

South Dakota
Department of Game, Fish and Parks

An Educator's Curriculum and
Resource Guide for

*FRAGILE LEGACY:
Rare Animals of
South Dakota*

Guide created by Jennifer A. Fowler
SD GF&P Wildlife Diversity Small Grant Project, 2007

FRAGILE LEGACY published by SD GF&P, 2006

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Fragile Legacy: Preface

Welcome to the Educator's Curriculum and Resource Guide for *FRAGILE LEGACY: Rare Animals of South Dakota*! This supplement can be utilized by the classroom teacher to increase awareness of the threatened and endangered animals found within South Dakota. It is a quality product that is ready to use in the classroom to meet selected middle school science standards. The materials can easily be adapted for any K-12 lessons.

This guide is a Microsoft Word document and has been designed for photographs to be copied and pasted into worksheets and PowerPoint presentations for various classroom activities. Permission has been granted for each of the photos in this resource guide and may be used for educational purposes in the classroom provided credit is noted to the photographer.

The activities provided are not detailed, instead they include a list of ideas to choose from to make planning easier and allows for individuality. Active hotlinks are provided to websites with search words for each link should it become inactive. Species accounts in this guide are current as of October 2007. Understand that an agency's management regulations may change over time.

Enjoy traveling throughout South Dakota as you join your students on their virtual field trips to various habitats!

~ Jennifer A. Fowler, Science Teacher at South Middle School in Rapid City, SD

***Fragile Legacy* books obtained by contacting:**

<http://www.sdgifp.info/Wildlife/Diversity/FragileLegacy.htm>

Start with the following links to agencies for South Dakota flora and fauna education in your classroom:

SD Game, Fish & Parks Wildlife Diversity Program

<http://www.sdgifp.info/Wildlife/Diversity/index.htm>

US Fish and Wildlife Service: Mountain-Prairie Region

www.fws.gov/mountain-prairie

US Geological Survey Northern Prairie Wildlife Research Center

www.nprwc.usgs.gov

National Park Service: Nature and Science

www.nature.nps.gov/biology

SD Game, Fish & Parks: Endangered Species Act Article

<http://www.sdgifp.info/Wildlife/Diversity/Digest%20Articles/ESA.htm>

South Dakota Project WILD

www.sdgifp.info/wildlife/education/projwild/projwild.htm

Fragile Legacy: Science Standards

Using this Resource Guide for *Fragile Legacy*, portions of the following South Dakota Middle School Science Content Standards, adopted by the SD DOE on March 22, 2005, may be met. A teacher's use of this guide may also accomplish other standards not included in this list.

SD Science Content Standards

<http://doe.sd.gov/contentstandards/science/index.asp>

6th Grade Science Standards included in this guide:

6.L.1.2. Students are able to explain the importance and scientific use of a classification system.

- Management of diversity for *organization and categorization*
- *Uniform scientific communication*

Example: identification and classification of newly-discovered organisms

✓ Kingdom, phylum, class, order, family, genus, species

✓ Kingdom classification system (monera, protista, plantae, fungi, animalia)

6.S.1.1. Students are able to describe how science and technology have *helped society to solve problems*.

Examples: *GPS, GIS, remote sensing*, prevention and treatment of diseases, vaccinations, water treatment, prosthetics

6.S.2.1. Students are able, given a scenario, to identify *the problem(s) of human activity* on the local, regional, or global environment. Examples: *urban expansion*, water treatment

7th Grade Science Standards included in this guide:

7.L.1.3. Students are able to *classify organisms* by using the currently recognized kingdoms. (Application)

Examples: monera, protista, plantae, fungi, animalia

✓ Identify and compare the *basic structure and function of major taxa*.

✓ Describe the *levels of organization* within organisms.

Example: cells to tissues to organs to systems to organisms

7.L.3.1. Students are able to predict the *effects of biotic and abiotic factors on a species' survival*. (Application)

Examples: adaptations, genetic defects, *population disturbances*, over-reproduction, animal behavior, *flooding*, global warming, oil spills, *human activity*

✓ Describe processes by which matter and energy flow through an ecosystem.

Examples: photosynthesis, respiration, nitrogen cycle

✓ Use geospatial technologies to investigate natural phenomena.

Examples: *GPS, GIS, remote sensing*

7.S.1.1. Students are able to describe how *science and technology are used to solve problems* in different professions and businesses. (Comprehension)

Examples: *GPS, GIS, remote sensing*, agriculture and genetics, medical and bio-technology (EKG), food industry and chemistry

7.S.2.1. Students are able, given a scenario, to *predict the consequence(s) of human activity* on the local, regional, or global environment. (Application)

Example: *Missouri River dams* and water needs

Fragile Legacy: South Dakota's Threatened and Endangered Animal Species

Common Name	Scientific Name	Status
<u>Vertebrates:</u>		
Mammals		
Black-footed Ferret	<i>Mustela nigripes</i>	FE, SE
River Otter	<i>Lontra canadensis</i>	ST
Black Bear	<i>Ursus americanus</i>	ST
Swift Fox	<i>Vulpes velox</i>	ST
Gray Wolf	<i>Canis lupus</i>	FE
Birds		
Peregrine Falcon	<i>Falco peregrinus</i>	SE
Whooping Crane	<i>Grus americana</i>	FE, SE
Bald Eagle	<i>Haliaeetus leucocephalus</i>	FT, ST
Eskimo Curlew	<i>Numenius borealis</i>	FE, SE
Interior Least Tern	<i>Sterna antillarum athalassos</i>	FE, SE
Piping Plover	<i>Charadrius melodus</i>	FT, ST
Osprey	<i>Pandion haliaetus</i>	ST
American Dipper	<i>Cinclus mexicanus</i>	ST
Reptiles		
False Map Turtle	<i>Graptemys pseudogeographica</i>	ST
Eastern Hognose Snake	<i>Heterodon platirhinos</i>	ST
Lined Snake	<i>Tropidoclonion lineatum</i>	SE
Fishes		
Pallid Sturgeon	<i>Scaphirhynchus albus</i>	FE, SE
Banded Killifish	<i>Fundulus diaphanus</i>	SE
Pearl Dace	<i>Margariscus margarita</i>	ST
Sturgeon Chub	<i>Macrhybopsis gelida</i>	ST
Sicklefin Chub	<i>Machrybopsis meeki</i>	SE
Longnose Sucker	<i>Catostomus catostomus</i>	ST
Blacknose Shiner	<i>Notropis heterolepis</i>	SE
Topeka Shiner	<i>Notropis topeka</i>	FE
Northern Redbelly Dace	<i>Phoxinus eos</i>	ST
Finescale Dace	<i>Phoxinus neogaeus</i>	SE
<u>Invertebrates:</u>		
Higgins' Eye	<i>Lampsilis higginsii</i>	FE
Scaleshell	<i>Leptodea leptodon</i>	FE
American Burying Beetle	<i>Nicrophorus americanus</i>	FE
Dakota Skipper	<i>Hesperia dacotae</i>	CL

SE = state endangered (in S.D.) ST = state threatened (in S.D.)
 FE = federal endangered FT = federal threatened CL = candidate for federal listing
ST and FT in Italics = species delisted since *Fragile Legacy* publication in 2006

Fragile Legacy: Activities ~ Reasons for Rarity

SD SCIENCE STANDARDS 6.S.2.1, 7.L.3.1, 7.S.2.1

OBJECTIVE Students will study the biotic and abiotic causes for concern regarding species survival. Students will be able to identify and predict consequences of human activity on local and regional environment.

MATERIALS *Fragile Legacy* book page 44
Reasons for Rarity information table

ACTIVITY IDEAS

1. Students read and discuss page 44 in *Fragile Legacy* book for an overview of the causes of species decline.
2. Students utilize the Reasons for Rarity table to categorize causes of species decline and read the individual species accounts in the *Fragile Legacy* book for more details.
3. Students determine what the marked boxes represent in the Reason for Rarity table.
4. Students make a line or bar graph using the data in the Reasons for Rarity table.
5. Students determine if more boxes in the Reasons for Rarity table should be marked. Current markings are based only on information from the *Fragile Legacy* book.
6. Students determine what actions could be taken to prevent more "X's" from being placed on the table.
7. Students determine what actions could be taken to prevent more animal species from being listed as threatened or endangered in South Dakota.

Fragile Legacy: Activities ~ Urban Expansion

SD SCIENCE STANDARDS 6.S.2.1, 7.S.2.1

OBJECTIVES Students will identify the problems of human activity of the local and regional environment.

MATERIALS Reasons for Rarity table
Habitat Photos

ACTIVITY IDEAS

1. Students first define urban expansion and identify some reasons for it.
2. Students identify how urban expansion affects habitat using the Reasons for Rarity table.
3. Teacher could print habitat photos or project in a larger format so students could discuss what they notice in each of the photos.
4. Students draw human impacts on printed pictures. (houses, cattle, towns, septic, roads)
5. Students notice the erosion patterns in the watershed as seen in the habitat photos. What factors are influenced by the watershed?
6. Students predict how future urban expansion may affect species that are not currently ranked as threatened or endangered in SD.
7. Students identify methods of conscientious urban development to minimize the human impact on the environment such as urban planning.

Fragile Legacy: Activities ~ From Mammals to Mussels

SD SCIENCE STANDARDS 6.L.1.2, 7.L.1.3

OBJECTIVES Students will study the scientific classification, organization, and categorization of 30 species found in South Dakota. Students will practice classifying organisms based on their traits of structure and function.

MATERIALS Scientific Classification table
Animal Photo Card pages

ACTIVITY IDEAS

1. Students locate trends in the classification table then compare and contrast their findings. (Examples: all 30 species are in the animal kingdom, invertebrates are not in phylum chordata, some animals share all names except a species name, and each animal has a unique scientific name)
2. Teacher could print, laminate and cut the 30 photo cards, making 1 set for each group of students. (paperclip together or store in envelope) Students make a dichotomous key by separating the 30 cards into categories based on physical traits found in the photos.
3. Students compare their criteria for splitting the first few categories of the photo cards with results from other student groups.

Fragile Legacy: Activities ~ Missouri River Habitat Investigation

SD SCIENCE STANDARDS 7.L.3.1, 7.S.2.1

OBJECTIVES Students will study the effects that Missouri River dams could have on animal species. Students will also determine effects of human activity, flooding, and other abiotic factors on animal species.

MATERIALS Missouri River Photos

ACTIVITY IDEAS

1. Students use the Least Tern and Piping Plover habitat photos to discuss requirements for their nesting habitat. What human actions could insure continual habitat availability?
2. Students study the invasive species sign and discuss the detriment of those species to the native ones in the Missouri River.
3. Students use the Gavin's Point photo to discuss advantages and disadvantages of dams in the Missouri River.
4. Students use the Endangered Species Habitat sign to discuss the role of educating the public regarding threatened and endangered species found in the area.
5. Students discuss what their role could be in conserving Missouri River habitat for future generations.
6. Students discover more information regarding the Missouri River on the following website:

US Army Corps of Engineers: Missouri River Basin
<http://www.nwd-mr.usace.army.mil/rcc/>

Fragile Legacy: Activities ~ Missouri River Photographs



Eastern shore of Lake Oahe, north of Pierre, SD.

Rocky and sandy lake shores are nesting sites for Interior Least Terns and Piping Plovers. Do Not Enter signs are posted in the nesting areas.

Photo courtesy of Jennifer A. Fowler



Rocky island in Lake Oahe north of Pierre, SD.

Islands like these are nesting sites for Interior Least Terns and Piping Plovers.

Photo courtesy of Ricky D. Olson

Fragile Legacy: Activities ~ Missouri River Photographs



‘Do Not Enter’ nesting awareness sign in nesting bird habitat.

Signs like this are posted near Interior Least Tern and Piping Plover nesting sites to deter human disturbances.

Photo courtesy of Carol Aron, USFWS



Invasive species prevention sign along Missouri River.

Eurasian watermilfoil, zebra mussels, and purple loosestrife are invasive species that are prolific in other areas of the United States. Signs like these are aimed to avoid their spread.

Photo courtesy of Jennifer A. Fowler

Fragile Legacy: Activities ~ Missouri River Photographs



Endangered Species Habitat Area sign posted at a boat launch along the Missouri River.

Educating the public is an effective way of ensuring the success of endangered species.

Photo courtesy of Jennifer A. Fowler



Gavin's Point Dam on the Missouri River, upstream of Yankton, SD.

Higgins' Eye and Scaleshell Mussels have been found below the dam.

Pallid Sturgeon, False Map Turtles, and Sicklefin Chub, currently reside in the river downstream of the dam.

Photo courtesy of Jennifer A. Fowler

Fragile Legacy: Activities ~ GPS/GIS/Remote Sensing

SD SCIENCE STANDARDS 6.S.1.1, 7.S.1.1

OBJECTIVES Students will study how science and technology can be used to solve problems.

MATERIALS Websites listed on this page

ACTIVITY IDEAS

1. Students utilize the listed websites to investigate the current research conducted in South Dakota utilizing GPS, GIS, and remote sensing.
2. Students determine how this technology can assist in the recovery and management of the threatened and endangered species in South Dakota.

Global Positioning Systems

<http://www.gps.gov/>

South Dakota GAP Analysis Project (with habitat requirements for all vertebrates)

<http://wfs.sdstate.edu/sdgap/sdgap.htm>

SD Land Cover Classification by South Dakota GAP Analysis Project

<http://wfs.sdstate.edu/sdgap/land.html>

USGS Earth Resources Observation and Science (EROS)

<http://eros.usgs.gov/>

USGS EROS State Landsat topographic maps

<http://eros.usgs.gov/imagegallery/collection.php?col=Tri-Decadal+Global+Landsat+Orthorectified+States>

USGS South Dakota Land Cover Images

<http://landcover.usgs.gov/southdakota.php>

Fragile Legacy: Reasons for Rarity ~ Causes for Concern

~ Information source: *Fragile Legacy*

	Over-harvest	Missouri River Dams	Habitat Loss	Introduced or Invasive Species	Edge of Range	Water Quality	Other
Mammals							
Black-footed Ferret			X				X
River Otter	X		X			X	
Black Bear	X		X				
Swift Fox	X		X				
Gray Wolf	X						
Birds							
Peregrine Falcon							X
Whooping Crane							
Bald Eagle							X
Eskimo Curlew	X		X				X
Interior Least Tern		X	X				X
Piping Plover		X	X				X
Osprey							X
American Dipper						X	
Reptiles							
False Map Turtle			X			X	
Eastern Hognose Snake			X		X		
Lined Snake			X				
Fishes							
Pallid Sturgeon		X	X			X	
Banded Killifish			X		X		
Pearl Dace				X	X		X
Sturgeon Chub		X	X				X
Sicklefin Chub		X			X		
Longnose Sucker						X	
Blacknose Shiner						X	
Topeka Shiner			X	X		X	X
Northern Redbelly Dace					X		
Finescale Dace					X		X
Invertebrates							
Higgins' Eye				X	X		
Scaleshell			X	X	X	X	
American Burying Beetle			X		X		X
Dakota Skipper			X				X

Fragile Legacy Species List and Scientific Classification

Common Name	Kingdom	Phylum	Class	Order	Family	Genus	Species	Subspecies
Mammals								
Black-footed Ferret	Animalia	Chordata	Mammalia	Carnivora	Mustelidae	<i>Mustela</i>	<i>nigripes</i>	
River Otter	Animalia	Chordata	Mammalia	Carnivora	Mustelidae	<i>Lontra</i>	<i>canadensis</i>	
Black Bear	Animalia	Chordata	Mammalia	Carnivora	Ursidae	<i>Ursus</i>	<i>americanus</i>	
Swift Fox	Animalia	Chordata	Mammalia	Carnivora	Canidae	<i>Vulpes</i>	<i>velox</i>	
Gray Wolf	Animalia	Chordata	Mammalia	Carnivora	Canidae	<i>Canis</i>	<i>lupus</i>	
Birds								
Peregrine Falcon	Animalia	Chordata	Aves	Falconiformes	Falconidae	<i>Falco</i>	<i>peregrinus</i>	
Whooping Crane	Animalia	Chordata	Aves	Gruiformes	Gruidae	<i>Grus</i>	<i>americana</i>	
Bald Eagle	Animalia	Chordata	Aves	Falconiformes	Accipitridae	<i>Haliaeetus</i>	<i>leucocephalus</i>	
Eskimo Curlew	Animalia	Chordata	Aves	Charadriiformes	Scolopacidae	<i>Numenius</i>	<i>borealis</i>	
Interior Least Tern	Animalia	Chordata	Aves	Charadriiformes	Sternidae	<i>Sterna</i>	<i>antillarum</i>	<i>athalassos</i>
Piping Plover	Animalia	Chordata	Aves	Charadriiformes	Charadrius	<i>Charadrius</i>	<i>melodus</i>	
Osprey	Animalia	Chordata	Aves	Falconiformes	Pandionidae	<i>Pandion</i>	<i>haliaetus</i>	
American Dipper	Animalia	Chordata	Aves	Passeriformes	Cinclidae	<i>Cinclus</i>	<i>mexicanus</i>	
Reptiles								
False Map Turtle	Animalia	Chordata	Reptilia	Testudines	Emydidae	<i>Graptemys</i>	<i>pseudogeographica</i>	
Eastern Hognose Snake	Animalia	Chordata	Reptilia	Squamata	Colubridae	<i>Heterodon</i>	<i>platirhinos</i>	
Lined Snake	Animalia	Chordata	Reptilia	Squamata	Colubridae	<i>Tropidoclonion</i>	<i>lineatum</i>	
Fishes								
Pallid Sturgeon	Animalia	Chordata	Actinopterygii	Acipenseriformes	Acipenseridae	<i>Scaphirhynchus</i>	<i>albus</i>	
Banded Killifish	Animalia	Chordata	Actinopterygii	Cyprinodontiformes	Fundulidae	<i>Fundulus</i>	<i>diaphanus</i>	
Pearl Dace	Animalia	Chordata	Actinopterygii	Cypriniformes	Cyprinidae	<i>Margariscus</i>	<i>margarita</i>	
Sturgeon Chub	Animalia	Chordata	Actinopterygii	Cypriniformes	Cyprinidae	<i>Macrhybopsis</i>	<i>gelida</i>	
Sicklefin Chub	Animalia	Chordata	Actinopterygii	Cypriniformes	Cyprinidae	<i>Machrybopsis</i>	<i>meeki</i>	
Longnose Sucker	Animalia	Chordata	Actinopterygii	Cypriniformes	Catostomidae	<i>Catostomus</i>	<i>catostomus</i>	
Blacknose Shiner	Animalia	Chordata	Actinopterygii	Cypriniformes	Cyprinidae	<i>Notropis</i>	<i>heterolepis</i>	
Topeka Shiner	Animalia	Chordata	Actinopterygii	Cypriniformes	Cyprinidae	<i>Notropis</i>	<i>topeka</i>	
Northern Redbelly Dace	Animalia	Chordata	Actinopterygii	Cypriniformes	Cyprinidae	<i>Phoxinus</i>	<i>eos</i>	
Finescale Dace	Animalia	Chordata	Actinopterygii	Cypriniformes	Cyprinidae	<i>Phoxinus</i>	<i>neogaeus</i>	
Invertebrates								
Higgins' Eye	Animalia	Moluska	Bivalvia	Unionoida	Unionidae	<i>Lampsilis</i>	<i>higginsii</i>	
Scaleshell	Animalia	Moluska	Bivalvia	Unionoida	Unionidae	<i>Leptodea</i>	<i>leptodon</i>	
American Burying Beetle	Animalia	Arthropoda	Insecta	Coleoptera	Silphidae	<i>Nicrophorus</i>	<i>americanus</i>	
Dakota Skipper	Animalia	Arthropoda	Insecta	Lepidoptera	Hesperiidae	<i>Hesperia</i>	<i>dacotae</i>	



Photo Credits:

Peregrine Falcon: Bruce Becker
 Higgins' Eye: Kevin Hanson
 Pearl Dace: Konrad Schmidt

Least Tern: USFWS
 Swift Fox: USFWS

Gray Wolf: Bruce Becker
 Piping Plover: USFWS



Photo Credits:

Lined Snake: Jeff LeClere
Dakota Skipper: Gary Marrone

Scaleshell: USFWS
Whooping Crane: International Crane Foundation

American Dipper: Doug Backlund
Black-footed Ferret: www.prairiewildlife.org



Photo Credits:

Northern Redbelly Dace: Konrad Schmidt
Longnose Sucker: Univ. of Minnesota and
Minnesota DNR

Blacknose Shiner: Konrad Schmidt
Topeka Shiner: Konrad Schmidt

Banded Killifish: Konrad Schmidt
Finescale Dace: Konrad Schmidt



Photo Credits:

Bald Eagle: Bruce Becker
American Burying Beetle: Doug Backlund

Sicklefin Chub: David Ostendorf
Eastern Hognose Snake: Jeff LeClere

Sturgeon Chub: David Ostendorf



Photo Credits:

Pallid Sturgeon: USFWS

Eskimo Curlew: Donald Bleitz & Western Foundation of Vertebrate Zoology Archives

Osprey: Doug Backlund

River Otter: Bruce Becker

Black Bear: Bruce Becker

False Map Turtle: graptemys.com

Fragile Legacy: Habitats



Roughlock Falls along Little Spearfish Creek in Lawrence County, SD.

This is a current breeding location for American Dippers. They nest behind waterfalls and in artificial nest boxes under foot bridges. There is a gravel road and foot trails nearby, and a very large chain link fence now blocks human foot traffic into this pictured area.

Photo courtesy of Jennifer A. Fowler



Swift fox habitat along Bad River Road in Stanley County, SD. They were reintroduced to this area and studies continue.

This is rural range land with gravel roads and nearby.

Photo courtesy of Jennifer A. Fowler

Fragile Legacy: Habitats



The Cheyenne River east of Wasta in Pennington County, SD.

This portion of the river is habitat for the Sturgeon Chub.

Interstate 90 is located at the base of the distant hills. The town of Wasta is upstream of this location.

Photo courtesy of Jennifer A. Fowler



Big Sioux River along Hwy 13, north of Flandreau in Moody County, SD.

This is a location of River Otter introductions by the Flandreau Sioux Tribe.

The Big Sioux River drains north eastern SD. Agricultural fields border the river.

Photo courtesy of Jennifer A. Fowler

Fragile Legacy: Habitats



Vermillion River along 306 St. north of Vermillion in Clay County, SD.

This portion of the river is habitat for the Topeka Shiner.

There are agricultural fields bordering the river.

Photo courtesy of Jennifer A. Fowler



Conata Basin in Badlands National Park and Buffalo Gap National grassland region of Pennington County, SD.

This is a Black-footed Ferret reintroduction site. There is a large prairie dog town here and a gravel road passing through.

Photo courtesy of Jennifer A. Fowler

Fragile Legacy: Habitats



Keya Paha River east of Millboro in Tripp County, SD.

The Northern Redbelly Dace and Pearl Dace currently reside in this habitat. Blacknose Shiner are no longer found in this habitat.

A tributary of the river is depicted on the upper right side of the photo.

Photo courtesy of Glenn Krumpus



Banks of the Missouri River, west of Vermillion in Clay County, SD.

The Eastern Hognose Snake prefers the sandy bank habitat of the Missouri River.

There is a soybean field and an ATV trail to the left of this photo location. This site is downstream of the Clay County Park boat launch.

Photo courtesy of Jennifer A. Fowler

Fragile Legacy: Vertebrates ~ Mammals

Black-footed Ferret

Mustela nigripes



Black-footed Ferret photo courtesy of
www.prairiewildlife.org



Reintroduction Sign photo courtesy of
Jennifer A. Fowler

Prairie Wildlife Research

<http://www.prairiewildlife.org/>

Black-footed Ferret Recovery Program

<http://www.blackfootedferret.org>

US Fish and Wildlife Service Black-footed Ferrets

<http://www.fws.gov/southdakotafieldoffice/b-fferret.htm>

US Fish and Wildlife Service Mountain-Prairie Region Black-footed Ferrets

<http://www.fws.gov/mountain-prairie/species/mammals/blackfootedferret/>

Natural Source Black-footed Ferrets

<http://www.northern.edu/natsource/ENDANG1/Bfferr1.htm>

Natural Source No Dogs Allowed! Activity

<http://www.northern.edu/natsource/DAKOTA1/Nodogs1.htm>

SD Game, Fish & Parks Dakota Natural Heritage Black-footed Ferrets

<http://www.sdgifp.info/Wildlife/Diversity/Digest%20Articles/bfferret.htm>

Fragile Legacy: Vertebrates ~ Mammals

River Otter

Lontra canadensis



River Otter photo courtesy of Bruce Becker (Madison River, Yellowstone NP)

SD Game, Fish & Parks Wildlife Diversity: River Otter

http://www.sdgfp.info/Wildlife/Diversity/river_otter_in_south_dakota.htm

University of Michigan Museum of Zoology: River Otter

http://animaldiversity.ummz.umich.edu/site/accounts/information/Lontra_canadensis.html

National Geographic Creature Feature: River otter

http://www.nationalgeographic.com/kids/creature_feature/0006/otters.html

Wisconsin Department of Natural Resources: River Otter EEK! Site

<http://dnr.wi.gov/org/caer/ce/EEK/critter/mammal/riverotter.htm>

Fragile Legacy: Vertebrates ~ Mammals

Black Bear

Ursus americanus



Black Bear photo courtesy of Bruce Becker

North American Bear Center: Black Bear

<http://www.bear.org/>

Northern Prairie Wildlife Research Center: Black Bear

<http://www.npwrc.usgs.gov/resource/wildlife/sdrare/species/ursuamer.htm>

Minnesota Department of Natural Resources: Black Bear

<http://www.dnr.state.mn.us/mammals/bears/index.html>

National Park Service: Black Bear

<http://www.nps.gov/grsm/naturescience/black-bears.htm>

Fragile Legacy: Vertebrates ~ Mammals

Swift Fox

Vulpes velox



Photo courtesy of US Fish and Wildlife Service

US Fish and Wildlife Service Mountain-Prairie Region Swift Fox

http://www.fws.gov/southdakotafieldoffice/swift_fox_main.htm

University of Michigan Museum of Zoology: Swift Fox

http://animaldiversity.ummz.umich.edu/site/accounts/information/Vulpes_velox.html

Badlands National Park Swift Fox Reintroduction

<http://www.nps.gov/archive/badl/brochures/Swift%20Fox%20EA.pdf>

US Fish and Wildlife Service Mountain-Prairie Region: Swift Fox

<http://www.fws.gov/mountain-prairie/species/mammals/swiftfox/>

Fragile Legacy: Vertebrates ~ Mammals

Gray Wolf

Canis lupus



Gray Wolf photo courtesy of Bruce Becker (Yellowstone National Park)

Wisconsin Department of Natural Resources Gray Wolf

<http://dnr.wi.gov/org/land/er/mammals/wolf/>

SD Game, Fish & Parks Wildlife Diversity Gray Wolf

<http://www.sdgfp.info/Wildlife/Diversity/Digest%20Articles/graywolf.htm>

US Fish and Wildlife Service Mountain-Prairie Region Gray Wolf

<http://www.fws.gov/southdakotafielddoffice/WOLF.HTM>

Scholastic: Gray Wolves of Yellowstone

<http://teacher.scholastic.com/wolves/gindex.htm>

Fragile Legacy: Vertebrates ~ Birds

Peregrine Falcon

Falco peregrinus



Peregrine Falcon photo courtesy of Bruce Becker

The Canadian Peregrine Foundation

<http://www.peregrine-foundation.ca/>

The Peregrine Fund: World Center for Birds of Prey

www.peregrinefund.org

Cornell Lab of Ornithology: Peregrine Falcon

http://www.birds.cornell.edu/AllAboutBirds/BirdGuide/Peregrine_Falcon.html

Wisconsin Department of Natural Resources Critter Corner: Peregrine Falcon

<http://www.dnr.state.wi.us/org/caer/ce/ee/critter/bird/falcon.htm>

Fragile Legacy: Vertebrates ~ Birds

Whooping Crane

Grus americana



Whooping Crane photo courtesy of International Crane Foundation, Baraboo, Wisconsin

US Fish and Wildlife Service South Dakota Field Office: Whooping Crane

<http://www.fws.gov/southdakotafieldoffice/CRANE.HTM>

Natural Source: Whooping Crane

<http://www.northern.edu/natsource/ENDANG1/Whoopi1.htm>

SD Game, Fish & Parks Wildlife Diversity: Whooping Crane

<http://www.sdgfp.info/Wildlife/Diversity/Digest%20Articles/whoopcrane.htm>

US Geological Survey Patuxent Wildlife Research Center: Whooping Crane

<http://whoopers.usgs.gov/photo.htm>

International Crane Foundation (look at reintroduction link from this site)

<http://www.savingcranes.org/>

Fragile Legacy: Vertebrates ~ Birds

Bald Eagle

Haliaeetus leucocephalus



Bald Eagle photo courtesy of Bruce Becker (Snake River in Idaho Falls, ID)

US Fish, and Wildlife Service: Bald Eagle Delisting

<http://www.fws.gov/midwest/eagle/>

SD Game, Fish & Parks Wildlife Diversity: Bald Eagle

<http://www.sdgfp.info/Wildlife/Diversity/BEAD/index.htm>

SD Game, Fish & Parks: Bald Eagle Management Plan

<http://www.sdgfp.info/Wildlife/WildlifePlans/BEPlan.pdf>

US Fish and Wildlife Service South Dakota Field Office: Bald Eagle

<http://www.fws.gov/southdakotafieldoffice/EAGLE.HTM>

Natural Source: Bald Eagle

<http://www.northern.edu/natsource/ENDANG1/Baldeg1.htm>

Fragile Legacy: Vertebrates ~ Birds

Eskimo Curlew

Numenius borealis



Eskimo Curlew photo courtesy of Donald Bleitz and the Western Foundation of Vertebrate Zoology Archives

Cornell Lab of Ornithology: Eskimo Curlew

http://www.birds.cornell.edu/AllAboutBirds/conservation/extinctions/eskimo_curlew

Audubon Society WatchList: Eskimo Curlew

<http://www.audubon2.org/watchlist/viewSpecies.jsp?id=80>

Environment Canada: Eskimo Curlew

http://www.ec.gc.ca/envirozine/english/issues/29/feature3_e.cfm

Texas Bird Records Committee: Eskimo Curlew

<http://www.texasbirds.org/tbrc/eskimo.html>

Fragile Legacy: Vertebrates ~ Birds

Interior Least Tern *Sterna antillarum athalassos*



Interior Least Tern photo courtesy of US Fish and Wildlife Service

SD Game, Fish & Parks: Least Tern Management Plan

<http://www.sdgameinfo.com/Wildlife/WildlifePlans/FinalLTPPMgmt1.pdf>

US Fish and Wildlife Service South Dakota Field Office: Least Tern

<http://www.fws.gov/southdakotafieldoffice/TERN.HTM>

Natural Source: Least Tern

<http://www.northern.edu/natsource/ENDANG1/Leastt1.htm>

US Fish and Wildlife Service: Interior Least Tern Fact Sheet

<http://www.fws.gov/midwest/Endangered/birds/tern.html>

Fragile Legacy: Vertebrates ~ Birds

Piping Plover

Charadrius melodus



Piping Plover and nest photo courtesy of U. S. Fish and Wildlife Service

SD Game, Fish & Parks: Piping Plover Management Plan

<http://www.sdgap.info/Wildlife/WildlifePlans/FinalLTPPMgmt1.pdf>

US Fish and Wildlife Service South Dakota Field Office: Piping Plover

<http://www.fws.gov/southdakotafieldoffice/PLOVER.HTM>

Natural Source: Piping Plover

<http://www.northern.edu/natsource/ENDANG1/Piping1.htm>

US Fish and Wildlife Service: Piping Plover Fact Sheet

<http://www.fws.gov/midwest/Endangered/pipingplover/pipingpl.html>

Fragile Legacy: Vertebrates ~ Birds

Osprey

Pandion haliaetus



Osprey photo courtesy of Doug Backlund



Osprey nest photo courtesy of Jennifer A. Fowler

The International Osprey Foundation

<http://www.ospreys.com/>

South Dakota Birds: Osprey

http://sdakotabirds.com/species/osprey_info.htm

Woods Hole Oceanographic Institute

<http://www.whoi.edu/science/osprey/osprey/cams.html>

US Geological Survey Patuxent Wildlife Research Center: Osprey

<http://www.mbr-pwrc.usgs.gov/id/framlst/i3640id.html>

Fragile Legacy: Vertebrates ~ Birds

American Dipper

Cinclus mexicanus



American Dipper photo courtesy of Doug Backlund

SD Game, Fish and Parks Wildlife Diversity: American Dipper
<http://www.sdgap.info/Wildlife/Diversity/dipper/index.htm>

US Fish and Wildlife Service Mountain-Prairie Region: American Dipper
http://www.fws.gov/southdakotafieldoffice/AmDipper_main.htm

Cornell Lab of Ornithology: American Dipper
http://www.birds.cornell.edu/AllAboutBirds/BirdGuide/American_Dipper.html

US Geological Survey Patuxent Wildlife Research Center: American Dipper
<http://www.mbr-pwrc.usgs.gov/id/framlst/i7010id.html>

Fragile Legacy: Vertebrates ~ Reptiles

False Map Turtle

Graptemys pseudogeographica



False Map Turtle photo courtesy of graptemys.com

SD Game, Fish and Parks Wildlife Diversity Article: False Map Turtle

http://www.sdqfp.info/Wildlife/Diversity/Digest%20Articles/false_map.htm

Northern Prairie Wildlife Research Center: False Map Turtle

<http://www.npwrc.usgs.gov/resource/wildlife/sdrare/species/grappseu.htm>

Home of the Map Turtles: False Map Turtle

www.graptemys.com

Reptiles and Amphibians of Minnesota: False Map Turtle

http://www.herpnet.net/Minnesota-Herpetology/turtles/falsemap_turtle.html

Fragile Legacy: Vertebrates ~ Reptiles

Eastern Hognose Snake

Heterodon platirhinos



Eastern Hognose Snake photo courtesy of Jeff LeClere www.herpnet.net

Iowa Reptiles and Amphibians Herpnet.net: Eastern Hognose Snake

http://herpnet.net/Iowa-Herpetology/index.php?option=com_content&task=view&id=49&Itemid=26

SD Game, Fish & Parks Wildlife: Eastern Hognose Snake

<http://www.sdgfp.info/Wildlife/Snakes/Easternhognosesnake.htm>

South Carolina Reptiles and Amphibians: Eastern Hognose Snake

<http://www.snakesandfrogs.com/scra/snakes/ehognos.htm>

Reptiles and Amphibians of Minnesota: Eastern Hognose Snake

http://www.herpnet.net/Minnesota-Herpetology/snakes/E.Hognose_snake.html

Fragile Legacy: Vertebrates ~ Reptiles

Lined Snake

Tropidoclonion lineatum



Lined Snake photo courtesy of Jeff LeClere www.herpnet.net

Iowa Reptiles and Amphibians herpnet.net: Lined Snake

http://www.herpnet.net/Iowa-Herpetology/index.php?option=com_content&task=view&id=53&Itemid=39

US Geological Survey Northern Prairie Wildlife Research Center: Lined Snake

<http://www.npwrc.usgs.gov/resource/wildlife/sdrare/species/tropline.htm>

SD Game, Fish & Parks Wildlife Diversity: Lined Snake

<http://www.sdgfp.info/Wildlife/Diversity/Digest%20Articles/linedsnake.htm>

Reptiles and Amphibians of Minnesota herpnet.net: Lined Snake

http://www.herpnet.net/Minnesota-Herpetology/snakes/Lined_snake.html

Fragile Legacy: Vertebrates ~ Fishes

Pallid Sturgeon

Scaphirhynchus albus



Pallid Sturgeon photo courtesy of U.S. Fish and Wildlife Service Digital Library System

SD Game, Fish and Parks Management Plan: Pallid Sturgeon

<http://www.sdgfp.info/Wildlife/WildlifePlans/FinalPallidPlan.pdf>

US Fish and Wildlife Service Mountain-Prairie Region: Pallid Sturgeon

<http://www.fws.gov/southdakotafieldoffice/STURGEON.HTM>

Natural Source: Pallid Sturgeon

<http://www.northern.edu/natsource/ENDANG1/Pallid1.htm>

Iowa Department of Natural Resources Fish and Fishing: Pallid Sturgeon

<http://www.iowadnr.com/fish/iafish/pls-card.html>

US Fish and Wildlife Service Gavin's Point National Fish Hatchery and Aquarium

http://www.fws.gov/qavinspoint/new_page_2.htm

Fragile Legacy: Vertebrates ~ Fishes

Banded Killifish

Fundulus diaphanus



Banded Killifish photo courtesy of Konrad Schmidt

University of Minnesota: Banded Killifish

http://www.gen.umn.edu/research/fish/fishes/banded_killifish.html

Iowa Department of Natural Resources Fish and Fishing: Banded Killifish

<http://www.iowadnr.com/fish/iafish/bak-card.html>

US Geological Survey Northern Prairie Wildlife Research Center: Banded Killifish

<http://www.npwrc.usgs.gov/resource/wildlife/sdrare/species/funddiap.htm>

SD Gap Analysis Project: Banded Killifish

<http://wfs.sdstate.edu/sdgap/fish/banded%20killifish.htm>

Fragile Legacy: Vertebrates ~ Fishes

Pearl Dace

Margariscus margarita



Pearl Dace photo courtesy of Konrad Schmidt

US Geological Survey Northern Prairie Wildlife Research Center: Pearl Dace
<http://www.npwrc.usgs.gov/resource/wildlife/sdrare/species/semomarg.htm>

Iowa Department of Natural Resources Fish and Fishing: Pearl Dace
<http://www.iowadnr.com/fish/iafish/ped-card.html>

University of Minnesota: Pearl Dace
http://www.gen.umn.edu/research/fish/fishes/pearl_dace.html

Inland Fishes of New York State: Pearl Dace
http://pond.dnr.cornell.edu/nyfish/Cyprinidae/pearl_dace.html

Fragile Legacy: Vertebrates ~ Fishes

Sturgeon Chub

Macrhybopsis gelida



Photo Courtesy of David Ostendorf

SD Game, Fish & Parks Wildlife Diversity: Sturgeon Chub

<http://www.sdgap.info/Wildlife/Diversity/Digest%20Articles/sschubs.htm>

US Fish and Wildlife Service Mountain-Prairie Region: Sturgeon Chub

<http://www.fws.gov/mountain-prairie/species/fish/chubs/index.htm>

US Geological Survey Northern Prairie Wildlife Research Center: Sturgeon Chub

<http://www.npwrc.usgs.gov/resource/wildlife/sdrare/species/hybogeli.htm>

Native Fish Conservancy: Sturgeon Chub

<http://www.nativefish.org/articles/sicklefin.php>

Fragile Legacy: Vertebrates ~ Fishes

Sicklefin Chub

Machrybopsis meeki



Photo courtesy of David Ostendorf

SD Game, Fish & Parks Wildlife Diversity: Sicklefin Chub

<http://www.sdgap.info/Wildlife/Diversity/Digest%20Articles/sschubs.htm>

Native Fish Conservancy: Sicklefin Chub

<http://www.nativefish.org/articles/sicklefin.php>

US Fish and Wildlife Service Mountain-Prairie Region: Sicklefin Chub

<http://www.fws.gov/mountain-prairie/species/fish/chubs/index.htm>

US Geological Survey Northern Prairie Wildlife Research Center: Sicklefin Chub

<http://www.npwrc.usgs.gov/resource/wildlife/sdrare/species/hybomeek.htm>

Fragile Legacy: Vertebrates ~ Fishes

Longnose Sucker

Catostomus catostomus



Photo courtesy of University of Minnesota and Minnesota DNR

University of Minnesota: Longnose Sucker

http://www.gen.umn.edu/research/fish/fishes/longnose_sucker.html

US Geological Survey Northern Prairie Wildlife Research Center: Longnose Sucker

<http://www.npwrc.usgs.gov/resource/wildlife/sdrare/species/catocato.htm>

US Geological Survey: Longnose Sucker

<http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=345>

Pennsylvania Department of Conservation and Natural Resources: Longnose Sucker

<http://www.gis.dcnr.state.pa.us/hgis/factsheets/11350.pdf>

Fragile Legacy: Vertebrates ~ Fishes

Blacknose Shiner

Notropis heterolepis



Blacknose Shiner photo courtesy of Konrad Schmidt

SD Game, Fish & Parks Wildlife Diversity: Blacknose Shiner

<http://www.sdqfp.info/Wildlife/Diversity/Digest%20Articles/blacknose.htm>

Iowa Department of Natural Resources Fish and Fishing: Blacknose Shiner

<http://www.iowadnr.com/fish/iafish/bks-card.html>

University of Minnesota: Blacknose Shiner

http://www.gen.umn.edu/research/fish/fishes/blacknose_shiner.html

Inland Fishes of New York State: Blacknose Shiner

http://pond.dnr.cornell.edu/nyfish/Cyprinidae/blacknose_shiner.html

Fragile Legacy: Vertebrates ~ Fishes

Topeka Shiner

Notropis topeka



Topeka Shiner photo by Konrad P. Schmidt

SD Game, Fish & Parks Wildlife Diversity: Topeka Shiner Management Plan
<http://www.sdgame.com/Wildlife/Diversity/Topeka%20Shiner/Topekashiner.htm>

US Fish and Wildlife Service Mountain-Prairie Region: Topeka Shiner
<http://www.fws.gov/southdakotafielddoffice/TOPEKA.HTM>

University of Minnesota: Topeka Shiner
http://www.gen.umn.edu/research/fish/fishes/topeka_shiner.html

US Fish and Wildlife Service Endangered Fishes: Topeka Shiner
http://www.fws.gov/midwest/Endangered/fishes/tosh_mn.html

Fragile Legacy: Vertebrates ~ Fishes

Northern Redbelly Dace

Phoxinus eos



Northern Redbelly Dace photo by Konrad Schmidt

US Geological Survey Northern Prairie Wildlife Research Center: Northern Redbelly Dace

http://www.npwrc.usgs.gov/resource/wildlife/sdrare/species/phoxeos_.htm

University of Minnesota: Northern Redbelly Dace

http://www.gen.umn.edu/research/fish/fishes/northern_red.html

Inland Fishes of New York State: Northern Redbelly Dace

http://pond.dnr.cornell.edu/nyfish/Cyprinidae/northern_redbelly_dace.html

Pennsylvania Department of Conservation and Natural Resources: Northern Redbelly Dace

<http://www.dcnr.state.pa.us/wrcf/factsheets/northern%20redbelly%20dace.pdf>

Fragile Legacy: Vertebrates ~ Fishes

Finescale Dace

Phoxinus neogaeus



Finescale Dace photo by Konrad Schmidt

University of Minnesota: Finescale Dace

http://www.gen.umn.edu/research/fish/fishes/finescale_dace.html

Inland Fishes of New York State: Finescale Dace

http://pond.dnr.cornell.edu/nyfish/Cyprinidae/finescale_dace.html

US Department of Agriculture Forest Service Species Conservation Project: Finescale Dace

<http://www.fs.fed.us/r2/projects/scp/assessments/finescaledace.pdf>

US Geological Survey Northern Prairie Wildlife Research Center: Finescale Dace

<http://www.npwrc.usgs.gov/resource/wildlife/sdrare/species/phoxneog.htm>

Fragile Legacy: Invertebrates ~ Mollusks

Higgins' Eye

Lampsilis higginsii



Higgins' Eye photo courtesy of Kevin Hanson, Iowa DNR

US Fish and Wildlife Service Mountain-Prairie Region: Higgins' Eye

<http://www.fws.gov/southdakotafieldoffice/hepm-facts.pdf>

Mississippi National River and Recreational Area: Higgins' Eye

<http://www.nps.gov/archive/miss/features/mussels/musselpages/higginseye.html>

Wisconsin Department of Natural Resources: Higgins' Eye

<http://dnr.wi.gov/org/land/er/invertebrates/mussels/higginseye.htm>

US Fish and Wildlife Service Endangered Species Program: Higgins' Eye

<http://www.fws.gov/midwest/Endangered/section7/higgins.html>

Fragile Legacy: Invertebrates ~ Mollusks

Scaleshell

Leptodea leptodon



Scaleshell Mussel photo courtesy of U. S. Fish and Wildlife Service

US Fish and Wildlife Service Mountain-Prairie Region: Scaleshell

http://www.fws.gov/southdakotafieldoffice/scmu_fct.pdf

US Fish and Wildlife Service Endangered Species Program: Scaleshell

http://www.fws.gov/Midwest/endangered/clams/scmu_fct.html

US Fish and Wildlife Service Endangered Species Facts: Scaleshell

http://library.fws.gov/Pubs3/scaleshell_mussel_facts.pdf

US Fish and Wildlife Service Threatened and Endangered Mussels: Scaleshell

<http://www.fws.gov/midwest/mussel/threatened.html>

Fragile Legacy: Invertebrates ~ Insects

American Burying Beetle

Nicrophorus americanus



American Burying Beetle photo courtesy of Doug Backlund

The American Burying Beetle in South Dakota

<http://www.sdgfp.info/Wildlife/Diversity/ABB/ABB.htm>

Natural Source: American Burying Beetle

<http://www.northern.edu/natsource/ENDANG1/Buryin1.htm>

Center for Conservation of the American Burying Beetle

<http://www.stlzoo.org/wildcareinstitute/americanburyingbeetlesinmi/>

University of Nebraska State Museum: American Burying Beetle

<http://www-museum.unl.edu/research/entomology/endanger.htm>

Texas Entomology: American Burying Beetle

<http://www.texasento.net/ABB.htm>

US Fish and Wildlife Service Mountain-Prairie Region: American Burying Beetle

<http://southdakotafieldoffice.fws.gov/BEETLE.HTM>

Fragile Legacy: Invertebrates ~ Insects

Dakota Skipper

Hesperia dacotae



Dakota Skipper photo courtesy of Gary Marrone

SD Game, Fish & Parks Wildlife Diversity Dakota Skipper

<http://www.sdgfp.info/Wildlife/Diversity/dskipper%20surveys.pdf>

US Fish and Wildlife Service Mountain-Prairie Region: Dakota Skipper

<http://www.fws.gov/southdakotafieldoffice/skipper.HTM>

Natural Source: Dakota Skipper

<http://www.northern.edu/natsource/ENDANG1/Dakota1.htm>

Nothern Prairie Wildlife Research Center: Dakota Skipper

<http://www.npwrc.usgs.gov/resource/insects/bflynd/index.htm>

US Fish and Wildlife Service Endangered Species Program: Dakota Skipper

<http://www.fws.gov/midwest/Endangered/insects/dask-q&a.html>