DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R5–ES–2014–0021]

[FXES11130900000C6–123–FF09E30000]

RIN 1018–AY83

Endangered and Threatened Wildlife and Plants; Proposed Rule to Remove the Delmarva Peninsula Fox Squirrel from the List of Endangered and Threatened Wildlife

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule; availability of draft post-delisting monitoring plan.

SUMMARY: Under the authority of the Endangered Species Act of 1973, as amended

(Act), we, the U.S. Fish and Wildlife Service (Service), propose to remove the Delmarva Peninsula fox squirrel (*Sciurus niger cinereus*), more commonly called the Delmarva fox squirrel (DFS), from the Federal List of Endangered and Threatened Wildlife due to recovery. This proposed action is based on a thorough review of all available information, which indicates that the subspecies is now sufficiently abundant and distributed to withstand current and foreseeable threats to its long-term viability and thus no longer meets the definition of a threatened species or an endangered species under the Act.

We are also providing notification that a draft post-delisting monitoring (PDM) plan is available for public review. We are seeking information and comments from the public on this proposed rule and the PDM plan.

DATES: We will accept comments received or postmarked on or before [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]. Comments submitted electronically using the Federal eRulemaking Portal (see **ADDRESSES** below) must be received by 11:59 p.m. Eastern Time on the closing date. We must receive requests for public hearings, in writing, at the address shown in **FOR FURTHER INFORMATION CONTACT** by [INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: You may submit comments by one of the following methods:

Electronically: Go to the Federal eRulemaking Portal: *http://www.regulations.gov.* Follow the instructions for submitting comments to Docket

No. FWS–R5–ES–2014–0021. Then, in the Search panel on the left side of the screen, under the Document Type heading, click on the Proposed Rules link to locate this document. You may submit a comment by clicking on "Send a Comment or Submission."

By hard copy: Submit by U.S. mail or hand-delivery to: Public Comments Processing, Attn: FWS–R5–ES–2014–0021, U.S. Fish & Wildlife Headquarters, MS: BPHC, 5275 Leesburg Pike, Falls Church, VA 22041-3803.

We will post all comments on *http://www.regulations.gov*. This generally means that we will post any personal information you provide (see the **Public Comments** section below for more information).

Copies of Documents: The proposed rule, draft post-delisting monitoring plan, and primary supporting documents are available on *http://www.regulations.gov*. In addition, the supporting file for this proposed rule will be available for public inspection, by appointment during normal business hours, at the Chesapeake Bay Field Office, 177 Admiral Cochrane Dr., Annapolis, MD 21401, 410–573–4573, and on the Chesapeake Bay Field Office Web site at: *http://www.fws.gov/chesapeakebay/*. Individuals who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Services (FIRS) at 800–877–8339.

FOR FURTHER INFORMATION CONTACT: Questions or requests for additional information may be directed to Genevieve LaRouche, Field Supervisor, by telephone at 410–573–4573, or Cherry Keller, Wildlife Biologist, by electronic mail at cherry_keller@fws.gov or by telephone 410–573–4532. Individuals who are hearing-

impaired or speech-impaired may call the Federal Relay Service at 800–877–8337 for TTY assistance.

SUPPLEMENTARY INFORMATION:

Executive Summary

Purpose of Regulatory Action

We propose to remove the Delmarva fox squirrel from the Federal List of Endangered and Threatened Wildlife (50 CFR 17.11) due to recovery. This proposed action is based on a thorough review of the best available scientific and commercial information as assessed in two 5-year status reviews conducted in 2007 and 2012. These reviews, along with additional information that has become available since 2012, indicate that current threats to the Delmarva fox squirrel have been sufficiently abated and that the subspecies is now sufficiently abundant and widely distributed to withstand any foreseeable threat to its long-term viability. It therefore no longer meets the definition of a threatened species or an endangered species under Act. This document thus consists of: (1) a proposed rule to delist the Delmarva fox squirrel; and (2) a notice of availability of a draft post-delisting monitoring plan.

Basis for Finding

Under the Endangered Species Act, a species may be determined to be endangered or threatened based on any of five factors: (A) the present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for

commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. We must consider the same factors in delisting a species. We may delist a species if the best scientific and commercial data indicate the species is neither threatened nor endangered for one or more of the following reasons: (1) the species is extinct, (2) the species has recovered and is no longer threatened or endangered, or (3) the original scientific data used at the time the species was classified were in error.

The Delmarva Peninsula fox squirrel was listed as federally endangered in 1967, because its distribution had contracted to only 10 percent of its historical range. The most likely causes for this decline were loss of mature forest from land clearing for agriculture, short-rotation timber harvest, and overhunting.

After reviewing all available scientific and commercial information, we find that delisting the Delmarva fox squirrel due to recovery is warranted for the following reasons:

(1) As a result of translocations and discovery of additional natural populations, the known distribution of DFS has expanded since listing, and its range now extends over 28 percent of the Delmarva Peninsula. Acres of occupied forest and average density estimates lead to an overall estimate of 17,000 to 20,000 DFS distributed across the subspecies' current range.

(2) The primary threats to the species' viability, including habitat loss due to development, timber harvest, and sea level rise, no longer pose either a current or foreseeable risk of DFS extinction, based on the following findings:

- Most development on the Delmarva Peninsula is projected to occur around several large cities outside the DFS's current occupied range, and existing laws and programs are directing development into agricultural land and out of forest land. Further, within the squirrel's current range, land protection is occurring at a more rapid rate than the rate of development. Within the current range, about 30 percent of DFS-occupied forest is now protected from development (USFWS 2012, table 5), comprising approximately 16,187 hectares (ha) (40,000 acres (ac)) of protected and occupied forest.

- Timber harvest rates and the size of individual cuts are decreasing over time, and remote sensing data indicate that sufficient acres of mature forest have remained on the landscape even with past harvest rates. In addition, 23,472 ha (58,000 ac) of forest land previously managed for pulpwood—and thereby precluded from maturing into DFS habitat—are now being managed by the State of Maryland for sawtimber and wildlife values, including DFS conservation; this management plan is expected to continue over the foreseeable future.

- Although sea level rise is projected to eventually affect the largest extant population of DFS, the associated habitat losses are not expected to cause its extirpation. This DFS population, which is over 70 times the minimum viable population size, is likely to expand into more inland forests via riparian and other connecting corridors. Further, despite impacts to this area and other localized habitat areas, over 80 percent of the squirrel's range is not vulnerable to a foreseeable sea level rise of 0.61 meter (m) (2 feet (ft)).

- Based on a 40-year track record, it is apparent that State laws and programs in Maryland, Delaware, and Virginia will continue to provide for forest habitat and wildlife conservation, including preventing the return of overhunting of DFS, following delisting.

Taking into consideration the current and projected rangewide population viability of the DFS and availability of suitable habitat, our overall conclusion is that this species is no longer in danger of becoming extinct, nor is it likely to once again become endangered in the foreseeable future.

Information Requested

We intend that any final action resulting from this proposed rule will be based on the best scientific and commercial data available and be as accurate and effective as possible. Therefore, we invite tribal and governmental agencies, the scientific community, industry, and other interested parties to submit comments or new data, if any, regarding this proposed rule. In particular, we are seeking information and comments concerning: (1) the continued presence, extirpation, or new locations of DFS colonies within the subspecies' historical range; (2) our analysis of the viability of DFS populations; (3) our analysis of the factors likely to affect the long-term status of the squirrel, especially development, forestry, and sea-level rise projections for the Delmarva Peninsula; and (4) our proposed post-delisting monitoring program for the DFS.

Please bear in mind that comments simply advocating or opposing the proposed action without providing supporting information will be noted but not considered in making a determination, as section 4(b)(1)(A) of the Act (16 U.S.C. 1531 *et seq*.) directs that determinations as to whether any species is a threatened or

endangered species shall be made "solely on the basis of the best scientific and commercial data available."

To issue a final rule to implement this proposed action, we will take into consideration comments and any additional information received within the public comment period. Such communications may lead to a final rule that differs from this proposal. All comments provided to us, including commenters' names and addresses, will become part of the supporting record.

You may submit your comments and supporting materials concerning the proposed rule by one of the methods listed in **ADDRESSES**. We will not accept comments sent to an address not listed in **ADDRESSES**. All comments must be submitted to *http://www.regulations.gov*, hand delivered, or postmarked by the deadline specified in **DATES**.

We will post your entire comment, including your personal identifying information, on *http://www.regulations.gov*. Individuals wishing to withhold personal identifying information, such as street address, phone number, or email address, must make this request prominently at the beginning of the comment document. Please note, however, that we cannot guarantee that we will be able to comply with such requests. We will always make submissions from organizations and businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

Comments and materials we receive, as well as supporting documentation used in preparing this proposed rule, will be available for public inspection on *http://www.regulations.gov* or by appointment during normal business hours at the

Service's Chesapeake Bay Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Peer Review

In accordance with our policy, "Notice of Interagency Cooperative Policy for Peer Review in Endangered Species Act Activities," published on July 1, 1994 (59 FR 34270), we will seek the expert opinion of at least three appropriate independent specialists regarding scientific data and interpretations contained in this proposed rule. We will send copies of this proposed rule to the peer reviewers immediately following publication in the **Federal Register**. The purpose of such review is to ensure that our decisions are based on scientifically sound data, assumptions, and analysis. Accordingly, the final decision may differ from this proposal.

Background

Regulations published at 50 CFR 424 specify the procedures and requirements for adding or removing species from the List of Endangered and Threatened Wildlife (50 CFR 17.11). The Secretary of the Interior has delegated responsibility to the Service for determining whether a species should be removed from any List published pursuant to section 4(c) of the Act. We are additionally required by section 4(c)(2) and 50 CFR 424.12 to review each species on the List every 5 years (i.e., conduct a 5-year review) to determine whether a species' classification under the Act is accurate. In the course of a 5-year review, we evaluate whether the species continues to meet the legal definition of a threatened or endangered species, based upon the species' biological status and its status

relative to the five factors under section 4(a)(1). These factors encompass the following extinction risks: (A) the present or threatened destruction, modification, or curtailment of the species' habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; and (E) other natural or manmade factors affecting the species' continued existence. A species may be delisted pursuant to 50 CFR 424.11(d) if the best available scientific and commercial data substantiate that the species is neither endangered nor threatened for one or more of the following reasons: the species is considered to be extinct, the species is considered to be recovered, or the data available when the species was listed (or the interpretation of those data) were in error.

This proposed rule is based upon information contained in, and the recommendation of, a 5-year review for the DFS that was initiated on August 4, 2010 (75 FR 47025), and approved on September 4, 2012 (USFWS 2012). The review, which assessed the DFS's status across its entire range, concluded that the subspecies is now sufficiently abundant and distributed to withstand current and foreseeable threats to its long-term viability, and that, therefore, the subspecies does not meet the definition of either an endangered species or a threatened species under section 3 of the Act, based on recovery. The entire review is available at *http://www.fws.gov/northeast/EcologicalServices/recovery*, and on the Chesapeake Bay Field Office Web site: *http://www.fws.gov/chesapeakebay*.

Previous Federal Actions

The Delmarva Peninsula fox squirrel was listed as an endangered species throughout its known historical range on March 11, 1967 (32 FR 4001). At that time, critical habitat was not provided for under the Act; hence, critical habitat was not designated for the DFS.

On September 13, 1984 (49 FR 35951), a translocated DFS population released on the Assawoman Wildlife Management Area in Sussex County, Delaware, was designated as an experimental nonessential population. Notably, this was the first experimental population designated under the Act.

The original recovery plan for the DFS was approved on November 6, 1979. The recovery plan was subsequently revised in January 1983, with a second revision on June 8, 1993. On October 31, 2003, the second revision of the recovery plan was updated to include new status information and clarify the recovery criteria for the DFS.

The DFS was included in three cursory 5-year reviews conducted for all listed species from 1979 to 1991, including a 1979 (44 FR 29566) review of all species listed prior to 1975; a 1985 (50 FR 29901) review of all species listed before 1976 and in 1979 and 1980; and a 1991 (56 FR 56882) review of all species listed before 1991. None of these reviews resulted in a recommendation to change the listing status of the DFS.

The first comprehensive and species-specific 5-year review for the DFS was completed in 2007 (USFWS 2007). This review recommended reclassification of the DFS from endangered to threatened status, pending further analysis of forest and development patterns on the Delmarva Peninsula. The second comprehensive 5-year review for the subspecies was completed in 2012; its recommendation to delist the DFS forms the basis for this proposed rule.

Further information on Federal actions for the DFS can be found on the Service's Environmental Conservation Online System (ECOS) at: *http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A00B.*

Biological Background

The Delmarva fox squirrel (*Sciurus niger cinereus*) is a subspecies of eastern fox squirrel (*Sciurus niger*) found only on the Delmarva Peninsula. The Delmarva Peninsula is located between the Chesapeake Bay and Atlantic Ocean and covers portions of Maryland, Delaware, and Virginia. The DFS is a large, silver-gray tree squirrel with white underparts and a wide tail. It can be easily distinguished from the gray squirrel (*Sciurus carolinensis*), the only other tree squirrel in the area, by its larger size, wider tail, short ears, and silver-gray color. The DFS inhabits mature forests of mixed hardwoods and pines within the agricultural landscapes of the Delmarva Peninsula and is not typically found in suburban settings. These mature forests provide abundant crops of acorns, pine cones, and other food as well as cavities for dens. DFS are also associated with forests that have a more open understory (Dueser *et al*. 1988, entire; Dueser 2000, entire) or where understory shrubs are clumped, leaving other open spaces (Morris 2006, p. 37). DFS use a wide range of mixed forest types that may be dominated by hardwoods or conifers. While they need mature forest, their diets are diverse and they travel and forage in many areas, including clearcuts, young forests, and agricultural fields.

As members of the Order Rodentia, DFS have life histories with good potential for population increase; for example, females breed at 1 year of age, litter sizes range from 2 to 4 young, some females have potential for 2 litters in 1 year, and lifespans can

reach 6 to 7 years in the wild. Den sites are frequently found in hollow portions of trees, but leaf nests may be used as well. Home ranges of DFS vary considerably but are typically 12 to 16 ha (30 to 40 ac), and individual home ranges overlap (Flyger and Smith 1980; entire, Paglione 1996; entire, Pednault-Willett 2002, p. 109). Densities range from 0.36 to 1.29 DFS per ha (0.15 to 0.5 DFS per ac), averaging 0.82 DFS per ha (0.33 DFS per ac) (Paglione 1996, p. 28; Pednault-Willett 2002, pp. 85–104).

Historically, this species was patchily distributed throughout most of the Delmarva Peninsula and into southern Pennsylvania, but by the time of listing the remnant populations occurred in only four Maryland counties (Taylor 1976, entire); this range contraction was most likely due to land use changes and hunting. When the subspecies was listed in 1967, its distribution had been reduced to only 10 percent of the Delmarva Peninsula. After listing, the hunting season was closed and recovery efforts focused on expanding the squirrel's distribution through translocations, thereby decreasing its vulnerability to extinction. In addition, new populations have been discovered since the time of listing (particularly since more intensive search efforts were initiated), and there are now many more areas of forest known to be occupied by DFS.

The squirrel's current occupied range is defined as the area within 4.8 kilometers (km) (3 miles (mi)) of credible DFS sightings. As of the 2012 5-year review, this covered 28 percent of the Delmarva Peninsula, including 10 of the 14 peninsular counties (8 counties in Maryland and 1 each in Delaware and Virginia) and 54,543 ha (134,778 ac) of occupied forest (USFWS 2012, based on 2010 data). Since that time, new sightings have continued to occur and an updated overview of the range as of 2013 is provided in table 1. An additional population discovered in Worcester County,

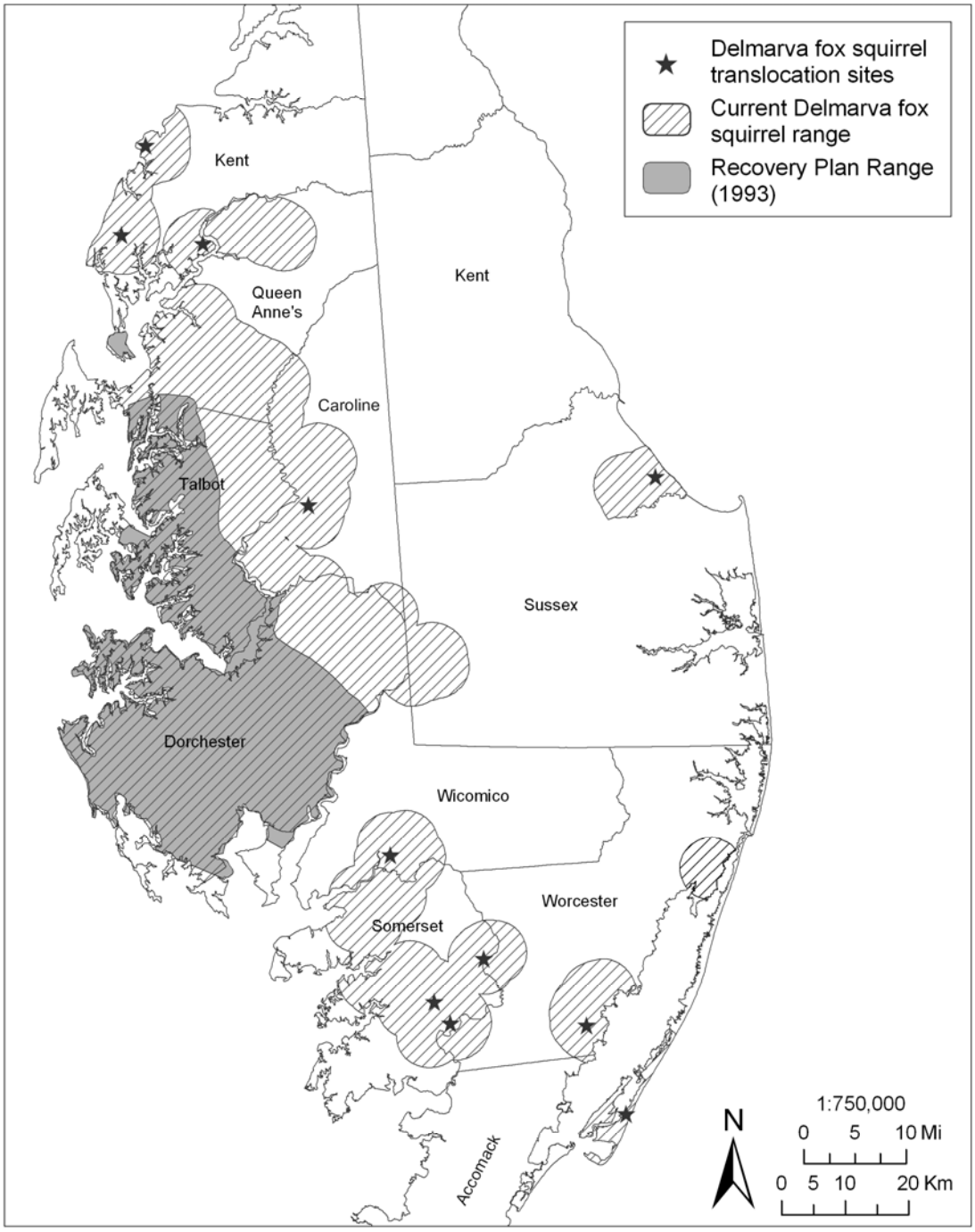
Maryland, is the first population found there that was not a result of a translocation.

Figure 1 shows range changes from the time of the 1993 recovery plan to the present.

Table 1. Known occupied range of the DFS, 1970 to 2013.

	Year (approximate date for the data)				
Occupied Range	**~ 1970**	**1990**	**2005**	**2010**	**2013**
Number of counties in the range (without translocations)	3	3	6	6	7
Number of counties in the range (with translocations)	4	10	10	10	10
Total acres of occupied forest rangewide	N/A	103,311	128,434	134,778	137,363
Percent of historical range occupied	10	--	27	28	28
Source	*Taylor and Flyger 1974*	*USFWS 1993, recovery plan*	*USFWS 2007, 5-yr review*	*USFWS 2012, 5-yr review*	*USFWS 2013 data*

Figure 1. Changes in DFS range, 1993 to the present, including successful translocation sites.



Recovery Criteria

Determinations to remove species from the List must be made in accordance with sections 4(a)(1) and 4(b) of the Act. Section 4(a)(1) requires that the Secretary determine if a species is endangered or threatened because of one or more of five threat factors. Section 4(b) of the Act requires that the determination be made "solely on the basis of the best scientific and commercial data available."

Recovery criteria, as required by section 4(f)(1)(B)(ii) of the Act, help guide recovery efforts and act as triggers for when it might be appropriate to undertake a review of the status of a listed species; however, the ultimate determination of whether to reclassify or delist a species must be made in accordance with statutory standards. Thus, although recovery criteria should always be considered when making listing decisions for listed species, they can neither substitute for nor pre-empt 4(a)(1) determinations and the regulations promulgated under this section of the Act. Ultimately, a decision to remove a species from the Federal List of Endangered and Threatened Wildlife is made when the best available data show that the species is no longer an endangered species or a threatened species, regardless of how closely this information conforms to the information and criteria in the recovery plan.

The following discussion provides a brief review of the current recovery plan for the DFS, as well as an assessment of the plan's objectives and criteria as they relate to evaluating the status of this subspecies.

The most recent DFS recovery plan was approved by the Service on June 8, 1993 (USFWS 1993, entire), and updated on October 31, 2003 (USFWS 2003, entire). The plan states that "the long-range objective of the DFS recovery program is to restore this

endangered species to a secure status within its former range." The plan provides three criteria for reclassifying the DFS from endangered to threatened status. It then provides four additional criteria to be considered in conjunction with the first three for delisting the DFS.

Criterion 1: Ecological requirements and distribution within the remaining natural range are understood sufficiently to permit effective management. A considerable body of new information has been obtained regarding DFS distribution and ecological requirements, and we thus conclude that this recovery criterion has been met. The six key contributions to our understanding of the DFS are summarized below.

DFS range and distribution. The geographic information system (GIS) maintained for the DFS documents a significant increase in the area occupied by DFS since the 1993 recovery plan was issued (see figure 1 above). Records of DFS sightings by knowledgeable observers and, in particular, the use of trap and camera surveys have greatly improved our ability to determine which forest tracts are occupied by the DFS and to determine continued DFS presence in these areas.

Population persistence. Persistence of DFS populations over the recovery period has been evaluated through comparison of occupancy over time (USFWS 2012, pp. 15–17). A 1971 survey of 101 sites within the historic range of the DFS identified 65 sites as occupied and 36 sites where the DFS was determined to be absent based on frequent site visits (Taylor and Flyger 1974, entire). This survey was repeated in 2001 (Therres and Willey 2005, entire) and showed that the DFS persisted at 60 of the 65 sites (92 percent) identified as occupied in 1971, was extirpated from 5 sites, and had colonized 11 sites;

thus, the DFS was considered to be stable to slightly increasing in the area surveyed.

A second analysis compared DFS persistence in woodlots known to be occupied in 1990 to its occupancy status through 2010 (USFWS 2012, pp. 7–17). As of 1990, the DFS was recorded on 275 Maryland forest tracts comprising 41,720 ha (103,125 ac). Records from 1998 to 2010 indicate that the DFS continued to occupy at least 91 percent of the 41,720 ha (encompassing 181 forest tracts) and was extirpated from 1 percent of these hectares (7 tracts). The occupied forest tracts where DFS persist are widely distributed across the known 1990 range (USFWS 2012, figure 4). Occupancy was deemed uncertain on 87 of the 275 tracts due to difficulty in accessing properties or lack of data (table 2). Noting that because woodlots range in size, the acreage of occupied forest is thought to be a better parameter than number of tracts, if we nevertheless consider the 188 woodlots that can be classified as persisting or extirpated, 96 percent were persisting and only 4 percent were extirpated.

Table 2. DFS occupancy of 275 forested tracts (41,733 ha or 103,125 ac) in Maryland, 1990 compared to 2010.

Occupancy change from 1990 to 2010	Area of forest	Number of forest tracts	Percent of the original 41,733 ha (103,125 ac) in each occupancy status
Persistence	38,130 ha (94,221 ac)	181	91
Extirpations	499 ha (1,233 ac)	7	1
Uncertain	3,104 ha (7,671 ac)	87	8
Discoveries or colonizations	13,042 ha (32,227 ac)	250	–

As of 2010, an additional 13,042 ha (32,227 ac) of DFS-occupied forest had been reported in all three States (USFWS 2012, p. 8). Although some of these discoveries are likely to be occurrences that were previously present but undetected, anecdotal information indicates that several new localities represent true range expansion. For instance, there are several locations where landowners living at a site for 25 years or more have reported seeing DFS only in the past decade (USFWS 2012, figure 4). Further, at one site in Caroline County, Maryland, DFS were observed 5 years after two seasons of negative trapping results, providing strong evidence for establishment of a new colony. The population on the Nanticoke Wildlife Management Area in southwestern Delaware is also likely a new colonization, given that State biologists had been working at this site for many years without observing DFS. As of 2010, forest areas with persisting or newly discovered DFS occurrences, plus occurrences awaiting confirmation, totaled 54,276 ha (134,119 ac) in Maryland alone. Using the 2010 figures for occupied forest in all three States, as well as maps of mature forest and density estimates of DFS available from various studies, we estimate that the total population of DFS is now about 20,000 animals across an expanded range (USFWS 2012, p. 21).

Population viability. A DFS population viability analysis (PVA) developed by Hilderbrand *et al*. (2007, entire) used environmental variability associated with demographic features of natural populations (fecundity and survivorship) to model the extinction probabilities of populations of different sizes. This PVA determined that a population with 65 females, or 130 animals total, had a 95 percent chance of persisting for 100 years. This value was described as a minimum viable population (MVP) and was used to gauge extinction risk by projecting how many MVPs are likely to be present in a

given portion of the current DFS range (USFWS 2012, pp. 18–20).

Using dispersal parameters and existing data on DFS movements, the PVA also estimated that 75 percent of a given DFS population would have the ability to disperse to areas within 4 km (2.5 mi) (Hilderbrand *et al.* 2007, p. 73). Thus, DFS in forest tracts within 4 km of each other and not separated by physical barriers such as rivers or cities were considered likely to be interbreeding; these interbreeding groups of DFS were defined as subpopulations. The analysis indicated that approximately 85 percent of DFS are found in four large population groups which are narrowly separated and could expand to become more connected. Each of these population groups contains several times the minimum threshold of 130 squirrels needed for a 95 percent probability of population persistence over 100 years; and the rangewide population, estimated at between 17,000 and 20,000 animals, contains more than 100 times the minimum threshold for a single population.

Effects of timber harvest. Two major studies of the effects of timber harvest on DFS (Paglione 1996, entire; Bocetti and Pattee 2003, entire) suggest that DFS are fairly tolerant of timber harvest, although specific impacts depend on the size, location, and landscape position of the harvest. Small clearcuts within a surrounding forest showed relatively little impact on DFS, with individual squirrels shifting their home ranges into adjacent habitat, whereas harvest of more isolated forest peninsulas forced DFS to move greater distances.

In their long-term study, Bocetti and Pattee (2003, entire) assessed the effects of 12- to 20-ha (30- to 50-ac) clearcuts within which small islands of habitat were retained. The number of DFS found pre- and post-harvest remained relatively unchanged, although

the number of gray squirrels dramatically declined. As the clearcuts regenerated in the subsequent 10 years into young stands of trees, DFS on the sites decreased to about half of their previous numbers, but overall they maintained a continued presence, using both the islands and adjacent areas of habitat (C. Bocetti, email 9/16/2009). These findings lead to the general conclusion that the DFS can tolerate timber harvests and can continue to occupy forested mosaics of mature and regenerating stands. In addition, both studies of DFS responses to timber harvest suggest that DFS have high site fidelity and tend to shift home ranges rather than abandon a site in response to disturbance.

Habitat availability. An inventory of mature forest suitable for DFS, covering much of the squirrel's range, was recently completed using Light Detection and Ranging (LiDAR) data provided by the State of Maryland (USFWS 2012, appendix E). The ability to use remote sensing to map DFS habitat has greatly improved our understanding of both DFS-occupied habitat and, importantly, unoccupied habitat that is available for potential DFS expansion. As of 2004, LiDAR mapping had identified 175,656 ha (434,056 ac) of mature forest in the eight Maryland counties occupied by DFS (55 percent of all forest was considered mature) with 17 percent currently occupied and over 80 percent of mature forest available for expansion (USFWS 2012, table 4).

Although these numbers and locations will change over time with timber harvest and forest growth, this provides a good baseline assessment of recent habitat patterns and indicates that mature forest is well distributed and available. Mature forest is often found in riparian zones where forests may be too wet to farm or log (USFWS 2012, figure 8); these riparian forest corridors can provide connected habitat for DFS dispersal and colonization of new areas. It is important to note, however, that LiDAR mapping also

showed large tracts of mature forest distributed in upland areas throughout the Maryland portion of the range. Given that most DFS populations occur in Maryland, and, further, that unoccupied but suitable habitat is found both along the coast and inland elsewhere on the Peninsula, we can infer from this habitat inventory that there is ample unoccupied mature forest to enable further expansion of the DFS rangewide population.

Habitat connectivity. Lookingbill *et al*. (2010, entire) conducted a GIS analysis of the connectivity of forest patches on the Delmarva Peninsula. This Delmarva Peninsula-wide study used satellite date to identify forested areas, and evaluated connectivity between 400-ha (175-ac) forest patches. Although the DFS is not a forest interior obligate and does not require forest blocks this large, the Lookingbill *et al*. (2010) model provides an interesting analysis of forest connectivity between forest blocks that could hold larger populations. Study results show high connectivity of forest blocks in the southern Maryland portion of the squirrel's range, indicating few obstacles to DFS dispersal throughout this area. The model treats the Choptank and Tuckahoe Rivers as barriers to dispersal; although this may be accurate for the wider sections of these rivers, it is less so for their upper reaches, which are narrow and may freeze in the winter. Two major forest corridors were identified for DFS dispersal out of Dorchester County, Maryland, one of which is already occupied by DFS. In addition, a third dispersal corridor not identified by the model is also DFS-occupied. Observations of DFS movement through a wide range of habitats, along with the results of this connectivity model and the map of LiDAR-defined mature forests, indicate that there is sufficient habitat availability and connectivity for further DFS range expansion.

Criterion 2: Benchmark populations are shown to be stable or expanding based on at least five years of data. Criterion 2 was originally intended to measure overall DFS population trends using at least 5 years of monitoring data from seven benchmark populations (six within the remaining natural range and the introduced Chincoteague National Wildlife Refuge (NWR) population). Ultimately, a slightly different set of eight benchmark sites was monitored and the resulting data were analyzed (Dueser 1999, entire). Dueser (1999) concluded that the benchmark sites were stable over a 5- to 7-year period, and benchmark monitoring was ended.

Since the completion of benchmark monitoring, we have collected additional data to better understand rangewide population trends. The distribution data and two population evaluations described under criterion 1 above are much better indicators of an expanding range and DFS recovery within that range. Although DFS in isolated areas (such as on small islands) are vulnerable to extirpation, the population data for DFS in most of its occupied habitat and the discovery of additional occupied forest tracts indicate that this recovery criterion has been met.

Criterion 3: Ten translocated colonies are successfully established throughout the historical range. This criterion requires that at least 10 new DFS colonies must be established (this may include translocations initiated prior to issuance of the 1993 recovery plan) within the squirrel's historical range and must show evidence of presence for at least 5 to 8 years after release. The intent is to demonstrate the ability of the DFS to colonize new sites, whether naturally or through management.

Consequent to 16 translocation efforts, 11 colonies were successfully established as shown by post-release trapping results (Therres and Willey 2002, entire). More recent trapping and camera surveys further indicate continued presence of these translocated colonies for more than 20 years (USFWS 2012, table 1), and in many of these areas, DFS have dispersed well beyond the initial release site.

The success rate for the DFS translocations (69 percent) is higher than is typically found for similar translocation efforts for other species. A study of 116 reintroductions found that only 26 percent were classified as successful (Fischer and Lindenmayer 2000, p. 5), although the success rate is generally higher for mammals and wild source populations (Wolf *et al*. 1996, p. 1146). Although there were some initial concerns about the genetic diversity of the translocated populations, subsequent analysis indicated that their genetic diversity was comparable to that of their source populations (Lance *et al.* 2003, entire). Given the relative success of this conservation tool for DFS, we conclude that this recovery criterion has been met.

Criterion 4: Five additional (post-1990) colonies are established outside of the remaining natural range. Criterion 4 requires discovery or establishment (from new translocations) of at least five new colonies that extend the DFS's range beyond that known to be occupied at the time of the 1993 recovery plan. This criterion addresses the threat of range contraction and provides for additional redundancy of populations as one component of long-term species viability.

By 2007, eight new populations had been identified that did not result from translocations, (USFWS 2007, figure 2), expanding the range toward the east. These

consist of the Maryland DFS populations in northeastern Dorchester County, southeastern Caroline County, the Tuckahoe River corridor in Talbot County, northern Queen Anne's County, the Centreville area of Queen Anne's County, eastern Talbot County, northern Somerset County, and the Nanticoke Wildlife Management Area in southwestern Sussex County, Delaware. The Sussex County population represents the first population found in Delaware since the time of listing that was not a result of a translocation.

Since the 2007 status review (USFWS 2007), additional occupied forest has been discovered between some of these new populations, thus improving their long-term likelihood of survival (USFWS 2012, figure 3). We therefore conclude that this recovery criterion has been met.

Criterion 5: Periodic monitoring shows that translocated populations have persisted over the recovery period. Criterion 5 requires the continued presence of at least 80 percent of translocated populations; in addition, at least 75 percent of these populations must be stable or improving. All 11 translocated populations (100 percent) that were successfully established have persisted over the full period of recovery and have either grown in abundance on their release sites or have expanded (or shifted) into new areas. Although their initial success was documented solely by trapping techniques (Therres and Willey 2002, entire), we have recently documented their presence by trapping and/or camera surveys conducted between 2009 and 2011 (USFWS 2012, table 1). Overall, with the continued presence and growth of DFS populations at the translocation sites, we conclude that this recovery criterion has been met.

Criterion 6: Mechanisms that ensure perpetuation of suitable habitat at a level sufficient to allow for desired distribution are in place and implemented within all counties in which the species occurs. This criterion requires that mechanisms be in place to ensure perpetuation of sufficient suitable habitat. Several well-established programs protect DFS habitat from development (Rural Legacy, Maryland Environmental Trust, Maryland Agricultural Programs, etc.). These programs, along with State and Federal ownership, protect an estimated 15,994 ha (39,524 ac), 29 percent, of DFS-occupied forest throughout the squirrel's range (USFWS 2012, table 3). In addition, several State laws and regulatory programs, including Maryland's Critical Area Law, Forest Conservation Act, and wetlands laws, and Delaware's Agricultural Land Protection Program and Forest Legacy Program will continue to protect forest habitat (see USFWS 2012, appendix D). As further described below, in Virginia and Delaware the DFS occurs primarily on Federal and State land. The only Virginia population is a barrier island population that was established on Chincoteague National Wildlife Refuge (NWR) and is completely protected from residential development or commercial timber harvest. We thus conclude that this recovery criterion has been met.

Criterion 7: Mechanisms are in place and implemented to ensure protection of new populations, to allow for expansion, and to provide inter-population corridors to permit gene flow among populations. This criterion requires sufficient habitat connectivity and protection to permit gene flow among populations and allow for their expansion. As discussed under criterion 1, LiDAR (remote sensing) data indicate that mature forest

blocks connected by riparian corridors are scattered throughout the Delmarva Peninsula. An analysis of current forest distribution using a J-walk model (Lookingbill *et al*. 2010, entire) indicates these connected blocks constitute a good network of forest across the Delmarva Peninsula to allow for dispersing DFS. For example, the translocations on the southern part of the Delmarva Peninsula are in an area of very large and well-connected tracts of forest, including forest on public lands. In addition, there are protected forested pathways connecting Dorchester County, where DFS are abundant, to adjacent counties; DFS are known to use some of these corridors and have found other corridors not identified by the J-walk model. Given these opportunities for dispersal, and the fact that many of these corridors are protected by State regulatory mechanisms (as discussed under ***D. The Inadequacy of Existing Regulatory Mechanisms*** below), we thus conclude this recovery criterion has been met.

Summary of Factors Affecting the Species

Section 4 of the Act and its implementing regulations (50 CFR part 424) set forth procedures for listing species, reclassifying species, or removing species from listed status. "Species" is defined by the Act as including any species or subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature (16 U.S.C. 1532(16)). Using the best available scientific and commercial data, a species may be determined to be an endangered species or threatened species because of any one or a combination of the five factors described in section 4(a)(1) of the Act: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational,

scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. According to 50 CFR 424.11(d), we may also delist a species on the same basis for any of the following reasons: (1) the species is extinct, (2) the species has recovered and is no longer endangered or threatened, and/or (3) the scientific data used at the time the species was listed were in error.

A recovered species is one that no longer meets the Act's definition of a threatened species or endangered species. Determining whether a species is recovered requires consideration of the same five categories of threats specified in section 4(a)(1) of the Act. For species that are already listed as threatened species or endangered species, we evaluate both the threats currently facing the species and the threats that are reasonably likely to affect the species in the foreseeable future following the delisting and the removal of the Act's protections.

A species is an "endangered species" under the Act if it is in danger of extinction throughout all or a significant portion of its range. It is a "threatened species" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

The Act does not define the term "foreseeable future." For the purposes of this proposed rule, we regard the foreseeable future as the extent to which, given available data, we can reasonably anticipate events or effects, or extrapolate threat trends, such that reliable predictions can be made concerning the future status of the DFS. In conducting this analysis, our general approach was to review past threat trends and the observed DFS response, followed by a prediction of future trends. We used a general timeframe of 40

years for examining both past and future trends, noting that the timeframe for the future trends is dependent on available data and can vary for specific threats. We also took uncertainty into account. Because predictions always have some uncertainty—and the further we try to look into the future, the greater the uncertainty—a general period of 20 to 40 years allowed for sufficiently reliable use of available data to inform our projections.

In the following analysis, we first evaluate the status of the DFS throughout all its range as indicated by the five-factor analysis. We then consider whether the species is in danger of extinction or likely to become so in any significant portion of its range (SPR).

A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range.

This factor focuses on habitat changes caused by residential development, sea level rise, and commercial timber harvest, as well as the habitat-related effects on DFS viability, both rangewide and on DFS subpopulations (see ***Recovery Criterion 1, Population Viability*** above). There are 22 subpopulations, representing groups of interbreeding DFS (Hilderbrand *et al*. 2007, p. 73), within the subspecies' current range (USFWS 2012, figure 5, table 7). While they occur in three States, the only Virginia population is a barrier island population that was established on Chincoteague National Wildlife Refuge (NWR) and is completely protected from residential development or commercial timber harvest. We do not, therefore, analyze development or timber harvest for the Virginia portions of the Delmarva Peninsula where DFS do not occur; however, the impact of sea level rise on this population is addressed.

Potential habitat loss due to development: Past development trends. The Delmarva Peninsula is basically a rural landscape, but the human population has increased since the DFS was listed. For instance, in the eight Maryland counties that harbor DFS, the human population increased from approximately 200,000 to 300,000 between 1970 and 2000 (*http://planning.maryland.gov/msdc/popproj/TOTPOP_PROJ08.pdf*). Consequently, acres of developed land increased from 3 percent of the landscape in 1973 to 8 percent in 2002 by one estimate (Maryland Department of Planning 2008, pp. 22–23). Another land-use classification scheme showed an increase to 11 percent developed in 2002 and 12 percent in 2010 (*http://planning.maryland.gov/OurWork/landuse.shtml*). Despite these increases and several areas that are continuing to grow, the majority of the Delmarva Peninsula is rural with approximately 45 percent agricultural land and 35 percent forest (USFWS 2012, table 2).

During the same time period, a variety of State laws and programs were put in place to counteract the rate of development (USFWS 2012, appendix D). These include the Maryland Forest Conservation Act, which requires offsetting forest clearing for development with forest protection or afforestation, and the Maryland Critical Area Law, which now requires that the land within 200 feet of tidal waters cannot be developed and that the forest in this zone must be maintained.

In addition, three State programs that protect private land from development on a voluntary basis have resulted in conservation of 79,066 ha (195,377 ac) of private land in the DFS's Maryland range (USFWS 2012, table 3). These programs include the Maryland Environmental Trust, the Maryland Agricultural Land Protection Fund, and the

Maryland Rural Legacy Program. Together, these programs protected about 3,642 ha/year (9,000 ac/year) between 2000 and 2008 (USFWS 2012, chart 4), which is triple the rate of development between 1973 and 2002 (Maryland Department of Planning 2008, pp. 22–23).

Overall, approximately 30 percent of DFS-occupied forest is protected from development, and these lands are widely distributed across its range (USFWS 2012, table 5). Additional acres of protected forest occur outside the current range of the DFS and provide areas for further expansion (USFWS 2012, figure 7). The 15,995 ha (39,524 ac) of occupied forest that is protected from development could contain a DFS population that is about 45 times the size of the MVP determined through the PVA (Hilderbrand *et al*. 2007, entire). Nonetheless, 70 percent of DFS-occupied forest occurs on private land that is legally unprotected from development; thus, future losses from development are likely.

Potential habitat loss due to development: Future development trends. The Maryland Department of Planning (*http://planning.maryland.gov/msdc/popproj/TOTPOP_PROJ08.pdf*) predicts that by 2030 the human population in the eight Maryland counties where DFS occur will reach 400,000 (in 2000, the human population was roughly 300,000). Further, under the worst-case scenario, where Smart Growth policies are not implemented and sprawl is maximized, the amount of developed land in the eight Maryland counties could encompass 14 percent of the landscape by 2030. The greatest growth is expected to occur in the vicinity of Salisbury and Ocean City, which are outside the current range of

the DFS. However, sprawl development in Queen Anne's County and the area around Easton is also identified in the report and would occur within the northern portion of the squirrel's range (the "northern portion" is commonly understood to include Kent, Queen Anne's, Talbot, and Caroline Counties in Maryland, while the "southern portion" is understood to include the Sussex County DFS population in Delaware, the southern four counties in Maryland, and the DFS population in Accomack County, Virginia).

We assessed the potential threat of DFS habitat loss stemming from future development by overlaying the acres of existing occupied forest with areas projected to be lost to development, including: (1) Smart Growth areas (excluding the acres that are protected by easement), (2) areas where development projects are already planned, and (3) areas that are projected to be lost by 2030 if Smart Growth policies are not implemented (USFWS 2012, figure 11).

Overall, 3 percent (2,283 ha or 5,643 ac) of the forest area currently occupied by DFS is anticipated to be lost to development by 2030. The reason for this relatively low level of loss is that most of the future development on the Delmarva Peninsula is projected to occur outside the current range of the DFS (e.g., Kent Island, Salisbury, and Ocean City). Development within the current range is expected to affect two small, isolated DFS subpopulations where extirpation already appears likely. Although loss of these two isolated populations is likely, together they constitute less than 0.5 percent of the total MVPs, and their loss will, therefore, have a negligible effect on the extinction risk for the rangewide DFS population. While we do not currently have additional projections of development past 2030, we expect most future development on the Delmarva Peninsula beyond this time will continue to occur outside the current range of

the DFS. Additionally, as described below, with anticipated continued expansion of DFS populations and State laws providing protection of DFS forest habitat, we expect any future loss of habitat due to development to have a negligible effect on the extinction risk for the rangewide DFS population.

The discovery of additional occupied forest areas may offset this projected loss of occupied forest, resulting in little change to the overall area of the distribution. In the past 10 years, discovery of new occupied forest has occurred at the rate of 763 ha/year (1,887 ac/year). We might expect the rate of discovery of new occupied forest to diminish in the future, but even if we discover new occupied forest at half that rate, or 382 ha/year (944 ac/year), we will have offset anticipated losses from development in 6 years.

In summary, in the past 40 years, development has eliminated some forested habitat, but the DFS range has expanded despite these losses. Although past increases in DFS occurrences are attributable in part to the cessation of hunting and DFS translocations, the number and distribution of naturally occupied woodlands have also increased. The discovery of new occupied forest is anticipated to exceed anticipated losses of forest from future development. Protection of DFS-occupied forest from future development occurs through several State conservation easement programs, and 30 percent of the occupied habitat is permanently protected from development through easements or public ownership. State laws are now more protective of DFS forest habitat than they were in the past, and these protections are likely to continue into the future, resulting in conservation of additional forest habitat. Given the projection that future losses are likely to be relatively small, combined with the availability of ample

unoccupied habitat for DFS to move into, the loss of occupied habitat due to development does not pose an extinction risk for the DFS.

Potential loss of forest habitat from sea level rise. The Delmarva Peninsula is a low-lying landform, and increases in the relative sea level of the Chesapeake Bay can flood and kill shoreline forests that constitute DFS habitat. Although these dynamic processes have been occurring for centuries, relative sea level rise has occurred at an accelerating rate (Sallenger *et al*. 2012,entire; Boesch *et al.* 2013, entire). The DFS is not a coastal species in that it does not depend on coastal habitats specifically, and this moderates its vulnerability to sea level rise compared to marsh-dependent species. In addition, it uses a wide range of mature forest types across the Peninsula and a GIS analysis indicates over 80 percent of the current range would remain, even after inundation by 0.61 m (2 ft) of water. However, the squirrel does occur in forest blocks along the edge of the Chesapeake Bay where sea level rise has occurred in the past and will continue into the future.

Sea level rise in the past. The forces of land subsidence and sea level rise have resulted in a long history of island loss and formation in the Chesapeake Bay. In the last century, these forces combined to produce a relative sea level rise in the Chesapeake Bay region of about 3.4 millimeters (mm)/year (0.134 inches (in)/year) (National Oceanic and Atmospheric Administration 2006, p. 4), or approximately 0.3 m/100 years (1 ft/100 years) (National Wildlife Federation 2008, p. 2).

Loss of some forest stands in southern Dorchester County is already apparent where shoreline timber stands at the lowest elevations have been killed by saltwater from

recent hurricanes. Although we cannot precisely quantify how much occupied habitat has been lost in the past 40 years, the LiDAR analysis of forest height and canopy cover has identified at least 68 ha (170 ac) of forest at the edge of coastal marshes that are now standing dead trees.

Hurricanes are part of the process that results in loss of forest from saltwater as sea levels rise. Saltwater moves further into forested areas during associated storm surges, which can kill or weaken trees. Hurricanes have always been part of the weather in this area and there is no evidence that hurricanes *per se* pose a problem for DFS. Even during super-storm Sandy in October 2012, cameras set out to monitor DFS in woods near the Atlantic coast recorded DFS onsite after the hurricane passed. While there is always the possibility that hurricanes or any storm can topple trees used by DFS, the major effect is the additional push of saltwater into more upland areas, killing coastal forest trees.

Future effects of sea level rise and climate change. Sea level rise in the Chesapeake Bay is certain to continue in the future, and the rate of change is likely to be even higher than in the past (National Wildlife Federation 2008, pp. 16–17; Sallenger *et al*. 2012, entire; Boesch *et al*. 2013, entire). While the precise rate of change may be debated, we have chosen to evaluate a 0.61-m (2-ft) inundation scenario to determine the extent of occupied forest that may be lost through the combined effects of sea level rise and subsidence (i.e., relative sea level rise) despite uncertainty about when this might occur. A sea level rise of this magnitude (0.61 m or 2 ft) is predicted to occur by about 2050 using the high or extreme scenario and by 2100 using the low scenario (Boesch *et al*. 2013, p. 15).

To determine the acres of DFS-occupied forest that might be lost due to sea level rise, we conducted a GIS analysis of DFS-occupied habitat overlaid by an inundation level of 0.61 m (2 ft) on the landscape by 2050 (USFWS 2012, p.31). Although we considered this to be the worst-case scenario for the next 40 years (Boesch *et al*. 2013, p. 15), it may be a more likely scenario over a 60- to 100-year timeframe (Boesch *et al*. 2013, p. 15; National Wildlife Federation 2008, p. 16).

Our GIS analysis indicated that the most severe effects of sea level rise on DFS by 2050 will be seen in the southwestern portion of Dorchester County, Maryland (USFWS 2012, figure 12). Here, the landscape is a convoluted shoreline bounding a mix of marsh and forest. With 0.61 m (2 ft) of inundation, the marsh would be submerged, islands of forest would gradually become smaller, and eventually the forest is likely to be killed by saltwater intrusion. Using this inundation scenario, 9,332 ha (23,060 ac) of currently occupied forest would either be lost or remain only on isolated islands (USFWS 2012, figure 12). In addition, 4,409 ha (10,897 ac) of habitat along the remaining southern edge of the county would eventually deteriorate, causing DFS to move inland. Noting that the ability of DFS to move into connected habitat likely reduces the effects on this subspecies of forest losses at the coastal marsh fringe, we nonetheless consider this as habitat loss. Remaining losses are scattered in small areas throughout the range, including some losses at the Chincoteague population (USFWS 2012, figure 12).

The predicted habitat losses from sea level rise are thus greatest in southwestern Dorchester County, but even if these losses were to occur immediately, the area's remaining 23,632 ha (58,398 ac) of occupied habitat would continue to support a highly abundant DFS population with a negligible risk of extinction. Moreover, the habitat in

the northeastern portion of this area is connected to existing occupied forest farther inland (USFWS 2012, figure 9). We anticipate that DFS will move into a large tract of State-owned forest that will mature into suitable DFS habitat within the next 10 years. Analysis of forest connectivity indicates that this area either already allows or will soon allow for DFS expansion, and it connects the Dorchester DFS subpopulation to forest tracts in Caroline and Sussex Counties (USFWS 2012, figure 10). Although sea level rise may cause streams and rivers to widen and pose more of a barrier than they currently do, forested paths will still be available to provide DFS access to habitat in the inland portions of Dorchester County. Thus, losses in the southwestern portion of the county could be tolerated, but they will likely be mediated by a population shift to the large interior portions of the county.

Given our current understanding of DFS habitat use, dispersal, and population dynamics, the expected DFS response to deterioration of coastal woodlands from sea level rise is the gradual movement of some DFS to more inland areas. The DFS is known to travel across areas of marsh and can move at least 40 to 50 m (131 to 164 ft) across marshland between forested islands and may also move across frozen marsh in the winter. We acknowledge that even with the squirrel's ability to move, some isolation and loss of individuals are likely to occur, and a portion of the squirrel's habitat in southwestern Dorchester County will become degraded or lost. Nonetheless, because of the large size of the Dorchester subpopulation that would remain, as well as the presence of currently unoccupied but suitable habitat for the DFS, we conclude that habitat loss due to sea level rise will not be a limiting factor to the future viability of this subspecies.

The 0.61-m (2-ft) inundation scenario does not play out the same in other parts of

the range. In the series of small peninsulas in northwestern Dorchester County called the "neck region," this scenario results in shrinkage of available habitat but does not create islands and leaves habitat for DFS to move into (USFWS 2012, figure 12). This is also the case in other portions of the squirrel's range near the Chesapeake Bay and the Atlantic Coast. Some additional small areas of occupied habitat may be lost, but the gradual loss can be accommodated by shifts in DFS home ranges to adjacent but currently unoccupied habitat.

The most coastal population of DFS is a translocated population introduced in 1968 to Chincoteague NWR, a barrier island in Virginia that could be severely affected by sea level rise (National Wildlife Federation 2008, p. 69). The refuge's draft Comprehensive Conservation Plan (draft available at: *http://www.fws.gov/nwrs/threecolumn.aspx?id=2147550165*) addresses this issue, and the refuge may consider future land acquisitions on the Delmarva Peninsula mainland. Chincoteague NWR will continue to manage for DFS into the future whether or not the species remains listed. In addition, translocations of DFS to areas outside refuge boundaries at some point in the future are possible.

It is not clear how climate change effects may alter the nature of the forests of the Delmarva Peninsula. If climate change effects result in warmer conditions in the long term, the loblolly pine-dominated forests on the southern half of the Delmarva Peninsula may become even more predominant. However, since DFS occur in forests that range from all hardwoods to all pines and prefer a good mix of hardwoods and pines with diverse tree species, shifts in the species composition of these forests are not likely to become a significant threat for the squirrel.

In summary, DFS distribution has increased in the past 40 years even with some sea level rise occurring (at a rate of approximately 0.3 m (1 ft) in 100 years). In the next 40 to 50 years, under a worst-case scenario of a 0.61-m (2-ft) rise in sea level, we predict some deterioration of forests in certain areas along the Chesapeake Bay and the Atlantic Coast (USFWS 2012, figure 12), but we also anticipate population expansion and shifts in DFS home ranges into suitable but currently unoccupied habitat that is available in the interior of the Delmarva Peninsula. Although some concern has been expressed about the likelihood of such expansion (CBD 2013), the analysis of habitat suitability, connectivity, and the range expansion documented in the last 15 years provides a strong basis for this expectation. Thus, available data indicate that the loss of habitat due to sea level rise does not pose an extinction risk to the DFS.

Combined effects of development and sea level rise. Although no individual threat under Factor A threatens this species with extinction now or in the foreseeable future, we examined the combined effects of the most pervasive stressors—future habitat loss from development and sea level rise—using a GIS analysis (USFWS 2012; figure 5, table 7).

Beginning with the total area of forest occupied in 2010, we subtracted all possible projected losses from development and sea level rise. We then added a conservative estimate of the average acres of occupied forest that have been discovered annually for the last 10 years. We considered this for the entire range and for 22 subpopulations within the range. We also estimated the number of MVPs (calculated as a population containing 65 females, or 130 animals total) in each subpopulation

(USFWS 2012, pp. 41–42) to gauge the extinction risk of each subpopulation. This enabled a spatial analysis of how the impacts of both development and sea level rise might interact.

As of 2010, there were 54,429 ha (134,496 ac) of DFS-occupied habitat distributed among 22 subpopulations, with an estimated DFS population approximately 171 times the size of an MVP (USFWS 2012, table 7). Apart from two small, isolated subpopulations that are likely to become extirpated because of both their size and location, the majority of the 22 subpopulations have some likelihood of remaining at or above current population levels given that they are either large enough to contain a population comparable to one or more MVPs or, if smaller, they are located close to other subpopulations (USFWS 2012, table 7, figure 5).

If we subtract the habitat that might be lost from development and sea level rise and do not count any expected discoveries of additional occupied habitat, we still retain 37,795 ha (93,393 ac) of occupied forest and a rangewide population of 17,000 to 20,000 DFS, that is, 120 times the MVP size. Ninety-five percent of DFS are found in the 11 largest subpopulations, all of which are considered likely to stay at or above current population levels, because they contain at least one MVP after all losses. With expected discovery of at least some additional occupied forest, it is more likely that the total DFS-occupied area will increase and that subpopulations are likely to become more connected and even more likely to remain at or above current levels into the foreseeable future. Thus, even with the cumulative loss of habitat from development and sea level rise, the factors analyzed do not endanger or threaten this species with extinction now or in the foreseeable future.

Loss of mature forest from timber harvest. Unlike development and sea level rise, timber harvest does not result in permanent loss of habitat. A timber harvest is followed by growth of a young forest, resulting in a landscape mosaic of mature and regenerating forest stands. DFS are resilient to timber harvests when there is adjacent habitat they can move into (Paglione 1996 pp. 69–73; Bocetti and Pattee 2003, entire). The major threats that could be posed by timber harvests are, therefore, (1) the prevalence of short-rotation timber harvests, where trees are harvested before they mature enough to become DFS habitat; and (2) harvest rates that exceed growth rates and result in a continual decline of mature forest.

Potential threat from short-rotation pine forestry. Short-rotation pine forestry involves harvesting trees at approximately 25 years of age for pulp and other fiber products. Since it takes approximately 40 years to produce suitable DFS habitat, forests harvested at 25 years of age never become suitable for DFS breeding. In the past, there were two large corporations managing for short-rotation pine on the Delmarva Peninsula. However, these industries have effectively left the Delmarva Peninsula, and in 1999 the State of Maryland acquired 23,471 ha (58,000 ac) of land to be managed for sustainable sawtimber production and wildlife values. These lands, collectively administered as the Chesapeake Forest Lands, are scattered parcels throughout the southern four Maryland counties (USFWS 2012, figure 13). In addition, 4,202 ha (10,384 ac) of forest land previously owned and managed for short-rotation pine are now owned by the State of Delaware. All these lands, on which short-rotations formerly precluded DFS habitat, will now be protected from development and managed for sustainable sawtimber harvest and

wildlife habitat objectives. With compatible management, these forests will provide suitable habitat for DFS into the foreseeable future.

Most of this land is currently in early stages of forest succession; 48 percent of Maryland Chesapeake Forest Lands in 2013 were less than 25 years old and about 30 percent were at least 41 years old (Maryland DNR 2013, p. 43). Within 10 years, however, most of the forested areas will be over 26 years of age and there will be more than 30 percent of the stands over 41 years and potentially suitable for DFS (Maryland DNR 2013, p. 43). Moreover, DFS management has been integrated into the Sustainable Forest Management Plan for Chesapeake Forest Lands (Maryland DNR 2013, pp. 92–96), which identifies a total of 17,618 ha (43,535 ac) as DFS Core Areas and DFS Future Core Areas where management is for 60- to 80-year rotations. According to the management plan, at least 50 percent of the DFS Core Areas must be maintained in suitable DFS habitat at any one time, with a management emphasis on mature mixed pine/hardwood stands (Maryland DNR 2013, p. 94). Thus, while most of the Chesapeake forest lands are currently unoccupied by DFS and are too young to provide breeding habitat, these areas are protected from development and will provide suitable DFS habitat in the near future. Overall, the Chesapeake Forest Lands represent a future of protected forest areas managed for sawtimber where DFS can survive and grow in numbers. This land acquisition substantially removes the threat posed by short-rotation pine management and provides a positive outlook for future habitat for the DFS on the lower portion of the Delmarva Peninsula.

Timber harvest across the landscape in the past. The 2007 review

(USFWS 2007, pp. 17–20) evaluated the threat from timber harvest using the U.S. Forest Service's Forest Inventory and Analysis data (Frieswyk 2001, entire) in conjunction with a database of sediment-and-erosion-control permits obtained from the counties. Although these data were the best available at the time, there was some concern about the possibility of underestimating harvest rates based on the number of permits issued. Conversely, this analysis approach also led to a concern about overestimating harvest rates, because there was some evidence that individuals may obtain the permits in anticipation of good harvesting conditions but then not actually conduct the harvest. This particularly appeared to be the case in Dorchester County. Consequently, since the 2007 review we have looked at corollary means of understanding timber harvest rates (e.g., direct reports from State foresters in each county and LiDAR analysis), while acknowledging that each technique has some potential biases and results are not comparable. Due to the latter issue of comparability, the 2012 status review's (USFWS 2012, table 6) estimates of acres harvested in each county used the sediment-and-erosion-control permits simply because these data are collected in the same way over time. The exception to this is the estimate for Sussex County, Delaware, which is considered to represent actual acres harvested on the ground, because permits are not granted until immediately before the harvest.

The average annual harvest in the most recent years preceding this review is substantially less than in previous years, (generally prior to 2005) according to the permit database (USFWS 2012, table 6). In the four southern Maryland counties, the average annual harvest has dropped from approximately 1,050 ha (2,594 ac) prior to 2005 to approximately 303 ha (749 ac) since 2005. The average size of the harvest in these

counties has also decreased from an average of 22 ha (54 ac) to an average of 15 ha (36 ac). In the northern four counties in Maryland, annual harvest was low prior to 2005 and stayed about the same in more recent years, with recent estimates averaging 235 ha (582 ac). The size of harvests was also about the same and averaged 14 to 15 ha (35 to 38 ac). Given that most forest harvest occurs in the southern counties, the result is a substantial decrease in total acres harvested since 2005.

This is also the case in Delaware, where we find the permit database to be very accurate. In Sussex County, the annual harvest rate in the last 4 years was half of what was generally harvested between 1998 and 2005. Not only has the annual harvest acreage declined, but so has the size of individual harvest areas. In the mid- to late 1990s, the typical size of timber harvests ranged from 12.1 to 28.3 ha (30 to 70 ac), while over the past 5 years the average size of timber harvests ranges from 8.9 to 19.4 ha (22 to 48 ac).

Among other reasons for this overall reduction in timber harvests, economic events have resulted in the closure of several sawmills on the Delmarva Peninsula; this was beginning to happen even before the 2008 recession. The market for timber has declined dramatically, and the loss of sawmills is both a cause and a reaction to lower demand. Prices for timber remain very low, and the incentives to harvest are thus low. As discussed below, additional factors suggest that reduced harvest levels are likely to continue in the future.

Future Threats Posed by Timber Harvest. Although it is very difficult to predict future market forces, several trends suggest future timber harvests might remain smaller in size and occur less frequently. An assessment of forests in the Chesapeake Bay area

(Sprague *et al*. 2006, pp. 22–24) refers to trends in fragmentation and parcelization of forests in the Chesapeake Bay region. Parcelization is the subdivision of large blocks of land into multiple ownerships. As forest lands are subdivided, landowners tend to change from management of their woodlands for timber to management for aesthetics and wildlife values. The National Woodland Owner Survey conducted by the U.S. Forest Service found that in Maryland 45 percent of the woodland owners own less than 20 ha (50 ac) of woods (U.S. Department of Agriculture, 2012), whereas most clearcuts in the past were 9 to 20 ha (22 to 50 ac) in size. Thus, almost half of the woodland owners do not own enough woodland to accommodate harvests the size of an average clearcut without losing nearly all of their woods.

In addition, these owners are not likely to be managing for timber as a source of income. This ownership pattern also reflects the "gentrification" of the eastern shore of Maryland, with landowners becoming less likely to be farmers or foresters and more likely to be commuters or retirees that do not earn their livings from the natural resources on their properties. The proportion of the population in this area that is greater than 65 years of age has been increasing in the past and is projected to increase in the future (*www.mpd.md.state.md.us./msdc/county*). Although these landowners may harvest small portions of their woods, they are likely to retain some portions as well. This continued parcelization and gentrification is expected to reduce the number of landowners managing for timber values, reduce the size of timber harvests, and result in an overall reduction in the total acres harvested. This trend is already apparent in the reduced average size of timber harvests indicated by the sediment-and-erosion control-permit databases discussed above.

In summary, the threat posed by short-rotation pine timber harvests has largely been eliminated by the transfer of 23,472 ha (58,000 ac) to the State of Maryland and 4,202 ha (10,384 ac) to the State of Delaware to be managed for sawtimber and wildlife habitat. Additionally, the timber harvest rates on private lands across the eight Maryland counties have declined dramatically in the past several years. Even if harvest rates were to increase in the future and approach the levels reported in the 2007 status review (USFWS 2007, pp. 19-20), the impacts would not be significant, because DFS are known to have expanded their range even at that level of harvest (i.e., under past harvest rates, approximately 55 percent of the forest in the eight Maryland counties was mature forest either occupied by or potentially suitable for DFS (USFWS 2012, table 4)). The Delmarva Peninsula-wide forest mapping also indicates that ample, well-connected habitat is available for DFS expansion, even under past harvest rates. Nonetheless, future timber harvest on the shore is likely to be more limited than it has been in the past because of changes in the timber market and landownership patterns. And, importantly, the transfer of 27,674 ha (68,317 ac) of timber lands with sustainable management provisions to Maryland and Delaware will provide significant long-term conservation benefits for the DFS. These land transfers, in conjunction with available data on harvest rates across the range of the squirrel, suggest that timber harvest does not pose an extinction risk for the DFS.

Factor A summary. The current range of the DFS spans the northern and southern portions of the Delmarva Peninsula, from coastal areas to the interior of the Delmarva Peninsula. DFS inhabit a wide range of forest types from hardwood-dominated to pine-dominated forests and from wetland to upland forests, suggesting that the DFS would

continue to remain at or above viable population levels under a variety of conditions. The wide distribution provides redundancy of occupied forest across the landscape, which also reduces extinction risk. Timber harvest rates in the past have not prevented population expansion, and the harvest rates are likely to be even lower in the future. We expect the rangewide DFS population to remain viable and to continue to occupy the full complement of landscapes and forest types on the Delmarva Peninsula. We conclude that habitat losses may occur in some areas from residential development or sea-level rise, but we expect the DFS population to remain at or above recovered levels, and, moreover, we do not expect such habitat losses to prevent overall expansion of the range in the future.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Overhunting has been posited as a factor in the original decline of this species. Squirrel hunting was common in the early and middle decades of the 20th century, and, given the DFS's larger size and tendency to be on the ground, they may have been preferred game over gray squirrels. Squirrel hunting was also a common way for young hunters to gain experience. Hunting of DFS in small, isolated woodlots or narrow riparian corridors could have resulted in local extirpations, and Taylor (1976, p. 51) noted that DFS remained present on large agricultural estates where hunting was not allowed, suggesting that these areas may have provided a network of refugia for DFS as the subspecies became extirpated elsewhere.

Hunting in the Past 40 Years. Hunting of DFS was banned through State regulations in 1972. Removal of hunting pressure, combined with other factors, may have allowed

renewed population growth and expansion of the squirrel's range to its current extent. Coincidentally, squirrel hunting has declined in popularity in recent decades (replaced largely by deer hunting). Nationwide, squirrel hunting declined by 41 percent between 1991 and 2001, along with an overall decline in the number of citizens hunting (USFWS 2001, p. 5). Across Maryland, the number of hunters pursuing gray squirrels declined by almost half between 2000 and 2005, from about 19,000 to 10,000 hunters, while the number of hunters pursuing western fox squirrels (*Sciurus niger rufiventor*) in western Maryland dropped from about 3,000 to 1,800 (*www.dnr.state.md.us/wildlife/gpar/gpfur_table1.asp*). Although some hunters may mistake DFS for gray squirrels (despite educational efforts to help hunters differentiate between the two), this is likely a rare situation that has not prevented the DFS from expanding over the last 40 years.

Hunting in the Future. Discussions with our State partners suggest that DFS management after delisting would be conducted very carefully and that a hunting season would not be initiated in the immediate future. We recognize that a very restricted hunt could be conducted at sites where DFS are abundant without causing a population decline, and that State management agencies have the capability to implement careful hunting restrictions and population management; for instance, the reopening of the black bear (*Ursus americanus*) hunt in Maryland is a good example of a carefully and successfully managed hunt (Maryland Department of Natural Resources 2012, entire).

We nonetheless foresee only limited public interest in reinitiating a DFS hunt, coupled with strong public attitudes against hunting DFS. Public sentiment toward

hunting in general has changed, with hunting for food, management of game populations, and animal population control considered acceptable, whereas hunting strictly for recreation is considered less acceptable (Duda and Jones 2008, p. 183). Given public attitudes, the declining interest in squirrel hunting, and the restrictions that we expect would be imposed on a renewed hunting program, hunting is highly unlikely to pose an extinction risk to the DFS in the foreseeable future.

C. Disease or Predation

Disease. Reports of disease in DFS are uncommon. Although other subspecies of eastern fox squirrels are known to carry diseases such as mange and rabies, there is no documentation of these diseases in DFS, and there is no evidence or suspicion of disease-related declines in any local population (USFWS 2012, pp. 37–38).

Despite the lack of apparent vulnerability to date, however, the recent advent of white-nose syndrome affecting bats (Blehert *et al*. 2009, entire) and chytrid fungus affecting amphibians (Daszak *et al*. 1999, entire) demonstrates the uncertainty surrounding novel disease events. The life-history traits of DFS nonetheless make them less susceptible to these types of epizootics. First, DFS do not congregate in large numbers (such as bats in hibernacula), where disease can easily spread through a population. Second, early records describe the DFS as patchily distributed across its range (Taylor 1976, p. 7), and this continues to be the case; this patchy distribution makes it more difficult for disease to spread through the squirrel's range. Finally, DFS are not migratory or in an environment (as with aquatic species) where pathogens can readily disperse. There currently is no evidence of disease-related declines or any indication that

DFS are particularly susceptibility to disease outbreaks, and we conclude that disease is neither a current nor future extinction risk for this subspecies.

Predation. Predators of DFS include the red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), red-tailed hawk (*Buteo jamaicensis*), bald eagle (*Haliaeetus leucocephalus*), and possibly domestic pets and feral animals (e.g., cats and dogs). Owls are probably not major predators, as camera surveys have found that DFS activity patterns rarely include dawn or evening hours, although the gray squirrel is active at these times. Morris (2006, pp. 35, 77) found that the majority of camera detections occurred between 8 a.m. and 5 p.m with two peaks in activity at mid-morning and mid-afternoon.

Changes in predator numbers may cause some fluctuations in DFS numbers at a site (e.g., a DFS population may decline when red fox populations increase), but these types of events are sporadic and localized. Likewise, bald eagle numbers have dramatically increased in the Chesapeake Bay region over the past 40 years, but although they have been known to take DFS, they still prey primarily on fish. While feral dogs and cats may occasionally take DFS, such predation is not a rangewide threat. The DFS population has increased over the last 40 years despite ongoing predation, and we conclude that predation at these levels is not a current or future extinction risk for this subspecies.

D. The Inadequacy of Existing Regulatory Mechanisms

Several laws established in Maryland over the past 40 years provide substantial protections for DFS habitat (USFWS 2012, appendix D). The Maryland Critical Areas

Act of 1984 designates all areas within 304.8 m (1,000 ft) of high tide as Critical Areas and originally prohibited development and forest clearing within 30.48 m (100 ft) of streams and the Chesapeake Bay. This law was amended in the spring of 2008 to increase this "no-development or forest clearing buffer" to 60.96 m (200 ft). These areas serve as corridors for DFS and as breeding habitat. The Maryland Forest Conservation Act of 1991 requires that, when a forested area is cleared and converted to other land use, other portions of the forest must be placed in an easement that will preclude development in perpetuity or, alternatively, other areas must be replanted to offset these losses. In addition, the State-implemented portions of the Clean Water Act protect the many forested wetlands where DFS occur.

Several State programs encourage voluntary conservation easements that protect lands from development; the Maryland Agricultural Land Protection Fund (MALPF), Maryland Environmental Trust (MET), and Rural Legacy Program collectively protected 3,624.4 ha (8,956 ac) per year from 2000 to 2008 in the eight Maryland counties where DFS occur. These programs protect 79,066 ha (195,377 ac) of private land in Maryland and similar programs in Delaware protect an additional 12,677 ha (31, 327 ac) in Sussex County (USFWS 2012, table 3).

Although in Delaware and Virginia the DFS occurs primarily on Federal and State land, private lands are protected for continued expansion. For example, Delaware also has an Agricultural Land Protection Program and a Forest Legacy Program, and, although these programs started later than in Maryland, they have already protected more than 12,677 ha (31, 327 ac) in Sussex County. The Virginia population is completely protected on Chincoteague National Wildlife Refuge, a coastal island, and expansion in

Virginia would require additional translocations. However, the State owns lands that would be suitable for future translocations, and there are private lands protected by land trusts as well.

Overall, many State laws and programs that protect DFS and their habitat have been enacted or strengthened in the last 40 years, and it is likely that this State protection will continue. Currently, these regulatory mechanisms, together with other factors that address population and habitat trends, have reduced the threats identified for the DFS. We thus conclude that the inadequacy of existing regulatory mechanisms does not pose an extinction risk to the DFS.

E. Other Natural or Manmade Factors Affecting Its Continued Existence

The following factors have been identified as posing potential extinction risks to the DFS. The level of risk posed by each factor is assessed below.

Forest pest infestations. Under Factor A, we evaluated habitat loss as a result of development, sea level rise, and timber harvest. However, additional factors can affect forest health and its ability to provide suitable habitat for DFS, including forest pest infestations. Gypsy moth (*Lymantria dispar*) and southern pine bark beetle (*Dendroctonus frontalis*) outbreaks can decimate mature forest stands, although the affected stands will eventually regenerate. However, monitoring and spraying for gypsy moth control appears to have reduced this threat within the current range of DFS; infestations in the last several years have diminished in acreage and occurred in other parts of the State (Maryland Department of Agriculture, Forest Health Highlights 2007,

2008, 2009, entire).

Pine bark beetle infestation necessitated salvage cuts for a total of 809.37 ha (2,000 ac) scattered across the southern counties in the early 1990s, but monitoring and control efforts appear to have reduced this threat as well.

Overall, an analysis of forest-pest risk across counties in the Chesapeake Bay watershed found that most areas on the Eastern Shore where DFS occur have relatively low risk for insect infestations, with most having 3.8 to 10 percent of their area considered to be at risk (Sprague *et al*. 2006, p. 87). Although emergence of new forest pests is to be expected, the Maryland Department of Agriculture has a Forest Health Monitoring Program that conducts surveys to map and report forest-pest problems (Maryland Department of Agriculture, Forest Pest Management, 2012, entire). Forest-pest outbreaks are likely to recur and may increase if climate warms as projected; however, this threat appears to be localized and sporadic and, with existing programs to monitor and treat forest pest outbreaks, we conclude that it is not an extinction risk factor.

Vehicle strikes. Vehicle strikes are a relatively common source of DFS mortality. Similar to other species, the probability of DFS being hit by vehicles is dependent on the density of DFS in the area and the proximity of the road to habitat. The frequency of road kills has been shown to reflect general patterns of abundance of many species over large geographic areas or time periods (McCaffery 1973, entire; Earle and Kramm 1982, entire; Gehrt 2002, entire; MacPherson *et al*. 2011, entire).

Vehicle strikes of DFS tend to be reported more frequently in areas where DFS are abundant, even if traffic levels are relatively low, (e.g., Dorchester County). The

conscientious reporting and collecting of DFS killed on roads at the Blackwater and Chincoteague NWRs, where DFS are very abundant, likely results in a more complete count of vehicle strikes than elsewhere. Vehicle strikes regularly occur at both refuges, yet DFS remain abundant in both places and have expanded their distribution at Chincoteague NWR despite vehicle strikes. Despite these local events, across their range and owing to their population biology, DFS populations continue to remain at current levels or expand, and we conclude that vehicle strikes alone are not a pervasive threat or an extinction factor for this species.

Summary of Factors A to E

A summary of our analysis of the five factors is provided in table 3 below. Based on our analysis, we conclude that no single factor or combination of factors, such as the combined effects of development, timber harvest, and sea level rise, poses a risk of extinction to the DFS now or in the foreseeable future.

Table 3.—Summary of five-factor analysis under the Act for DFS.

Factor	Trends in past 40 years	Foreseeable trends in next 40 years	Does factor pose an extinct-tion risk?
Habitat loss from development	In the past 40 years, development increased from 3 to 8 percent of the eight Maryland counties; development has increased in Sussex County, Delaware, as well. Some habitat has been lost, but	Development is expected to increase to 14 percent of the land area in the 8 Maryland counties and in Sussex County, Delaware, as well. Most projected development will occur near urban areas where DFS do not occur. However, 3 to 4 percent of total DFS occupied habitat is expected to be lost to development. While these losses may cause	No

	most development occurs near existing towns where DFS are not as prevalent, and development often occurs on agricultural rather than forest land.	some small subpopulations to disappear, the majority of the occupied habitat will continue to be available. Despite this development, the DFS distribution is expected to continue to grow as it has in the past.	
Habitat loss from sea level rise	In the past, losses in occupied habitat have occurred in southern Dorchester County, although the acreage is not known. Sea level rise has occurred in the past at the rate of 3.5 mm per year (about 1 ft per 100 years).	Under an extreme scenario of 0.61-m (2-ft) inundation in 40 years, considerable acreage will be lost or isolated in southwestern Dorchester County. However, even if this loss occurred immediately, this subpopulation would still retain 71 times the MVP. The Dorchester County subpopulation would continue to be the largest subpopulation and is very likely to remain at levels well above the MVP.	No
Habitat loss from timber harvest	Sawtimber harvest has occurred throughout the Delmarva Peninsula. The harvest rate in Dorchester County was 927 ha (2,291 ac) per year. This estimate (possibly an overestimate) appears to have been sustainable, as DFS have remained present in Dorchester County and elsewhere despite these harvest rates.	Recent declines in timber harvest rates and mill closings may reduce the harvest rate for some time. Increasing parcelization of land will reduce the opportunities for large-scale timber production. Gentrification of the Eastern Shore will likely shift public values for forest management from timber production to management for aesthetics and wildlife. Thus, future timber harvest rates are not expected to exceed past harvest rates.	No
Habitat loss from short-rotation pine management	In the past, short-rotation pine harvests have occurred on approximately 58,000 ac of the eight Maryland Counties and 10,000 ac more in Sussex County, Delaware. These acres were typically harvested before they were mature enough to be DFS habitat.	Since 1999, these lands have been obtained by the States of Maryland and Delaware and are now managed for sawtimber, which will provide suitable DFS habitat. Thus, we now have 58,000 ac of land protected from development and managed for sawtimber, enabling use by DFS that was previously precluded.	No
Overutiliza-tion	Hunting seasons have been closed since listing.	Hunting seasons are likely to remain closed. If opened, they would be limited and managed very carefully. Interest in squirrel hunting has declined significantly, and public attitudes toward hunting have changed to primarily support hunting species viewed as needing population	No

		management, such as deer.	
Disease or Predation	Disease and predation have not been significant threats for this species in the past 40 years.	These threats are not expected to increase, and the increasing distribution of the DFS lessens the impact that disease and predation could have on this species.	No
Inadequacy of regulatory mechanisms	Several new Maryland laws have appeared in the last 40 years to help conserve forest areas. DFS occurrences in Delaware and Virginia are almost exclusively on protected lands.	In the next 40 years, forest conservation measures are expected to continue, and the programs that have begun in Maryland are expected to continue or increase as they have in the past. Easement programs that protect private lands from development have begun in Delaware and Virginia and are expected to increase in the future as well.	No
Other natural or manmade factors	Forest pests and vehicle strikes have occurred in the past 40 years to some extent but have not limited the expansion of the DFS distribution.	Forest pests and vehicle strikes are likely to continue to occur to some extent, but these factors have not limited growth of the subpopulations in the past and are not expected to in the future. As DFS populations increase in density, vehicle strikes could increase as the probability of vehicle strikes is primarily a function of animal abundance.	No

Proposed Rangewide Determination

We have carefully assessed the best scientific and commercial information available regarding past, present, and future threats to the long-term viability of the DFS. The current range of DFS spans the northern and southern portions of the Delmarva Peninsula, comprising all three States, and extends from coastal areas to the interior of the Delmarva Peninsula. The DFS inhabits a variety of forest types, from hardwood-dominated to pine-dominated forests and from wetland to upland forests, indicating an underlying genetic variability or behavioral plasticity that should enhance the species' viability under changing environmental conditions. Its relatively wide distribution also provides redundancy of occupied forest across the landscape, which further reduces extinction risk, and its continued occupancy of woodlots over the past 20 to 30 years and

the success of translocation efforts indicate considerable resilience to stochastic events. We thus expect the rangewide population of DFS not only to remain at recovery levels but to grow and continue to occupy the full complement of landscapes and forest types on the Delmarva Peninsula.

The DFS has met the recovery criteria for considering delisting, and the analysis of potential threats shows that the range and distribution of the subspecies is sufficient to withstand all foreseeable threats to its long-term viability. We note, further, that the PVA threshold of 95 percent probability of persistence over 100 years is indicative of an even higher probability of persistence over the foreseeable future, defined as the next 40-years. After assessing the best available information, we have determined that the DFS is no longer in danger of extinction throughout all of its range, nor is it likely to become so in the foreseeable future.

Significant Portion of the Range Analysis

Background

Having determined that the DFS is not endangered or threatened throughout all of its range, we next consider whether there are any significant portions of its range in which the DFS is in danger of extinction or likely to become so. Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to becomes so throughout all or a significant portion of its range. The Act defines "endangered species" as any species which is "in danger of extinction throughout all or a significant portion of its range," and "threatened species" as any species which is "likely

to become an endangered species within the foreseeable future throughout all or a significant portion of its range." The term "species" includes "any subspecies of fish or wildlife or plants, and any distinct population segment [DPS] of any species of vertebrate fish or wildlife which interbreeds when mature." We published a final policy interpreting the phrase "Significant Portion of its Range" (SPR) on July 1, 2014 (79 FR 37578). The final policy states that (1) if a species is found to be endangered or threatened throughout a significant portion of its range, the entire species is listed as endangered or threatened, respectively, and the Act's protections apply to all individuals of the species wherever found; (2) a portion of the range of a species is "significant" if the species is not currently endangered or threatened throughout all of its range, but the portion's contribution to the viability of the species is so important that, without the members in that portion, the species would be in danger of extinction or likely to become so in the foreseeable future, throughout all of its range; (3) the range of a species is considered to be the general geographical area within which that species can be found at the time the Service or the National Marine Fisheries Service makes any particular status determination; and (4) if a vertebrate species is endangered or threatened throughout an SPR, and the population in that significant portion is a valid DPS, we will list the DPS rather than the entire taxonomic species or subspecies.

The SPR policy is applied to all status determinations, including analyses for the purposes of making listing, delisting, and reclassification determinations. We use standard procedures for analyzing whether any portion of the range is an SPR, regardless of the type of status determination we are making. The first step in our analysis of the status of a species is to determine its status throughout all of its range. If we determine

that the species is in danger of extinction, or likely to become so in the foreseeable future, throughout all of its range, we list the species as an endangered species (or threatened species) and no SPR analysis is required. If the species is neither in danger of extinction nor likely to become so throughout all of its range, we next determine whether the species is in danger of extinction or likely to become so throughout a significant portion of its range. If it is, we list the species as an endangered species or a threatened species, respectively; if it is not, we conclude that listing the species is not warranted.

When we conduct an SPR analysis, we first identify any portions of the species' range that warrant further consideration. The range of a species can theoretically be divided into portions in an infinite number of ways. However, there is no purpose to analyzing portions of the range that are not reasonably likely to be both significant and endangered or threatened. To identify only those portions that warrant further consideration, we determine whether there is substantial information indicating that (1) the portions may be significant, and (2) the species may be in danger of extinction in those portions or likely to become so within the foreseeable future. We emphasize that answering these questions affirmatively is not a determination that the species is endangered or threatened throughout a significant portion of its range—rather, it is a step in determining whether a more detailed analysis of the issue is required. In practice, a key part of this analysis is questioning whether the threats are geographically concentrated in some way. If the threats to the species are affecting it uniformly throughout its range, no portion is likely to have a greater risk of extinction, and thus would not warrant further consideration. Moreover, if any concentration of threats applies only to portions of the range that clearly do not meet the biologically based

definition of “significant” (i.e., the loss of that portion clearly would not be expected to increase the vulnerability to extinction of the entire species), those portions will not warrant further consideration.

If we identify any portions that may be both (1) significant and (2) in danger of extinction or likely to become so, we engage in a more detailed analysis to determine whether these standards are indeed met. As discussed above, to determine whether a portion of the range of a species is significant, we consider whether, under a hypothetical scenario, the portion's contribution to the viability of the species is so important that, without the members in that portion, the species would be in danger of extinction or likely to become so in the foreseeable future throughout all of its range. This analysis considers the contribution of that portion to the viability of the species based on the conservation biology principles of redundancy, resiliency, and representation. (These concepts can similarly be expressed in terms of abundance, spatial distribution, productivity, and diversity.) The identification of an SPR does not create a presumption, prejudgment, or other predetermination as to whether the species in that identified SPR is endangered or threatened. We must go through a separate analysis to determine whether the species is in danger of extinction or likely to become so in the SPR. To determine whether a species is endangered or threatened throughout an SPR, we will use the same standards and methodology that we use to determine if a species is endangered or threatened throughout its range.

Depending on the biology of the species, its range, and the threats it faces, it may be more efficient to address either the significance question first, or the status question first. Thus, if we determine that a portion of the range is not “significant,” we do not

need to determine whether the species is endangered or threatened there; if we determine that the species is not endangered or threatened in a portion of its range, we do not need to determine if that portion is "significant."

SPR analysis for DFS

Applying the process described above, we evaluated the range of the DFS to determine if any area could be considered a significant portion of its range. As mentioned above, one way to identify portions for further analyses is to identify any natural divisions within the range that might be of biological or conservation importance. Based on examination of the recovery plan (USFWS 1993, 2003; entire) and other relevant and more recent information on the biology and life history of the DFS, we determined that there are no separate areas of the range that are significantly different from others or that are likely to be of greater biological or conservation importance than any other areas. We next examined whether any threats are geographically concentrated in some way that would indicate the species could be in danger of extinction, or likely to become so, in that area. Through our review of potential threats, we identified some areas where DFS are likely to be extirpated, including areas in Queen Anne's County, Maryland, where DFS distribution is scattered and relatively isolated by roads and water, and where future development is anticipated (see discussion of future development trends under Factor A). We thus considered whether this area in the northern portion of the range (see Factor A) may warrant further consideration as a significant portion of its range.

As discussed previously, we anticipate 3 percent of the forest area currently occupied by DFS to be lost to development by 2030. This development would affect two small, isolated subpopulations in Queen Anne's County that together constitute less than 0.5 percent of the rangewide population. Additionally, the Queen Anne's County's landscape is similar to nearby Kent, Talbot, and Caroline Counties in Maryland in that it has hardwood-dominated forest patches in a landscape of primarily agricultural land (USFWS 2012, table 2) and does not represent a unique habitat type or ecological setting for the species. While there is projected localized loss of habitat in areas of Queen Anne's County (see Factor A), five large DFS subpopulations are expected to remain viable across this broader northern portion of the current range. We consider these subpopulations to be resilient, and their distribution provides the necessary redundancy to offset loss of local populations. The areas that may be lost due to development represent a very small proportion of the range (3 percent), as well as a very small proportion of the total population of the species (0.5 percent). Moreover, if the areas expected to be lost due to development were in fact lost, that loss would not appreciably reduce the long-term viability of the subpopulation, much less cause the species in the remainder of its range to be in danger of extinction or likely to become so. Therefore, there is not substantial information that the small portions of the range in Queen Anne's County may be a significant portion of the DFS's range.

We also expect loss of DFS-occupied forests from sea level rise in Dorchester County, Maryland. The anticipated losses in this area are on the southwestern periphery of the habitat supporting the largest subpopulation of DFS. However, as discussed under Factor A, above, these losses do not threaten either the subpopulation or the subspecies

with a risk of extinction, as there is ample unoccupied and sufficiently connected habitat for displaced squirrels to colonize (along with the evidence provided by successful translocations of the ability of DFS to readily colonize new areas). Moreover, if the area expected to be lost were in fact lost, that loss would not appreciably reduce the long-term viability of the subpopulation, much less cause the species in the remainder of its range to be in danger of extinction or likely to become so. Therefore, there is not substantial information that the portion of the range that is expected to be lost from sea level rise may be a significant portion of the DFS's range.

These are the only two portions of the range that contain populations that may be affected by potential threats that could cause the species to be in danger of extinction or likely to become so or result in possible extirpation in those portions and thus warranting review for an SPR determination. Finding that the potential losses in small areas of Queen Anne's County do not cause cascading vulnerability or reflect unique areas that are not represented elsewhere in the species' range, and finding that loss of the area of Dorchester County anticipated to be lost to sea level rise would not cause the remainder of the species to be in danger of extinction or likely to become so, or affect the continued viability of the Dorchester subpopulation, we do not consider this subspecies to be in danger of extinction, or likely to become so in the foreseeable future, in any significant portion of its range. Further, given consideration (4) in the final SPR policy (see **Significant Portion of the Range Analysis, *Background*** above), and having not found the basis for an SPR determination on the grounds of either significance of, or threat to, a portion of the current range of the DFS, we also find that a DPS analysis is not warranted.

The DFS's current and projected resiliency, redundancy, and representation should enable this subspecies to remain at recovered population levels throughout all of its range, and even expand its range over the foreseeable future. Having assessed the best scientific and commercial data available and determined that the DFS is no longer in danger of extinction throughout all or significant portions of its range, nor is it likely to become so in the foreseeable future, we are proposing to remove this species from the List of Endangered and Threatened Species under the Act.

Effects of the Rule

This proposal, if made final, would revise 50 CFR 17.11(h) to remove the DFS from the Federal List of Endangered and Threatened Wildlife. The prohibitions and conservation measures provided by the Act, particularly through sections 7 and 9, would no longer apply to this species. Federal agencies would no longer be required to consult with the Service under section 7 of the Act in the event that activities they authorize, fund, or carry out may affect the DFS. There is no critical habitat designated for this species.

This proposed rule, if made final, would also remove the experimental population status of the DFSs that were introduced to the Assawoman State Wildlife Management Area in Sussex County, Delaware. This designation was established on September 13, 1984 (49 FR 35951–35955).

Post-delisting Monitoring Plan

Section 4(g)(1) of the Act requires us, in cooperation with the States, to implement a monitoring program for not less than 5 years for all species that have been recovered and delisted. The purpose of this requirement is to develop a program that detects the failure of any delisted species to sustain itself without the protective measures provided by the Act. If, at any time during the monitoring period, data indicate that protective status under the Act should be reinstated, we can initiate listing procedures, including, if appropriate, emergency listing.

Notice of availability of a draft DFS post-delisting monitoring plan. We are announcing the availability for public review of a draft post-delisting monitoring plan for the DFS. The draft PDM plan can be obtained upon request from the Chesapeake Bay Field Office (see **ADDRESSES** above) and is posted in the docket on *http://www.regulations.gov* and on the Chesapeake Bay Field Office Web page at: *http://www.fws.gov/chesapeakebay*.

This draft plan builds upon and continues the research and monitoring that have been conducted to date. In general, the plan proposes that the Service and State natural resource agencies will: (1) continue to map all DFS sightings and occupied forest to delineate the distribution and range, and (2) assess the occupancy of DFS in a sample of forest tracts to estimate the relative proportion of viable DFS populations versus extirpations across the range.

The draft PDM plan identifies measurable management thresholds and responses for detecting and reacting to significant changes in the DFS's protected habitat, distribution, and ability to remain at recovered population levels. If declines are detected

equaling or exceeding these thresholds, the Service, along with other post-delisting monitoring participants, will investigate causes, including consideration of habitat changes, stochastic events, or any other significant evidence. Results will be used to determine if the DFS warrants expanded monitoring, additional research, additional habitat protection, or resumption of Federal protection under the Act.

The final PDM plan and any future revisions will be posted on our Endangered Species Program's national Web page at: *http://endangered.fws.gov* and on the Chesapeake Bay Field Office Web page at: *http://www.fws.gov/chesapeakebay*.

Required Determinations

Clarity of the Rule

We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

(a) Be logically organized;

(b) Use the active voice to address readers directly;

(c) Use clear language rather than jargon;

(d) Be divided into short sections and sentences; and

(e) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed in **ADDRESSES**. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the names of the sections or paragraphs that are unclearly written, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.

National Environmental Policy Act

We have determined that environmental assessments and environmental impact statements, as defined under the authority of the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq*.), need not be prepared in connection with regulations pursuant to section 4(a) of the Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

Government-to-Government Relationship with Tribes

In accordance with the President's memorandum of April 29, 1994, Government-to-Government Relations with Native American Tribal Governments (59 FR 22951), E.O. 13175, and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with Tribes in developing programs for healthy ecosystems, to acknowledge that tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to Tribes. As no Federally recognized Tribes occur within the squirrel's Delmarva Peninsula range, we have determined that no Tribes will be affected by this rule.

References Cited

A complete list of all references cited in this final rule is available at: *http://www.regulations.gov* at Docket No. FWS–R5–ES–2014–0021, or upon request from the Chesapeake Bay Field Office (see **ADDRESSES**).

Authors

The primary authors of this proposed rule are staff members of the Service's Chesapeake Bay Field Office (see **ADDRESSES** and **FOR FURTHER INFORMATION CONTACT)**.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Proposed Regulation Promulgation

Accordingly, we hereby propose to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 1531–1544; 4201–4245; unless otherwise noted.

§ 17.11—[Amended]

2. Amend section 17.11(h) by removing both entries for "Squirrel, Delmarva Peninsula fox" under "Mammals" from the List of Endangered and Threatened Wildlife.

§ 17.84—[Amended]

3. Amend § 17.84 by removing and reserving paragraph (a).

Dated: September 5, 2014

Signed: Daniel M. Ashe

Director, U.S. Fish and Wildlife Service

~~[Endangered and Threatened Wildlife and Plants; Proposed Rule to Remove the Delmarva Peninsula Fox Squirrel (*Sciurus niger cinereus*) From the List of Endangered and Threatened Wildlife and Notice of Availability of Draft DFS Postdelisting Monitoring Plan]~~ **Billing Code 4310-55**