Final Post-delisting Monitoring Report for the Delmarva Peninsula Fox Squirrel *(Sciurus niger cinereus)*

Photo: Translocated Delmarva fox squirrel (wearing collar) and young squirrel behind her; Redden State Forest, Sussex County, Delaware. *Photo credit*: *Delaware Department of Natural Resources and Environmental Control, Division of Fish and Wildlife*

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Acknowledgements

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Background

The following provides the final report of post-delisting monitoring and conservation conducted between 2020 and 2025 for the Delmarva Peninsula fox squirrel (*Sciurus niger cinereus),* generally called the Delmarva fox squirrel. The Delmarva fox squirrel (DFS) is a subspecies of the eastern fox squirrel found only on the Delmarva Peninsula. It was listed as endangered in 1967 and delisted in September 2015 due to recovery. An Interim Post-delisting Monitoring Report for the Delmarva Peninsula Fox squirrel summarized the post-delisting monitoring conducted in the first 5 years since delisting (USFWS 2020, entire). The following final report summarizes the monitoring and conservation work conducted between 2020 and 2025.

The original reason for listing this species was the approximately 90 percent decline in the size of its range. The most likely causes of this range retraction include loss of mature forest habitat through clearing land for agriculture and short-rotation timber harvest, as well as over-hunting that had probably occurred since the early 1900s. Since the initial listing, the hunting season was closed and Federal and state biologists translocated DFS to establish new populations within its historical range. Most of these translocations have been successful and have resulted in 11 new populations that continue to survive and grow 30 to 40 years after the initial releases. This substantially increased the size of the DFS range. In addition, by 2005, eight new populations were discovered on the periphery of the 1993 range that did not result from translocations (USFWS 2007, p.7).

In 2012, the 5-year status review identified additional occupied forest that further connected subpopulations (USFWS 2012, Figure 3). These additional discoveries increased the range and reduced the risk of extinction. The status review (USFWS 2012, entire) evaluated the DFS population distribution, the abundance and connectivity of habitat, and all threats to DFS persistence, concluding that the DFS was not in danger of extinction throughout all or a significant portion of its range and not likely to become so in the foreseeable future. The Delmarva fox squirrel was removed from the endangered species list in September 2015 due to recovery.

In 2020, the Interim Post-delisting Monitoring Report (USFWS 2020, entire) evaluated the persistence of DFS on 48 monitoring locations and found 96 percent of these continued to support DFS. The report concluded there were persisting populations, improved connectivity among populations and an overall larger range. It also identified plans for additional translocations in Delaware (DNREC 2014, entire). The following report describes the expanded range of the DFS due to three new populations established through translocations conducted in Sussex County, Delaware.

Increases in the Range

In the last 5 years, major conservation work has been conducted by the State of Delaware (DE) as three new populations have been successfully established in Sussex County, DE (Niederriter 2024). Animals were translocated from Maryland (MD) to three locations in DE between 2020 and 2024 in collaboration with the U.S. Department of Agriculture (Pepper 2020) who trapped squirrels in Maryland. These translocations established populations in Assawoman Wildlife Management Area (AWA), Trap Pond State Park and Redden State Forest. These new populations have substantially increased the range and distribution of this species to further enhance redundancy of populations. In addition, some new sightings have increased the range in both MD and DE.

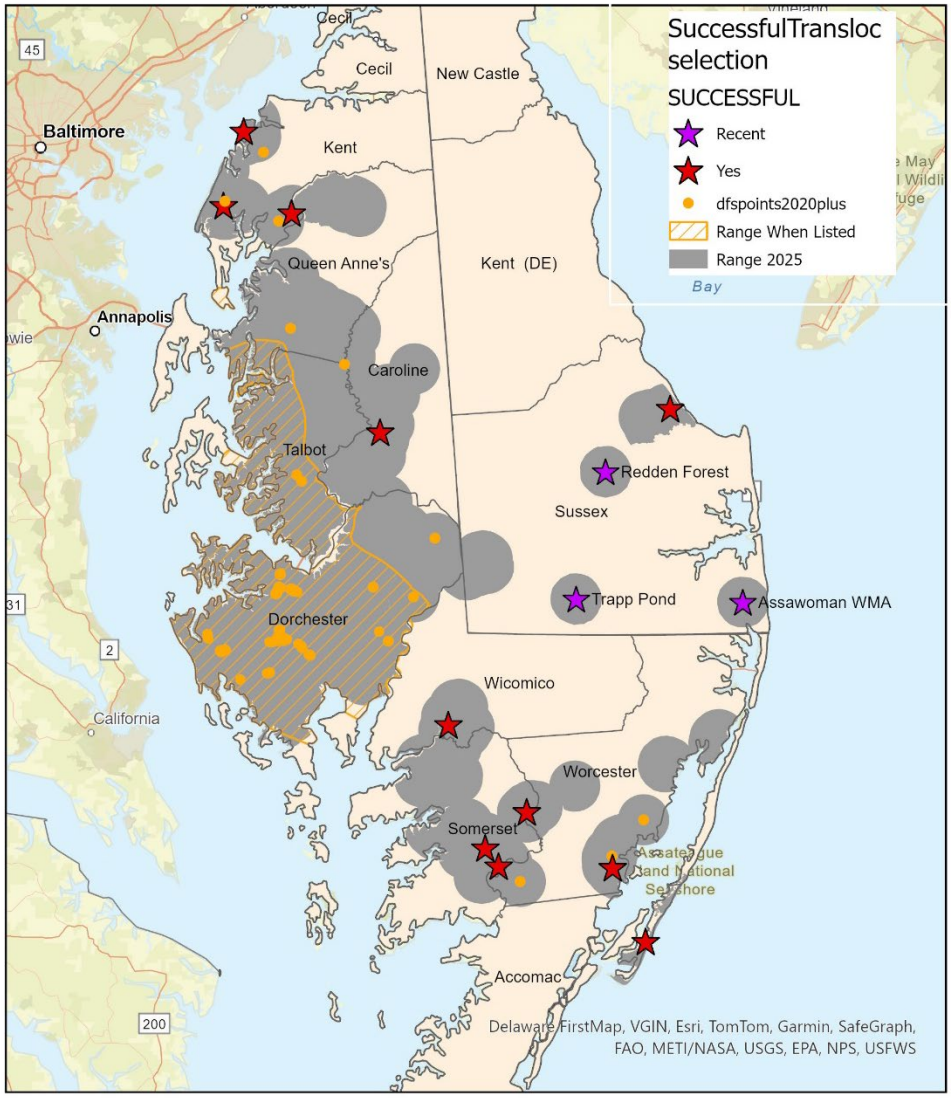

Figure 1. Current range (2025) of the Delmarva fox squirrel compared to the range at the time of listing.

Since 2010, we have defined the range of the DFS as all sightings buffered by 3 miles. At the time of the 2020 post-delisting monitoring report, the range covered 1,135,487 acres or 29 percent of the area of the Delmarva Peninsula. The area of the range in 2025, after the translocations and additional sightings is 1,215,288 acres or 31 percent of the Delmarva Peninsula (Table 1). The major accomplishments in this range expansion come from the translocations in Delaware discussed below.

Table 1. Changes in the range of the Delmarva fox squirrel over time. Green column indicates data at the time of listing, blue columns indicate post-delisting data.

	At listing circa 1970	**1990**	**2005**	**2010**	**At delisting 2015**	**Post-delisting 2020**	**Post-delisting 2025**
Number of Counties Occupied not including translocations	**3**	**3**	**6**	**6**	**7**	**7**	**7**
Number of Counties Occupied including translocations	4	10	10	10	10	10	10
Area of the DFS range (acres)	Not Available	Not Available	Not Available	1,078,043	1,100,307	1,135,487	1,215,288
Percentage of Delmarva Peninsula Occupied by DFS Range	10%	Not Available	27%	28%	28%	29%	31%
Source	Taylor and Flyger 1974	USFWS 1993, recovery plan	USFWS 2007, 5-yr review	USFWS 2012, 5-yr review	USFWS 2015 data	USFWS 2020 data	USFWS 2025 data

Three New Translocations in Delaware

Between 2020 and 2024, Delmarva fox squirrels were captured in MD and translocated to DE at multiple times to start the three new populations in DE (Table 2). Translocations have been a successful conservation tool used in the past and we have learned how to improve success over the years (USFWS 1993, p.20; Bendel and Therres 1994, entire). The Recovery Plan (USFWS 1993; Appendix D) provides a protocol for translocations and states that a minimum of 24 to 30 squirrels from two locations are needed to successfully start a population. We have also learned that multiple releases over several years were the most successful in the previous translocations (USFWS 1993, p. 16). The DE translocations did an even better job of starting the three new translocations by moving even more than 30 squirrels to each site in multiple releases (Table 2).

Table 2. Summary of Delaware translocations of Delmarva fox squirrels conducted since 2020.

DE Property	Release Years	Total number of animals released	Evidence of Reproduction
Assawoman Wildlife Area	2020, 2021, 2024	41	Yes
Redden State Forest	2021,2022, 2023, 2024	48	Yes
Trap Pond State Park	2022, 2023	34	Yes

Assawoman Wildlife Area

This State-owned Wildlife Area was the location of a past translocation initially made in 1984-1985 with only 13 animals (USFWS 1993, p.17) and this site was not supplemented with any additional animals. While it persisted for some time, by 2004 the numbers had dwindled and DFS were no longer considered to be present on the site (USFWS 2007, Table 1). As described above, we have learned from the earlier translocations that supplementing populations is an important feature that improves success, especially if initial numbers were low, and the final number of squirrels needed to start a population is at least 24 (USFWS 1993; Appendix D).

In fall of 2020 and spring of 2021, 30 squirrels were released back to Assawoman Wildlife Area with an additional 11 squirrels in 2024. Monitoring documented reproduction at this site and a persisting population of Delmarva fox squirrels (Niederriter 2024).

Redden State Forest

The first set of squirrels were released in fall 2021 and the last group in spring 2024 (Niederriter 2024) for a total of 48 squirrels. Reproduction has been documented through cameras and includes one female with two young and another female with one young (photo on the cover). The survivorship of 18 DFS released at Redden in 2023 was 78 percent 30 days post-release with 12 percent unknown. After one year, known survival was 47 percent and 24 percent unknown. These numbers are acceptable for translocations of animals that are prey for many mammalian and avian predators.

It is interesting to note that one of the first squirrels released here was captured 519 days after her release and another was tracked until 645 days post release. Two more were tracked 490 and 442 days post-release. All were captured or tracked to the Marvel Tract of Redden State Forest.

Evidence of dispersal is clear from a recent discovery of a post-lactating female and a collared male found more than 4 miles from the Redden Release site on a site owned by The Nature Conservancy (H. Niederriter, 2025).

Trap Pond State Park

Starting in spring 2022, a total of 34 squirrels were released to Trap Pond State Park. Reproduction was documented in 2024 with trapping of two females showing signs of lactation. While most squirrels stayed within 1 or 2 miles of the release site, one squirrel moved 7 miles from the release site (Niederriter 2024). Past translocations conducted prior to delisting reported the longest movement from a release site to be 5 miles.

Translocation Mortality Rates

Mortality rates were based on collared squirrels and only counted as a mortality if the body or part thereof was found. Overall, the known mortality after 90 days averaged 19 percent, 30 percent and 10 percent for Redden, Trap Pond and Assawoman respectively. These mortality rates compare favorably to other fox squirrel translocation efforts. Bendall and Therres (1994) tracked 20 DFS for 90 days and found a known morality rate of 45 percent. The known mortality rate at 365 days averaged 37 percent, 32 percent and 23 percent for Redden, Trap Pond and Assawoman respectively.

Summary

The Interim Post-delisting Monitoring Report (USFWS 2020), reported on information gathered in the first 5 years post-delisting. There were 48 monitoring sites where persistence or extirpation could be determined, and persistence could be confirmed in 96 percent of these sites after delisting (USFWS 2020; Table 2). Persistence within the range has also been noted in previous 5-year reviews (USFWS 2015). New sightings also indicated an expanded range and improved connectivity between previously isolated subpopulations (USFWS 2020; Figure 3). In the last 5 years, the three translocations conducted in DE between 2020 and 2024 greatly improves the overall redundancy across the range and makes this species even more secure from extinction. The State of Delaware will be monitoring these populations and also encourages the public to report sightings of Delmarva fox squirrels to potentially capture additional expansion of the population (https://dnrec.delaware.gov/fish-wildlife/conservation/fox-squirrel/). Overall, the Delmarva fox squirrel continues to do well since its delisting in 2015.

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