these habitat types via niche modeling (BS) 	<ul style="list-style-type: none"> • Sagebrush lizard • Greater short-horned lizard • associated species using this habitat type 	<ul style="list-style-type: none"> • Short-horned lizard survey (<i>Phrynosoma hernandesi</i>) survey in South Dakota 2008 – 2009. Final Report Submitted to the South Dakota Department of Game, Fish and Parks 31 December 2009. Hugh Quinn, Brian Smith, Holly Quinn and Gwen H. Writer. • Brian E. Smith, Jodi L. Massie, and Ben G. Blake. Distribution of the sagebrush lizards,

			<i>Sceloporus graciosus</i> , in the Black Hills of South Dakota. 2006. Unpublished report submitted to the South Dakota Department of Game, Fish and Parks.
Protection of snake hibernacula	<p>Research:</p> <ul style="list-style-type: none"> Characterization of habitat features required for snake hibernacula via GIS modeling; surveys of such habitat (BS) 	<ul style="list-style-type: none"> all snakes 	<ul style="list-style-type: none"> Smith, Brian E., and Hugh Quinn. 2012. Threats, management and suggested harvest and collection policy for herpetofauna of South Dakota. Report to South Dakota Game, Fish and Parks Department, Pierre, South Dakota. Massie, J.L., B.E. Smith, and H. Quinn. 2013. Redbelly snake (<i>Storeria occipitomaculata</i>) and smooth greensnake (<i>Opheodrys vernalis</i>) activity along roadways near a presumed hibernaculum. Report to South Dakota Department of Game, Fish and Parks, Pierre, South Dakota.
Over-collection of reptiles and amphibians	<p>Policy:</p> <ul style="list-style-type: none"> Enact bag limits for the collection of all amphibians and reptile species in South Dakota (HQ). 	<ul style="list-style-type: none"> all amphibians and reptiles 	<ul style="list-style-type: none"> Smith, Brian E., and Hugh Quinn. 2012. Threats, management and suggested harvest and collection policy for herpetofauna of South Dakota. Report to South Dakota Game, Fish and Parks Department, Pierre, South Dakota.
Genetic Structure Data	<p>Research:</p> <ul style="list-style-type: none"> Inbreeding rates and nesting success of American white pelicans, determining factors that may contribute to poor survival (AK) Examine subspecies determinations for herpetofauna. Will help understand and protect habitat for these species (AK). Participate in genetics analyses of two spotted skunk species 	<ul style="list-style-type: none"> American white pelican All herpetofauna Plains (Eastern) spotted skunk 	<ul style="list-style-type: none"> USGS research studies SDGFP herp. book

Riparian area habitat degradation and loss	Survey: <ul style="list-style-type: none"> Establish a monitoring program for mussels and other aquatic biodiversity in South Dakota, in association with housing development along riparian areas. (KPaquatics). 	<ul style="list-style-type: none"> All mussels All aquatic SGCN 	<ul style="list-style-type: none">
	Research: <ul style="list-style-type: none"> Study effects of housing developments along riparian areas on mussels and other aquatic biodiversity. (KPaquatics). 		<ul style="list-style-type: none">

Appendix H. Species-level research and survey needs identified during the South Dakota Wildlife Action Plan revision by habitat types or geographical areas. Amended during 2018 Minor Revision to add three species where appropriate, highlighted in table.

Habitat or area	Future research needs future or ongoing survey needs	Relevant SGCN	Related completed or ongoing projects
Sagebrush	Survey: <ul style="list-style-type: none"> Map sagebrush habitat on private lands Map sagebrush habitat in Fall River County (ND) Complete faunal survey of sagebrush habitat (ND) Determine quality of sagebrush (ND) Monitor sagebrush habitats (MH) 	<ul style="list-style-type: none"> Greater Sage-Grouse sagebrush lizard 	<ul style="list-style-type: none"> Wright, P. and D. Wegner. 2007. Mapping sagebrush for sage grouse habitat in Butte and Harding Counties, South Dakota. Bureau of Reclamation Technical Service Center Remote Sensing and GIS Group Technical Memorandum No. 86-68260-08-01. 35 pages. This mapping needs to be extended to the private lands. It may require updated photographs, but a good start would be to extend the current classification (MR).
	Research: <ul style="list-style-type: none"> Effects of livestock grazing on sagebrush obligates (ND) 	<ul style="list-style-type: none"> Greater Sage-Grouse sagebrush lizard 	
Wetlands	Survey: <ul style="list-style-type: none"> Update National Wetlands Inventory maps; put priority on wetlands east of the James River Research: <ul style="list-style-type: none"> How are wetland migrants distributed among natural and man-made wetlands? (Source: SD All Bird Conservation Plan) 	<ul style="list-style-type: none"> Blanchard's cricket frog Willet Wilson's Phalarope Black Tern aquatic insects Whooping Crane Piping Plover 	<ul style="list-style-type: none"> Bakker, K.K. 2005. South Dakota All Bird Conservation Plan. South Dakota Department of Game, Fish and Parks, Wildlife Division Report 2005-09.
	Survey: <ul style="list-style-type: none"> Tile drainage locations (agreement with the importance of this factor – CD) 	<ul style="list-style-type: none"> Whooping Crane Willet Long-billed Curlew Marbled Godwit Wilson's Phalarope Black Tern LeConte's Sparrow All Aquatic SGCN 	
	Research <ul style="list-style-type: none"> Impact of narrowleaf cattail and hybrid spp. on wetland birds 	<ul style="list-style-type: none"> Black Tern Trumpeter Swan 	
	Research: <ul style="list-style-type: none"> ID quality stopover habitat for wetland birds 	<ul style="list-style-type: none"> Piping Plover Willet Marbled Godwit Wilson's Phalarope 	

Grassland	Survey: <ul style="list-style-type: none"> Map remaining native prairie on a recurring basis Overlap lost grassland habitat with the habitat needs of monitored species (CD) Assess grassland habitats throughout state during migration and in breeding season (MH) 	<ul style="list-style-type: none"> Baird's Sparrow Swift Fox Western Box Turtle Dakota Skipper Sprague's Pipit Lark Bunting Baird's Sparrow Le Conte's Sparrow Chestnut-collared Longspur Golden Eagle Monarch 	<ul style="list-style-type: none"> Higgins, K.F., V. J. Smith, J.A. Jenks, J. J. Higgins, and G. A. Wolbrink. 2000. A provisional inventory of relict tallgrass prairie tracts remaining in Eastern South Dakota. SD Agricultural Experiment Station Extension Circular EC912. South Dakota State University, Brookings
	Survey: <ul style="list-style-type: none"> Map Grassland Bird Conservation Areas, West River (as done for East River by Bismarck HAPET office/Prairie Pothole Joint Venture (ND) 	<ul style="list-style-type: none"> Baird's Sparrow Swift Fox Chestnut-collared Longspur Greater Prairie-Chicken Ferruginous Hawk Lark Bunting 	
	Survey: <ul style="list-style-type: none"> Map untilled prairie on a recurring basis 	<ul style="list-style-type: none"> Baird's Sparrow Swift Fox Western Box Turtle Dakota Skipper 	
	Survey: <ul style="list-style-type: none"> Determine quality of untilled prairie 	<ul style="list-style-type: none"> Baird's Sparrow Swift Fox Western Box Turtle Dakota Skipper 	
	Research: <ul style="list-style-type: none"> Habitat requirements for non-passerine grassland birds 	<ul style="list-style-type: none"> Burrowing Owl Marbled Godwit Long-billed Curlew Greater Prairie Chicken Ferruginous Hawk Golden Eagle 	Relevant species conservation plans (ND) <ul style="list-style-type: none"> http://www.whsrn.org/sites/default/files/file/Marbled_Godwit_Conservation_Plan_10_02-28_v1.2.pdf http://www.whsrn.org/sites/default/files/file/Marbled_Godwit_Conservation_Plan_10_02-28_v1.2.pdf http://www.whsrn.org/sites/default/files/file/Long-billed_Curlew_Plan_-_USFWS_rev_2009_Sept.pdf
	Research: <ul style="list-style-type: none"> Evaluate impacts of CRP loss on wildlife (ND) 	<ul style="list-style-type: none"> Ferruginous Hawk Marbled Godwit Long-billed Curlew Greater Prairie-Chicken Willet Baird's Sparrow Lark Bunting 	<ul style="list-style-type: none"> SD State Wildlife Grant project T-59-R-1 (Evaluation of the James River Conservation Reserve Enhancement Program in South Dakota); duration 1 January 2013 – 31 December 2016

		<ul style="list-style-type: none"> Chestnut-collared Longspur Sprague's Pipit Dakota skipper Monarch 	
	Research: <ul style="list-style-type: none"> Nest success between native and "tame" grasslands (ND) 	<ul style="list-style-type: none"> Marbled Godwit Long-billed Curlew Greater Prairie-Chicken Willet Baird's Sparrow Lark Bunting Chestnut-collared Longspur Sprague's Pipit 	
Aquatic	Survey: <ul style="list-style-type: none"> Description of aquatic habitats (e.g. Substrate, flow, conductivity, temperature, dissolved oxygen, pH, and channel width) 	<ul style="list-style-type: none"> All Aquatic SGCN 	
	Survey: <ul style="list-style-type: none"> Location of springs 	<ul style="list-style-type: none"> river otter Fish SGCN 	
	Survey: <ul style="list-style-type: none"> Map lakes and streams 	<ul style="list-style-type: none"> American White Pelican Blanchard's Cricket Frog Fish SGCN 	<ul style="list-style-type: none"> Burdick, S.L. and D.L. Swanson. 2010. Status, distribution and microhabitats of Blanchard's cricket frog <i>Acris blanchardi</i> in South Dakota. Herpetological Conservation and Biology 5:9-16. (DS) Swanson, D.L. and S.L. Burdick. 2010. Overwintering physiology and hibernacula microclimates of Blanchard's cricket frogs at their northwestern range boundary. Copeia 2010:248-254. (DS)
	Survey: <ul style="list-style-type: none"> Aquatic vegetation layer (produces invertebrates as a food source) 	<ul style="list-style-type: none"> Fish SGCN Mussel SGCN Wilson's Phalarope 	
	Research: <ul style="list-style-type: none"> Bioassessment toolkit 	<ul style="list-style-type: none"> Fish SGCN Aquatic Insects 	<ul style="list-style-type: none"> Krause, J.R., K.N. Bertrand, A.Kafle, and N.H. Troelstrup, Jr. In press. A fish index of biotic integrity for South Dakota's Northern Glaciated Plains Ecoregion. Ecological Indicators.
Multiple	Research: <ul style="list-style-type: none"> What is a large intact habitat block for wildlife species in South Dakota? Conduct an assessment of grassland and wetland loss in correlation to 	<ul style="list-style-type: none"> Long-billed curlew swift fox Short-horned lizard Greater Prairie-chicken Willet 	

	wetland, wildlife, and overall ecosystem health (including effects that will be detrimental to humans, potentially including water clarity, invertebrate species composition and quantity, vegetation structure, percent full and average depth for existing wetlands) (MH)	<ul style="list-style-type: none"> Sprague's Pipit (ND) All SGCN 	
Riparian	Survey: <ul style="list-style-type: none"> Map riparian corridor habitats Monitor riparian hardwood habitat (Source: SD Private Lands Habitat & Access Programs Plan) 	<ul style="list-style-type: none"> Bald Eagle Silver-haired Myotis Northern River Otter Northern Myotis Fringe-tailed Myotis All Aquatic SGCN 	<ul style="list-style-type: none"> South Dakota Department of Game, Fish and Parks. 2008. Private Lands Habitat & Access Programs Strategic Plan. South Dakota Department of Game, Fish and Parks; Wildlife Division – Habitat Section.
Woodlands	Survey: <ul style="list-style-type: none"> Woody habitat layer including tree type or tree group; density, average tree height 	<ul style="list-style-type: none"> Silver-haired bat (MR) 	
	Research: <ul style="list-style-type: none"> Nest success between natural and man-made woodlands Monitor nesting success and factors effecting nest success of woodland birds using relevant current protocols (DS) 		<ul style="list-style-type: none"> I made a meager attempt to evaluate cowbird parasitism in green ash woodlands along the Missouri river. It was not very successful. The study was vastly underfunded. (MR) Gentry, D.J., D.L. Swanson, and J.D. Carlisle. 2006. Species richness and nesting success of migrant forest birds in natural river corridors and anthropogenic woodlands in southeastern South Dakota. <i>Condor</i> 108:140-153. (DS)
	Research: <ul style="list-style-type: none"> Establish standard methods to evaluate woodland habitat quality and compare natural and planted woodlands 		<ul style="list-style-type: none"> Uresk has already completed woodland classifications for cottonwood, green ash, oak, and box elder woodland types (MR). Liu, M. and D.L. Swanson. 2014. Physiological evidence that anthropogenic woodlots can substitute for native riparian woodlands as stopover habitat for migrant birds. <i>Physiological and Biochemical Zoology</i> 87: <i>In press</i> (DS) Thomas, N.E. and D.L. Swanson. 2013. Plasma metabolites and creatine kinase levels of shorebirds during fall migration in the Prairie Pothole Region. <i>Auk</i> 130:<i>In press</i>. http://www.jstor.org/stable/10.1525/auk.2013.12169 (DS)
Pine-juniper-mahogany habitat,	Survey: <ul style="list-style-type: none"> Outline and survey extent of this habitat type, especially related to distribution of 	<ul style="list-style-type: none"> 	

southern Black Hills	unique species (ex: Virginia's warbler) (DS)		
Black Hills	Survey/research: (MR) <ul style="list-style-type: none"> Black Hills meadows, aspen, conifers 	<ul style="list-style-type: none"> Northern Goshawk Ruffed Grouse Black Hills Red squirrel Northern flying squirrel Black-backed Woodpecker (MR) American Three-toed Woodpecker (MR) (DS) 	<ul style="list-style-type: none"> There is need for monitoring population estimate protocol for BBWO populations, and further research to tease out relations with mountain pine beetle infestations such as spatial configuration of home ranges, characteristics of trees selected for foraging, cause specific mortality. There also is need for research on summer prescribed fire and timing of wildfires as it relates to BBWO habitat (MR). There is also likely a need for genetics research on NTWO. There are a lot fewer of these than BBWOs and I suspect it would be likely there is genetic isolation here as well (MR). Ervin. A.E. 2011. Habitat selection, nesting success and genetic structure of the American Three-toed Woodpecker in the Black Hills of South Dakota. Ph.D. dissertation, University of South Dakota, Vermillion. 156 pp. (DS)
	Research: <ul style="list-style-type: none"> Effects of development on Black Hills wildlife 	<ul style="list-style-type: none"> American Dipper Northern Goshawk Black-backed, American Three-toed, and Lewis's woodpeckers Black Hills Red squirrel Northern flying squirrel Mountain Sucker Townsend's Big-eared bat 	<ul style="list-style-type: none"> I don't see development being an issue on these woodpeckers. BBWO, NTWO, and Lewis' are all uncommon disturbance dependent (at some scale), and housing is not likely a problem. We have actually searched and found nests of BBWOs behind developments in the Deerfield area (MR).
Black Hills	Research: <ul style="list-style-type: none"> Wildlife response to mountain pine bark beetle epidemic (ND) 	<ul style="list-style-type: none"> Northern Goshawk Ruffed Grouse Black-backed, American Three-toed and Lewis's woodpeckers Black Hills red squirrel Northern flying squirrel Townsend's big-eared bat 	

Appendix I. Species-level research and survey needs identified during South Dakota Wildlife Action Plan revision for terrestrial animal species groups. Amended during 2018 Minor Revision to add three species where appropriate, highlighted in table.

Species or species group	Future or ongoing survey needs Future research needs Educational needs	Relevant SGCN	Related completed or ongoing projects
BIRDS			
Raptors	<p>Survey:</p> <ul style="list-style-type: none"> • Continue to monitor nest site selection, nesting phenology, nest success, and population trends of all raptor species. • Survey small mammal populations in key habitats to assess changes in prey base. • Collate data on human-caused mortality (direct hunting, power lines, wind turbines, etc.) (ND) <p>Research:</p> <ul style="list-style-type: none"> • Identify critical habitats and prey preferences. • Research the effects of lead and other contaminants in the ecosystem to raptor populations. • Evaluate the potential effects of oil and gas development in northwest South Dakota to raptor nest success. • Assess the impact of wind energy facilities to resident and migratory raptors. • Evaluate the effects of habitat loss due to land conversion and fragmentation to raptor ecology 	<ul style="list-style-type: none"> • Bald Eagle • Osprey • Burrowing Owl • Ferruginous Hawk • Northern Goshawk • Peregrine Falcon • Golden Eagle 	<ul style="list-style-type: none"> • South Dakota Breeding Bird Atlas 1 and 2 • Bald Eagle Midwinter Survey • Bald Eagle Nest Surveys • Ft. Pierre National Grasslands winter raptor surveys • Raptor Management Surveys • A raptor survey of the Grand River National Grassland, Perkins County, SD • Aerial survey of Northwestern South Dakota for nesting golden eagles • Burrowing owl distribution and nest site selection in western South Dakota • Breeding ecology of ferruginous hawks and golden eagles in north central and western South Dakota • Nesting ecology of the northern goshawk in the Black Hills of South Dakota
	<p>Survey:</p>	<ul style="list-style-type: none"> • Osprey 	

	<ul style="list-style-type: none"> Continue to solicit sightings of color-banded birds to evaluate success of reintroduction efforts 	<ul style="list-style-type: none"> Peregrine Falcon 	
	<p>Survey:</p> <ul style="list-style-type: none"> Continue periodic monitoring of Black Hills population, including evaluation of nests that may pose risks to powerlines or other structures 	<ul style="list-style-type: none"> Osprey 	
	<p>Survey:</p> <ul style="list-style-type: none"> Investigate reports of nesting pairs or color-banded birds 	<ul style="list-style-type: none"> Peregrine Falcon 	
	<p>Species Reintroduction:</p> <ul style="list-style-type: none"> Continue the reintroduction of selected species into suitable sites across South Dakota 	<ul style="list-style-type: none"> Osprey 	<ul style="list-style-type: none"> Reintroduction of osprey into suitable sites along the Missouri River in South Dakota Peregrine falcon reintroduction in South Dakota
Colonial Waterbirds	<p>Survey:</p> <ul style="list-style-type: none"> Continue statewide long-term monitoring of populations, identification of key colonies, and searches for new colony locations. Determine what and how management actions may positively or negatively impact breeding waterbirds. Track size and locations of colonies to aid management of waterbird-fisheries conflicts. Monitor colonies with double-crested cormorants to evaluate how they impact other species in the colonies (CD) Document all bird species using Bitter Lake complex (CD) 	<ul style="list-style-type: none"> American White Pelican Black Tern Interior Least Tern Piping Plover 	<ul style="list-style-type: none"> South Dakota statewide colonial and semi-colonial Waterbird inventory with a plan for long-term monitoring, 2007. South Dakota 2012 colonial waterbird survey South Dakota Breeding Bird Atlas 1 and 2 Colonial waterbird volunteer counts, 2009 and 2010

	<p>Research:</p> <ul style="list-style-type: none"> Evaluate breeding habitat requirements and the effects of surrounding land use, changes in water levels, and human disturbances. Identify causes of colony turnover. Evaluate potential effects of commercial and non-commercial bait collection to food source availability. Research factors that contribute to and the effects of interspecific competition at colonies. 		<ul style="list-style-type: none"> Nesting success of tree-nesting waterbirds in colonies on selected wetlands in northeast South Dakota Exploration of factors that influence productivity of American white pelicans at Bitter Lake in northeastern South Dakota
American dipper	<p>Survey:</p> <ul style="list-style-type: none"> Continue monitoring nest site occupancy in Black Hills (KeB) Identify critical wintering areas (ND) Continue to document sightings of color-marked birds <p>Research:</p> <ul style="list-style-type: none"> Factors limiting population size, distribution (ND) Winter ecology (ND) Monitor breeding population/success (ND) 	<ul style="list-style-type: none"> American Dipper 	<ul style="list-style-type: none"> Forest Service also interested in monitoring. Possible sharing of personnel, etc.
Ruffed grouse	<p>Survey</p> <ul style="list-style-type: none"> Monitor long-term population trends. Possible cost share with FS (KeB) <p>Research:</p> <ul style="list-style-type: none"> Refine monitoring protocol to be more cost effective (KeB) Reasons for dramatic decrease in 	<ul style="list-style-type: none"> Ruffed Grouse 	<ul style="list-style-type: none"> Hansen, Christopher P.; Rumble, Mark A.; Millspaugh, Joshua J. 2010. Monitoring ruffed grouse in the Black Hills: Protocol and user's manual for the occupancy spreadsheet program. Gen. Tech. Rep. RMRS-GTR-246WWW. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 36 p. Integrated Monitoring in Bird Conservation Regions (IMBCR). Hansen, C.P., J.J. Millspaugh, M.A. Rumble. 2011. Occupancy

	distribution (ND)		<p>modeling of ruffed grouse in the Black Hills National Forest. J. Wildl. Manage. 75(1): 71-77.</p> <ul style="list-style-type: none"> Hansen, C.P., M.A. Rumble, J.J. Millspaugh. Ruffed grouse selection of drumming sites in the Black Hills National Forest. Am. Midl. Nat. 165:400-411.
Greater Prairie-Chicken	<p>Research: (Source: SD Prairie Grouse Management Plan)</p> <ul style="list-style-type: none"> Relate weather variables to grouse production on Ft. Pierre National Grasslands 	<ul style="list-style-type: none"> Greater Prairie-Chicken 	<ul style="list-style-type: none"> South Dakota Department of Game, Fish and Parks. no date. Prairie Grouse Management Plan for South Dakota 2011-2015. South Dakota Department of Game, Fish and Parks, Pierre, SD.
Woodpeckers	<p>Survey:</p> <ul style="list-style-type: none"> Monitor long-term population trends. Possible cost share with FS. (KeB) Develop appropriate survey and monitoring techniques (ND) Conduct baseline survey to determine distribution, estimate population sizes (ND) Develop plan for long-term monitoring (ND) <p>Research:</p> <ul style="list-style-type: none"> Evaluate effectiveness of IMBCR for monitoring trends (KeB) Evaluate woodpecker responses to tree mortality caused by mountain pine bark beetles and fire (ND) Identify limiting factors to population growth (ND) Elucidate wood-boring insect prey population cycles in burns (ND) 	<ul style="list-style-type: none"> Black-backed Woodpecker Lewis's Woodpecker American Three-toed Woodpecker 	<ul style="list-style-type: none"> Integrated Monitoring in Bird Conservation Regions (IMBCR) Alternate protocol may be needed for low density birds with irregular distribution such as black-backed woodpecker
Piping Plover and Interior	<p>Research</p> <ul style="list-style-type: none"> Assess health of sandbar habitats with 	<ul style="list-style-type: none"> Piping Plover Interior Least 	<ul style="list-style-type: none"> Variety of habitat evaluations conducted by U.S. Army Corps of Engineers, U.S.G.S. and additional research entities

Least Tern	<p>observed success of piping plover and least terns to determine successful habitat characteristics (MH)</p> <ul style="list-style-type: none"> • Continue evaluation of nesting requirements and responses to annual available habitat 	Tern	
Piping Plover	<p>Survey:</p> <ul style="list-style-type: none"> • Participate in International Piping Plover Census 	<ul style="list-style-type: none"> • Piping Plover 	<ul style="list-style-type: none"> •
Trumpeter Swan	<p>Survey:</p> <ul style="list-style-type: none"> • Winter distribution and limits to that distribution (ND) <p>Research:</p> <ul style="list-style-type: none"> • Investigate why breeding population is not spreading (ND) 	<ul style="list-style-type: none"> • Trumpeter Swan 	<ul style="list-style-type: none"> •
Northern Goshawk	<p>Research:</p> <ul style="list-style-type: none"> • Telemetry study – where do pairs go when lose nest tree/stand/ nest- and territory site fidelity (ND) • Prey preferences; prey responses to habitat change and NOGO responses to prey base changes (ND) 	<ul style="list-style-type: none"> • Northern Goshawk 	<ul style="list-style-type: none"> •
Ferruginous Hawk	<p>Research:</p> <ul style="list-style-type: none"> • Effects of prairie dog shooting, poisoning (ND) 	<ul style="list-style-type: none"> • Ferruginous Hawk 	<ul style="list-style-type: none"> •
Whooping Crane	<p>Survey:</p> <ul style="list-style-type: none"> • Continue monitoring movements and associated habitat use of migrating whooping cranes. <p>Research:</p> <ul style="list-style-type: none"> • Habitat requirements at stopover sites (ND) 	<ul style="list-style-type: none"> • Whooping Crane 	<ul style="list-style-type: none"> •

Long-billed Curlew	Survey: <ul style="list-style-type: none"> Breeding distribution in SD (ND) Location of core areas for conservation efforts (ND) 	<ul style="list-style-type: none"> Long-billed Curlew 	<ul style="list-style-type: none">
Sprague's Pipit	Research: <ul style="list-style-type: none"> Reproductive success in native versus nonnative grasslands (ND) Habitat requirements during migration (ND) 	<ul style="list-style-type: none"> Sprague's Pipit 	<ul style="list-style-type: none">
Chestnut-collared Longspur	Research: <ul style="list-style-type: none"> Identify core areas with highest population densities (ND) Long-term monitoring of all grassland bird species (ND) 	<ul style="list-style-type: none"> Chestnut-collared Longspur 	<ul style="list-style-type: none">
White-winged Junco	Survey: <ul style="list-style-type: none"> Monitor general status through existing methods, such as SDBBA2, North American Breeding Bird Survey and SDOU reporting 	<ul style="list-style-type: none"> White-winged Junco 	<ul style="list-style-type: none">
MAMMALS			
Bats	Survey: <ul style="list-style-type: none"> Monitor progression of WNS (KeB) Monitor important hibernacula sites for evidence of WNS (outside cave entrances for excessive winter/spring bat mortality) (KeB) Evaluate cave conditions to determine if conditions are conducive to WNS (KeB) Riparian area surveys, intensive monitoring programs along riparian areas in eastern SD (e.g., lakes and wetlands) and western SD (e.g., rivers) (AK) Survey: (source: SD Bat Management Plan)	<ul style="list-style-type: none"> Northern myotis Townsend's big-eared bat Silver-haired bat Red bat 	<ul style="list-style-type: none"> Nationwide monitoring of WNS (USFWS) Forest Service effort to monitor bats, hibernacula and WNS as funding and time permits. Forest Service temperature/humidity data loggers in several caves in Black Hills. South Dakota Bat Working Group. 2004. South Dakota Bat Management Plan. Wildlife Division Report 2004-08. 89 pp. Bales, B.T. 2007. Regional distribution and monitoring of bats, especially species of conservation concern, along the lower Missouri River in South Dakota. M.S. Thesis, South Dakota State University, Brookings. Swier, V.J. 2003. Distribution, roost site selection and food habits

	<ul style="list-style-type: none"> • Monitor significant hibernacula and maternity roosts through surveys, especially gated mines and caves. • Evaluate mines (marked for closure on public lands or funded for closure by public monies) through biological survey and monitoring by bat biologists before closure to determine significance of bat habitat. • Design a program for monitoring bats in South Dakota, particularly caves and mines. • Identify hibernacula and maternity roosts of bats, particularly for Townsend’s big-eared bats, and identify sites for gate installations. • Census bats along non-urban riparian corridors to understand the value of these habitats for foraging and roosting and as migration routes. • Survey bridges and box culverts along non-urban riparian corridors to determine location and type (e.g., swallow nests or crevices) of bat roosts. • Identify and protect important maternity roosts, nursery roosts, and hibernacula. (JT) <p>Research: (source: SD Bat Management Plan)</p> <ul style="list-style-type: none"> • Determine which bridge and box culvert designs are used most frequently and/or may enhance use by bats in South Dakota • Determine the relative population trend 		<p>of bats in eastern South Dakota. M.S. Thesis, South Dakota State University, Brookings.</p> <ul style="list-style-type: none"> • Tigner, J. and E.D. Stukel. 2003. Bats of the Black Hills – A description of status and conservation needs. South Dakota Department of Game, Fish and Parks. Wildlife Division Report 2003-05. • Tigner (BatWorks) contract work for SDGFP, USFWS and BLM.
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	<p>of each bat species in South Dakota.</p> <ul style="list-style-type: none"> • Continue to gather information on bat reproductive rates, home range, and movement patterns, particularly rare species, in each region of the state. • Determine the effective size of buffer zones needed around occupied caves and/or mines that serve as hibernacula and maternity roosts. • Investigate and determine impact of plant diversity and structure on bat activity at bat foraging habitats. • Determine the diets of each bat species and the relationship between invasive plant species, insect availability, and bat foraging success. • Determine the abundance and diversity of prey and investigate the impacts of pesticides on prey abundance and diversity and the effects on bats. • Analyze the potential threats to bats in areas selected as high priority for wind power generation. • Determine the effects of wind power generation sites on migratory bat populations in South Dakota. • Investigate responses of bats to fire (prescribed or wild) or other disturbance and/or catastrophe. • Continue to gather information on population genetic structure and evolutionary affinities of bat species 		
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	<p>and/or subspecies throughout the state.</p> <ul style="list-style-type: none"> • Examine the role bats play in contributing to the control of pest populations in South Dakota. • Determine the effects of selective timber harvest on bat populations in the Black Hills. • Role of abandoned mines in supporting bat populations. (JT) • Conduct future research under framework similar to <i>Guidelines for the Protection of Bat Roosts</i>, American Society of Mammalogists, 1992. (JT) <p>Education: (source: SD Bat Management Plan)</p> <ul style="list-style-type: none"> • Develop Black Hills-wide education process (e.g., newspapers, schools, and radio/TV PSA) for existing and new landowners that may have mine audits. • Share information and management recommendations and procedures on how to maintain and enhance forest stands and riparian areas for tree bat roosts. • Increase public awareness of bat use of bridges and box culverts. • Inform pest control groups about bat friendly exclusion procedures and bat biology. • Provide information regarding regulations and policies associated with bats, bat roosts and habitats to agencies, organizations, and individuals. 		
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	<ul style="list-style-type: none"> • Provide information regarding bats and their value, protection status, and (if available) conservation incentives. • Identify and develop informational tools to distribute to different publics. <p>Agency Coordination:</p> <ul style="list-style-type: none"> • Agencies involved with public land and wildlife management should develop formal relationships to maintain monitoring and continue habitat research. (JT) • Continue requiring compliance with South Dakota bat collection and sampling protocol for scientific collector's permit holders. (JT) • Protect specific locational information on significant roosting locations to prevent unnecessary disturbance. (JT) 		
Ground Squirrels	<p>Survey:</p> <ul style="list-style-type: none"> • Monitor distribution and abundance to evaluate effects of native grassland alteration. <p>Research:</p> <ul style="list-style-type: none"> • Assess habitat use and requirements • Research factors influencing distributional changes in South Dakota 	<ul style="list-style-type: none"> • Franklin's Ground Squirrel • Richardson's Ground Squirrel 	<ul style="list-style-type: none"> • Status and distribution of Franklin's and Richardson's ground squirrels in eastern South Dakota-T-53-R-1
Jackrabbits	<p>Research:</p> <ul style="list-style-type: none"> • Needs study to identify limited factors. (CD) 		
Black-footed ferret	<ul style="list-style-type: none"> • Determine the influence of predators and prey on black-footed ferret populations • Evaluate and improve reintroduction 	<ul style="list-style-type: none"> • Black-footed ferret 	<ul style="list-style-type: none"> • Research needs identified by the Conservation Subcommittee of the National Black-footed Ferret Recovery Implementation Team, letter to the Executive Committee, 20 February 2013.

	<p>methods including captive rearing, captive animal release and translocation of wild animals</p> <ul style="list-style-type: none"> • Further understand the ecology of sylvatic plague • Evaluate and improve current sylvatic plague mitigation methods including vaccination and insecticide application • Evaluate efficacy of sylvatic plague vaccine as a disease management tool and its effect on black-tailed prairie dog ecosystems 		
Arboreal squirrels	<p>Survey:</p> <ul style="list-style-type: none"> • Monitor long-term population trends. (KeB) • Conduct surveys and monitor population trends and dynamics (e.g., reproductive success). Do so in intervals (e.g., every other year) rather than annually to gather long-term data (AK) <p>Research:</p> <ul style="list-style-type: none"> • Evaluate effects of timber harvest and mountain pine beetle to population dynamics and movements • Habitat relationships, habitat use, desired habitat characteristics (KeB) 	<ul style="list-style-type: none"> • Northern flying squirrel • Red squirrel 	<ul style="list-style-type: none"> • Kiesow, A.M. Dissertation.
River otter	<p>Survey: (source: SD River Otter Management Plan)</p> <ul style="list-style-type: none"> • Update knowledge of river otter distribution in South Dakota <p>Research (source: SD River Otter Management Plan)</p> <ul style="list-style-type: none"> • Determine life history characteristics of 	<ul style="list-style-type: none"> • river otter 	<ul style="list-style-type: none"> • South Dakota Department of Game, Fish and Parks. 2012. South Dakota River Otter Management Plan. South Dakota Department of Game, Fish and Parks Wildlife Division Report Number 2012-07, Pierre, South Dakota, USA.

	<p>river otters in South Dakota</p> <ul style="list-style-type: none"> • Determine cause of mortality and reproductive status of river otters in South Dakota • Determine reproductive status of river otters in South Dakota <p>Education (source: SD River Otter Management Plan)</p> <ul style="list-style-type: none"> • Provide information to the public about river otter population and legal status 		
River otter	<ul style="list-style-type: none"> • Conduct river otter reintroduction to speed up recovery (CD) 	<ul style="list-style-type: none"> • river otter 	
Plains (Eastern) spotted skunk	<p>Survey:</p> <ul style="list-style-type: none"> • Develop survey or sampling methodology to update knowledge of state distribution and population status (CH and EDS) • Share updated information with U.S. Fish and Wildlife Service to inform listing decision (CH and EDS) <p>Research:</p> <ul style="list-style-type: none"> • Collect DNA samples opportunistically for genetics analysis and pesticide accumulation testing; (CH and EDS) • Investigate distribution connectivity within occupied range (CH and EDS) • Use survey and associated habitat data to predict occupancy potential (CH and EDS) 	<ul style="list-style-type: none"> • Plains (Eastern) spotted skunk 	
REPTILES AND AMPHIBIANS			

Amphibians and reptiles	Education: <ul style="list-style-type: none"> Conduct state wildlife law and species identification training regarding amphibians and reptiles to wildlife law enforcement and other GF&P Department personnel (HQ). 	<ul style="list-style-type: none"> All amphibians and reptiles 	<ul style="list-style-type: none"> Smith, Brian E., and Hugh Quinn. 2012. Threats, management and suggested harvest and collection policy for herpetofauna of South Dakota. Report to South Dakota Game, Fish and Parks Department, Pierre, South Dakota. Kiesow, Alyssa M. 2006. Field guide to amphibians and reptiles of South Dakota. South Dakota Department of Game, Fish and Parks. Pierre, South Dakota. Massie, J.L., B.E. Smith, and H. Quinn. 2013. Redbelly snake (<i>Storeria occipitomaculata</i>) and smooth greensnake (<i>Ophedrys vernalis</i>) activity along roadways near a presumed hibernaculum. Report to South Dakota Department of Game, Fish, and Parks, Pierre, South Dakota. Brian E. Smith, Jodi L. Massie, and Ben G. Blake. Distribution of the Sagebrush Lizard, <i>Sceloporus graciosus</i>, in the Black Hills of South Dakota. 2006. Unpublished report submitted to the South Dakota Department of Game, Fish, and Parks. Short-horned lizard (<i>Phrynosoma hernandesi</i>) survey in South Dakota 2008 – 2009. Final Report Submitted to the South Dakota Department of Game, Fish and Parks 31 December 2009. Hugh Quinn, Brian Smith, Holly Quinn and Gwen H. Writer.
	Research: <ul style="list-style-type: none"> Characterization (i.e., niche modeling) of foraging habitat used during active season to predict locations of more populations of these species in South Dakota (BS) 	<ul style="list-style-type: none"> sagebrush lizard short-horned lizard Black Hills redbelly snake 	
	Survey: <ul style="list-style-type: none"> Establish statewide effort, e.g., FrogWatch, to monitor amphibian populations. Organize and advertise citizen science program throughout the state, working with universities, Dept. of Education, etc. (AK) 	<ul style="list-style-type: none"> all amphibian species 	
	Survey: <ul style="list-style-type: none"> Establish statewide effort, e.g., FrogWatch, to monitor reptile populations. Organize and advertise citizen science program throughout the state, working with universities, Dept. of Education, etc. (AK) 	<ul style="list-style-type: none"> all reptile species 	
	Survey: <ul style="list-style-type: none"> Digitize herp. book via marking it an “app” for download. Educational product available to all. Will assist with statewide monitoring efforts (AK). 	<ul style="list-style-type: none"> all herpetofauna 	

	<p>Survey:</p> <ul style="list-style-type: none"> • Surveys of habitats in foraging habitat characterization (BS). 	<ul style="list-style-type: none"> • sagebrush lizard 	
Turtles	<p>Survey:</p> <ul style="list-style-type: none"> • Survey Missouri River false map turtle populations north of Pierre to the North Dakota border (HQ). 	<ul style="list-style-type: none"> • False map turtle 	<ul style="list-style-type: none"> • Smith, Brian E., and Hugh Quinn. 2012. Threats, management and suggested harvest and collection policy for herpetofauna of South Dakota. Report to South Dakota Game, Fish and Parks Department, Pierre, South Dakota.
	<ul style="list-style-type: none"> • Survey rivers in the northern and western portions of the state for smooth softshell populations (HQ). 	<ul style="list-style-type: none"> • Smooth softshell 	
	<ul style="list-style-type: none"> • Survey potential ornate box turtle sites identified via GIS technology by Higa et al. 2012 (HQ). 	<ul style="list-style-type: none"> • Ornate box turtle 	<ul style="list-style-type: none"> • Higa, Alessandra, Hugh Quinn, and Daniel W. Uresk. 2012. Distribution, abundance, and seasonal habitat use patterns in ornate box turtles (<i>Terrapene ornata</i>) in South Dakota. Report to South Dakota Game, Fish and Parks Department, Pierre, South Dakota.
	<p>Research:</p> <ul style="list-style-type: none"> • Examine the scope of aquatic turtle mortality as bycatch in fish traps (HQ). 	<ul style="list-style-type: none"> • False map turtle • Smooth softshell 	<ul style="list-style-type: none"> • Smith, Brian E., and Hugh Quinn. 2012. Threats, management and suggested harvest and collection policy for herpetofauna of South Dakota. Report to South Dakota Game, Fish and Parks Department, Pierre, South Dakota.
	<ul style="list-style-type: none"> • Identify areas where large concentrations of smooth softshells overwinter, and produce plans to manage those areas (HQ). 	<ul style="list-style-type: none"> • Smooth softshell 	
Turtles	<p>Policy/Enforcement:</p> <ul style="list-style-type: none"> • Identify key false map turtle and smooth softshell nesting beaches along the Missouri River, and 1) prevent nest disturbances by recreationalists, 2) establish predator (of turtle nests) 	<ul style="list-style-type: none"> • False map turtle • Smooth softshell 	<ul style="list-style-type: none"> • Smith, Brian E., and Hugh Quinn. 2012. Threats, management and suggested harvest and collection policy for herpetofauna of South Dakota. Report to South Dakota Game, Fish and Parks Department, Pierre, South Dakota.

	control programs at the beaches, and 3) post boat speed limits near the beaches (to prevent propeller injuries to females as they congregate to lay eggs) (HQ).		
	<ul style="list-style-type: none"> Encourage enactment of tribal law to provide protection of ornate box turtles on Pine Ridge and Rosebud Reservations (HQ). 	<ul style="list-style-type: none"> Ornate box turtle 	
	<p>Survey:</p> <ul style="list-style-type: none"> Continue surveys of greater short-horned lizards to better understand their distribution in the state. Use of predictive ecological niche modeling should further help define appropriate areas to search (HQ). 	<ul style="list-style-type: none"> Greater short-horned lizard 	<ul style="list-style-type: none"> Quinn, Hugh, Brian Smith, and Gwen H. Writer. 2009. Short-horned lizard (<i>Phrynosoma hernandesi</i>) in South Dakota 1008 – 2009. Report to South Dakota Game, Fish and Parks Department, Pierre, South Dakota.
	<ul style="list-style-type: none"> Conduct pitfall trap as well as visual surveys for many-lined skinks and common earless lizards in areas of sandy soils in Fall River, Shannon, Custer, Pennington, Jackson, Bennett, Mellette, Todd, Tripp and potentially Gregory Counties (HQ). 	<ul style="list-style-type: none"> Many-lined skink Common earless lizard 	
Lizards	<p>Research:</p> <ul style="list-style-type: none"> Collect and analyze molecular genetic population data of greater short-horned lizards and sagebrush lizards to examine population differentiation, gene flow, and populations potential at risk due to low genetic variation (HQ & BS). 	<ul style="list-style-type: none"> Greater short-horned lizard Sagebrush lizard 	<ul style="list-style-type: none"> Quinn, Hugh, Brian Smith, and Gwen H. Writer. 2009. Short-horned lizard (<i>Phrynosoma hernandesi</i>) in South Dakota 2008 – 2009. Report to South Dakota Game, Fish and Parks Department, Pierre, South Dakota. Smith, Brian E., and Hugh Quinn. 2012. Threats, management and suggested harvest and collection policy for herpetofauna of

	<ul style="list-style-type: none"> Examine micro- and macro-habitat use of greater short-horned lizards and sagebrush lizards to better understand the requirements of this species in South Dakota (HQ & BS). 	<ul style="list-style-type: none"> Greater short-horned lizard Sagebrush lizard 	<p>South Dakota. Report to South Dakota Game, Fish and Parks Department, Pierre, South Dakota.</p> <ul style="list-style-type: none"> Brian E. Smith, Jodi L. Massie, and Ben G. Blake. Distribution of the Sagebrush Lizard, <i>Sceloporus graciosus</i>, in the Black Hills of South Dakota. 2006. Unpublished report submitted to the South Dakota Department of Game, Fish, and Parks.
	<ul style="list-style-type: none"> Conduct genetic analyses of many-lined skink and common earless lizard populations to determine the distinctiveness of South Dakota populations from those in other parts of their ranges (HQ). 	<ul style="list-style-type: none"> Many-lined skink 	
Snakes	<p>Research:</p> <ul style="list-style-type: none"> Define patterns of genetic variation and differentiation among South Dakota eastern hog-nosed snake populations, and compare these to populations outside the state (HQ). 	<ul style="list-style-type: none"> Eastern hognose snake 	<ul style="list-style-type: none"> Smith, Brian E., and Hugh Quinn. 2012. Threats, management and suggested harvest and collection policy for herpetofauna of South Dakota. Report to South Dakota Game, Fish and Parks Department, Pierre, South Dakota. Massie, J.L., B.E. Smith, and H. Quinn. 2013. Redbelly snake (<i>Storeria occipitomaculata</i>) and smooth greensnake (<i>Opheodrys vernalis</i>) activity along roadways near a presumed hibernaculum. Report to South Dakota Department of Game, Fish, and Parks, Pierre, South Dakota.
	<ul style="list-style-type: none"> Identify specific areas of high lined snake road mortality, and design methods to ameliorate such losses (HQ). 	<ul style="list-style-type: none"> Lined snake 	
	<ul style="list-style-type: none"> Conduct genetic analyses to determine the distinctiveness of South Dakota lined snake populations from those in other parts of their range (HQ). 	<ul style="list-style-type: none"> Lined snake 	
	<ul style="list-style-type: none"> Long-term mark-recapture studies to track population densities through time (BS) 	<ul style="list-style-type: none"> snake species 	
Amphibians and reptiles	<p>Policy:</p> <ul style="list-style-type: none"> Participate in identification of Priority Amphibian and Reptile Conservation Areas (PARCAs) through regional Partners in Amphibian and Reptile Conservation 	all species	http://www.parcplace.org/publications/parcas-priority-amphibian-and-reptile-conservation-areas.html

	(PARC) chapters		
TERRESTRIAL INSECTS			
Little white tiger beetle	<p>Survey:</p> <ul style="list-style-type: none"> Survey dunes in the Hecla area to see if this is still present. Identify threats (intensive grazing). Spomer's recent habitat evaluation indicated some areas that were heavily grazed and dunes trampled. Continued presence at this site may depend on remaining undisturbed or lightly disturbed dunes (SS). Clean (undisturbed) blowouts need to be identified inland or on shores of lakes or river. Blacklighting or using Mercury Vapor can provide good results. (SS) 	<ul style="list-style-type: none"> Little white tiger beetle 	
Northern sandy tiger beetle	<p>Survey:</p> <ul style="list-style-type: none"> More surveys needed (SS) 	<ul style="list-style-type: none"> Northern sandy tiger beetle 	<ul style="list-style-type: none">
Indian Creek tiger beetle	<ul style="list-style-type: none"> Continual monitoring of these species. Due to continued loss of prairie habitats in NE SD it is important to locate larval and adult populations of insects dependent on prairie habitats (AK). 	<ul style="list-style-type: none"> Indian Creek tiger beetle 	<ul style="list-style-type: none"> Dennis Skadsen
Dakota skipper and other prairie butterflies	<p>Survey:</p> <ul style="list-style-type: none"> Continued monitoring of these species <p>Research:</p> <ul style="list-style-type: none"> Continued participation in captive propagation and reintroduction efforts 	<ul style="list-style-type: none"> Dakota skippers, other prairie butterflies 	<ul style="list-style-type: none"> Dennis Skadsen contract work Dennis Skadsen contract work in association with Minnesota Zoo
Monarch	<p>Survey:</p> <ul style="list-style-type: none"> Determine and implement assessment of milkweed extent, particularly in eastern South Dakota (CH and EDS) 	<ul style="list-style-type: none"> Monarch 	<ul style="list-style-type: none"> Mid-American Monarch Conservation Strategy development (http://www.mafwa.org/?page_id=2347)

	<ul style="list-style-type: none"> Participate opportunistically in regional and national conservation planning efforts, such as the Mid-America Monarch Conservation Strategy, led by the Midwest Association of Fish and Wildlife Agencies, and related coordinated insect and habitat surveys (CH and EDS) <p>Research:</p> <ul style="list-style-type: none"> Determine relationship between monarch populations and habitat patch size and juxtaposition within areas that do not provide habitat for larvae or adults (CH and EDS) Regional land management strategies that enhance pollinator habitat in a sustained and implementable way (CH and EDS) 		
American burying beetle	<p>Research:</p> <ul style="list-style-type: none"> Continued participation in captive propagation and reintroduction efforts 	<ul style="list-style-type: none"> American burying beetle 	<ul style="list-style-type: none">