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

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.

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

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.

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.

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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.

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.

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.**

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.

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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.

Quick Facts

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

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.

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.

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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.

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.**

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.

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.

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.**

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

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. 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.

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.

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.**

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.