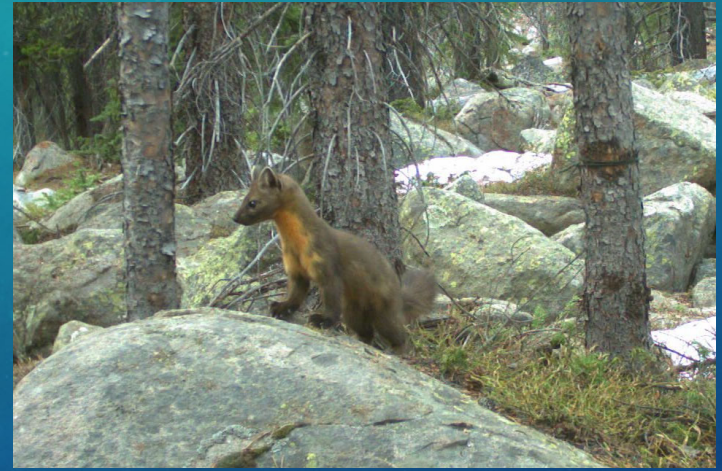


FURBEARER MANAGEMENT PROGRAM UPDATE



MARK VIEIRA
CPW CARNIVORE AND FURBEARER PROGRAM MANAGER
MARCH 2023 PWC MEETING- AURORA

LONG TERM COMMITMENT TO SWIFT FOX MONITORING: 1995-2021

Special Section: The Value and Utility of Phoenix-Arizona Data in Wildlife Monitoring and Research

ESTIMATION OF SWIFT FOX POPULATION SIZE AND OCCUPANCY RATES IN EASTERN COLORADO

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Abstract: The status of the swift fox (*Vulpes velox*) has become a subject of controversy since a petition was submitted in 1992 to have a closed status for the protection of the Endangered Species Act. Colorado's habitat for the species is the largest remaining population of the species due to significant amounts of short grass prairie habitat suitable for occupancy by swift fox. To support a request to remove Colorado from the geographic range and prevent an adjustment to the Endangered Species Act, we used a mark-recapture study to estimate occupancy rates and population size of swift fox in a 100,000 ha site in eastern Colorado. Of the grids sampled, 54% were found to be occupied with 70% occupancy rates. We captured 24 swift foxes (17 males, 7 females), and recaptured 10 (17.0% of the grids). We estimated a mean capture probability per night of an individual fox, weighted by number of grids and number of trapping occasions for each grid as 0.218 (SE = 0.022). Habitat-suitable and population estimates varied during the September to March period. We estimated the average number of foxes per grid as 0.18 (SE = 0.196). Mark-recapture estimates from three trapping occasions in the trapping grids. Percentage of occupied areas within each grid was an important predictor of the occupancy rate for the observed population. We estimated occupancy rates of the 72 grids ranged from 0.01 (SE = 0.001), using the mean (SE) of the observed grids to be 0.18 (SE = 0.022). The 72 grids contained 100% of the population of swift foxes. The estimated population size of the grids ranged from 1 to 100. We used simulations to compare the power of three alternative designs to occupancy rate estimates: discrete probability of 0.18 and an occupancy rate of 0.18 with only trapping occasions, with only trapping grids, the power was 80% to detect a change in occupancy from 0.18 to 0.18. With 10 trapping grids and 10 trapping occasions, the power was nearly 80% to detect a 3-fold change in occupancy rate and 100% for a 4-fold occupancy increase.

KEYWORDS: Colorado, detection probability, mark-recapture, monitoring, occupancy estimates, program MMR, presence-absence, site occupancy, wolf fox, Vulpes velox

The status of the swift fox has become a subject of controversy since a petition was submitted in 1992 to have a closed status for the protection of the Endangered Species Act. Colorado's habitat for the species is the largest remaining population of the species due to significant amounts of short grass prairie habitat suitable for occupancy by swift fox. To support a request to remove Colorado from the geographic range and prevent an adjustment to the Endangered Species Act, we used a mark-recapture study to estimate occupancy rates and population size of swift fox in a 100,000 ha site in eastern Colorado. Of the grids sampled, 54% were found to be occupied with 70% occupancy rates. We captured 24 swift foxes (17 males, 7 females), and recaptured 10 (17.0% of the grids). We estimated a mean capture probability per night of an individual fox, weighted by number of grids and number of trapping occasions for each grid as 0.218 (SE = 0.022). Habitat-suitable and population estimates varied during the September to March period. We estimated the average number of foxes per grid as 0.18 (SE = 0.196). Mark-recapture estimates from three trapping occasions in the trapping grids. Percentage of occupied areas within each grid was an important predictor of the occupancy rate for the observed population. We estimated occupancy rates of the 72 grids ranged from 0.01 (SE = 0.001), using the mean (SE) of the observed grids to be 0.18 (SE = 0.022). The 72 grids contained 100% of the population of swift foxes. The estimated population size of the grids ranged from 1 to 100. We used simulations to compare the power of three alternative designs to occupancy rate estimates: discrete probability of 0.18 and an occupancy rate of 0.18 with only trapping occasions, with only trapping grids, the power was 80% to detect a change in occupancy from 0.18 to 0.18. With 10 trapping grids and 10 trapping occasions, the power was nearly 80% to detect a 3-fold change in occupancy rate and 100% for a 4-fold occupancy increase.

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EXECUTIVE SUMMARY MONITORING POPULATIONS OF SWIFT FOX IN EASTERN COLORADO



Background

- A decline in populations of swift fox (*Vulpes velox*) lead to a 1992 petition of the U.S. Fish and Wildlife Service (USFWS) to list the swift fox as under the Endangered Species Act of 1973 (ESA). The Colorado Division of Wildlife (CDOW) and other wildlife agencies within the geographic range of the swift fox formed the Swift Fox Conservation Team (SFCT) in 1994.

- Establishment of and initial findings from the SFCT lead the USFWS in 1995 to deem swift fox warranted but precluded from listing under ESA. However, identifying the current geographic distribution and population status of swift fox were listed as a priority for the SFCT. The CDOW funded research from 1995-1997 that resulted in a new methodology to survey swift fox over a large geographic area relative to previous studies (Finley 1999), and planned to continue this effort every 5 years.

Translocation

- Because populations of swift fox in the northern plains were greatly diminished or extirpated, the CDOW is cooperating with Badlands National Park (BNP) to reintroduce swift foxes in South Dakota. In 2004, 20 swift fox were captured from 6-12 October in eastern Colorado and translocated to BNP. This was the second year of a 3 yr effort to establish a viable population of swift fox in BNP, and added to the 30 swift foxes translocated to BNP from Colorado in 2003.

Population Monitoring

- Based on the methods of Finley (1999), the CDOW monitored swift fox in eastern Colorado from 31 August 2004-12 February 2005. Following objectives of the SFCT, the goals of this project were to: 1) Determine occupancy rates, 2) Estimate geographic distribution, 3) Index population size, and 4) Test for seroprevalence of 3 infectious diseases in the swift fox population.

- We set cage-traps on 51 randomly selected grids measuring 3 x 4 mi². Each grid consisted of 20 traps, one set near each section corner, and run three consecutive nights. Our effective trapping effort totaled 3,000 TrapNights (TN).

- We captured 136 swift fox on 36 (71%) grids including 12 recaptures (55 females, 61 males, and 8 in which sex was not determined). The estimated occupancy rate using the average amount of short grass prairie found on the 51 grids samples was 0.77 (SE = 0.076, 95% CI 0.595 - 0.934). When the estimated occupancy was summed across the 51 grids using the observed amount of short grass prairie on

STATUS OF SWIFT FOX IN EASTERN COLORADO



October 2017

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MONITORING SWIFT FOX USING REMOTE CAMERAS IN EASTERN COLORADO



March 2012

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STATUS OF SWIFT FOX IN EASTERN COLORADO

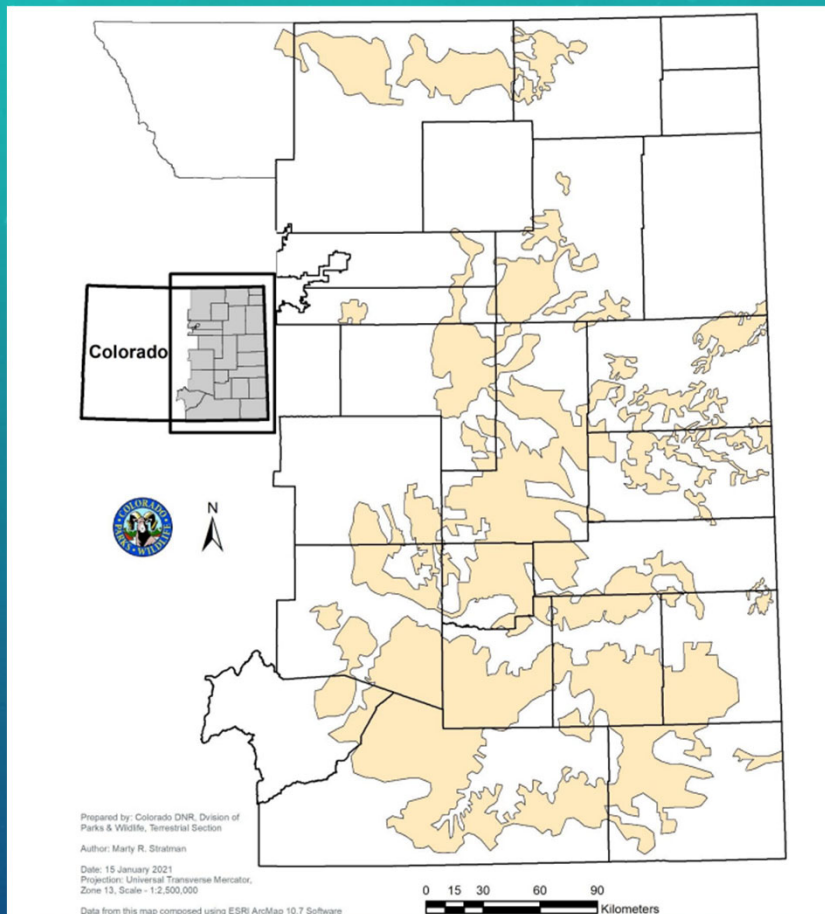


October 2022

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2021 OCCUPANCY MONITORING RESULTS



- SGP patch size matters
- ~34,000 km² occupied SGP
- Very low projected harvest rate



LIVE LIFE
OUTSIDE

PINE MARTEN

- *Conservative* statewide abundance = ~5,000
- Annual statewide harvest = ~320
- Annual harvest rate = ~6 %

