



# United States Department of the Interior

FISH AND WILDLIFE SERVICE  
Chesapeake Bay Field Office  
177 Admiral Cochrane Drive  
Annapolis, MD 21401



December 3, 2004

Lieutenant Colonel Robert J. Ruch  
District Engineer  
U.S. Army Corps of Engineers, Philadelphia District  
Wannamaker Building, 100 Penn Square East  
Philadelphia, PA 19107-3390

The U.S. Fish and Wildlife Service, Chesapeake Bay Field Office has been engaged in ongoing efforts to support research on Delmarva fox squirrels (*Sciurus niger cinereus*, DFS) and review new scientific information related to this federally listed endangered species. The Service continually updates our protocols and methods as new information becomes available. New information on movements of Delmarva fox squirrels, from research studies and monitoring efforts, has resulted in a revised approach to the determination of where DFS are likely to occur.

Delmarva fox squirrels are large tree squirrels with large home ranges and they are capable of moving relatively large distances. Several animals have been documented to move 5 miles from initial capture areas and these movements were the basis of the Service's determination that within 5 miles of sightings, DFS were considered likely to occur. However, previously, we had no information on the proportion of DFS that move various distances. Recent data suggests that the likelihood of an individual DFS moving 5 miles is very low. Most recaptures of marked DFS are close to their initial capture area, but movements up to 3 miles are not uncommon. In addition, we know our current mapping of DFS occurrence is not complete and some currently undocumented populations are likely to exist. New populations of DFS are being discovered on the periphery of the range identified in the 1993 Recovery Plan, but these are generally within 3 miles of our known occurrences. Based on all the information we now possess, the Service considers it reasonable to conclude that DFS are generally likely to occur in the area within 3 miles of our currently recorded sightings of DFS. Therefore, based upon updated DFS study data, the Service considers projects outside of a 3 mile radius of known DFS occurrence as not likely to effect Delmarva fox squirrels.

An updated range map of the area where DFS are likely to occur is attached. This area is the accumulation of areas where DFS have been observed and the surrounding 3 mile area where the DFS are likely to occur. This map will continue to be revised as new sightings are recorded and we will be providing you an updated range map on a periodic basis.

Thank you for your continued conservation efforts towards Delmarva fox squirrels. Please feel free to contact Dr. Cherry Keller (410-573-4532) of our Endangered Species program for further information on this issue.

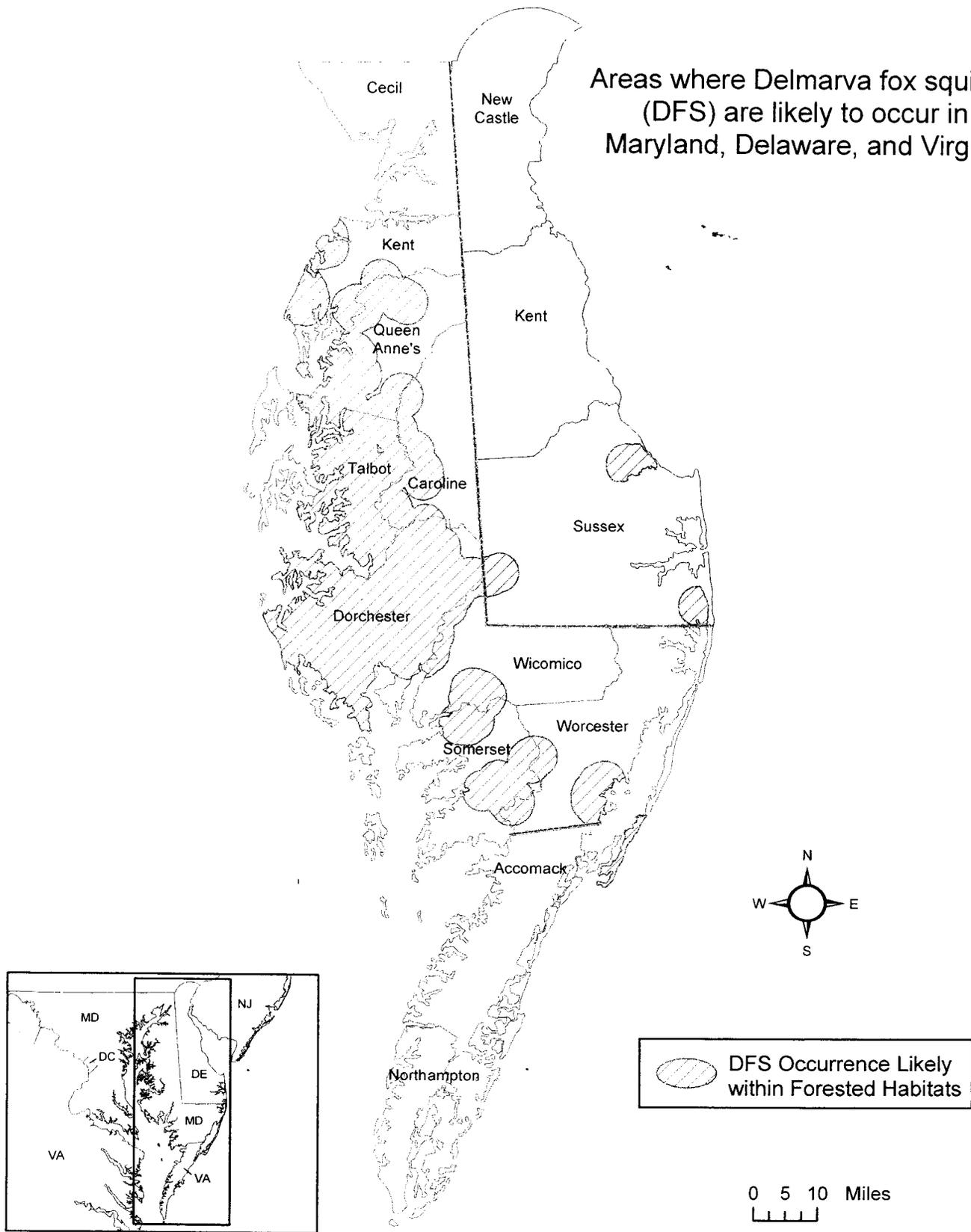
Sincerely,

A handwritten signature in black ink, appearing to read "Salvatore M. Amato". The signature is fluid and cursive, with the first name being the most prominent.

Salvatore M. Amato  
Acting Field Supervisor

Attachments

# Areas where Delmarva fox squirrels (DFS) are likely to occur in Maryland, Delaware, and Virginia



These data represent the ongoing efforts of the U.S. Fish and Wildlife Service and Maryland Department of Natural Resources to consolidate, summarize, and regularly update and correct existing information regarding Delmarva fox squirrel occurrence. Comprehensive field surveys have not been conducted and changes in this map are expected to occur in the future. This map should be used as a tool to assist decision makers, but cannot provide a definitive statement on the presence, absence or condition of Delmarva fox squirrel populations.

The U.S. Fish and Wildlife Service makes no warranty as to the suitability of this map for any use and assumes no liability for its appropriate use or misuse.

Memorandum

To: Tom McCabe

From: Cherry Keller, Senior Biologist, Endangered Species Program

Date: October 8, 2004

Subject: Recommendation to revise the area where Delmarva fox squirrels (*Sciurus niger cinereus*) are considered likely to occur from 5 miles around sightings to 3 miles from sightings based on new information.

There have been several new pieces of information on the movements of Delmarva fox squirrels (DFS), and theoretical dispersal abilities of mammals in general, that relate to the area within which DFS are likely to occur. This new information suggests to the staff of the Endangered Species Program that we should revise our definition of where DFS are "likely to occur" from the area within 5 miles of current sightings, to the area within 3 miles. Staff of the Endangered Species Program have met on several occasions to discuss this new data (February 9, March 8, and June 15<sup>th</sup> 2004) and we have developed the recommendation provided below. The following summarizes our rationale for determining where DFS are likely to occur and incorporates this new information.

Delmarva fox squirrels are mobile animals that have a large home range. The average of DFS home range sizes reported in the literature is 40 acres. The particular location of a sighting is thus not the only place where DFS are likely to occur and we expect them to be found in a larger area around places where they have been observed. We know that individual animals can move as much as 5 miles based on observations. Thus, up until now, we have used this radius around sightings as the area within which we can reasonably expect animals to be present. This was based on observations of both translocated and untranslocated animals.

- Translocated animals have moved as far as 5 miles (Assawoman radio-collared animal followed by Ken Reynolds, Delaware Dept. of Natural Resources and Environmental Control, pers. com.) and 4.6 miles (Popular Neck to DeBlasio- p.16 DFS Recovery Plan, USFWS 1993) from initial reintroduction sites.
- Individuals that have not been translocated have moved as far as 3.29 miles reported by Bocetti and Pattee, and 4.97 miles reported at Chincoteague (see attached spreadsheet).

However, recent data has been provided on the proportion of animals that actually move 5 miles, and the proportion of animals, or *likelihood* of DFS moving 5 miles, is very low. The attached spread sheet summarizes data from two studies where animals have been tagged on one study

area and then recaptured on another study area. Let me provide background on these studies.

#### Studies documenting movements of DFS

Carol Bocetti and Hank Pattee are USGS researchers who have been conducting a long-term study on the effects of forest harvest on Delmarva fox squirrels. They have six study areas in Dorchester County, three are experimental plots and three are controls. On the experimental plots they have been monitoring DFS before and after a timber harvest and comparing this to monitoring of the three control sites. They trap and mark animals in the spring and fall and the population information comes from recapture information. Most of the marked animals are recaptured in the same study plot that they are first captured on and thus stay within approximately 0.5 miles of their capture site. However, sometimes an animal that is marked on one study plot, is recaptured on another study plot and documents the movement of the animal that particular distance. I asked these researchers for information on these types of movements and they provided the data in the attached table. It must be underscored that this type of information will *underestimate* true movements because squirrels can only be recaptured on the five other study plots. If they happened to move beyond these plots, or in other directions, they will not be recaptured and their movements will go undetected.

- In Bocetti and Pattee's study of 215 marked animals on six study sites, 97% of the animals stayed within 0.5 miles. Only 7 animals (3%) moved more than 0.5 miles from initial capture. The seven animals moved 0.53, 0.84, 0.87, 0.93, 1.43, 2.61, and 3.29 miles respectively. Thus only 1% of the marked animals moved more than 2 miles, though these are acknowledged underestimates of the number of squirrels moving because recapture is limited to the study sites.

Similar data was also collected by Dueser and Larson as they had been marking and recapturing animals on four study plots at Chincoteague where repeated trapping was used to monitor the study areas as a benchmark sites and to provide information on the population size at Chincoteague. Again, most animals remain in the vicinity of initial captures.

- Data from Chincoteague Benchmark sites indicate that of 231 tagged DFS, 97% remained on their study site and only (3%) moved more than 1.24 miles with the maximum distance being 4.97 miles (p. 7 Dueser, 1999 Benchmark report to USFWS). Again, this data will underestimate movements but is instructive.

In addition, Bowman et al. (2001) describe a significant relationship between maximum dispersal distances and home range sizes of mammals. Using the relationship described in this study, the maximum dispersal distance for DFS is approx. 10 mile. The shape of the curve is logarithmic, again indicating that most movements are close, and fewer and fewer movements occur at greater distances. Using this relationship, Hilderbrand et al. uses the distance of 2.25 miles as the distance within which, DFS are expected to successfully move, and populations that are within this distance of each other are considered connected and not isolated in the Population

Viability Analysis for this species (Hilderbrand et al. *in prep*).

From our discussions, we determined that the area where DFS are “reasonably likely to occur” integrates 3 ideas:

- 1) how far can an individual DFS move?,
- 2) how likely is a DFS to move various distances, and
- 3) what is the probability that a new population will be discovered in previously unoccupied areas, i.e. how certain and fixed is our current distribution data?

Data responding to questions 1 and 2 have been presented above and can be summarized as follows. We know that individuals can move up to 5 miles. We know that mark recaptures studies indicate that most do not move more than 1 to 2 miles, but these are underestimates of these movements. Movements of 2 to 3 miles may be more realistic. Theoretical estimates suggest 2.25 miles.

The third question to consider, is what is the probability that a new population will be discovered (through population expansion or improved surveys)? In other words, if we had not detected some of the new populations on the periphery of the range, how many populations would we have missed?

- Of 63 new sightings entered into the CBFO GIS database in 2001, 2002, and 2003, 88% of the sightings are within 2 miles of the previously known population and 92% are within 3.0 miles of the sightings known in the year 2000. These new sightings occur on the periphery of the previous range and it is reasonable to expect that DFS are also likely to occur in the area between the remnant population and these new peripheral observations. While they may occur at lower densities, we fully expect to be able to document their occurrence in the area between remnant and peripheral observations as we continue to accumulate more sightings.

While probabilities of occurrence cannot be determined precisely from any of these data, based on the information available, we are proposing that the area where DFS are considered “likely to occur” be changed from a 5-mile radius around existing observations, to a 3-mile radius around existing observations. While individual animals may be capable of moving 5 miles, most marked individuals are re-trapped within 1-2 miles of their initial capture sites. And since this information is an underestimate of movements, 2-3 miles is probably a better estimate of typical movements. In addition, of 63 new sightings recorded in a three year period (2001-2003), 92% were within 3 miles of the sightings known in the year 2000. Though, probabilities of occurrence cannot be determined precisely from any of these data, the 3 mile radius around sites where DFS have been observed is our best estimate of where this animal is likely to occur. This

area will include DFS occurrence due to the movements of DFS from existing known populations and is also more likely to include new populations. Our assessment of this information is that the frequency of DFS movements beyond 3 miles is too rare to justify a determination of "likely to occur".

Thus, within 3 miles of existing observations we would generally consider DFS to be likely to occur if suitable habitat is present. Trapping to determine presence or absence at a particular site continues to be an option for applicants, using the USFWS recommended trapping protocol. However, if the applicant chooses not to trap, and suitable habitat is present, we would generally assume DFS are "likely to occur".

Attached is a revision to our take guidance describing the method for assessing likelihood of DFS presence on a project site. If you are in agreement with this change please sign the concurrence line at the bottom of this memo and we will implement the new method for assessing the area where DFS are likely to occur.

#### References

Bowman, J., J.A.G. Jaeger and L Fahrig. 2001. Dispersal distance of mammals is proportional to home range. Ecology 83:2049-2055.)

Dueser, R.D. 1999. Analysis of Delmarva fox squirrel (*Sciurus niger cinereus*) benchmark population data (1991-1998). Report to USFWS, Chesapeake Bay Field Office, Annapolis MD. Contract 5141070512A.

Hilderbrand, R.,H., R.H. Gartner, M.J. Ratnaswamy, and C.E. Keller. In prep. Population viability analysis for the Delmarva fox squirrel.

Paglione, L. 1996. Population status and habitat management of Delmarva fox squirrels. MS Thesis, Department of Forestry and Wildlife Management, Univ. of Massachusetts, Amherst.

U.S. Fish and Wildlife Service. 1993. Delmarva fox squirrel (*Sciurus niger cinereus*) recovery plan, second revision. Prepared by Delmarva fox squirrel recovery team for Northeast Region, U.S. Fish and Wildlife Service, Hadley, MA. 69 pp. plus appendices.

CONCUR: \_\_\_\_\_

NONCONCUR: \_\_\_\_\_

DATE: 10-13-04

DATE: \_\_\_\_\_

DFS ID	Initial Capture Area	New Area1	New Area2	Move	Distance1 meters	Distance2 meters	Total Distance meters	Distance1 miles	Distance2 miles	Total Distance miles	Study	Comments
F0284	TCF2	TCF1		twice	300			0.19				0.19 Bocetti and Pattee
F0007	TCF1	TCF2		Twice	350			0.22				0.22 Bocetti and Pattee
F0125	TCF2	TCF1		No return	400			0.25				0.25 Bocetti and Pattee
F0086	TCF2	TCF1		Twice	400			0.25				0.25 Bocetti and Pattee
F0166	TCF1	TCF2		No return	400			0.25				0.25 Bocetti and Pattee
F0062	TCF2	TCF1		Round trip	450			0.28				0.28 Bocetti and Pattee
F0002	TCF1	TCF2		Round trip	550			0.34				0.34 Bocetti and Pattee
F0325	TCF1	TCF3		Round trip	550			0.34				0.34 Bocetti and Pattee
F0039	TCF3	WHMA		No return	700			0.43				0.43 Bocetti and Pattee
F0175	WHMA	TCF3		No return	700			0.43				0.43 Bocetti and Pattee
F0177	WHMA	TCF3		No return	700			0.43				0.43 Bocetti and Pattee
F0091	TCF3	TCF2		Round trip	750			0.47				0.47 Bocetti and Pattee
F0218	TCF1	TCF2		No return	850			0.53				0.53 Bocetti and Pattee
F0147	TCF3	TCF1	TCF2	Round trip	900	450	1350	0.56	0.28			0.84 Bocetti anc based on radio telemetry; cross Corsey Creek
F0238	TCF2	TCF1	TCF3	No return	600	800	1400	0.37	0.50			0.87 Bocetti and Pattee
F0263	TCF3	TCF1		No return	1500			0.93				0.93 Bocetti and Pattee
F0170	TCF1	Whitemarsh Rd.		Round trip	2300			1.43				1.43 Bocetti and Pattee
F0145	TCF3	Harrisville Rd.		Round trip	4200			2.61				2.61 Bocetti anc based on radio telemetry; cross Corsey Creek
F0169	TCF1	Harrisville Rd.		No return	5300			3.29				3.29 Bocetti anc based on radio telemetry; cross Corsey Creek
<p>Conclusion from Bocetti: Based on emailed data from Carol Bocetti on May 6, 2003, stating that of 215 animals marked on four study sites, 19 individuals moved to a new study site. However, "these movements between sites are not necessarily farther than movements within sites (all sites are 800-900 meters long). If you want to breakdown by 0.5 miles increments, then consider all ind's that stayed within site to be within 0.5 miles from Initial Capture". Thus of the 215 animals marked in their study only 7 individuals (3%) moved more than 0.5 miles from initial capture. Only 1 individual (0.5%) moved more than 3 miles.</p>												
PAGLIONE												
no ID	Egypt	Linthicum		No return	7250			4.50				4.50 Paglione at cross Buttons Neck Creek
<p>DUESER/Larson</p> <p>Table 5 Dueser Benchmark Report</p>												
<p>OF 231 tagged DFS at Chincoteague Benchmark Sites, 22 animals moved between study sites.</p>												
<p>minimum distance of DFS that moved between sites 500 0.31</p>												
<p>maximum distance of DFS that moved between sites 8000 4.97</p>												
<p>7 of 22 animal movements between sites 2000 or more 1.24</p>												
<p>THUS: 7 of 231 animals (3%) moved 1.24 miles or more)</p>												
<p>1 (1%) of 95 tagged animals at Chincoteague 1600 0.99</p>												
<p>0.99 (Larson and Dueser unpub. 1990) p. 7 Benchmark report</p>												