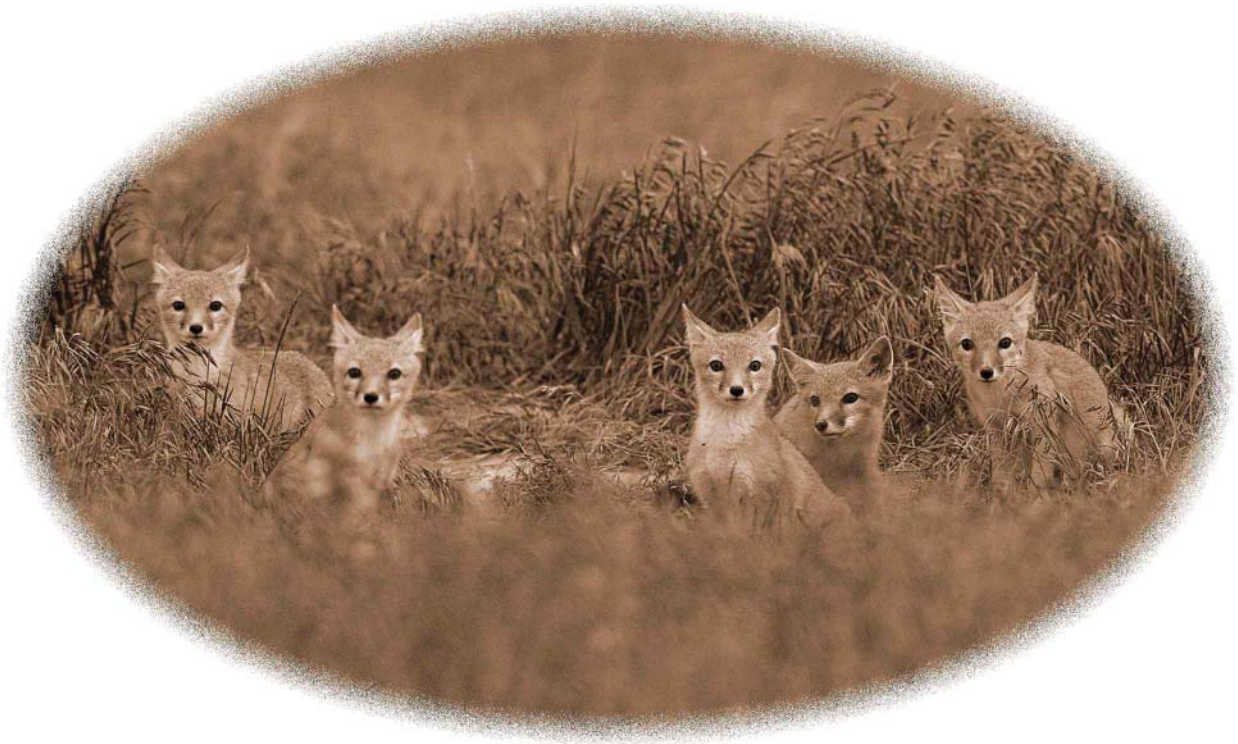




# Swift Fox Curriculum Unit

Grades 7-12



Teacher Background Information

Lesson 1: Swift Fox Inquiry & Presentations

Lesson 2: Meet with a Park Ranger

Lesson 3: Data Analysis Lab

Lesson 4: Review Data Results with Ranger

*Data and Student Sheets included with lessons*



# Badlands National Park

## Swift Fox Curriculum Unit

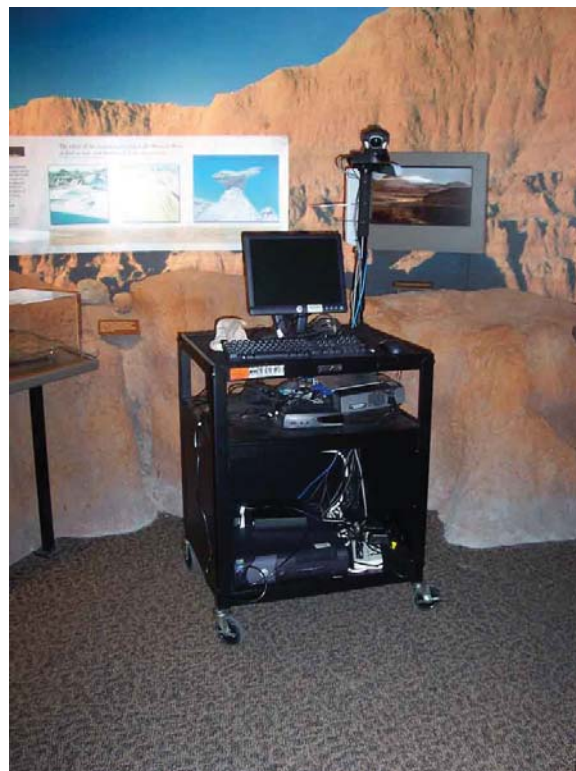
Thank you for your interest in the Badlands National Park Swift Fox Curriculum Unit. This unit uses research data from the swift fox restoration program at Badlands National Park to explore topics such as populations, ecological interdependence, genetic diversity, and the job of wildlife biologists. The background information and lessons offer real world examples of science in action. Students have the unique opportunity to interact with park rangers and analyze real scientific data. Students will research the natural history of swift foxes, meet with park staff, and make predictions based on the information they have gathered. We hope that you and your students find this unit a rewarding learning experience.

### Audience

The Swift Fox Curriculum Unit is intended for life science students in grades 7 through 12. The park ranger can modify individual presentations to better meet your classroom needs. The unit can be adapted for other groups and grade levels.

### Distance Learning Teleconference

Lessons 2 and 4 feature distance learning teleconferences between your classroom and Badlands National Park staff. If your school has a distance learning teleconferencing system then park staff will work with you and your school's IT department to establish a connection. For more information or to schedule the distance learning teleconferences, please contact



Badlands National Park distance learning system

**Julie Johndreau**  
Education Specialist  
605-433-5242  
[BADL\\_Information@nps.gov](mailto:BADL_Information@nps.gov)

Badlands National Park Distance Learning IP Address: 64.251.168.34



# Badlands National Park

## Education Standards

This Swift Fox Curriculum Unit was developed in accordance with both the National Science Education Standards and the South Dakota State Content Standards. This unit is appropriate for science students in grades 7 through 10. The lessons can be modified by classroom teachers to meet the individual goals of their classroom curriculum.

## National Science Education Standards

### Grades 7-8

Life Science Content Standard C As a result of their activities in grades 5-8, all students should develop understanding of populations and ecosystems.

A population consists of all individuals of a species that occur together in a given place and time. All populations living together and the physical factors with which they interact compose an ecosystem.

The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range of temperature, and soil composition. Given adequate biotic and abiotic resource and no disease or predators, populations (including humans) increase at rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem.

### Grades 9-12

Life Science Content Standard C: As a result of their activities in grades 9-12, all students should develop understanding of interdependence of organisms

Organisms both cooperate and compete in ecosystems. The interrelationships and interdependencies of these organisms may generate ecosystems that are stable for hundreds or thousands of years.

Living organisms have the capacity to produce populations of infinite size, but environments and resources are finite. This fundamental tension has profound effects on the interactions between organisms.

Human beings live within the world's ecosystems. Increasingly, humans modify ecosystems as a result of population growth, technology, and consumption. Human destruction of habitats through direct harvesting, pollution, atmospheric changes, and other factors is threatening current global stability, and if not addressed, ecosystems will be irreversibly affected.



# Badlands National Park

## South Dakota Content Standards

### Seventh Grade

#### Seventh Grade Life Science

Indicator 3: Analyze how organisms are linked to one another and the environment.

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

#### Seventh Grade Science, Technology, Environment, and Society

Indicator 1: Analyze various implications/effects of scientific advancement within the environment and society.

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

Indicator 2: Analyze the relationships/interactions among science, technology, environment, and society.

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.

### Eighth Grade

#### Eighth Grade Science, Technology, Environment, and Society

Indicator 1: Analyze various implications/effects of scientific advancement within the environment and society.

8.S.1.1. Students are able to describe how science and technology have been influenced by social needs, attitudes, and values.

Indicator 2: Analyze the relationships/interactions among science, technology, environment, and society.

8.S.2.1. Students are able, given a scenario, to offer solutions to problems created by human activity on the local, regional, or global environment.

### High School

#### Core High School Life Science

Indicator 3: Analyze how organisms are linked to one another and the environment.

9-12.L.3.1. Students are able to identify factors that can cause changes in stability of populations, communities, and ecosystems.

#### Core High School Nature of Science

Indicator 1: Understand the nature and origin of scientific knowledge.

9-12.N.1.1. Students are able to evaluate a scientific discovery to determine and describe how societal, cultural, and personal beliefs influence scientific investigations and interpretations.

9-12.N.1.2. Students are able to describe the role of observation and evidence in the development and modification of hypotheses, theories, and laws.



# Teacher Background Information

## Swift Fox Timeline

In the late 1800's to early 1900's swift fox populations were reduced due to fur trapping, conversion of land to agriculture, and indirect poisoning. Follow the timeline below to explore the history of swift fox populations in North America.

- 1983 Swift fox reintroduction program begins in Canada
- 1992 Petition to place swift fox on Endangered Species List
- 1994 U.S. Fish and Wildlife Service (USFWS) determine swift fox should be listed as a Threatened Species, but decides that it is "precluded by other higher priority species."
- 1994 Swift Fox Conservation Team established in United States-conglomerate of state wildlife agencies and federal agencies formed in response to non-listing of swift fox. Sent the USFWS a draft Conservation Assessment and Conservation Strategy outlining swift fox management strategies.
- 1998 Canadian reintroduction program transitions into monitoring program
- 1998 Swift fox releases begin in Montana on Blackfeet Reservation
- 2001 USFWS removes swift fox from Threatened Species candidate status because of improving populations. Continued "vigilance" recommended to ensure continued success of swift fox populations.
- 2001 Swift Fox Conservation Team visits Badlands National Park and Buffalo Gap National Grassland to assess potential for swift fox reintroduction. Determined that wide area of potential swift fox habitat exists in these areas.
- 2002 Turner Endangered Species Fund (TESF) begins Swift Fox reintroduction program on Bad River Ranch, northeast of Badlands National Park.
- 2003 -  
2006 Badlands National Park (NP) releases 114 wild swift foxes, translocated from Colorado
- 2004 3 litters and 15 pups monitored in Badlands NP
- 2005 13 litters and 48 pups monitored in Badlands NP
- 2006 15 litters and 55 pups monitored in Badlands NP
- 2006 Lower Brule Sioux Tribe begins swift fox reintroduction program northeast of Badlands NP
- 2007 27 litters and 109 pups monitored in Badlands NP



# Teacher Background Information

## A Shortgrass Prairie Neighborhood

Take a walk through Badlands National Park. Fairly soon you will step into a swift fox's neighborhood. You will be walking through a land sparsely carpeted in short grasses, perhaps as high as your ankles in some spots. A few spaces might be a bit taller, but not by much. You are in the land of mixed-grass prairie, dominated by species like buffalo grass and wheat grass. Prairie dogs will yip and squeak to warn others of your approach. You might see the head of a prairie dog, just before it ducks into its safe underground burrow.

If you are very lucky, gazing in the distance you might see a swift fox looking at you curiously, with large pointed ears, bright eyes, and pointed snout. The fox's lanky grayish, brown body with orange-tan sides will snap around to dive into a burrow, leaving a glimpse of a black-tipped bushy tail behind. The swift fox is the smallest North American member of the canine family. It also spends more time underground than any other North American canine. While coyotes may use a den for part of the year, swift foxes depend on burrows year round for home.

Burrows act as protection from predators and bad weather, as well as home for raising babies. The swift fox may dig its own, or take over an abandoned burrow. Chances are more than one burrow is in the area, as swift foxes often utilize more than one, and family members sometimes stay nearby.

### **Quick Facts**

**Family:** Canidae

**Species:** *Vulpes velox*

**Weight:** 4-6 lbs.

**Height:** 12 inches

**Length:** 31 inches (about the size of a housecat)

**Diet:** prairie dogs, other rodents, birds, arthropods

**Habits:** nocturnal with some daytime activity close to burrows uses underground burrows for protection and raising young

**Habitat:** Short and mixed-grass prairie

**Predators:** coyotes, golden eagles, badgers

**Reproduction:** 4 to 6 pups, both parents care for family

**Life-span:** wild 3 to 5 years, captivity up to 13 years



NPS Photo: Shortgrass prairie habitat found in Badlands NP

Between May and October, a burrow can provide protection for a pair of foxes, along with 4 to 6 young pups. Both the male and female will care for the babies for 4 to 6 months. Swift fox pups stick with their parents longer than any other North American canine. Pups will not even leave the den until they are a month old. The parents usually mate between January and March, and appear to stay together for life. About 51 days after parents mate, pups are born.

Swift foxes spend most of the day underground, but will occasionally come outside while staying very close to home. Early in the morning, swift foxes hunt prairie dogs and other small mammals. As the prairie dogs emerge from their burrows, a swift fox may pounce. At times like these, even

the relative safety of the prairie dog's burrow is compromised. Swift foxes also eat insects, birds, arthropods, and carrion. The swift fox can roam over 6 to 15 square miles.



## Teacher Background Information

While out and about, swift foxes must be on the look out for potential dangers. Animals like golden eagles and badgers are on the prowl for their own meals. Coyotes are usually the most pressing threat in a swift fox's life, both hunting the foxes and competing for the same food. Living in mixed-grass prairie means foxes have a clear view of the area surrounding them. If foxes spot predators, the small canines will dive into a burrow for protection. Running is also a defense mechanism for the foxes, and the source of their name. Clocked at about 35 mph, the swift fox can run as fast as a car travels on smaller city roads.

### Losing Neighbors: The Decline of the Swift Fox

During the late 1800's and early 1900's, the swift fox's neighborhood began to change. Before the western expansion in the United States, people were relatively few and far between. However, as the years progressed, homesteaders started moving west to build new lives and find new opportunities. With increasing populations came neighborhood changes.

Instead of open rolling hills with relatively short grass, roaming bison, and prairie dogs, the swift fox neighborhood was filled with taller crops and huge herds of cattle. Crops grew taller while areas for burrows disappeared. Swift foxes could no longer see to the horizon to avoid predators.

In other efforts to protect their own homes, people set out strychnine-poisoned baits to attract and eliminate wolves along with other predators. As carrion eaters, swift foxes were also attracted to the baits, dying in large numbers. Later, people poisoned prairie dogs. Swift foxes ate the poisoned prairie dogs and died. Swift fox populations declined further.

#### *Quick Facts*

- **Swift fox population declined in early to mid 1900's**
- **Decline resulted from homesteaders and growing population changing mixed-grass prairie into agriculture land**
- **Decline resulted from poisoning of wolves, coyotes, and prairie dogs.**
- **With new laws preventing poisoning and declining agriculture usage, population started increasing in mid-1900's**

These two major forces hit the swift fox populations almost simultaneously, with drastic consequences. In the early 1800's before significant land changes and population increases, swift foxes were considered common in South Dakota, North Dakota, Montana, Nebraska, Wyoming, Colorado, Kansas, Oklahoma, New Mexico, and Texas, as well as southern parts of Canada. In the early to mid 1900's swift fox sightings became rare, and in some states non-existent.

However, in the 1950's the swift fox began to make a come-back. The usage of poison to control wolves and other predators was gradually banned. The swift fox began to rebound in population, and expand into some of its former habitat. By the late 1990's, swift foxes were recorded in many of its former home ranges. However, the foxes were still missing from North Dakota, and actually decreasing in South Dakota. South Dakota listed the swift fox as a state Threatened Species.



# Teacher Background Information

## A Piece of the Piece: Swift Foxes in Badlands National Park

Stepping into Badlands National Park means stepping into the largest protected prairie ecosystem in the National Park System. Looking at the horizon, sharp and flat teeth-like buttes rise up. Looking north the horizon fills with a combination of subtly undulating hills and wide flat expanses. These horizons used to contain swift fox homes.

Badlands NP began looking at whether or not its horizons could once again provide homes for swift foxes. As a piece of the South Dakota landscape, and part of the National Park Service, Badlands NP works to preserve the land's natural ecosystem, particularly any state threatened or endangered species. The goals of both the National Park Service and Badlands National Park, as well as the swift fox's South Dakota status as a threatened species made the little canine a big priority.

The small mammals are not the first disappearing puzzle piece returning to Badlands National Park prairies. Bighorn sheep, bison, and the black-footed ferret are all pieces of Badland's biodiversity. All of these species can again be found in the park thanks to a combination of management, reintroductions, and community cooperation. In 2001, Badlands National Park hoped the swift fox would join this group of come-backs.

### *Quick Facts*

- **Badlands NP historical swift fox home.**
- **Swift foxes disappeared from most of South Dakota including Badlands NP.**
- **As part of National Park Service, Badlands NP works to preserve all pieces of ecosystems as well as state threatened or endangered species.**



Photo Copyright Rikk Flohr





# Teacher Background Information

## Setting the Scene

In 2001, Swift Fox Conservation Team scientists and experts deemed Badlands NP as suitable habitat. After this initial step, biologists looked at the habitat from the perspective of a swift fox. A swift fox is concerned with one thing: survival. Survival means finding food and avoiding predators, specifically coyotes.

Biologists gathered a better view of potential release sites using GIS information and observations. Scientists created a model laying out elevations and soil types. Flat and gently rolling areas were considered good release sites. One piece of survival covered.

What about the other part of surviving? What about not becoming a meal? Biologists also tried to take into account where swift fox predators live. Coyotes, like swift foxes, have areas they call home. Biologists found main coyote home ranges using coyote GPS collars. The collars recorded coyote locations on a regular basis. After six months, collars dropped off the coyotes. Biologists located the collars using radio signals. Using the GPS information, Badlands NP staff created coyote territory maps. Because coyote populations are always changing, scientists continued capturing and GPS monitoring during multiple years of swift fox releases.

Swift fox reintroductions took advantage of both the land data and coyote data. Releases would take place close to prairie dog colonies, but on the outskirts of coyote territories.

### ***Quick Facts***

- **Biologists attach GPS collars to coyotes, mapping predator home ranges. Mapping helps define release sites farther away from predators.**
- **See timeline**

## Switching Homes: From Colorado to South Dakota

Though two main factors contribute to an individual fox's survival, survival of the species is more complex. Diverse genes in a population mean a species is more likely to survive changes in habitat like disease and changes in food sources. More diversity means a greater chance for population success. Because of relatively low South

Dakota swift fox populations, Badlands NP hoped to increase genetic biodiversity while introducing a new population.

### ***Quick Facts***

- **A healthy swift fox population requires genetic diversity.**
- **Biologists transported swift foxes from Colorado and Wyoming to Badlands NP.**
- **Before transport, swift foxes tested for diseases. Foxes with diseases not transported.**
- **Once in Badlands NP, foxes kept in quarantine to ensure health of future population.**

Badlands NP biologists travelled southwest to relatively healthy and strong swift fox populations. Scientists planned to help the foxes switch homes, from Colorado and Wyoming to South Dakota. To do this, lessons from past swift fox and other mammal reintroductions were taken into account. This would not only ensure success, but protect the foxes from danger.

Taking a cue from initial lessons learned from black-footed ferret reintroductions, biologists were careful to test all foxes for disease before moving them. Once captured, Colorado foxes were held in kennels while laboratories tested their blood samples for diseases. Staff re-released any animals testing positive for the diseases. Once scientists captured healthy foxes, the swift foxes were vaccinated against rabies, distemper, and other viruses. Then the foxes took a road trip.



## Teacher Background Information

Driven straight to Badlands NP, the small canines took up temporary fourteen day residence in quarantine pens. Any pairs kept their partners in the pens, while single foxes remained alone. The blood tests, vaccinations, and quarantine time all helped biologists ensure a healthy population, protecting the future generations of swift foxes, as well as wildlife already calling Badlands NP home.

### Home Sweet Home: Reintroductions Begin

Think about the last time you moved homes. Stress and feelings of chaos probably came with leaving the old home. Your new home was not immediately familiar. It took awhile to find the closest grocery stores, your favorite restaurants, and places to relax. However, after a time, your new home was no longer new. Instead, you just called it home.

Swift foxes go through a similar process during reintroductions. Being captured, tested, monitored, and moved can be very stressful to wild animals. Then there is the initial release into the wild. Foxes must then find a good place to live, either digging holes or finding deserted burrows. It takes a little time to find the best hunting spots, along with areas to avoid because of coyotes or other predators. However, other reintroductions show that eventually, swift foxes will call new lands home.

Biologists know the entire process can be stressful. They also want swift fox populations to be as successful as possible. Swift fox comfort in new habitat, and ability to establish home quickly can mean better survival chances. Therefore, staff constantly works to improve the process to ensure swift fox health and safety. Part of the process involves modifying release techniques.

2003 marked the first swift fox releases in Badlands NP. Biologists carried the pioneers to release sites in portable kennels, setting the foxes free at dusk. Beginning in 2004, swift foxes experienced both hard and soft releases. The hard releases changed slightly, in the hopes of keeping the released animals closer to the original site. Instead of simply releasing a swift fox into the open, hard releases meant placing the fox in an abandoned burrow. Instead of landing directly into wide open, unfamiliar spaces, the fox had a chance to adjust while safe underground.

Soft-releases went one step further in helping swift foxes adapt to their new homes. Biologists surrounded burrows with chicken-wire pens, about 3' by 13' in size. A soft released fox was forced to stay in the area, but simultaneously protected with the burrow and pen. This allowed foxes to become used to their new homes. Once released, biologists continue providing food, and leave the pen available for shelter in case the fox wants to make use of it.

Soft-release foxes seem less likely to travel far from the release sites. As a small animal, staying close to home can be good. It means they have close protection in case of a coyote or other predator visit. It means they are familiar with where to find food. Home can be safer, and can mean survival.

#### *Quick Facts*

- **Some swift foxes hard released in Badlands NP. Either released in the open, or released into abandoned burrow.**
- **Some swift foxes soft released. Released in burrows surrounded by a wire pen to provide protection, and keep foxes in the area.**
- **Soft releases may allow more gradual adjustment time, and more familiarity with habitat. May increase survival chances.**
- **Between 2003 and 2006, 114 swift foxes released in Badlands NP.**



# Teacher Background Information

## Where Are They Now: Monitoring the New Swift Fox Population

Swift foxes once again roam Badlands NP. This particular biodiversity puzzle piece is back. Or is it?

Even when a puzzle piece is put back, biologists never know if it will remain or begin to fade again. Biologists also never know if putting back that puzzle piece may shift or damage other surrounding pieces. Badlands staff must constantly examine the bigger picture.

Monitoring is the process of taking in this bigger picture. It may not seem as exciting as capturing swift foxes and setting them free. However, the monitoring stage is key to defining success or failure. Even in the case of failure, the monitoring stage can set the scene for another reintroduction attempt.

In the case of Badlands NP, radio collars help paint the bigger picture. Every reintroduced fox enters the wild with a radio collar that transmits regular signals. Biologists drive the prairie-lands, carrying antenna to track the foxes. The signals tell staff where individual swift foxes travel to and spend time. Scientists can also discover what habitat areas the foxes particularly like, or where they are more likely to build family dens.

Signals can also alert staff if a swift fox dies or goes missing. That information helps determine whether or not the swift fox population is surviving. Collars indicate lack of movement over a certain amount of time, specifically alerting biologists that a fox may have died. Even when the Badlands NP population loses a fox, the information is very valuable. Staff find the swift fox, and look for clues about its death. Is it close to a road? Are there coyote tracks nearby? Has the fox's body been eaten? What kind of bite marks are involved? If the cause of death is not obvious, biologists in a laboratory take a closer look at the body.



Photo Copyright Diane Hargreaves

Because some collars fall off or stop working, even more swift foxes may be raising families biologists are not aware of. Since the population seems to be increasing in numbers, biologists stopped reintroducing new foxes as of 2007.

### ***Quick Facts***

- **Released foxes and new pups wear radio collars. Collar signals allow biologists to learn more about fox habits and survival.**
- **Collar signals can let biologists know if a fox has died. Allows biologists to understand population successes and failures.**
- **Number of swift fox pups and adults is increasing. Released foxes are raising the next generation**
- **Reintroductions stopped as of 2007. Biologists still tracking the population.**

The next generation of swift foxes also joins the collar club. Biologists watch for activity around swift fox dens, recording behavior of parents and pups alike. When pups are about 4 months old Badlands NP staff capture the pups, fitting radio collars so that monitoring of the next generation can take place.

Data collection takes place over multiple years in order to paint an accurate picture of swift fox survival. A single year shows only a small, though encouraging, part of the big story. Some of the first released swift foxes not only survived, but began new families. 3 litters with 15 pups were observed in the summer of 2004. Since then, as biologists release more swift foxes, the number of litters and pups also increases year by year. In 2007 biologists monitored 29 litters with 109 pups.



## Teacher Background Information

### The Next Step: Foxes Move On and Biologists Keep Working

During monitoring, biologists have begun noticing something else exciting. A few foxes are leaving Badlands NP. At first glance, this seems like a bad thing. Why would biologists want swift foxes to leave home?

Foxes are not only leaving home, but potentially meeting up with other introduced swift fox populations, and possibly even making new homes with new families. The population appears to be expanding. Instead of three separate populations, swift foxes may be expanding into one larger population. Scientists still need more complete data, and more time to determine whether or not such expansion is happening. But biologists still see hopeful signs.

Foxes moving from Badlands NP to places like Buffalo Gap National Grasslands and other areas also demonstrates the biodiversity puzzle's expanse. Badlands NP proved to be vital in bolstering the South Dakota swift fox populations. But Badlands NP does not stand alone. It is a piece of the puzzle; a part of the whole ecosystem supporting swift foxes.

Scientists now want to examine the genetic health of the newer South Dakota swift fox populations. The species is back as part of the prairie ecosystem's biodiversity. What does the population's internal biodiversity look like? Diversity in genetics means a population can survive changing conditions, like different food sources, diseases, or other environmental changes. Genetic diversity tells biologists more than whether or not individuals will survive from year to year. Genetic diversity can tell scientists if an entire population will survive for many years to come. As of 2008, biologists will begin looking at swift fox genetics, comparing the small native South Dakota population with reintroduced populations. While looking at population health, biologists also hope to discover if more Badlands NP swift foxes are leaving home to mix with other swift fox populations.

Challenges to the swift fox population still exist. For instance, many pups die as a result of car encounters on roads. Coyote populations are always a natural threat. The need for specific habitat types can limit where swift foxes expand to. However, even with these challenges, swift foxes have started making a come back. Badlands NP staff and surrounding communities like yours will continue watching, learning about, and protecting the tiny canine, in the hopes that comeback continues.

#### *Quick Facts*

- **Swift foxes are expanding out from Badlands.**
- **Moving to Buffalo Gap National Grasslands, and potentially other lands.**
- **Biologists will be looking at genetic health of population. May also discover if foxes are expanding SD ranges further than people know.**
- **Still threats to foxes like cars and coyotes. However, population seems to be making a comeback.**



# Lesson 1: Swift Fox Inquiry & Presentation

**In this lesson, students create a presentation about swift fox and Badlands National Park. Students will choose from a list of predetermined topics. Students use prompt questions related to their topic to research and present the required information to fellow students.**

**Duration:** 1-3 class periods (approximately 50 - 150 minutes)\*

\*Required class time depends on teacher preference. Assignment can be homework (only 1 class period required for group presentations); or classwork (2-3 class periods for research and presentation)

**Setting:** Classroom, Library, Homework

**Materials:** Teacher Background Information, Student Group Presentation Topics Sheets, Student Group Presentation Follow-Along Question Sheets

**Vocabulary:** Endangered Species Act, endangered, listed, threatened, extinct, extirpated, reintroduction, translocation

**Objectives:** Students will practice skills in biological research by investigating the answers to prompt questions related to the swift fox topic to be presented. Students working in pairs or groups will practice collaborative thinking in order to present a single presentation as a group. Each student will become an expert on their topic and be responsible for teaching what they have learned to fellow classmates through the presentation. Students who observe each presentation are responsible for the content by answering follow-along questions.

**Procedure:** As an instructor, decide whether students will be doing this assignment individually or in small groups, depending on class size. Use the sheet titled Group Presentation Topics when assigning presentation topics. The group or individual needs to find the information listed under the topic heading and cover that information in their presentation. The remainder of the students listening to the presentation need to find the answers to the questions listed on the Group Presentation Follow-Along Question Sheet. Students remain engaged and accountable through the audience requirement to answer questions pertaining to the presentations. Ideally, a class period for research and a class period for presentations should be sufficient time. This, of course, depends on class length and if additional in-class time is required for research.

**Assessment:**

- Students can informally assess other presentations dependant upon whether or not they are able to answer the follow-along questions from the content delivered. If students are finding it difficult to answer the questions, required information may be missing from the presentation.
- If a formal document is desired, adjust the Group Presentation Topics Sheet and use it as a check-off list for completion of required information.
- Students can also be given an individual grade based on their participation in collaborative group work. This may dissuade students from allowing others to carry the load.

## Lesson 1: Swift Fox Inquiry & Presentation (Continued)

**Extensions:** There are many other National Parks that have translocated or reintroduced species. You can use the same questioning and topic technique to inquire about other species in similar situations throughout the National Park Service.

Depending on the ability to work with other classrooms or grade levels, students may be able to share their presentations with other students. The class could collectively put together one cohesive presentation and teach other students (possibly younger students) about the Swift Fox and Badlands National Park. If you are within close proximity to the park, you could visit as a class or become guides for lower grade levels.



# Lesson 1: Student Sheet

## **Group Presentation Topics**

### **Group #1: Swift Fox Habitat**

- What is the typical landscape and habitat for Swift Fox ?
- What types of climate and weather are conducive to this habitat?
- How are the previous populations/habitat different from current populations?

### **Group #2: Swift Fox Appearance**

- Color (Male v. Female)
- Size (Adult v. Pups) (Males v. Females)
- How is their appearance suited for their environment? Or not?
  - eye placement on skull
  - ear set
  - teeth
  - paws and claws

### **Group #3: Swift Fox Food**

- Predators, Prey, or both?
- What do they eat? Is it different during different seasons?
- Are there any problems with food availability?
- How are they physically designed for obtaining food?

### **Group #4: Swift Fox Lifestyle**

- What is the typical natural lifespan?
- What are their mating habits?
- Describe location choice and design of a typical den (not necessarily Swift Fox specific)
- Average number of offspring per litter

### **Group #5: Enemies and Threats**

- Natural threats and enemies
- Human/man made threats (past, present)
- Territory overlap? Any threats from other species?

### **Group #6: The National Park Service and Badlands National Park**

- What is the National Park Service?
- Where is Badlands National Park? Describe/show key features of this park
- What other groups of people inhabit the area near Badlands National Park that might affect or be affected by the Swift Fox?
- Are there any other organizations that are working to help protect the Swift Fox outside of the National Park Service?



# Lesson 1: Student Sheet

## **Group #7: Native American Tribes and the Swift Fox**

- What are the names of the Native American Tribes located near Badlands National Park?
- Is there any importance placed on the badlands in Native American Culture?
- What influence does the fox have in Native American Culture?
- What is the Lakota name for the swift fox?

## **Group #8: Put Some Perspective on the Species**

- Where are swift fox located currently?
- Biologically speaking, why would we want to reintroduce the swift fox?
- Socially and aesthetically, why would we want to reintroduce the swift fox?
- What is the Endangered Species Act?
- Try to find the current “status” of the swift fox in regards to the terms listed above.
- What do these terms mean:
  - Endangered Species
  - Threatened
  - Listed
  - Extinct
  - Extirpated
  - Translocation





# Lesson 1: Student Sheet

## Group Presentation Follow-Along Questions

### Group #1: Swift Fox Habitat

1. What is the typical landscape and habitat for swift fox ?
2. What types of climate?
3. What is the weather like in this climate?
4. Have populations of swift fox always been the same? How have they changed?

### Group #2: Swift Fox Appearance

1. Describe the color of the fox. Is it any different among males or females?
2. What is the average adult size of a swift fox? Do the genders differ in size?
3. We know that an animal's adaptations usually help them survive in a particular environment. What is special about the traits below that help the swift fox survive?

Eye placement on skull?

Ear set?

Teeth size and shape?

Paws and claws?

### Group #3: Swift Fox Food

1. We know about predators and prey, which would best describe the swift fox?
2. What do they eat? Is it different during different seasons?
3. Are there any problems with food availability?
4. How is the swift fox physically designed for obtaining food?

### Group #4: Swift Fox Lifestyle

1. What is the typical lifespan of a swift fox in the wild?
2. Do swift foxes mate for life or do they form new pairs each breeding season?
3. Describe a typical den.
4. What is the average number of offspring per litter?

### Group #5: Enemies and Threats

1. List any natural threats or enemies to the swift fox
2. List any human or manmade threats past or present to the swift fox
3. Does the swift fox's habitat overlap with any other species that might pose a threat?

### Group #6: The National Park Service and Badlands National Park

1. What is the National Park Service?
2. Where is Badlands National Park?
3. What is a key feature of Badlands National Park?
4. What other groups of people inhabit the area near Badlands National Park that might affect or be affected by the swift fox?
5. Are there any other organizations that are working to help protect the swift fox besides the National Park Service?



# Lesson 1: Student Sheet

## Group #7: Native American Tribes and the Swift Fox

1. What are the names of the Native American Tribes located near Badlands National Park?
2. Is there any importance placed on the badlands in Native American Culture?
3. What influence does the fox have in Native American Culture?
4. What is the Lakota name for the swift fox?

## Group #8: Put Some Perspective on the Species

1. Where are swift fox located currently?
2. Biologically speaking, why would we want to reintroduce the swift fox?
3. Socially and aesthetically, why would we want to reintroduce the swift fox?
4. What is the idea of the Endangered Species Act?
5. What do these terms mean:
  - Endangered Species:
  - Threatened:
  - Listed:
  - Extinct:
  - Extirpated:
  - Translocation:



## Lesson 2: Meet with a Park Ranger

**In this lesson, students will interact with a park ranger from Badlands National Park. The ranger will present information about the translocation and reintroduction process used by biologists at Badlands National Park. Students will be expected to ask informed questions.**

**Duration:** 1 class periods (approximately 50 minutes)

**Setting:** Classroom with access to Distance Learning Teleconferencing Equipment (Digital Dakota Network in SD)

**Materials:** Teacher Background Information, List of Questions for the Ranger, Student Topic Outline Follow-Along Sheet

**Vocabulary:** quarantine, vaccination, population, genetic diversity, home range, hard release, soft release, generation, data, predation

**Objectives:** Students will meet with a ranger from Badlands National Park via distance learning teleconference. This is a great opportunity to involve technology in the classroom. Students will also be able to practice questioning skills when they prepare follow-up questions from the Lesson 1 presentations.

**Procedure:** Prior to meeting with the ranger, the class should compile a list of questions. The teacher should email the list to the ranger before the presentation. The ranger will present information on the reintroduction process and use photos, graphs, maps, and swift fox props (pelts, skulls, collars, etc). The ranger will try to address some of the student's questions throughout the presentation.

Students will record information they learn about each item (photo, prop, graph, etc.) on their Topic Outline Follow-Along Sheet. The Topic Outline will help students follow along and practice note taking and information analysis skills.

At anytime, students will be encouraged to ask questions. Time will be allotted at the end of the presentation specifically for questions and answers.

**Assessment:**

- Student notes can be used as an assessment or for independent practice.
- Students can write down notes on the outline or record 1-3 facts per image, graph, or prop.

**Extensions:** Classes can interact live with the ranger regarding other species, issues, or interests at Badlands National Park. Classes can also contact other National Parks that conduct distance learning programs.



## Lesson 2: Student Sheet

### Topic Outline

#### A. Badlands National Park

- 1:
- 2:
- 3:
- 4:
- 5:

#### B. Swift Fox

- 1:
- 2:
- 3:
- 4:
- 5:

#### C. Translocation into Badlands National Park

- 1:
- 2:
- 3:
- 4:
- 5:

#### D. Swift Fox Monitoring

- 1:
- 3:
- 4:
- 5:

#### E. Swift Fox Future at Badlands National Park

- 1:
- 2:
- 3:



## Lesson 3: Data Analysis Lab

**In this lesson, students will take on the role of a wildlife biologist and analyze actual 2003 swift fox translocation data from Badlands National Park. Students will work together to compile a master data sheet showing their findings. Students will share their findings with the ranger in Lesson 4.**

**Duration:** 2 class periods (approximately 100 minutes)

**Setting:** Classroom setting where students can move around

**Materials:** Teacher Background Information, 2003 Swift Fox Translocation Teacher Key, Fox File Student Sheets, and Blank 2003 Swift Fox Translocation Student Data Sheets

**Vocabulary:** mortality, sire, dam, wildborn, disease, contagion, plague, tularimia, parvo, canine distemper virus (CDV)

**Objectives:** Student-biologists will practice reading and analyzing scientific data based on the fox or foxes they are assigned. Students will practice interpreting individual charts and work together as a classroom team of biologists to compile overall data for the 2003 Swift Fox translocation season. Students will practice basic scientific data interpretation skills.

**Procedure:** Students should be in a location where they are able to move from one data station to another. Students will be assigned random swift fox numbers from up to 3 different foxes, depending on class size. There are 40 foxes included in the 2003 study data.

Students will act as biologists and collect information on their specific foxes from the data tables posted around the room. Students will fill out a Fox File card for each different fox they have been assigned. Information will consist of finding the fox's gender, age, weight, capture location, capture date, date released into Badlands National Park, disease information, breeding information, mortality dates, etc. This information will then be compiled into one master list of foxes 1-40.

Students will be responsible for contributing their Fox File information for the master data lists that students will compile. Each student will be responsible for compiling a master data list on the Blank 2003 Swift Fox Translocation Chart Student Sheets. Teachers should use the 2003 Swift Fox Teacher Key for reference.

**Assessment:**

- Teachers use the Teacher Key to make sure students are filling in the Fox File cards appropriately
- Each student will make his/her own copy of the list. Use the Blank 2003 Swift Fox Translocation Student Data Sheet included in the excel file. Use the 2003 Swift Fox Translocation Teacher Key for reference

**Extensions:** Data sets from other swift fox translocation years may be available for further analysis as the reintroduction program progresses. Students can continue to follow swift fox management at Badlands National Park through actual scientific data as it becomes available from the park.

# Lesson 3: Student Sheet



## Fox Files

Fox # _____	Capture Date: ___ / ___ / ___	Biologist: _____	
Release Date: _____			
Sex: _____ Male _____ Female	Weight: _____ kg    _____ lbs	Age: _____ Pup _____ Sub-adult _____ Adult	
Body Condition: _____ Poor _____ Fair _____ Good			
Canine Distemper (CDV)	Tularemia	Parvo	Plague
_____ + _____ -	_____ + _____ -	_____ + _____ -	_____ + _____ -
Translocated to Badlands NP? _____ Yes    _____ No		Life Status as of 10/18/2004 _____ Alive    _____ Dead    Date ___ / ___ / ___	
Spring 2004 Breeding Pair?    _____ No    _____ Yes    Mate # _____    # in Litter _____			

Fox # _____	Capture Date: ___ / ___ / ___	Biologist: _____	
Capture Location: _____			
Sex: _____ Male _____ Female	Weight: _____ kg    _____ lbs	Age: _____ Pup _____ Sub-adult _____ Adult	
Body Condition: _____ Poor _____ Fair _____ Good			
Canine Distemper (CDV)	Tularemia	Parvo	Plague
_____ + _____ -	_____ + _____ -	_____ + _____ -	_____ + _____ -
Translocated to Badlands NP? _____ Yes    _____ No		Life Status as of 10/18/2004 _____ Alive    _____ Dead    Date ___ / ___ / ___	
Spring 2004 Breeding Pair?    _____ No    _____ Yes    Mate # _____    # in Litter _____			

## Swift Fox Trapping - Lincoln County, Colorado August 2003

Fox #	Sex	Age	Capture Date	Weight kg	Body Condition	Results ≤0.0625	Results ≤1%	Parvo Results (1:25)	Plague Results	Translocated to BADL?	Release Date	Life Status 10/14/2004
301	M	Subadult	8/26/2003	1.9	Good	0.2500	12.5%	1:1600	Negative	Yes	14-Sep	Alive
302	M	Adult	8/26/2003	2.3	Good	0.2500	12.5%	1:1600	Negative	Yes	14-Sep	Alive
303	F	Adult	8/26/2003	2.05	Good	0.2500	12.5%	1:1600	Negative	Yes	13-Sep	6/8/2004
304	F	Adult	8/26/2003	2.1	Good	0.2500	12.5%	1:400	Negative	Yes	14-Sep	10/7/2003
305	F	Adult	8/26/2003	2.0	Poor	0.2500	12.5%	neg	Positive	No	N/A	Alive
306	F	Subadult	8/26/2003	1.5	Good	0.2500	25%	neg	Negative	Yes	14-Sep	Alive
307	F	Pup	8/27/2003	1.65	Good	0.2500	0.78%	1:1600	Negative	Yes	13-Sep	Alive
308	F	Pup	8/27/2003	1.9	Good	0.2500	12.5%	1:400	Negative	Yes	14-Sep	Alive
309	M	Subadult	8/27/2003	2.4	Good	0.2500	12.5%	neg	Negative	Yes	14-Sep	Alive
310	M	Subadult	8/27/2003	1.75	Good	0.2500	12.5%	1:25	Negative	Yes	14-Sep	12/21/2003
311	F	Adult	8/27/2003	2.05	Good	0.0078	6.25%	neg	Negative	Yes	15-Sep	3/3/2004
312	M	Subadult	8/27/2003	1.82	Good	0.2500	12.5%	1:25	Negative	Yes	14-Sep	12/30/2003
313	F	Subadult	8/27/2003	1.84	Good	0.2500	25%	1:1600	Negative	Yes	14-Sep	10/27/2003
314	F	Pup	8/27/2003	1.2	Fair	0.2500	25%	1:400	Negative	No	N/A	Alive
315	M	Adult	8/27/2003	2.15	Good	0.0039	6.25%	1:1600	Negative	Yes	13-Sep	Alive
316	M	Adult	8/27/2003	2.2	Good	0.2500	3.1%	1:100	Negative	Yes	13-Sep	Alive
317	F	Pup	8/27/2003	1.2	Fair	0.2500	12.5%	1:100	Negative	No	N/A	Alive
318	F	Adult	8/27/2003	1.75	Good	0.2500	12.5%	1:100	Negative	Yes	14-Sep	7/13/2004
319	M	Subadult	8/28/2003	2.2	Good	0.2500	6.25%	1:1600	Negative	Yes	14-Sep	Alive
320	M	Subadult	8/28/2003	2.1	Good	0.2500	12.5%	1:400	Negative	Yes	14-Sep	Alive
321	F	Adult	8/28/2003	2.1	Fair	0.2500	12.5%	1:1600	Negative	No	N/A	Alive
322	F	Subadult	8/28/2003	1.84	Good	0.2500	6.25%	1:100	Negative	Yes	14-Sep	9/21/2003
323	M	Subadult	8/28/2003	2.0	Fair	0.2500	12.5%	1:1600	Negative	No	N/A	Alive
324	F	Adult	8/28/2003	1.94	Good	0.2500	6.25%	1:1600	Negative	Yes	14-Sep	Alive
325	M	Adult	8/28/2003	2.21	Good	0.2500	12.5%	1:1600	Negative	Yes	14-Sep	Alive
326	M	Subadult	8/28/2003	1.88	Good	0.2500	12.5%	1:100	Negative	Yes	14-Sep	12/8/2003
327	M	Adult	8/28/2003	2.4	Fair	0.0156	12.5%	1:1600	Negative	No	N/A	Alive
328	F	Subadult	8/28/2003	1.75	Good	0.2500	25%	1:1600	Negative	Yes	14-Sep	Alive
329	M	Pup	8/28/2003	1.65	Fair	0.2500	6.25%	1:1600	Negative	No	N/A	Alive
330	M	Subadult	8/28/2003	2.1	Good	0.2500	6.25%	1:1600	Negative	Yes	15-Sep	Alive
331	F	Pup	8/28/2003	1.6	Good	0.2500	12.5%	1:1600	Negative	Yes	14-Sep	11/15/2003
332	M	Subadult	8/28/2003	2.0	Good	0.2500	12.5%	1:400	Negative	Yes	14-Sep	Alive
333	F	Adult	8/28/2003	1.8	Good	0.0039	6.25%	1:1600	Negative	Yes	14-Sep	2/24/2004
334	M	Adult	8/28/2003	1.9	Good	0.2500	1.56%	1:100	Negative	Yes	14-Sep	11/4/2003
335	M	Pup	8/28/2003	1.4	Fair	0.1250	12.5%	1:100	Negative	No	N/A	Alive
336	M	Adult	8/28/2003	2.2	Good	0.0039	6.25%	1:1600	Negative	Yes	14-Sep	7/13/2004
337	F	Pup	8/28/2003	1.6	Good	0.2500	6.25%	1:1600	Negative	Yes	14-Sep	11/16/2003
338	F	Adult	8/28/2003	2.1	Good	0.2500	12.5%	1:1600	Negative	Yes	14-Sep	Alive
339	M	Pup	8/28/2003	1.95	Fair	0.2500	25%	1:1600	Negative	No	N/A	Alive
340	M	Adult	8/28/2003	2.1	Poor	0.0039	3.12%	1:400	Positive	No	N/A	Alive





<b>Fox #</b>	<b>Trans to BADL</b>	<b>Date</b>
301	Yes	Released 14-Sep
302	Yes	Released 14-Sep
303	Yes	Released 14-Sep
304	Yes	Released 14-Sep
305	No	Released @ capture site
306	Yes	Released 14-Sep
307	Yes	Released 13-Sep
308	Yes	Released 14-Sep
309	Yes	Released 14-Sep
310	Yes	Released 14-Sep
311	Yes	Released 15-Sep
312	Yes	Released 14-Sep
313	Yes	Released 14-Sep
314	No	Released @ capture site
315	Yes	Released 13-Sep
316	Yes	Released 13-Sep
317	No	Released @ capture site
318	Yes	Released 14-Sep
319	Yes	Released 14-Sep
320	Yes	Released 14-Sep
321	No	Released @ capture site
322	Yes	Released 14-Sep
323	No	Released @ capture site
324	Yes	Released 14-Sep
325	Yes	Released 14-Sep
326	Yes	Released 14-Sep
327	No	Released @ capture site
328	Yes	Released 14-Sep
329	No	Released @ capture site

<b>Fox #</b>	<b>Trans to BADL</b>	<b>Date</b>
330	Yes	Released 15-Sep
331	Yes	Released 14-Sep
332	Yes	Released 14-Sep
333	Yes	Released 14-Sep
334	Yes	Released 14-Sep
335	No	Released @ capture site
336	Yes	Released 14-Sep
337	Yes	Released 14-Sep
338	Yes	Released 14-Sep
339	No	Released @ capture site
340	No	Released @ capture site

<b>Fox #</b>	<b>Sex</b>	<b>Sire</b>	<b>Dam</b>	<b>Pup Life Status As of 10/14/2004</b>
401	M	302	306	Alive
402	M	302	306	Alive
403	F	302	306	Alive
404	M	302	306	Alive

405	F	320	328	9/1/2004
406	F	320	328	10/18/2004
407	F	320	328	Alive
408	F	320	328	Alive
409	M	320	328	Alive
410	?	320	328	Alive

411	M	309	303	Alive
412	F	309	303	7/19/2004
413	F	309	303	Alive
414	F	309	303	8/24/2004
415	F	309	303	Alive

<b>Fox #</b>	<b>Body Condition</b>
301	Good
302	Good
303	Good
304	Good
305	Poor
306	Good
307	Good
308	Good
309	Good
310	Good
311	Good
312	Good
313	Good
314	Fair
315	Good
316	Good
317	Fair
318	Good
319	Good
320	Good
321	Fair
322	Good
323	Fair
324	Good
325	Good
326	Good
327	Fair
328	Good
329	Fair
330	Good
331	Good
332	Good
333	Good

<b>Fox #</b>	<b>Body Condition</b>
334	Good
335	Fair
336	Good
337	Good
338	Good
339	Fair
340	Poor

<b>Fox #</b>	<b>Capture Date</b>
301	8/26/2003
302	8/26/2003
303	8/26/2003
304	8/26/2003
305	8/26/2003
306	8/26/2003
307	8/27/2003
308	8/27/2003
309	8/27/2003
310	8/27/2003
311	8/27/2003
312	8/27/2003
313	8/27/2003
314	8/27/2003
315	8/27/2003
316	8/27/2003
317	8/27/2003
318	8/27/2003
319	8/28/2003
320	8/28/2003
321	8/28/2003
322	8/28/2003
323	8/28/2003
324	8/28/2003
325	8/28/2003
326	8/28/2003

<b>Fox #</b>	<b>Capture Date</b>
327	8/28/2003
328	8/28/2003
329	8/28/2003
330	8/28/2003
331	8/28/2003
332	8/28/2003
333	8/28/2003
334	8/28/2003
335	8/28/2003
336	8/28/2003
337	8/28/2003
338	8/28/2003
339	8/28/2003
340	8/28/2003

## Canine Distemper Virus (CDV) Test Results from Blood Sample

Fox #	Blood sample size that CDV titers are detected in  ≤ 0.0625 indicates a positive test
301	0.2500
302	0.2500
303	0.2500
304	0.2500
305	0.2500
306	0.2500
307	0.2500
308	0.2500
309	0.2500
310	0.2500
311	0.0078
312	0.2500
313	0.2500
314	0.2500
315	0.0039
316	0.2500
317	0.2500
318	0.2500
319	0.2500
320	0.2500

Fox #	Blood sample size that CDV titers are detected in  ≤ 0.0625 indicates a positive test
321	0.2500
322	0.2500
323	0.2500
324	0.2500
325	0.2500
326	0.2500
327	0.0156
328	0.2500
329	0.2500
330	0.2500
331	0.2500
332	0.2500
333	0.0039
334	0.2500
335	0.1250
336	0.0039
337	0.2500
338	0.2500
339	0.2500
340	0.0039

## Tularemia Blood Test Results

Fox #	<b>≤1%* indicates a positive test</b>
301	12.5%
302	12.5%
303	12.5%
304	12.5%
305	12.5%
306	25%
307	0.78%
308	12.5%
309	12.5%
310	12.5%
311	6.25%
312	12.5%
313	25%
314	25%
315	6.25%
316	3.1%
317	12.5%
318	12.5%
319	6.25%
320	12.5%

Fox #	<b>≤1%* indicates a positive test (1:128)</b>
321	12.5%
322	6.25%
323	12.5%
324	6.25%
325	12.5%
326	12.5%
327	12.5%
328	25%
329	6.25%
330	6.25%
331	12.5%
332	12.5%
333	6.25%
334	1.56%
335	12.5%
336	6.25%
337	6.25%
338	12.5%
339	25%
340	3.12%

*\* When testing for disease titers in the blood samples, the original blood sample (100%) was reduced to successively smaller size. The percentage indicates the amount from the original sample in which the disease titers could still be detected in, indicating a higher concentration of the disease in the blood.*

<b>Fox #</b>	<b>Parvo Results (1:25)</b>
301	1:1600
302	1:1600
303	1:1600
304	1:400
305	Negative
306	Negative
307	1:1600
308	1:400
309	Negative
310	1:25
311	Negative
312	1:25
313	1:1600
314	1:400
315	1:1600
316	1:100
317	1:100
318	1:100
319	1:1600
320	1:400
321	1:1600
322	1:100
323	1:1600
324	1:1600
325	1:1600
326	1:100
327	1:1600
328	1:1600
329	1:1600
330	1:1600
331	1:1600

<b>Fox #</b>	<b>Parvo Results (1:25)</b>
332	1:400
333	1:1600
334	1:100
335	1:100
336	1:1600
337	1:1600
338	1:1600
339	1:1600
340	1:400

<b>Fox #</b>	<b>Plague</b>
301	Negative
302	Negative
303	Negative
304	Negative
305	Positive
306	Negative
307	Negative
308	Negative
309	Negative
310	Negative
311	Negative
312	Negative
313	Negative
314	Negative
315	Negative
316	Negative
317	Negative
318	Negative
319	Negative
320	Negative
321	Negative
322	Negative
323	Negative
324	Negative
325	Negative
326	Negative
327	Negative
328	Negative
329	Negative

<b>Fox #</b>	<b>Plague</b>
330	Negative
331	Negative
332	Negative
333	Negative
334	Negative
335	Negative
336	Negative
337	Negative
338	Negative
339	Negative
340	Positive



<b>Fox #</b>	<b>Weight kg</b>	<b>Weight lbs</b>
301	1.9	
302	2.3	
303	2.05	
304	2.1	
305	2.0	
306	1.5	
307	1.65	
308	1.9	
309	2.4	
310	1.75	
311	2.05	
312	1.82	
313	1.84	
314	1.2	
315	2.15	
316	2.2	
317	1.2	
318	1.75	
319	2.2	
320	2.1	
321	2.1	
322	1.84	
323	2.0	
324	1.94	
325	2.21	
326	1.88	
327	2.4	
328	1.75	
329	1.65	
330	2.1	
331	1.6	
332	2.0	
333	1.8	

<b>Fox #</b>	<b>Weight kg</b>	<b>Weight lbs</b>
334	1.9	
335	1.4	
336	2.2	
337	1.6	
338	2.1	
339	1.95	
340	2.1	

2.2kilograms = 1 pound

<b>Fox #</b>	<b>Mortality Detected As of 10/18/2004</b>
301	Alive
302	Alive
303	6/8/2004
304	10/7/2003
305	Alive
306	Alive
307	Alive
308	Alive
309	Alive
310	12/21/2003
311	3/3/2004
312	12/30/2003
313	10/27/2003
314	Alive
315	Alive
316	Alive
317	Alive
318	7/13/2004
319	Alive
320	Alive
321	Alive
322	9/21/2003
323	Alive
324	Alive
325	Alive
326	12/8/2003
327	Alive
328	Alive

<b>Fox #</b>	<b>Mortality Detected As of 10/18/2004</b>
329	Alive
330	Alive
331	11/15/2003
332	Alive
333	2/24/2004
334	11/4/2003
335	Alive
336	7/13/2004
337	11/16/2003
338	Alive
339	Alive
340	Alive

<b>Fox #</b>	<b>Sex</b>	<b>Age</b>
301	M	Subadult
302	M	Adult
303	F	Adult
304	F	Adult
305	F	Adult
306	F	Subadult
307	F	Pup
308	F	Pup
309	M	Subadult
310	M	Subadult
311	F	Adult
312	M	Subadult
313	F	Subadult
314	F	Pup
315	M	Adult
316	M	Adult
317	F	Pup
318	F	Adult
319	M	Subadult
320	M	Subadult
321	F	Adult
322	F	Subadult
323	M	Subadult
324	F	Adult
325	M	Adult
326	M	Subadult
327	M	Adult
328	F	Subadult
329	M	Pup
330	M	Subadult
331	F	Pup

<b>Fox #</b>	<b>Sex</b>	<b>Age</b>
332	M	Subadult
333	F	Adult
334	M	Adult
335	M	Pup
336	M	Adult
337	F	Pup
338	F	Adult
339	M	Pup
340	M	Adult



## Lesson 4: Review Data Result with Ranger

**In this lesson, students will use the information that they have compiled as a class and present their findings to the park ranger from Badlands National Park. The ranger will ask the students to explain their findings and note any patterns or inconsistencies in the data.**

**Duration:** 1 class period (approximately 50 minutes)

**Setting:** Classroom with access to Distance Learning Teleconferencing Equipment (Digital Dakota Network in SD)

**Materials:** Teacher Background Information, Completed 2003 Data Table for Swift Foxes 1-40 (compiled by students)

**Objectives:** After the students have compiled the data from Lesson 3, they will meet with a ranger from Badlands National Park to discuss their findings. Thoughtful analysis of the data compiled will be practiced as conclusions are made with the help of the ranger. The ranger will also conclude the unit, answering final questions and possibly arranging for a field trip if proximity allows.

**Procedure:** Teacher and students should be prepared with their own copies of the data chart compiled from the previous lesson. Students will review their data results with the ranger and point out any patterns or anomalies. The ranger will help the students draw conclusions from the data.

The ranger will also answer any questions the students may have about any topics covered throughout the unit. The ranger will address future plans for the swift fox at Badlands National Park and discuss any current activity or interesting information that may pertain to new developments in the swift fox population. This final lesson is the conclusion to the unit.

**Assessment:** • Students can conclude the unit by compiling a small journal or digital file that includes key information from their presentation, student sheets assigned from previous lessons, and a completed data set for the 2003 Swift Fox translocation process. This can be turned in or also shared with students from a lower grade level as a student teaching/sharing project

**Extensions:** At the end of the unit, students can take the information they have learned about translocation and wildlife reintroduction and research any species that may have gone through a similar process in their local area.