

June 8, 2001

Memorandum

To: J. Schroer, Refuge Manager, Chincoteague NWR, Chincoteague, VA

From: J. Wolflin, Field Supervisor

Subject: Biological Opinion for Chincoteague National Wildlife Refuge

This document transmits the Service's biological opinion on the effects of the proposed construction of a new Education and Administration Center at Chincoteague National Wildlife Refuge on the Delmarva fox squirrel (*Sciurus niger cinereus*), a Federally endangered species. All comments are written in accordance with Section 7 of the Endangered Species Act of 1973, as amended, (16 U.S.C. 1531 *et seq.*). Your request for formal consultation was received by the Chesapeake Bay Field Office on November 21, 2000. A complete administrative record of this consultation is on file in this office.

I. CONSULTATION HISTORY

The consultation history is provided in Appendix A.

II. BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTIONS

The proposed activity is the construction of the Herbert H. Bateman Educational and Administrative Center (HHBEAC) with adjoining parking facilities adjacent to the site of the existing Chincoteague National Wildlife Refuge (CHNWR) Headquarters office building (see Map 1). Additional parking will be constructed on the site of the existing SubHeadquarters/ Auditorium area. The total size of the new office building will be approximately 18,000 square feet. The proposed parking areas will accommodate approximately 100 vehicles and will be within a short walking distance of the HHBEAC facility. In this document, HHBEAC refers to the educational and administrative center and the associated structures: the proposed office building, the proposed storage shed, the proposed parking areas, and all proposed roads.

Loblolly pine (*Pinus taeda*) forest within the project site is occupied by the Delmarva fox squirrel (DFS). Impacts from construction activities, use of the new building, and use of the entrance road and parking lot of the proposed buildings may adversely affect nesting and foraging behavior of this species.

STATUS OF THE SPECIES/CRITICAL HABITAT

This section summarizes Delmarva fox squirrel biology and ecology as well as information regarding habitat suitability, threats to the species, and recovery goals and objectives. The Service uses this information to assess whether a Federal action is likely to jeopardize the continued existence of the species. Based upon best available scientific information, the Service has no information to suggest that any other listed species may be affected by the proposed action described above.

Species/Critical Habitat Description.-- Delmarva fox squirrels are large, heavy-bodied tree squirrels with full, fluffy tails. The DFS is a subspecies of *Sciurus niger*, a species found throughout the eastern United States. The DFS resembles the gray squirrel (*Sciurus carolinensis*). Gray squirrels are smaller, their tails are not as full, and their dorsal area is not as uniformly colored as DFS. The DFS is shy and often wary, and relatively quiet. Its call is deeper than that of the gray squirrel. When disturbed or excited, it may fan out its tail, thereby increasing its apparent size (Dozier and Hall 1944).

In 1967, the DFS was listed as a Federally endangered species due primarily to its disappearance from 90% of its former range. The dramatic decrease of this species is attributed to habitat loss resulting from forest clearing and changing land use patterns throughout its range (Taylor 1973), and possible over-hunting in the past. No critical habitat has been designated for this species.

Biology and Ecology of the Species.-- Historically, DFS were distributed throughout the Delmarva peninsula and into southeastern Pennsylvania and southern New Jersey. Currently, remnant populations persist in only five Maryland counties: Kent, Queen Anne's, Talbot, Caroline, and Dorchester. Although quantitative population data are scant, DFS may be locally abundant in mature pine and mixed hardwood forest in these counties. In addition to the remnant populations, DFS translocations have figured prominently in the recovery program. Delmarva fox squirrels have been reintroduced to 17 sites within their historical range in Maryland, Delaware, and Virginia. It appears that squirrel colonies have been successfully established in at least 11 of these sites (including Chincoteague NWR); however, more assessment and investigation is needed to verify their status. The species is typically observed in low densities, and populations may be adversely affected by reductions in numbers of only a few individuals (USFWS 1993).

There are many components that influence the suitability of habitat for the DFS. These components in and of themselves may or may not be limiting factors, but should be viewed collectively to accurately assess habitat suitability. The components that are generally viewed as important to the DFS include forest stand size and composition, tree size, canopy cover, understory, edge habitat, and food

availability. Natural predators and possibly domestic pets also influence DFS populations and, consequently, habitat suitability.

Optimal DFS habitat consists of large (greater than 12" dbh) hard and soft mast producing trees such as oak (*Quercus spp.*), hickory (*Carya spp.*), beech (*Fagus grandifolia*), and pine (*Pinus spp.*) (Taylor 1976). Generally, DFS prefer forest stands with large trees, an expansive canopy, and sparse understory (Taylor 1976, Dueser et al. 1988, Paglione 1996). The large (mature) trees provide sites for cavity and leaf nests as well as mast, while the sparse understory is thought to enhance DFS foraging efficiency. Forest edge habitat is used extensively by DFS (Taylor 1976, Flyger and Smith 1980, and Paglione 1996) and the association of agricultural fields with forest edge may play an important role in the suitability of habitat for DFS. Agricultural crops such as corn, wheat, soybeans, oats, and other crops have been found to be readily used by DFS to supplement their diet when available (Allen 1943, Brown and Yeager 1945, Bakken 1952, Taylor 1976, Paglione 1996).

The importance of crops as a food source for DFS is a subject of some uncertainty. Recovery Team members have agreed that conservation of agricultural fields should not be a DFS management tool. Certainly, agricultural crops were not historically important to DFS since there were no agricultural fields on the Delmarva peninsula until after the arrival of European settlers. Delmarva fox squirrels were translocated to the CHNWR in Virginia, where there are no agricultural fields, and have done well (USFWS 1993). The species is found in many types of forested landscapes in apparently stable populations, supporting the conclusion that DFS, like other southeastern fox squirrels, are highly opportunistic in their habitat preferences (M. Steele *in litt.* 1992).

Delmarva fox squirrels utilize tree cavities (Allen 1952, Nixon and Hansen 1987) that provide maximum safety for young (nesting) and protection from cold and wet weather (shelter). They also construct nests of leaves and twigs (Dozier and Hall 1944, Allen 1952) which may vary from small day shelters and feeding platforms to large, well insulated rearing nests (Weigl et al. 1989). Nests are generally found in crotches of tree trunks, in tangles of vines, on a trunk, or situated towards the ends of larger branches (B.J. Larson pers. comm.). Southeastern fox squirrels and gray squirrels have been found to use multiple nests and/or cavities over variable time periods (Colin 1957, Moore 1957, Donohoe and Beal 1972, Adams 1973, Hilliard 1979, Edwards et al. 1989, Weigl et al. 1989, Kantola and Humphrey 1990). When present, gray squirrels, flying squirrels (*Glaucomys volans*), raccoons (*Procyon lotor*), woodpeckers (*Picidae*), and wood ducks (*Aix sponsa*) compete with DFS for cavities. Raccoons may commandeer and use DFS leaf nests during periods of severe weather and early in the nesting period (USFWS, W. Giese, pers. comm.).

Most mating occurs in late winter and early spring (Lustig and Flyger 1976). Gestation lasts approximately 44 days (Asdell 1964) and most young are born in February, March, and April. There is a smaller breeding period and birth peak in July and August. Litter size is one to six (mean: 4 (Dozier and Hall 1944); mean: 2.25 (Lustig and Flyger 1976); mean: 1.7 (Larson 1990)). Young are dependent on their mothers for approximately 3 months (Moore 1957). To protect breeding squirrels and their young, the recommended time of year restrictions for habitat disturbance are from January 1

through May 15, and July 1 through September 15.

Although no quantitative studies of southeastern fox squirrel food habits have been conducted to date, observations of feeding and examination of some stomach contents reveal the diets of southeastern fox squirrels include mast from a variety of trees, pine buds, staminate cones, pine seeds, berries, hypogeous and epigeous fungi, and insects (Moore 1957, Ha 1983, Weigl et al. 1989, Larson 1990, Humphrey and Jodice 1992).

During much of the year, mast from mature trees (primarily from oak, hickory, beech, walnut) is a primary component of the fox squirrel diet (Weigl et al. 1989). During the spring, DFS feed extensively on tree buds and flowers, and will consume large quantities of fungi, insects, fruit, seeds, and occasionally bird eggs and young (USFWS 1983). At Chincoteague NWR, Larson (1990) found that DFS switched from reliance on pine and oak mast in the fall/early winter to heavy use of soft mast hardwoods (primarily maple and oaks) in the late winter and spring months. Like other southeastern fox squirrels, DFS feed largely on mature green pine cones during late summer and early fall until acorns and other hard mast become available in the fall (Moore 1957, Ha 1983, Weigl et al. 1989, Kantola and Humphrey 1990, Larson 1990). By late summer, DFS are often in poor condition due to low food availability in the spring and early summer (Kantola 1986, Weigl et al. 1989, Larson 1990). Further, although pine-seed crops are subject to failure, the magnitude of their year-to-year variation is not as great as acorn crops. Thus, pine seeds may be particularly important to squirrels during years of acorn mast failure (Kantola and Humphrey 1990).

Fox squirrels are more cursorial, less agile, slower, and more deliberate in their movements than are gray squirrels (Dozier and Hall 1944). When a fox squirrel moves from one tree to another, it usually descends to the ground rather than leaping from tree to tree as do gray squirrels. Activity levels vary with season and food supply, with most activity occurring during the morning and early afternoon. Activity is reduced during cold or inclement weather.

Home range sizes for the DFS are related to habitat type, and variation within the subspecies is substantial. Flyger and Smith (1980) estimated mean home range size for DFS in an agricultural landscape (described as "a mixture of woodland and fields of corn or soybeans with narrow wooded strips 20-25 m wide between fields" with relatively open understory) as 30 ha, while home range for the Chincoteague NWR population varies from 1.4 to 12.8 ha, with a mean of 4.1 ha (Larson 1990). Paglione (1996) found a seasonal variation in DFS home range within and between a mature stand adjacent to an agricultural field and a younger stand dominated by pine. Male home ranges were usually larger (average 5.88 - 28.47 ha varying on location and season) than females (4.5 to 13.62 ha). This sex variation was especially pronounced in spring and early summer periods. Similar sexual differences in DFS home ranges were also found at Chincoteague NWR, with an average of 2.5 ha for females and 6.1 ha for males (Larson 1990).

Home range sizes of other southeastern fox squirrels (based on minimum convex polygon method) range from 9 to 19 ha for females and 20-32 ha for males (Hilliard 1979, Edwards 1986, Weigl et al.

1989, Kantola and Humphrey 1990). Average home ranges of southeastern fox squirrels are generally larger (>15 hectares; Hilliard 1979, Edwards 1986, Weigl et al. 1989) than those of western fox squirrels (5 ha or less; Ha 1983). In general, this larger home range has been considered an adaptation to patchy landscapes (Ha 1983, Mace and Harvey 1983), and unpredictable seasonal food supply found in southeastern forests (Ha 1983, Weigl et al. 1989, Paglione 1996). Weigl et al. (1989) found that food supplies had the greatest influence on the ecology of southeastern fox squirrels, often affecting the size and location of their home range. Patterns of space use within the home range have received relatively little study (Loeb and Moncrief 1993). However, Steele (1988) found that fox squirrels in North Carolina used much of their home range in July, but in August space use was reduced by more than 50% as squirrels began to feed extensively in selected longleaf pine trees.

Density estimates for the DFS include a density of 0.39 DFS/ha at the CHNWR (Larson 1990) and densities of 0.36 DFS/ha to 1.29 DFS/ha (Paglione 1996) from two sites at Blackwater National Wildlife Refuge. The high density at the Blackwater NWR site was attributed to the presence of "exceptional habitat composed of large mature pines and mixed hardwoods, with a clear understory and adjacent agricultural fields" (Paglione 1996). Density estimates for other southeastern fox squirrels vary from 8.4 squirrels/km² (0.08 squirrels/ha) (Humphrey et al. 1985), 15.3-17.71 squirrels/km² (0.15-0.18 squirrels/ha) (Tappe 1991), to 20.0 squirrels/km² (0.20 squirrels/ha) (Hilliard 1979). Gray squirrels, potential competitors with fox squirrels, can reach densities of 15/ha (Gurnell 1983). Weigl et al. (1989) reported a mean density of 0.05 squirrels/ha (highest annual density of 0.35/ha) in North Carolina; they inferred from the low densities generally exhibited by southeastern fox squirrels, that preservation of large habitat blocks would be necessary to support viable populations.

Threats to the Species. -- Timber harvest, short-rotation pine forestry, and forest conversion to agriculture and/or structural development (housing, roads, industry) constitute threats to the DFS and their habitats. The following information concerning these and other threats is taken largely from the DFS Recovery Plan (USFWS 1993).

The human population within DFS historical range has increased significantly in recent years. In Maryland's nine eastern shore counties, the human population increased 14% between 1980 and 1990; for the year 2000, a 23% increase from 1980 has been projected (Maryland Forest, Park and Wildlife Service 1989). Increases within the counties on the southern portion of the Eastern shore (Dorchester, Worcester, Somerset, Wicomico) were slightly less than those within the counties on the northern portion of the Eastern shore (Cecil, Kent, Queen Anne's, Talbot, and Caroline), at 13% and 15% respectively. Such increases in human population, with associated demands for housing, services, and industry, have brought about significant land use changes within the DFS historical range. These trends are expected to continue.

In addition, shifts in forest cover and composition may substantially affect DFS habitat suitability. Up to a 7% loss of forest land occurred on Maryland's Eastern shore (excluding Cecil County) between 1973 and 1990 (Frieswyk and DiGiovanni 1988, Maryland Office of Planning 1990). Agricultural land also decreased, while housing and industrial land uses increased. The Maryland Forest, Park and

Wildlife Service (1989) projected further loss of forest land due to continued increases in the human population on the eastern shore.

On the southern Eastern shore, loblolly pine declined by 29% between 1976 and 1986 (Frieswyk and DiGiovanni 1988). The loblolly saw timber class was reduced by 30%, and most of the remaining saw timber appears to be in the smaller range (this can be contrasted with significant increases in the saw timber acreage for oak/pine and oak/hickory). Significant reductions were also noted in the seedling/sapling class for loblolly. The potentially devastating effects of forest pest infestations, including gypsy moths (*Lymantria dispar*) and southern pine beetles (*Dendroctonus frontalis*), also constitute a threat to DFS habitat because diseased trees die or are removed.

Accidental DFS mortality is most frequently attributed to being struck by automobiles and to hunters who mistake DFS for gray squirrels. Although unsubstantiated, over hunting of DFS is thought to have contributed to past declines. Illegal hunting is not considered a threat at this time.

Recovery Goals and Objectives. -- The following provides information on the current recovery goals and objectives for downlisting or delisting the species that are outlined in the 1993 DFS Recovery Plan.

For the reclassification of the DFS from endangered to threatened, ecological requirements and distribution within the natural range must be fully understood, the seven benchmark populations must be stable or expanding for at least five years and ten new colonies must be established within the historical range. The DFS will be considered for delisting when (besides having met the reclassification criteria) the following elements have been achieved: (1) five post-1990 colonies are established outside the remaining natural range, (2) periodic monitoring shows that 80% of translocated populations have persisted over the full period of recovery, and at least 75% of these populations are not declining, (3) mechanisms that ensure perpetuation of suitable habitat at a level sufficient to allow desired distribution is in place within all counties in which the species occurs and (4) mechanisms are in place to ensure protection and monitoring of new populations, to allow for expansion, and to provide interpopulation corridors to permit gene flow among populations (USFWS 1993).

ENVIRONMENTAL BASELINE

As defined in 50 CFR 402.02, "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas. The "action area" is defined as all areas affected directly or indirectly by the Federal action, and not merely the immediate area involved in the action. The direct and indirect effects of the actions and activities resulting from the Federal action must be considered with the effects of other past and present Federal, state, or private activities, and the cumulative effects of certain future state or private activities within the action area.

For the purposes of this consultation, the Service has determined that the action area for this project will encompass the approximately 10 acres (4.05 ha) within and surrounding the proposed HHBEAC and associated structures building area (see Map 1). This action area includes the building site as well as the 150 ft. (480 m) buffer surrounding all structures and roads.

Description of the Action Area. -- This project will impact a small portion of DFS habitat within the proposed areas of construction. This site was impacted by the most recent southern pine beetle (SPB) outbreak from 1994 through 1996 (see Map 1). During this infestation, several trees were removed to stop the spread of this destructive insect to adjacent squirrel habitat. Presently, only a few mature pine trees remain within the proposed construction area. Approximately eight large loblolly pine trees (mean DBH 19") may need to be removed from within the proposed construction site. However, the proposed building will be situated within this area with as little disturbance as possible to existing vegetation.

Reforestation of 138 acres (55.85 ha) followed the SPB infestation of 1994 and 1996. Replanting has been conducted over a five year period with native hardwood tree species. During this time period, a total of over 5,000 water oak (*Quercus nigra*), 500 southern red oak (*Q. falcata*), 600 flowering dogwood (*Cornus florida*), and 600 wild persimmon (*Diospyros virginiana*) seedlings were planted within the cut-over sites. The gradual recovery of these areas will provide a diverse habitat with ample food resources for the fox squirrel population.

The construction of the facility with adjoining parking sites will occur on less than 7 acres (2.83 ha) of fox squirrel habitat within the refuge. This constitutes less than 1% of DFS habitat on the Refuge, nearly all of which is permanently preserved for natural resources, including the fox squirrel. All trees were checked by refuge biologists for squirrel activity (nests or foraging) in Fall 2000, and no evidence of occurrence was found. Trees will be checked immediately prior to and throughout construction.

Status of Species in Action Area. -- Thirty DFS were successfully introduced to Chincoteague NWR between 1968 and 1971. The population at this actively monitored benchmark site has since grown and become well-established (USFWS, 1993).

Chincoteague NWR has initiated a DFS telemetry study that will attempt to document squirrel habitat use in relationship to forest habitat lost due to the recent SPB infestation. The results of the study will document the impact of forest habitat loss on fox squirrels within the local population. Data will be used to implement future habitat enhancement activities on and off the refuge.

This study includes sites directly north, east, and west of the proposed building site (see Map 2). Trapping efforts and nest box checks have been recorded since 1994: the Headquarters site, which is 312 meters (341.21 yd) southwest of the HHBEAC site, comprises 22% of successful nest box checks and 13% of successful trap efforts; the Maintenance site, which is 104 meters (114.74 yd) northeast of the HHBEAC site, comprises 4% of successful nest box checks and 6% of successful trap efforts; and

the Residence site, which is 200 meters (218.72 yd) north of the HHBEAC site, comprises 20% of successful nest box checks and 15% of successful trap efforts (see Appendix B). These results confirm that squirrels are actively using forested areas surrounding the HHBEAC site.

Telemetry data taken from radio-collared squirrels revealed the average home range of squirrels using areas in and adjacent to the building site is 6.3 acres (2.55 ha) (see Map 3). Therefore, the forest area removed for construction of the HHBEAC equals 3% of the average CHNWR DFS home range size. The forest area degraded by the HHBEAC is 1.8 times the size of the average CHNWR DFS home range.

EFFECTS OF THE ACTION

Potential impacts to DFS may result from the clearing, construction, and subsequent human activity associated with this project. Impacts that may occur include direct mortality of individual DFS, as well as harm and harassment. Population declines may result from diminishing habitat quality.

Habitat Loss and Degradation. -- Habitat losses and degradation caused by new structures are permanent and have effects that can result in take. These effects may include: increased predation, intra- or interspecific competition, intensified consequences of catastrophic events (e.g., drought, flooding, ice storms, fire, disease), increased road kills as squirrels shift to another woodland and/or increase their home range out of necessity, decreased reproductive success, and decreased carrying capacity resulting from decreased availability of nesting and shelter sites and food. As stated in the Delmarva Fox Squirrel Recovery Plan (USFWS 1993: page 6), populations can be adversely affected by reductions in numbers of only a few individuals, especially breeding females (Cordes and Barkalow 1972, Adams 1973).

Increased Physical Barriers to Dispersal and Mobility. -- Roads or other physical barriers such as houses, waterways, fences, and walls may impair the mobility of DFS and make them more susceptible to direct take (mortality) due to predation or reduced access to food and water (Taylor 1976, Poole 1993, Paglione 1996). The planned building area is bordered to the north by Beach Road and to the south by a wetland (Pool A). Therefore, the existence of the HHBEAC, as well as the increased use of roads and paths associated with the HHBEAC structures, may act as an impediment to DFS currently using this area as a travel corridor.

Vehicular Strikes. -- Increased traffic levels are likely to result in increased take from vehicle strikes. Individual mortality and effects on population levels are intensified if roads bisect DFS habitat or separate habitat use areas such as forests and croplands (Paglione 1996). Thus, take as direct mortality or as defined under harm may result.

Direct Impacts from Human Presence. -- Direct impacts from human activity associated with the HHBEAC may include disruptions caused by noise and/or recreational activities near or within the forested habitat. These impacts may rise to the level of take under the definition of harass which entails disruption of normal behavior such as breeding, feeding, or sheltering.

Cumulative Effects.– Cumulative effects include the effects of future State, tribal, local, or private actions that may occur in the action area.

Future Federal, State, local, or private actions that occur within the action area, (i.e., CHNWR) will either be carried out by, or will require a permit from, the Service. These actions will therefore require a Section 7 consultation. The Service is not aware of any future State, local or private actions that could occur within the action area that would not be subject to a Section 7 review. Therefore, cumulative effects, as defined in the ESA, are not expected to occur within the action area without consultation and therefore will not be addressed further in this Opinion.

CONCLUSION

After reviewing the current status of the DFS throughout its range and in the action area, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's Biological Opinion that the construction of the HHBEAC as proposed is not likely to jeopardize the continued existence of the DFS. No critical habitat has been designated for this species, therefore, none will be affected.

III. INCIDENTAL TAKE STATEMENT

Sections 4(d) and 9 of the Endangered Species Act prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is any take of listed species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

AMOUNT OR EXTENT OF TAKE

The Service anticipates that incidental take of DFS will likely occur through direct (habitat removal) and

indirect (habitat degradation) impacts as a result of the construction and existence of the HHBEAC (See Map 1). The total impact will be 10.27 acres (4.34 ha), comprising 0.09 acres (0.04 ha) of habitat removal resulting from building construction, 6.22 acres (2.52 ha) of habitat degradation resulting from building use (human activity), 3.86 acres (1.56 ha) of habitat degradation associated with road use, and 0.10 acres (0.04 ha) of habitat removal resulting from road construction (see Appendix C for take calculations). The extent of take (number of individual DFS taken) resulting from the use and construction of structures is not quantifiable based on existing information, but the take will be confined principally to those individuals which occur within the defined project area.

Chincoteague NWR has kept roadkill data since 1991, and no squirrels have been hit by vehicles on the current Visitor Contact Station access road or in any existing parking lots. The increased road use resulting from construction and use of the HHBEAC is expected to result in direct mortality to the DFS due to vehicular strikes in the vicinity of the facility and, possibly, associated parking areas. New parking lots will be constructed, and a speed limit of 10-15 mph will be enforced to reduce the likelihood of squirrels being struck by vehicles these areas. Currently, the DFS vehicular mortality rate on the CHNWR is .0083 roadkills/day/mile. Because refuge management intends to draw in current beach visitors to the HHBEAC rather than increase total refuge visitation, no perceptible increase in roadkills on Beach Road are expected. However, the HHBEAC access road (Service Drive) may to have a DFS vehicular mortality of 0.939 DFS roadkills/year (see Appendix D for take calculations).

REASONABLE AND PRUDENT MEASURES

The measures described below are nondiscretionary, and must be implemented by the CHNWR as specified by the Terms and Conditions below. They become binding conditions of any grant or permit issued to the CHNWR in order for the exemption in Section 7(o)(2) to apply. The CHNWR has a continuing duty to regulate the activity covered by this incidental take statement. If the CHNWR (1) fails to adhere to the Terms and Conditions of the incidental take statement through enforceable terms that are specified below, and/or (2) fails to assume and implement the Terms and Conditions, the protective coverage of Section 7(o)(2) may lapse. The Service considers the following reasonable and prudent measures to be necessary and appropriate to minimize take of DFS:

- (1) Vehicle speeds on the HHBEAC entry road must be maintained at a low enough speed, not to exceed 15 mph, to avoid or minimize the potential for DFS collisions.
- (2) Building design and construction plans should incorporate appropriate minimization measures to reduce incidental take of DFS and the loss of DFS habitat.
- (3) Habitat suitable for DFS on CHNWR should be enhanced or restored to compensate for any degradation of habitat resulting from this project.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of Section 9 of the Act, the CHNWR must comply with the following Terms and Conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These Terms and Conditions are non-discretionary.

- (1) Vehicle speeds on the HHBEAC access roads must be maintained at a low enough speed, not to exceed 15 mph, to avoid or minimize the potential for DFS collisions.
 - d) Vehicle speeds on access roads and in parking lots of the HHBEAC will be enforced by CHNWR law enforcement personnel.
 - e) Signs warning motorists of DFS presence will be posted along the HHBEAC access roads.
 - f) All roadkills will be immediately reported to the law enforcement address below.
 - g) All locations of roadkills will be recorded in detail and reported to the Chesapeake Bay Field Office (CBFO) Field Supervisor.

- (2) Building design and construction plans should incorporate appropriate minimization measures to reduce incidental take of DFS and the loss of DFS habitat.
 - a) Building and road layout should be such that a minimum number of trees are lost, as discussed in consultation between CHNWR and CBFO staff.
 - b) Qualified refuge personnel should perform tree checks for nests before and during construction.
 - c) Time of year restrictions should be enforced.

- (3) Habitat suitable for DFS on CHNWR should be enhanced or restored to compensate for any degradation of habitat resulting from this project (see Appendix E).
 - a) Loblolly pine thinning will occur on approximately 16 acres (6.47 ha) of a 60 acre (24.28 ha) study area within the 133 acre (53.82 ha) Sow Pond forest stand.
 - b) A prescribed fire management study will take place to investigate the possible benefits of prescribed fire on DFS habitat.
 - c) Hardwood plantings within approximately 5 acres (2.02 ha) of clear cuts found along the White Hills forest tract.
 - d) Understory thinning by hydroax will occur on approximately 20 acres (8.09 ha) in the Lighthouse Ridge, White Hills, and Woodland Trail forest stands.

Reporting Requirements

- C The applicants shall notify the Service upon start-up and completion of project construction at the address given below:

Chesapeake Bay Field Office
 U.S. Fish and Wildlife Service
 177 Admiral Cochrane Drive
 Annapolis, MD 21401
 Phone (410) 573-4541

- C Upon locating a dead, injured, or sick DFS, notification must be made to the nearest USFWS Law Enforcement Office:

Division of Law Enforcement
 U.S. Fish and Wildlife Service
 177 Admiral Cochrane Drive
 Annapolis, Maryland 21401
 (410) 573-4514

The Service believes that no more than one DFS may be incidentally taken as a result of the proposed action over the course of one year. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. CHNWR must immediately provide an explanation of the causes of the taking, and review with the CBFO the need for possible modification of the reasonable and prudent measures.

IV. REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the action outlined in the CHNWR's request. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount of extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Should you have questions or concerns regarding this biological opinion for the impacts to the Delmarva fox squirrel, please contact Dr. Mary Ratnaswamy, Chief of the CBFO Endangered Species Branch (410/573-4541).

Enclosures

cc: Program Supervisor - South, ES, Hadley, MA
(ATTN: Jeff Underwood)
Endangered Species Coordinator, ES, Hadley, MA
(ATTN: Paul Nickerson)

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Appendix A. (Consultation History)

<u>Date</u>	<u>Description</u>
09-08-1999	First Chincoteague "Intra-Service Section 7 Biological Evaluation Form for Virginia FWS Projects" submittal
02-01-2000	E-mail: Irvin Ailes to Mary Ratnaswamy Re: mitigation information
02-03-2000	Memorandum: Mary Ratnaswamy to file Re: Mary's visit with John Schroer and Irvin Ailes, and subsequent impact and restoration information (includes John Wolflin's handwritten comments)
03-08-2000	Telephone Communication: Mary Ratnaswamy, John Schroer

Re: Buffer area, ratio (3:1), restored area is not DFS area currently

03-22-2000 E-Mail Transmittal: Irvin Ailes to Mary Ratnaswamy
Re: Irvin sends new Section 7 to Mary (dated 03/22/00)

03-30-2000 Telephone Communication?: Mary Ratnaswamy to John Schroer
Re: New Concept Plan

03-30-2000 Telephone Communication: Mary Ratnaswamy to Irvin Ailes
Re: New CHNWR Concept plan with map

03-30-2000 Facsimile: Irvin Ailes to Mary Ratnaswamy
Re: "New Admin and Ed facilities" map

07-13-2000 Third Chincoteague "Intra-Service Section 7 Biological Evaluation Form for Virginia FWS Projects" submittal

08-21-2000 Facsimile: Irvin Ailes to Charisa Morris
Re: GIS map of construction site (also mails a copy)

08-25-2000 Memorandum: Mary Ratnaswamy to Irvin Ailes
Re: Impact Estimate

09-07-2000 Memorandum response: Irvin Ailes to Mary Ratnaswamy/Charisa Morris
Re: 8/25/00 memo corrections - unmarked wetland area

09-13-2000 Memorandum: Mary Ratnaswamy to Irvin Ailes
Re: Revised impact estimate

09-20-2000 Telephone Communication: Irvin Ailes to Mary Ratnaswamy
Re: past roadkill information

10-03-2000 Telephone Communication: Mary Ratnaswamy, John Schroer, Andy Moser, Barron Crawford
Re: actions taken by refuge to decrease roadkills

11-21-2000 E-mail Transmittal: John Schroer to Mary Ratnaswamy
Re: John sends revised Chincoteague "Intra-Service Section 7 Biological Evaluation Form for Virginia FWS Projects" submittal

12-18-2000 IMPACTS AND MITIGATION WORKSHEET

01-10-2001 ROADKILL ANALYSIS WORKSHEET

01-12-2001 Telephone Communication: John Schroer to Charisa Morris
Re: no expected increase in refuge visitation - the proposed education center will pull in beach visitors

03-02-2001 Telephone Communication: Charisa Morris to Irvin Ailes
Re: need to tell John Schroer to change “not likely to adversely affect” to likely to adversely affect” on Section 7

03-05-2001 Telephone Communication: John Schroer to Charisa Morris
Re: CHNWR leaves Section 7 as is, CBFO checks formal consultation - as a refuge manager, cannot take action if it is likely to adversely effect.

03-14-2001 Telephone Communication: Charisa Morris to Kendra Willet
Re: DFS study data needed to incorporate into Biological Opinion

03-19-2001 Telephone Communication: Charisa Morris to Irvin Ailes
Re: DFS habitat and environment questions to incorporate into Biological Opinion

03-22-2001 Telephone Communication: Irvin Ailes to Charisa Morris
Re: New pathway for bike trail, but CBFO concurs no additional impacts

03-22-2001 Facsimile: Irvin Ailes to Charisa Morris
Re: New bike trail map

- 03-25-2001 Biological Memorandum: Irvin Ailes/Kendra Willet to Charisa Morris
Re: DFS homerange, trapping success, nest box success data
- 03-27-2001 E-Mail Transmittal: Irvin Ailes to Charisa Morris
Re: 5th and final Chincoteague “Intra-Service Section 7 Biological Evaluation
Form for Virginia FWS Projects” submittal

Appendix B. (DFS Study Data)

U.S. FISH AND WILDLIFE SERVICE
CHINCOTEAGUE NATIONAL WILDLIFE REFUGE
P.O. Box 62
Chincoteague, VA 23336

BIOLOGICAL MEMORANDUM

March 25, 2001

TO: Charisa Morris

FROM: Irvin Ailes and Kendra Willett

SUBJECT: DFS data

Included below is nest box check data and trapping results data for 1994 - 2001. Nest boxes have been checked once a year in January since 1977. In 2000 and 2001, as part of biological technician Willett's master project, all nest boxes were checked on 3 separate occasions in order to collect sufficient data to estimate the population size. Trapping began on CHNWR in 1994, and continues to date (trapping was not conducted in 1999). Traps were placed near the nest boxes and checked for three days. In 2000 and 2001, as part of Willett's masters project, trapping was conducted on a grid established in four study sites (Woodland Trail, Lighthouse Ridge, White Hills, Sow Pond). Traps were checked for three to four days in each site during the spring and fall 2000. Trapping for spring 2001 started March 22. Data is reported as number of new captures and recaptures for each of the following areas: Residence, Headquarters, Maintenance, Lighthouse Ridge (see attached map). Recaptures also include squirrels recaptured during the same period.

Also attached is a map showing home ranges of 4 DFS collared in the Lighthouse Ridge study site. Home range results are preliminary and have not been corrected for outliers or data entry errors. They were estimated using kernel home range estimates and include 4 confidence levels. The 85% confidence level is in red and sample size for each squirrel is included. The home range data is preliminary, and should not be distributed or published outside of the biological opinion.

NEST BOX CHECKS (1994-2001)			
	NEW	RECAPTURE	ESCAPES
Residences	11	3	1
Headquarters	11	4	1
Maintenance	1	2	0
Lighthouse Ridge	24	13	1
Total	47	22	3
Trapping Data (Spring 1994-2000, Fall 2000)			
	NEW	RECAPTURE	ESCAPES
Residences	8	10	0
Headquarters	10	5	0
Maintenance	3	4	0
Lighthouse Ridge	30	49	0
Total	51	68	0
Grand Total	98	90	3

PROJECT: Chincoteague National Wildlife Refuge proposed Visitor's Center
BIOLOGIST: Mary Ratnaswamy

I. Delineation of DFS habitat (See Map 1)

II. Impacts from Structures

$$\text{A. Acres of DFS habitat to be cleared for structures} \quad \frac{0.19}{\text{acres}} \times \frac{3.0}{\text{ratio}} = \frac{0.57}{\text{acres}}$$

$$\text{B. Acres of DFS habitat degraded by structures} \quad \frac{6.22}{\text{acres}} \times \frac{1}{\text{ratio}} = \frac{15.55}{\text{acres}}$$

(within 150' of structures)

III. Impacts from Roads

$$\text{A. Acres of DFS habitat to be cleared for roads} \quad \frac{0.10}{\text{acres}} \times \frac{3.0}{\text{ratio}} = \frac{0.30}{\text{acres}}$$

$$\text{B. Acres of DFS habitat degraded by roads} \quad \frac{3.86}{\text{acres}} \times \frac{2.5}{\text{ratio}} = \frac{9.65}{\text{acres}}$$

(within 150' of roads)

$$\text{Total mitigation debt} = \frac{26.07}{\text{acres}}$$

PROJECT: Chincoteague National Wildlife Refuge
BIOLOGIST: Mary Ratnaswamy

I. Delineation of proposed length of road on map (See Map 1)

II. Previous roadkill data from Chincoteague National Wildlife Refuge

A. Data from CNWR

Test Period (TP):	January 1, 1992 through October 2, 1998
Days in the TP:	2,467 days
Road Length (RL):	2.1 miles
Total # DFS found dead on road in TP (DOR):	43 squirrels

B. Calculations

$$\# \text{ of DFS found DOR/day} = \frac{\text{DOR}}{\text{TP}} = \frac{43}{2,467} = 0.0174 \text{ DFS DOR/day}$$

$$\# \text{ DFS DOR/day per mile} = \frac{\text{DOR/TP}}{\text{RL}} = \frac{0.0174}{2.1} = 0.0083 \text{ DFS DOR/day/mile}$$

$$\# \text{ DFS DOR per day per mile} = 0.0083$$

III. Roadkill Estimate for CNWR visitors center proposed roads:

$$\# \text{ DFS DOR per day on 0.31 mile road} = .002573$$

$$\# \text{ DFS DOR per year on 0.31 mile road} = 0.939$$

- A. Loblolly pine thinning will occur on approximately 16 acres of a 60 acre study area located within the 133 acre Sow Pond Forest Stand (Please refer to recently approved Section 7 for Sow Pond tract for detail description). These prescriptions should still be considered for mitigation despite being implemented prior to approval of this Section 7. A separate Section 7 was prepared and recently approved for this activity in order to complete the field work with volunteers in late October 2000.
- B. Four prescriptions involving loblolly pine thinning were developed based upon recommendations from the Regional Forester in the 1992 Upland Management Plan and the DFS Recovery Team meeting at Chincoteague NWR in 1995. The Sow Pond tract was selected for developing and testing these four prescriptions based upon the poor health of the pine forest, the declining use of this area by DFS, and the accessibility for equipment to implement the prescriptions and for personnel to monitor the results. A follow up evaluation will determine which prescription achieved the desired results. All prescriptions will be implemented according to the guidelines of other management plans, such as the Fire Management Plan, and guidelines outlined by the Endangered Species Act and the Delmarva Peninsula fox squirrel recovery plan. Due to the variation in basal area between the compartments and the lack of pine cone production in all compartments, smaller, inferior pine trees will be identified and removed to open the canopy and permit the remaining trees to become more productive.
- C. Specific prescriptions for each compartment are as follows:
1. Compartment one: thin and remove pine trees under 30cm DBH by selectively removing individual pines to reduce direct competition and promote the growth of the remaining pines.
 2. Compartment two: thin by dropping and let lay all trees under 30 cm DBH in direct competition with larger pines.
 3. Compartment three: remove selected pines under 30cm DBH that are in direct competition with larger pines. All trees will be girdled and left standing to provide potential cavity habitat.
 4. Compartment four: thin and remove all trees under 30 cm DBH in direct competition with larger pines, conduct a cool burn in the summer throughout the stand to reduce pine duff, apply two tons of lime to the plot to improve soil conditions, and plant hardwoods, such as maple and water oak, at a minimum of 10 feet from the nearest existing tree in the newly created openings.

- D. A prescribe fire management study is being proposed and organized by the Regional Fire Ecologist to look at the possible benefits of prescribed fire on DFS habitat. Adjacent to Compartment four, a 10 acre plot will be delineated and forest information collected following the protocols established by the Regional Fire Ecologist as part of a study on the effects of prescribed fire on coastal pine stands. Chincoteague NWR is one of five proposed study sites. This study will look at fire effects on forest fuel loads, the floral community, the avian community, and on DFS. The proposed study will address the following DFS recovery tasks that were identified in the 1993 DFS Recovery Plan:
1. Field test and define applications for the habitat suitability model;
 2. Determine the effects of timber management and other land use practices on the DFS;
 3. Develop and refine guidelines for perspective habitat management for DFS;
 4. Develop and implement guidelines for habitat management on public lands occupied by DFS; and
 5. Monitor the outcome of prescriptive habitat management.
- E. Funding is currently being sought for this project. However, this study could be initiated on Chincoteague NWR using current staffing patterns. Information would be collected during the winter of 2000 and early spring 2001 with a proposed burn date of mid summer 2001. This activity will occur outside of the breeding season for DFS.
1. Hardwood plantings will occur within approximately five acres of clear cuts found along the White hills forest tract. These small clear cuts were created to halt the progression of the southern pine beetle during the early 1990's. These plantings will promote forest diversity and reduce the forests vulnerability to future pine beetle outbreaks. Also, mast from the hardwood trees would provide an important food resource to DFS. Hardwoods will be planted on a minimum of ten feet by ten feet spacing. Plantings may be encompassed by a biodegradable tree protector to prevent browsing by deer species if evidence suggest that this method does not interfere with the development of the seedling.
 2. The final habitat enhancement will involve understory thinning by the Regional hydro ax on approximately 20 acres in the Lighthouse Ridge, White Hills, and Woodland Trail forest stands. The habitat suitability model for DFS is based on five variables: percent canopy cover, percent of all trees that are pine, percent of all trees that are over 30 cm DBH, percent ground cover, and a subjective estimate of how difficult it is to walk through the stand. Thus, by thinning the dense understory component, the model score should increase significantly. Also, travel corridors will be created which will allow DFS to disperse to other forest stands.