Appendix B

Biological Opinions, Permits, and Cooperative Agreements

Appendix B: Biological Opinions, Permits, and Cooperative Agreements

This Appendix B contains copies of specific Biological Opinions (BO), Permits, and natural resource and conservation Cooperative Agreements, as reflected in Table B-1 on the following page, and in the List of Attachments below. General information regarding BOs, Permits, and Cooperative Agreements can be found in Chapter 7 of this INRMP.

List of Attachments

Table B-1. List of Documents in Appendix B Attachments

Found in Attachment	Document Designation Letter	Type of Document	Document Name	Issued By	Document/ Permit Number	Installation Covered	Start/Issue Date (if applicable)	Expiration Date (if applicable)	Status
B-1	A	BO	Light Management	USFWS	41910-2009-F-0087	CCAFS and PAFB	18 Nov 2008	Not applicable	Active
B-1	B	PBO	Programmatic BO for routine activities, re SEBM	USFWS	41910-2009-F-0110	CCAFS	23 Dec 2008	Not applicable	Active
B-2	C	BO	Beach nourishment at PAFB	USFWS	2009-F-0336 Mod.	PAFB	29 Oct 2013	Not applicable	Active
B-2	D	BO	Sand borrow, CCAFS upland borrow source	USFWS	41910-2006-F-0707	CCAFS	20 July 2006	Not applicable	Active
B-2	E	BO	Sand borrow, CCAFS upland borrow source	USFWS	41910-2009-F-0037	CCAFS	20 Oct 2008	Not applicable	Active
B-2	F	BO	Skid strip – effect on T&E species	USFWS	41910-2008-F-0148	CCAFS	08 May 2008	Not applicable	Active
B-2	G	BO	Skid strip transporter road	USFWS	41910-2010-F-0019	CCAFS	30 Nov 2009	Not applicable	Active
B-2	H	BO	Skid strip-change LMUs	USFWS	41910-2010-F-0386	CCAFS	15 Sept 2011	Not applicable	Active
B-3	I	BO	Sand borrow, CCAFS upland borrow source	USFWS	05-1125	CCAFS	19 Oct 2005	Not applicable	Inactive
B-3	J	BO	Southeastern beach mouse, inadvertent SEBM trapping	USFWS	02-617	CCAFS	22 Aug 2002	Not applicable	Inactive
B-4	K	Letter authorization identifying sub-permittees	Sub-permittee Designation for USFWS migratory bird depredation permit	45 SW	MB673776-0	CCAFS and PAFB	07 May 2014	31 March 2015	Active
B-4	K	Permit	Migratory Bird Depredation Permit	USFWS	MB673776-0	CCAFS and PAFB	01 April 2014	31 March 2015	Active
B-4	L	Letter authorization identifying sub-permittees	Authorized agents designation for FWC American alligator permit	45 SW	SPGS-14-67	CCAFS, PAFB, MTA	22 Aug 2014	22 August 2019	Active
B-4	L	Permit	Special Purpose Permit, American alligator	FWC	SPGS-14-67	CCAFS, PAFB, MTA	22 Aug 2014	22 August 2019	Active
B-4	M	Permit	Nuisance Alligator Harvest Permit	FWC	64331	CCAFS, PAFB, MTA	21 May 2009	21 May 2019	Active
B-4	N	Permit	Marine Turtle Permit	FWC	MTP-14-075	CCAFS and PAFB	01 Jan 2014	12/31/2014	Active
B-4	O	Permit	Special Purpose Permit, steel trap use for wildlife predators	FWC	LSSP-12-00005B	CCAFS	10 March 2014	31 December 2014	Active
B-4	O	Letter authorization identifying assistants	Assistants Designation for FWC steel trap permit	45 SW	LSSP-12-00005B	CCAFS	11 March 2014	31 December 2014	Active
B-4	P	Permit	Triploid Carp Permit	FWC	MT-19-CR-94-0873	PAFB	12 Aug 2005	until revoked by Executive Director	Unknown
B-5	Q	Cooperative Agreement	Candidate Conservation Agreement for the Gopher Tortoise, Eastern Population	State, federal, non-governmental and private organizations	None listed	USAF	November 2008	Not Applicable	Active

Attachment B-1

Copies of Active Biological Opinions

Active BO

Attachment B-1	Document Designation Letter	A

United States Department of the Interior

U. S. FISH AND WILDLIFE SERVICE

7915 BAYMEADOWS WAY, SUITE 200
JACKSONVILLE, FLORIDA 32256-7517

IN REPLY REFER TO:

FWS Log No. 41910-2009-F-0087

November 18, 2008

Brigadier General Edward L. Bolton, Jr.
Commander, 45th Space Wing, 45 CES/CEVP
1224 Edward H. White II Street, MS-7100
Patrick AFB, Florida 32925-3299
(ATTN: Robin Sutherland)

FWS Log No. 41910-2009-F-0087

Dear General Bolton:

This document transmits the U.S. Fish and Wildlife Service's (Service) final biological opinion (BO) based on our review of historical and anticipated future light management activities by the 45th Space Wing (45th SW) of the U.S. Air Force at the Cape Canaveral Air Force Station (CCAFS) and Patrick Air Force Base (PAFB) in Brevard County, Florida, and their effects on nesting and hatchling loggerhead (*Caretta caretta*), green (*Chelonia mydas),* leatherback (*Dermochelys coriacea*), hawksbill (*Eretmochelys imbricata*), and Kemp's ridley (*Lepidochelys kempii*) sea turtles in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). A complete administrative record of this consultation is on file at this office.

CONSULTATION HISTORY

On April 13, 1988, Mr. Earl Possardt, the Southeastern Sea Turtle Coordinator for the Service, met with several representatives of the Air Force to discuss a security upgrade lighting for Launch Complex (LC) 17, 40, and 41 and the sea turtle hatchling disorientations at this installation. During the 1987 – 1990 sea turtle nesting season, there were between 2236 loggerhead nests and 26-78 green turtle nests on CCAFS. For the 1988 sea turtle nesting season, 69 nests at CCAFS and 4 nests at PAFB were disoriented or misoriented due to CCAFS lighting. On August 15, 1988, the Service sent a letter to the 45th SW reiterating the

concern for the number of disorientations at CCAFS and the need for compliance with Section 7 of the Act, as amended. The Air Force replied with a letter to the Service on September 19, 1988 indicating their desire to resolve the lighting issues at CCAFS. Following this letter, it was agreed that the Air Force would develop light management plans (LMP) in cooperation with the Service, for its launch complexes and other facilities at CCAFS. On October 17, 1989, LMPs were provided to the Service for the following areas: Industrial Area, Vertical Integration Building (VIB), Port Area, LC 17, LC 40, and LC 41. On February 28, 1990, revised LMPS were provided to the Service for LC 17 and LC 41. For the 1990 sea turtle nesting season, 160 nests at CCAFS and 12 nests at PAFB were disoriented or misoriented due to CCAFS lights.

On February 9, 1990, the Service issued a Biological Opinion (BO) for the LMP for LC 36. On January 17, 1991, a revised LMP was provided to the Service for the Port Area. On April 9, 1991, the Service issued their BO authorizing an incidental take of hatchlings from 75 loggerhead and 2 green turtle nests at CCAFS and hatchlings from 2 loggerhead nests at PAFB. In subsequent years, the authorized level of incidental take was to reduce by 50% each year following the implementation of the LMPs. The Air Force developed seven LMPs, eliminated 293 incandescent, high pressure sodium, mercury vapor fixtures and quartz lights. Four hundred and seventy-seven incandescent lights were replaced with yellow buglights. Eight hundred and forty-four incandescent, high pressure sodium, mercury vapor, quartz, and metal halide lights were changed to low pressure sodium. Four hundred and forty-nine high pressure sodium lights were shielded. Lights not in use were shut off and compliance was recorded ensuring routine security inspection and patrols. Annual notices to all complex personnel were issued prior to sea turtle nesting season.

On September 9, 1991, the Service received a letter from the Air Force to report that CCAFS had exceeded the incidental take for sea turtle hatchlings authorized by the Service in the April 9, 1991, BO. The Air Force has exceeded its authorized incidental take by 61 loggerhead nests. On October 10, 1991, the Service's Southeastern Sea Turtle Coordinator, Mr. Earl Possardt, met with representatives of CCAFS to discuss the implementation of the LMPs and additional measures to minimize the number of hatchling disorientations. The exceeded take was due to a higher number of nests and more comprehensive nesting and lighting surveys. To minimize further disorientations, 280 susceptible nests were screened. The BO written on April 9, 1990 was modified to include all hatchlings from nests disoriented and misoriented during the 1991 nesting and hatching season. Incidental take for subsequent years was authorized for hatchlings from four percent of the nests at CCAFS during the 1992 nesting season and reduced to two percent for subsequent years. The Service amended their BO on May 2, 2000 to authorize an incidental take of two percent of hatchlings and two percent of nesting females at CCAFS.

Patrick Air Force Base: On August 30, 2004, the Service received an email from an Air Force, 45th SW representative of PAFB, Ms. Keitha Dattilo-Bain, to inform us that the 2% incidental take of sea turtles given in the BO dated May 2, 2000 was exceeded. The email contained

information with precautions that were being conducted to reduce the number of disorientation events; such as reducing/shielding the safety/security lighting at a few facilities and planting more dune vegetation in the areas from the Officers' Club to the north Distinguished Visitors beach housing. Keitha Dattilo-Bain stated that the traffic lights on State Road (SR) A1A for the Main Gate and the former Officers' Club/Blockhouse (including public beach access lights) appeared to be the cause of the majority of the disorientation events. Modifications to the lights were being researched to attempt to develop a solution by next nesting season, but it would be low on the Brevard County Traffic Engineering's (BTE) list as repairs to other traffic lights destroyed by the hurricanes in 2004 would be top priority. In the interim, funding would be obtained by the Air Force and coordination with the Florida Department of Transportation (FDOT) and BTE would occur to strive for retrofitting before the next nesting season.

In 2005, two lighting surveys were conducted at PAFB by the University of Central Florida Marine Turtle Research Group and a representative of the 45th SW, Keitha Dattilo-Bain. The surveys included patrolling the beach at night to determine sources of light that could potentially cause disorientations of sea turtles. The surveys identified the traffic lights at the Main Gate and Officers' Club as light sources likely to cause sea turtle disorientations during the 2005 sea turtle nesting season. On July 28, 2005, the Service received an email from Keitha Dattilo-Bain to discuss the traffic lights at the Main Gate and Officers' Club. Emails were exchanged with Keitha Dattilo-Bain of PAFB, Dean Gallagher of the Florida Fish and Wildlife Conservation Commission, Doug Mihalich of BTE, and the Service as to a possible solution for the traffic lights. On July 28, 2005, the Service received an email from Keitha Dattilo-Bain stating that the solution reached through discussions with FDOT) and BTE was for installation of shielding louvers on the traffic lights. The lighting from the traffic signals would still be visible on the beach but reduced. In the interim, while waiting for the Air Force funds and BTE scheduling, the Air Force agreed to use silt fencing to temporarily shield any nests laid on the dune that were likely to be affected by the traffic lights.

Louvers were installed at the traffic lights at the Main Gate and former Officer's Club/Blockhouse at PAFB in January 2006. BTE readjusted the louvers, installed new mounting hardware, and added new signal heads to increase visibility for motorists. Strong winds in February and March of 2006 caused significant sway of these traffic lights, which, in combination with the louvers, reduced the ability of motorists to see the traffic signal.
In March 2006, FDOT ordered the louvers from the Main Gate to be removed due to safety concerns and public complaints. The pedestrian and beach access signal louvers at the former Officer's Club/Blockhouse were opened to three times their original configuration. Other alternatives for the traffic lights were discussed at a meeting held on April 13, 2006 with Keitha Dattilo-Bain, the Service, Doug Mihalich, Rick Morrow, Chris Cairns, Suzanne Hertz, representatives of FDOT, and OJ Oujevolk of BTE. Options for removing the traffic signal at the former Officer's Club/Blockhouse were discussed as well as rerouting traffic and turning off lights during the nesting season. Discussions are on-going between the 45th SW, FDOT, BTE, and the Service to minimize impacts to sea turtles from the traffic lights.

On October 21, 2004, the Service received a letter from Angy Chambers, a representative of CCAFS, to inform us that the incidental take of 2% for sea turtles given in the May 2, 2000 BO, was also exceeded at this location. On June 27, 2005, the Service conducted a site visit and met with representatives of the 45th SW, including Angy Chambers and Randall Rowland. The possible lighting sources causing the sea turtle hatchling disorientations and misorientations were discussed.
On August 23, 2006, the Service issued an interim BO for the 2006 and 2007 nesting seasons. The "Terms and Conditions" provided in the interim BO were assessed and amended "Terms and Conditions" were discussed. Disorientation is defined as a nesting female's or hatchling's loss of orientation, being unable to maintain constant directional movement. Misorientation is defined as orientation in the wrong direction. This BO represents the final BO with an allowable percentage of incidental take from lighting disorientations and misorientations.

On September 17, 2008, a representative of CCAFS provided the Service with the 2007 Sea Turtle Hatchling Disorientation Report for CCAFS and PAFB. The Service had sufficient information to complete the final BO.

Information for this final BO was obtained by email correspondence, meetings, several site visits, telephone conversations and other sources of information. A complete administrative record of this consultation is on file at the Service's Jacksonville Field Office.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The area involved in this biological opinion is the entirety of CCAFS and PAFB in Brevard County, Florida. The CCAFS has approximately 21 km of nesting beach and PAFB approximately 7 km of beach. At CCAFS, Light Management Plans (LMP) were previously developed for CCAFS and at PAFB, a Light Management Plan was developed for the base and approved by the Service in 1993, in an attempt to reduce or eliminate sea turtle hatchling disorientation/misorientation events. Facility custodians and managers are responsible for ensuring compliance of site personnel with operational constraints. The 45th SW Civil Engineering Squadron/Civil Engineering Environmental Protection (CES/CEVP) office conducts lighting inspections and records noncompliance, and the person responsible for the lights is notified. In addition, facility managers are required to report noncompliant lights. The 45th SW issues annual notices to all personnel prior to the sea turtle nesting season reminding tenants of light use requirements and responsibilities.

The previously issued May 2, 2000, BO requires the 45th SW to develop LMPs for all new construction and all facilities that currently do not have an LMP at CCAFS and PAFB for submittal to the Service for review and approval. The purpose of reinitiating consultation due to authorized incidental take being exceeded, is to reevaluate the level of anticipated incidental

take as a result of disorientation and misorientation, modify the Service's minimization measures, review the 45th SW lighting guidelines, retrofit where feasible the lighting sources that are potentially causing the disorientations/misorientations, and re-evaluate the need for individual facility LMPs.

STATUS OF THE SPECIES/CRITICAL HABITAT

Species/critical habitat description

Loggerhead Sea Turtle

The loggerhead sea turtle was listed as a threatened species on July 28, 1978 (43 FR 32800). The loggerhead occurs throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans.

Within the continental U.S., loggerheads nest from Texas to Virginia with major nesting concentrations found in South Florida. Additional nesting concentrations occur on coastal islands of North Carolina, South Carolina, and Georgia, and on the Atlantic and Gulf coasts of Florida (NMFS and Service 1991b). Within the western Atlantic, loggerheads also nest in Mexico and the Caribbean.

The loggerhead sea turtle grows to an average weight of about 200 pounds and is characterized by a large head with blunt jaws. Adults and subadults have a reddish-brown carapace. Scales on the top of the head and top of the flippers are also reddish-brown with yellow on the borders. Hatchlings are a dull brown color (NMFS 2002a). The loggerhead feeds on mollusks, crustaceans, fish, and other marine animals.

The loggerhead occurs throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans. However, the majority of loggerhead nesting is at the western rims of the Atlantic and Indian Oceans. The species is widely distributed within its range. It may be found hundreds of miles out to sea, as well as in inshore areas such as bays, lagoons, salt marshes, creeks, ship channels, and the mouths of large rivers. Coral reefs, rocky places, and ship wrecks are often used as feeding areas. Nesting occurs mainly on open beaches or along narrow bays having suitable sand, and often in association with other species of sea turtles.

No critical habitat has been designated for the loggerhead sea turtle.

On November 16, 2007, the Service and NMFS received a petition from Oceana and the Center for Biological Diversity requesting that loggerhead turtles in the western North Atlantic Ocean be reclassified as a Distinct Population Segments (DPS) with endangered status and that critical habitat be designated. A DPS is a population segment that is discrete in relation to the remainder of the species to which it belongs, and significant to the species to which it belongs.

NMFS took the lead on the petition response and issued a 90–day finding on March 5, 2008 in the Federal Register, that the petition presents substantial scientific information indicating that the petitioned action may be warranted. NMFS has initiated a review of the status of the species to determine whether the petitioned action is warranted and to determine whether any additional changes to the current listing of the loggerhead turtle are warranted and solicited public comment that ended on May 5, 2008 (73 FR 11849).

Green Sea Turtle

The green sea turtle was federally listed as a protected species on July 28, 1978 (43 FR 32800). Breeding populations of the green turtle in Florida and along the Pacific Coast of Mexico are listed as endangered; all other populations are listed as threatened. The green sea turtle has a worldwide distribution in tropical and subtropical waters. Major green turtle nesting colonies in the Atlantic occur on Ascension Island, Aves Island, Costa Rica, and Surinam. Within the U.S., green turtles nest in small numbers in the U.S. Virgin Islands and Puerto Rico, and in larger numbers along the east coast of Florida, particularly in Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties (NMFS and Service 1991a). Nesting also has been documented along the Gulf coast of Florida from Escambia County through Franklin County in northwest Florida and from Pinellas County through Collier County in southwest Florida (FWC Statewide Nesting Beach Survey database). Green turtles have been known to nest in Georgia, but only on rare occasions (Georgia Department of Natural Resources statewide nesting database). The green turtle also nests sporadically in North Carolina and South Carolina (North Carolina Wildlife Resources Commission statewide nesting database; South Carolina Department of Natural Resources statewide nesting database). Unconfirmed nesting of green turtles in Alabama has also been reported (Bon Secour National Wildlife Refuge nesting reports).

Green sea turtles are generally found in fairly shallow waters (except when migrating) inside reefs, bays, and inlets. The green turtle is attracted to lagoons and shoals with an abundance of marine grass and algae. Open beaches with a sloping platform and minimal disturbance are required for nesting.

The green sea turtle grows to a maximum size of about 4 feet and a weight of 440 pounds. It has a heart-shaped shell, small head, and single-clawed flippers. The carapace is smooth and colored gray, green, brown and black. Hatchlings are black on top and white on the bottom (NMFS 2002b). Hatchling green turtles eat a variety of plants and animals, but adults feed almost exclusively on seagrasses and marine algae.

Critical habitat for the green sea turtle has been designated for the waters surrounding Culebra Island, Puerto Rico, and its outlying keys.

Leatherback Sea Turtle

The leatherback sea turtle, listed as an endangered species on June 2, 1970 (35 FR 8491), nests on shores of the Atlantic, Pacific and Indian Oceans. Leatherbacks have the widest distribution of the sea turtles with nesting on beaches in the tropics and sub-tropics and foraging excursions into higher-latitude sub-polar waters. They have evolved physiological and anatomical adaptations (Frair et al. 1972, Greer et al. 1973) that allow them to exploit waters far colder than any other sea turtle species would be capable of surviving. Non-breeding animals have been recorded as far north as the British Isles and the Maritime Provinces of Canada and as far south as Argentina and the Cape of Good Hope (Pritchard 1992). Nesting grounds are distributed worldwide, with the Pacific Coast of Mexico historically supporting the world's largest known concentration of nesting leatherbacks. The largest nesting colony in the wider Caribbean region is found in French Guiana, but nesting occurs frequently, although in lesser numbers, from Costa Rica to Columbia and in Guyana, Surinam, and Trinidad (NMFS and Service 1992; National Research Council 1990a).

The leatherback regularly nests in the U.S., in Puerto Rico, the U.S. Virgin Islands, and along the Atlantic coast of Florida as far north as Georgia (NMFS and Service 1992). Leatherback turtles have been known to nest in Georgia, South Carolina, and North Carolina, but only on rare occasions (North Carolina Wildlife Resources Commission; South Carolina Department of Natural Resources; and Georgia Department of Natural Resources statewide nesting databases). Leatherback nesting has also been reported on the northwest coast of Florida (LeBuff 1990; FWC Statewide Nesting Beach Survey database); and in southwest Florida a false crawl (non-nesting emergence) has been observed on Sanibel Island (LeBuff 1990).

This is the largest, deepest diving of all sea turtle species. The adult leatherback can reach 4 to 8 feet in length and weigh 500 to 2,000 pounds. The carapace is distinguished by a rubber-like texture, about 1.6 inches thick, made primarily of tough, oil-saturated connective tissue. Hatchlings are dorsally mostly black and are covered with tiny scales; the flippers are edged in white, and rows of white scales appear as stripes along the length of the back (NMFS 2002c). Jellyfish are the main staple of its diet, but it is also known to feed on sea urchins, squid, crustaceans, tunicates, fish, blue-green algae, and floating seaweed.

Adult females require sandy nesting beaches backed with vegetation and sloped sufficiently so the distance to dry sand is limited. Their preferred beaches have proximity to deep water and generally rough seas.

Marine and terrestrial critical habitat for the leatherback sea turtle has been designated at Sandy Point on the western end of the island of St. Croix, U.S. Virgin Islands (50 CFR 17.95).

Hawksbill Sea Turtle

The hawksbill sea turtle was listed as an endangered species on June 2, 1970 (35 FR 8491). The hawksbill is found in tropical and subtropical seas of the Atlantic, Pacific, and Indian Oceans. The species is widely distributed in the Caribbean Sea and western Atlantic Ocean.

Within the continental U.S., hawksbill sea turtle nesting is rare and is restricted to the southeastern coast of Florida (Volusia through Dade Counties) and the Florida Keys (Monroe County) (Meylan 1992; Meylan et al. 1995). However, hawksbill tracks are difficult to differentiate from those of loggerheads and may not be recognized by surveyors. Therefore, surveys in Florida likely underestimate actual hawksbill nesting numbers (Meylan et al. 1995). In the U.S. Caribbean, hawksbill nesting occurs on beaches throughout Puerto Rico and the U.S. Virgin Islands (NMFS and Service 1993).

Hawksbills typically weigh around 176 pounds or less in the wider Caribbean; hatchlings average about 1.6 inches straight length and range in weight from 0.5 to 0.7 ounces. The carapace is heart shaped in young turtles, and becomes more elongated or egg-shaped with maturity. The top scutes are often richly patterned with irregularly radiating streaks of brown or black on an amber background. The head is elongated and tapers sharply to a point. The lower jaw is V-shaped (NMFS 2002d).

Critical habitat for the hawksbill sea turtle has been designated for selected beaches and/or waters of Mona, Monito, Culebrita, and Culebra Islands, Puerto Rico.

Kemp's Ridley Sea Turtle

The Kemp's ridley sea turtle was listed as endangered on December 2, 1970 (35 FR 18320). The Kemp's ridley, along with the flatback sea turtle (*Natator depressus*), has the most geographically restricted distribution of any sea turtle species. The range of the Kemp's ridley includes the Gulf coasts of Mexico and the U.S., and the Atlantic coast of North America as far north as Nova Scotia and Newfoundland. The majority of nesting for the entire species occurs on the primary nesting beach at Rancho Nuevo (Marquez-M. 1994).

Outside of nesting, adult Kemp's ridleys are believed to spend most of their time in the Gulf of Mexico, while juveniles and subadults also regularly occur along the eastern seaboard of the U.S. (Service and NMFS 1992). There have been rare instances when immature ridleys have been documented making transatlantic movements (Service and NMFS 1992). It was originally speculated that ridleys that make it out of the Gulf of Mexico might be lost to the breeding population (Hendrickson 1980), but data indicate that many of these turtles are capable of moving back into the Gulf of Mexico (Henwood and Ogren 1987). In fact, there are documented cases of ridleys captured in the Atlantic that migrated back to the nesting beach at Rancho Nuevo (Schmid and Witzell 1997, Schmid 1998, Witzell 1998).

Hatchlings, after leaving the nesting beach, are believed to become entrained in eddies within the Gulf of Mexico, where they are dispersed within the Gulf and Atlantic by oceanic surface currents until they reach about 7.9 inches in length, at which size they enter coastal shallow water habitats (Ogren 1989).

No critical habitat has been designated for the Kemp's ridley sea turtle.

Life history

Loggerhead Sea Turtle

Loggerheads are long-lived, slow-growing animals that use multiple habitats across entire ocean
basins throughout their life history. This complex life history encompasses terrestrial, nearshore, and open ocean habitats. The three basic ecosystems in which loggerheads live are the:

1. Terrestrial zone (supralittoral) - the nesting beach where both oviposition (egg laying) and embryonic development and hatching occur.
2. Neritic zone - the inshore marine environment (from the surface to the sea floor) where water depths do not exceed 656 feet (200 meters). The neritic zone generally includes the continental shelf, but in areas where the continental shelf is very narrow or nonexistent, the neritic zone conventionally extends to areas where water depths are less than 656 feet (200 meters).
3. Oceanic zone - the vast open ocean environment (from the surface to the sea floor) where water depths are greater than 656 feet (200 meters).

Maximum intrinsic growth rates of sea turtles are limited by the extremely long duration of the juvenile stage and fecundity. Loggerheads require high survival rates in the juvenile and adult stages, common constraints critical to maintaining long-lived, slow-growing species, to achieve positive or stable long-term population growth (Congdon et al. 1993; Heppell 1998; Crouse 1999; Heppell et al. 1999, 2003; Musick 1999).

The basic life cycle of the loggerhead turtle in the western North Atlantic consists of seven life stages (**Figure 1**) that are based on the size of the sea turtles at different ages (Bolten 2003, Crouse et al. 1987).

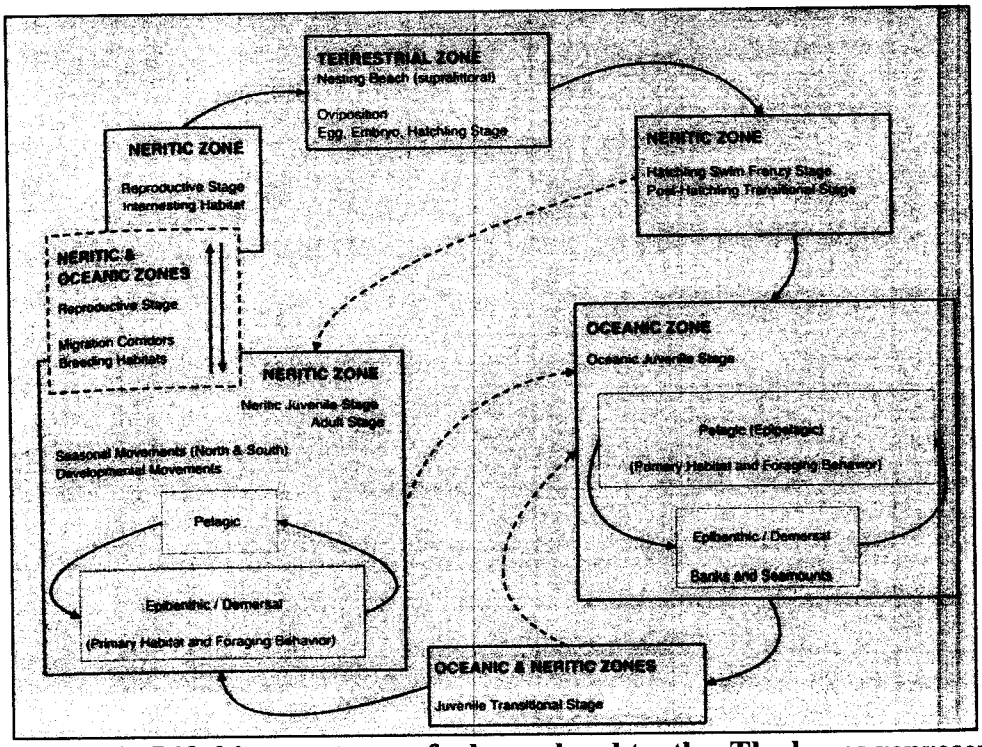

Figure 1. Life history stages of a loggerhead turtle. The boxes represent life stages and the corresponding ecosystems, solid lines represent movements between life stages and ecosystems, and dotted lines are speculative (Bolten 2003).

Numbers of nests and nesting females are often highly variable from year to year due to a number of factors including environmental stochasticity, periodicity in ocean conditions, anthropogenic effects, and density-dependent and density-independent factors affecting survival, growth, and reproduction (Meylan 1982, Hays 2000, Chaloupka 2001, Solow et al. 2002). Despite these sources of variation, and because female turtles exhibit strong nest site fidelity, a nesting beach survey can provide a valuable assessment of changes in the adult female population, provided that the study is sufficiently long and effort and methods are standardized (Meylan 1982, Gerrodette and Brandon 2000, Reina et al. 2002).

Life History Trait	**Data**
Clutch size (mean)	100-126 eggs[1]
Incubation duration (varies depending on time of year and latitude)	Range = 42-75 days[2,3]
Juvenile (<87 cm CCL) sex ratio	65-70% female[4]
Pivotal temperature (incubation temperature that produces an equal number of males and females)	29.0°C[5]

Nest productivity (emerged hatchlings/total eggs) x 100 (varies depending on site specific factors)	Range = 45-70%[2,6]
Clutch frequency (number of nests/female/season)	3-4 nests[7]
Internesting interval (number of days between successive nests within a season)	12-15 days[8]
Remigration interval (number of years between successive nesting migrations)	2.5-3.7 years[9]
Nesting season	late April-early September
Hatching season	late June-early November
Age at sexual maturity	32-35 years[10]
Life span	>57 years[11]

[1] Dodd 1988.
[2] Dodd and Mackinnon (1999, 2000, 2001, 2002, 2003, 2004).
[3] B. Witherington, FWC, pers. comm. 2006 (information based on nests monitored throughout Florida beaches in 2005, n=865).
[4] National Marine Fisheries Service (2001); A. Foley, FWC, pers. comm. 2005.
[5] Mrosovsky (1988); Marcovaldi et al. (1997).
[6] B. Witherington, FWC, pers. comm. 2006 (information based on nests monitored throughout Florida beaches in 2005, n=1,680).
[7] Murphy and Hopkins (1984); Frazer and Richardson (1985); Ehrhart, unpublished data.
[8] Caldwell (1962), Dodd (1988).
[9] Richardson et al. (1978); Bjorndal et al. (1983); Ehrhart, unpublished data.
[10] M. Snover, NMFS, pers. comm. 2005.
[11] Dahlen et al. (2000).

Loggerheads nest on ocean beaches and occasionally on estuarine shorelines with suitable sand. Nests are typically laid between the high tide line and the dune front (Routa 1968, Witherington 1986, Hailman and Elowson 1992). Wood and Bjorndal (2000) evaluated four environmental factors (slope, temperature, moisture, and salinity) and found that slope had the greatest influence on loggerhead nest-site selection. Loggerheads appear to prefer relatively narrow, steeply sloped, coarse-grained beaches, although nearshore contours may also play a role in nesting beach site selection (Provancha and Ehrhart 1987).

Sea turtle eggs require a high-humidity substrate that allows for sufficient gas exchange for development (Miller 1997, Miller et al. 2003). Loggerhead nests incubate for variable periods of time. The length of the incubation period (commonly measured from the time of egg deposition to hatchling emergence) is inversely related to nest temperature, such that between 26°C and 32°C, a change of 1°C adds or subtracts approximately 5 days (Mrosovsky 1980).

The warmer the sand surrounding the egg chamber, the faster the embryos develop (Mrosovsky and Yntema 1980). Sediment temperatures prevailing during the middle third of the incubation period also determine the sex of hatchling sea turtles (Mrosovsky and Yntema 1980). Incubation temperatures near the upper end of the tolerable range produce only female hatchlings while incubation temperatures near the lower end of the tolerable range produce only male hatchlings. The pivotal temperature (i.e., the incubation temperature that produces equal numbers of males and females) in loggerheads is approximately 29°C (Limpus et al. 1983, Mrosovsky 1988, Marcovaldi et al. 1997). However, clutches with the same average temperature may have different sex ratios depending on the fluctuation of temperature during incubation (Georges et al. 1994). Moisture conditions in the nest similarly influence incubation period, hatching success, and hatchling size (McGehee 1990, Carthy et al. 2003).

Loggerhead hatchlings pip and escape from their eggs over a 1- to 3-day interval and move upward and out of the nest over a 2- to 4-day interval (Christens 1990). The time from pipping to emergence ranges from 4 to 7 days with an average of 4.1 days (Godfrey and Mrosovsky 1997). Hatchlings emerge from their nests en masse almost exclusively at night, and presumably using decreasing sand temperature as a cue (Hendrickson 1958, Mrosovsky 1968, Witherington et al. 1990). Moran et al. (1999) concluded that a lowering of sand temperatures below a critical threshold, which most typically occurs after nightfall, is the most probable trigger for hatchling emergence from a nest. After an initial emergence, there may be secondary emergences on subsequent nights (Carr and Ogren 1960, Witherington 1986, Ernest and Martin 1993).
Hatchlings use a progression of orientation cues to guide their movement from the nest to the marine environments where they spend their early years (Lohmann and Lohmann 2003). Hatchlings first use light cues to find the ocean. On naturally lighted beaches without artificial lighting, ambient light from the open sky creates a relatively bright horizon compared to the dark silhouette of the dune and vegetation landward of the nest. This contrast guides the hatchlings to the ocean (Daniel and Smith 1947, Limpus 1971, Salmon et al. 1992, Witherington 1997, Witherington and Martin 1996).

Green Sea Turtle

Green turtles deposit from one to nine clutches within a nesting season, but the overall average is about 3.3 nests. The interval between nesting events within a season varies around a mean of about 13 days (Hirth 1997). Mean clutch size varies widely among populations. Average clutch size reported for Florida was 136 eggs in 130 clutches (Witherington and Ehrhart 1989). Only occasionally do females produce clutches in successive years. Usually two, three, four or more years intervene between breeding seasons (NMFS and Service 1991a). Age at sexual maturity is believed to be 20 to 50 years (Hirth 1997).

Leatherback Sea Turtle

Leatherbacks nest an average of five to seven times within a nesting season, with an observed maximum of 11 nests (NMFS and Service 1992). The interval between nesting events within a season is about 9 to 10 days. Clutch size averages 80 to 85 yolked eggs, with the addition of usually a few dozen smaller, yolkless eggs, mostly laid toward the end of the clutch (Pritchard 1992). Nesting migration intervals of 2 to 3 years were observed in leatherbacks nesting on the Sandy Point National Wildlife Refuge, St. Croix, U.S. Virgin Islands (McDonald and Dutton 1996). Leatherbacks are believed to reach sexual maturity in 6 to 10 years (Zug and Parham 1996).

Hawksbill Sea Turtle

Hawksbills nest on average about 4.5 times per season at intervals of approximately 14 days (Corliss et al. 1989). In Florida and the U.S. Caribbean, clutch size is approximately 140 eggs, although several records exist of over 200 eggs per nest (NMFS and Service 1993). On the basis of limited information, nesting migration intervals of 2 to 3 years appear to predominate. Hawksbills are recruited into the reef environment at about 14 inches in length and are believed to begin breeding about 30 years later. However, the time required to reach 14 inches in length is unknown and growth rates vary geographically. As a result, actual age at sexual maturity is unknown.

Kemp's Ridley Sea Turtle

Nesting occurs from April into July during which time the turtles appear off the Tamaulipas and Veracruz coasts of Mexico. Precipitated by strong winds, the females swarm to mass nesting emergences, known as *arribadas* or *arribazones*, to nest during daylight hours. The period between Kemp's ridley arribadas averages approximately 25 days (Rostal et al. 1997), but the precise timing of the arribadas is highly variable and unpredictable (Bernardo and Plotkin 2007). Clutch size averages 100 eggs and eggs typically take 45 to 58 days to hatch depending on temperatures (Marquez-M. 1994, Rostal 2007).

Some females breed annually and nest an average of 1 to 4 times in a season at intervals of 10 to 28 days. Analysis by Rostal (2007) suggested that ridley females lay approximately 3.075 nests per nesting. Interannual remigration rate for female ridleys is estimated to be approximately 1.8 (Rostal 2007) to 2.0 years (Marquez Millan et al. 1989, TEWG 2000). Age at sexual maturity is believed to be between 10 to 17 years (Snover et al. (2007).

Population dynamics

Loggerhead Sea Turtle

The loggerhead occurs throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans. However, the majority of loggerhead nesting is at the western rims of the Atlantic and Indian Oceans. The most recent reviews show that only two loggerhead nesting beaches have greater than 10,000 females nesting per year (Baldwin et al. 2003, Ehrhart et al.

2003, Kamezaki et al. 2003, Limpus and Limpus 2003, Margaritoulis et al. 2003): South Florida (U.S.) and Masirah (Oman). Those beaches with 1,000 to 9,999 females nesting each year are Georgia through North Carolina (U.S.), Quintana Roo and Yucatán (Mexico), Cape Verde Islands (Cape Verde, eastern Atlantic off Africa), and Western Australia (Australia). Smaller nesting aggregations with 100 to 999 nesting females annually occur in the Northern Gulf of Mexico (U.S.), Dry Tortugas (U.S.), Cay Sal Bank (Bahamas), Sergipe and Northern Bahia (Brazil), Southern Bahia to Rio de Janerio (Brazil), Tongaland (South Africa), Mozambique, Arabian Sea Coast (Oman), Halaniyat Islands (Oman), Cyprus, Peloponnesus (Greece), Island of Zakynthos (Greece), Turkey, Queensland (Australia), and Japan.

The loggerhead is commonly found throughout the North Atlantic including the Gulf of Mexico, the northern Caribbean, the Bahamas archipelago, and eastward to West Africa, the western Mediterranean, and the west coast of Europe.

The major nesting concentrations in the U.S. are found in South Florida. However, loggerheads nest from Texas to Virginia. Total estimated nesting in the U.S. has fluctuated between 47,000 and 90,000 nests per year over the last decade (FWC, unpublished data; GDNR, unpublished data; SCDNR, unpublished data; NCWRC, unpublished data). About 80% of loggerhead nesting in the southeast U.S. occurs in six Florida counties (Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties). Adult loggerheads are known to make considerable migrations between foraging areas and nesting beaches (Schroeder et al. 2003, Foley et al. in press). During non-nesting years, adult females from U.S. beaches are distributed in waters off the eastern U.S. and throughout the Gulf of Mexico, Bahamas, Greater Antilles, and Yucatán.

From a global perspective, the U.S. nesting aggregation is of paramount importance to the survival of the species and is second in size only to that which nests on islands in the Arabian Sea off Oman (Ross 1982, Ehrhart 1989). The status of the Oman loggerhead nesting population, reported to be the largest in the world (Ross 1979), is uncertain because of the lack of long-term standardized nesting or foraging ground surveys and its vulnerability to increasing development pressures near major nesting beaches and threats from fisheries interaction on foraging grounds and migration routes (E. Possardt, Service, personal communication 2005). The loggerhead nesting aggregations in Oman, the U.S., and Australia account for about 88% of nesting worldwide (NMFS and Service 1991b).

Green Sea Turtle

About 150 to 3,000 females are estimated to nest on beaches in the continental U.S. annually (FWC 2005). In the U.S. Pacific, over 90 percent of nesting throughout the Hawaiian archipelago occurs at the French Frigate Shoals, where about 200 to 700 females nest each year (NMFS and Service 1998a). Elsewhere in the U.S. Pacific, nesting takes place at scattered locations in the Commonwealth of the Northern Marianas, Guam, and American Samoa. In the western Pacific, the largest green turtle nesting aggregation in the world occurs on Raine

Island, Australia, where thousands of females nest nightly in an average nesting season (Limpus et al. 1993). In the Indian Ocean, major nesting beaches occur in Oman where 30,000 females are reported to nest annually (Ross and Barwani 1995).

Leatherback Sea Turtle

A dramatic drop in nesting numbers has been recorded on major nesting beaches in the Pacific. Spotila et al. (2000) have highlighted the dramatic and possible extirpation of leatherbacks in the Pacific.

The East Pacific and Malaysia leatherback populations have collapsed. Spotila et al. (1996) estimated that only 34,500 females nested annually worldwide in 1995, which is a dramatic decline from the 115,000 estimated in 1980 (Pritchard 1982). In the eastern Pacific, the major nesting beaches occur in Costa Rica and Mexico. At Playa Grande, Costa Rica, considered the most important nesting beach in the eastern Pacific, numbers have dropped from 1,367 leatherbacks in 1988-1989 to an average of 188 females nesting between 2000-2001 and 2003-2004. In Pacific Mexico, in 1982 through aerial surveys of adult female leatherbacks this area became the most important leatherback nesting beach in the world. Tens of thousands of nests were laid on the beaches in 1980s but during the 2003-2004 seasons a total of 120 nests was recorded. In the western Pacific, the major nesting beaches lie in Papua New Guinea, Papua, Indonesia, and the Solomon Islands. These are some of the last remaining significant nesting assemblages in the Pacific. Compiled nesting data estimated approximately 5,000-9,200 nests annually with 75% of the nests being laid in Papua, Indonesia.

However, the most recent population size estimate for the North Atlantic alone is a range of 34,000-94,000 adult leatherbacks (Turtle Expert Working Group 2007). In Florida, an increase in leatherback nesting numbers from 98 nests in 1989 to between 800 and 900 nests in the early 2000s has been documented.

Nesting in the Southern Caribbean occurs in the Guianas (Guyana, Suriname, and French Guiana), Trinidad, Dominica, and Venezuela. The largest nesting populations at present occur in the western Atlantic in French Guiana with nesting varying between approximately 5,029 and 63,294 nests between 1967 and 2005 (Turtle Expert Working Group 2007). Trinidad supports an estimated 6,000 leatherbacks nesting annually, which represents more than 80% of the nesting in the insular Caribbean Sea. Leatherback nesting along the Caribbean Central American coast takes place between the Honduras and Colombia. In Atlantic Costa Rica, at Tortuguero the number of nests laid annually between 1995 and 2006 was estimated to range from 199-1,623; modeling of these data indicated that the nesting population has decreased by 67.8% over this time period.

In Puerto Rico, the main nesting areas are at Fajardo on the main island of Puerto Rico and on the island of Culebra. Between 1978 and 2005, nesting increased in Puerto Rico with a minimum of 9 nests recorded in 1978 and a minimum of 469-882 nests recorded each year

between 2000 and 2005. Recorded leatherback nesting on the Sandy Point National Wildlife Refuge on the island of St. Croix, U.S. Virgin Islands between 1990 and 2005, ranged from a low of 143 in 1990 to a high of 1,008 in 2001. In the British Virgin Islands, annual nest numbers have increased in Tortola from 0-6 nests per year in the late 1980s to 35-65 nests per year in the 2000s.

The most important nesting beach for leatherbacks in the eastern Atlantic lies in Gabon, Africa. It was estimated there were 30,000 nests along 60 miles (96.5 km) of Mayumba Beach in southern Gabon during the 1999 - 2000 nesting season. Some nesting has been reported in Mauritania, Senegal, the Bijagos Archipelago of Guinea-Bissau, Turtle Islands and Sherbro Island of Sierra Leone, Liberia, Togo, Benin, Nigeria, Cameroon, Sao Tome and Principe, continental Equatorial Guinea, Islands of Corisco in the Gulf of Guinea and the Democratic Republic of the Congo, and Angola. A larger nesting population is found on the island of Bioko (Equatorial Guinea).

Hawksbill Sea Turtle

About 15,000 females are estimated to nest each year throughout the world with the Caribbean accounting for 20 to 30 percent of the world's hawksbill population. Only five regional populations remain with more than 1,000 females nesting annually (Seychelles, Mexico, Indonesia, and two in Australia) (Meylan and Donnelly 1999). Mexico is now the most important region for hawksbills in the Caribbean with about 3,000 nests/year (Meylan 1999). Other significant but smaller populations in the Caribbean still occur in Martinique, Jamaica, Guatemala, Nicaragua, Grenada, Dominican Republic, Turks and Caicos Islands, Cuba, Puerto Rico, and U.S. Virgin Islands. In the U.S. Caribbean, about 150 to 500 nests per year are laid on Mona Island, Puerto Rico and 70 to 130 nests/year are laid on Buck Island Reef National Monument, U.S. Virgin Islands. In the U.S. Pacific, hawksbills nest only on main island beaches in Hawaii, primarily along the east coast of the island of Hawaii. Hawksbill nesting has also been documented in American Samoa and Guam (NMFS and Service 1998b).

Kemp's Ridley Sea Turtle

Most Kemp's ridleys nest on the coastal beaches of the Mexican states of Tamaulipas and Veracruz, although a small number of Kemp's ridleys nest consistently along the Texas coast (Turtle Expert Working Group 1998). In addition, rare nesting events have been reported in Alabama, Florida, Georgia, South Carolina, and North Carolina. Historic information indicates that tens of thousands of ridleys nested near Rancho Nuevo, Mexico, during the late 1940s (Hildebrand 1963). The Kemp's ridley population experienced a devastating decline between the late 1940s and the mid 1980s. The total number of nests per nesting season at Rancho Nuevo remained below 1,000 throughout the 1980s, but gradually began to increase in the 1990s. In 2007, 11,268 nests were documented along the 18.6 miles (30 km) of coastline patrolled at Rancho Nuevo, and the total number of nests documented for all the monitored beaches in Mexico was 15,032 (Service 2007c). During the 2007 nesting season, an arribada

with an estimated 5,000 turtles was recorded at Rancho Nuevo from May 20 to May 23. In addition, 128 nests were recorded during 2007 in the U.S., primarily in Texas.

Status and Distribution

Loggerhead Sea turtle

Genetic research involving analysis of mitochondrial DNA has identified five different loggerhead subpopulations/nesting aggregations in the western North Atlantic: (1) the Northern Subpopulation occurring from North Carolina to around Cape Canaveral, Florida (about 29° N.); (2) South Florida Subpopulation occurring from about 29° N. on Florida's east coast to Sarasota on Florida's west coast; (3) Dry Tortugas, Florida, Subpopulation, (4) Northwest Florida Subpopulation occurring at Eglin Air Force Base and the beaches near Panama City; and (5) Yucatán Subpopulation occurring on the eastern Yucatán Peninsula, Mexico (Bowen 1994, 1995; Bowen et al. 1993; Encalada et al. 1998; Pearce 2001). These data indicate that gene flow between these five regions is very low. If nesting females are extirpated from one of these regions, regional dispersal will not be sufficient to replenish the depleted nesting subpopulation.
The Northern Subpopulation had an average of 5,151 nests per year from 1989-2005 (Georgia Department of Natural Resources, unpublished data; North Carolina Wildlife Resources Commission, unpublished data; South Carolina Department of Natural Resources, unpublished data). Standardized ground surveys of 11 North Carolina, South Carolina, and Georgia nesting beaches showed a significant declining trend of 1.9% annually in loggerhead nesting from 1983-2005 (M. Dodd, Georgia Department of Natural Resources, personal communication 2006; M. Godfrey, North Carolina Wildlife and Marine Resources Commission, personal communication 2006; S. Murphy, South Carolina Department of Natural Resources, personal communication 2006). In addition, standardized aerial nesting surveys in South Carolina have shown a significant annual decrease of 3.1% from 1980-2002 (South Carolina Department of Natural Resources, unpublished data).

An analysis of Florida's long-term loggerhead sea turtle nesting data, carried out as part of the FWC's Index Nesting Beach Survey (INBS) program (its purpose is to measure seasonal productivity, allowing comparisons between beaches and between years.), reveals a decline in loggerhead nest numbers around the state. Nest counts have decreased nearly 50 percent from 1998 to 2007. The precipitous decline in loggerhead nest numbers has followed a modest increase that occurred between 1989 and 1998. Between 1989 and 2007, the overall trend in loggerhead nesting is down approximately 37 percent. Data collected during the 2007 Statewide Nesting Beach Survey (SNBS) program (its purpose is to document the total distribution, seasonality and abundance of sea turtle nesting in Florida) indicate the lowest nesting levels in Florida in the 19-year history of this monitoring program (45,084 nests).

A near complete census of the Florida Panhandle Subpopulation undertaken from 1995 to 2006 reveals a mean of 910 nests per year, which equates to about 222 females nesting per year

(FWC Statewide Nesting Beach Survey database). However, preliminary analysis for 11 years (1995 to 2005) of INBS data for the Florida Panhandle subpopulation shows a declining trend (B. Witherington, FWC, personal communication 2007).

A near complete census of the Dry Tortugas Subpopulation undertaken from 1995 to 2004, excluding 2002 (9 years surveyed), reveals a mean of 246 nests per year, which equates to about 60 females nesting per year (FWC Statewide Nesting Beach Survey database). The trend data for the Dry Tortugas Subpopulation are from beaches that are not included in Florida's INBS program, but have moderately good monitoring consistency. There are 9 years of data for this Subpopulation, but the time series is too short to detect a trend (B. Witherington, FWC, personal communication 2007).

The Yucatán Nesting Subpopulation (occurring in the eastern Yucatán Peninsula in Mexico) had a range of 903-2,331 nests from 1987-2001 along the central coast of Quintana Roo (Zurita *et al.* 2003). Zurita *et al.* (2003) reported a statistically significant increase in the number of nests laid on seven of the beaches in Quintana Roo, Mexico, from 1987-2001 where survey effort was consistent during the period. However, nesting since 2001 has declined and the previously reported increasing trend appears to have not been sustained (J. Zurita, personal communication 2006).

Recovery Criteria

The southeastern U.S. loggerhead population can be considered for delisting when, over a period of 25 years, the following conditions are met:

1. The adult female population in Florida is increasing and in North Carolina, South Carolina, and Georgia, it has returned to pre-listing levels (NC - 800, SC - 10,000, and GA - 2,000 nests per season). The above conditions shall be met with the data from standardized surveys, which would continue for at least five years after delisting.

2. At least 25 percent (348 miles) of all available nesting beaches (1,400 miles) are in public ownership, distributed over the entire nesting range and encompassing at least 50 percent of the nesting activity in each state.

3. All priority one tasks identified in the recovery plan have been successfully implemented.

The Recovery Plan for the loggerhead sea turtle is currently under revision. An initial recovery plan for the loggerhead turtle was approved on September 19, 1984. This initial plan was a multi-species plan for all six species of sea turtles occurring in the U.S. On December 26, 1991, a separate recovery plan for the U.S. Atlantic population of the loggerhead turtle was approved. Since approval of the first revised plan in 1991, significant research has been

accomplished and important conservation and recovery activities have been undertaken. As a result, we have a greater knowledge of the species and its status. Thus, a revision of the Recovery Plan was drafted and distributed for public comment on May 30, 2008 (73 FR 31066). Comments are requested by July 29, 2008.

The Service and NMFS completed a five-year status review of the loggerhead sea turtle in August 2007 (NMFS and Service 2007a). A recommendation has been made to determine the application of the Distinct Population Segment (DPS) policy for the species. A DPS is a population segment that is discrete in relation to the remainder of the species to which it belongs, and significant to the species to which it belongs. NMFS and the Service have established a Biological Review Team to assess the loggerhead population structure globally to determine whether DPSs exist and assess the status of each DPS. The Biological Review Team is in the process of reviewing and synthesizing information and will ultimately render an expert opinion in a written report. This report is anticipated to be completed in 2009.

Green Turtle

Nesting data collected as part of the Florida SNBS program (2000-2006) show that a mean of approximately 5,600 nests are laid each year in Florida. Nesting occurs in 26 counties with a peak along the east coast, from Volusia through Broward Counties. The green turtle nesting population of Florida appears to be increasing based on 19 years (1989-2007) of INBS data from throughout the state. The increase in nesting in Florida is likely a result of several factors, including: (1) a Florida statute enacted in the early 1970s that prohibited the killing of green turtles in Florida; (2) the species listing under the ESA in 1973, affording complete protection to eggs, juveniles, and adults in all U.S. waters; (3) the passage of Florida's constitutional net ban amendment in 1994 and its subsequent enactment, making it illegal to use any gillnets or other entangling nets in state waters; (4) the likelihood that the majority of Florida adult green turtles reside within Florida waters where they are fully protected; (5) the protections afforded Florida green turtles while they inhabit the waters of other nations that have enacted strong sea turtle conservation measures (e.g., Bermuda); and (6) the listing of the species on Appendix I of CITES, which stopped international trade and reduced incentives for illegal trade from the U.S.

Recovery Criteria

The U.S. Atlantic population of green sea turtles can be considered for delisting when, over a period of 25 years the following conditions are met:

1. The level of nesting in Florida has increased to an average of 5,000 nests per year for at least six years. Nesting data shall be based on standardized surveys.

2. At least 25 percent (65 miles) of all available nesting beaches (260 miles) are in public ownership and encompass at least 50 percent of the nesting activity.

3. A reduction in stage class mortality is reflected in higher counts of individuals on foraging grounds.

4. All priority one tasks identified in the recovery plan have been successfully implemented.

The current "Recovery Plan for the U.S. Population of Atlantic Green Turtle (*Chelonia mydas*)" was completed in 1991, the Recovery Plan for U.S. Pacific Populations of the Green Turtle (*Chelonia mydas*)" was completed in 1998, and the "Recovery Plan for U.S. Pacific Populations of the East Pacific Green Turtle (*Chelonia mydas*)" was completed in 1998. The recovery criteria contained in the plans, while not strictly adhering to all elements of the Recovery Planning Guidelines (Service and NOAA), are a viable measure of the species status.

The Service and NMFS completed a five-year status review of the green sea turtle in August 2007 (NMFS and Service 2007b). A recommendation has been made to conduct an analysis and review of the species to determine the application of the Distinct Population Segment (DPS) policy for the species. A DPS is a population segment that is discrete in relation to the remainder of the species to which it belongs, and significant to the species to which it belongs. Since the species' listing, a substantial amount of information has become available on population structure (through genetic studies) and distribution (through telemetry, tagging, and genetic studies). The data has not been fully assembled or analyzed; however, at a minimum, these data appear to indicate a possible separation of populations by ocean basins.

Leatherback Sea Turtle

Declines in leatherback nesting have occurred over the last two decades along the Pacific coasts of Mexico and Costa Rica. The Mexican leatherback nesting population, once considered to be the world's largest leatherback nesting population (historically estimated to be 65 percent of worldwide population), is now less than one percent of its estimated size in 1980. Spotila et al. (1996) estimated the number of leatherback sea turtles nesting on 28 beaches throughout the world from the literature and from communications with investigators studying those beaches. The estimated worldwide population of leatherbacks in 1995 was about 34,500 females on these beaches with a lower limit of about 26,200 and an upper limit of about 42,900. This is less than one third the 1980 estimate of 115,000. Leatherbacks are rare in the Indian Ocean and in very low numbers in the western Pacific Ocean. The largest population is in the western Atlantic. Using an age-based demographic model, Spotila et al. (1996) determined that leatherback populations in the Indian Ocean and western Pacific Ocean cannot withstand even moderate levels of adult mortality and that even the Atlantic populations are being exploited at a rate that cannot be sustained. They concluded that leatherbacks are on the

road to extinction and further population declines can be expected unless action is taken to reduce adult mortality and increase survival of eggs and hatchlings.

In the U.S., nesting populations occur in Florida, Puerto Rico, and the U.S. Virgin Islands. In Florida, the SNBS program has documented an increase in leatherback nesting numbers from 98 nests in 1988 to between 800 and 900 nests per season in the early 2000s (FWC SNBS; Stewart and Johnson 2006). Although the SNBS program provides information on distribution and total abundance statewide, it cannot be used to assess trends because of variable survey effort. Therefore, leatherback nesting trends are best assessed using standardized nest counts made at INBS sites surveyed with constant effort over time (1989-2007). An analysis of the INBS data has shown a substantial increase in leatherback nesting in Florida since 1989 (FWC INBS; Turtle Expert Working Group 2007).

Recovery Criteria

The U.S. Atlantic population of leatherbacks can be considered for delisting when the following conditions are met:

1. The adult female population increases over the next 25 years, as evidenced by a statistically significant trend in the number of nests at Culebra, Puerto Rico, St. Croix, U.S. Virgin Island, and along the east coast of Florida.

2. Nesting habitat encompassing at least 75 percent of nesting activity in U.S. Virgin Islands, Puerto Rico, and Florida is in public ownership.

3. All priority one tasks identified in the recovery plan have been successfully implemented.

The current "Recovery Plan for the Leatherback Turtles (*Dermochelys coriacea*)" in the U.S. Caribbean, Atlantic, and Gulf of Mexico" was signed in 1992 and the "Recovery Plan for U.S. Pacific Populations of the Leatherback Turtle (*Dermochelys coriacea*)" was signed in 1998. The recovery criteria contained in the plans, while not strictly adhering to all elements of the Recovery Planning Guidelines (Service and NOAA), are a viable measure of the species status.

The Service and the National Marine Fisheries Service completed a five-year status review of the leatherback sea turtle in August 2007 (NMFS and Service 2007c). A recommendation has been made to conduct an analysis and review of the species to determine the application of the Distinct Population Segment (DPS) policy for the species. A DPS is a population segment that is discrete in relation to the remainder of the species to which it belongs, and significant to the species to which it belongs. Since the species' listing, a substantial amount of information has become available on population structure (through genetic studies) and distribution (through telemetry, tagging, and genetic studies). The data has not been fully assembled or analyzed; however, at a minimum, these data appear to indicate a possible separation of populations by ocean basins.

Hawksbill Sea Turtle

The hawksbill sea turtle has experienced global population declines of 80 percent or more during the past century and continued declines are projected (Meylan and Donnelly 1999). Most populations are declining, depleted, or remnants of larger aggregations. Hawksbills were previously abundant, as evidenced by high-density nesting at a few remaining sites and by trade statistics.

Recovery Criteria

The U.S. Atlantic population of hawksbills can be considered for delisting when the following conditions are met:

1. The adult female population is increasing, as evidenced by a statistically significant trend in the annual numbers of nests on at least five index beaches, including Mona Island and Buck Island Reef National Monument (BIRNM).
2. Habitat for at least 50 percent of the nesting activity that occurs in the U.S. Virgin Islands (USVI) and Puerto Rico is protected in perpetuity.

3. Numbers of adults, subadults, and juveniles are increasing, as evidenced by a statistically significant trend on at least five key foraging areas within Puerto Rico, USVI, and Florida.

4. All priority one tasks identified in the recovery plan have been successfully implemented.

Kemp's Ridley Sea Turtle

Today, under strict protection, the population appears to be in the early stages of recovery. The recent nesting increase can be attributed to full protection of nesting females and their nests in Mexico resulting from a bi-national effort between Mexico and the U.S. to prevent the extinction of the Kemp's ridley, and the requirement to use Turtle Excluder Devices (TEDs) in shrimp trawls both in the United States and Mexico.

The Mexico government also prohibits harvesting and is working to increase the population through more intensive law enforcement, by fencing nest areas to diminish natural predation, and by relocating most nests into corrals to prevent poaching and predation. While relocation of nests into corrals is currently a necessary management measure, this relocation and concentration of eggs into a "safe" area is of concern since it makes the eggs more susceptible to reduced viability.

Recovery Criteria

The goal of the recovery plan is for the species to be reduced from endangered to threatened status. The Recovery Team members feel that the criteria for a complete removal of this species from the endangered species list need not be considered now, but rather left for future revisions of the plan. Complete removal from the federal list would certainly necessitate that some other instrument of protection, similar to the Marine Mammal Protection Act, be in place and be international in scope. Kemp's ridley can be considered for reclassification to threatened status when the following four criteria are met:

1. Protection of the known nesting habitat and the water adjacent to the nesting beach (concentrating on the Rancho Nuevo area) and continuation of the bi-national project.

2. Elimination of the mortality from incidental catch from commercial shrimping in the U.S. and Mexico through the use of TEDs and full compliance with the regulations requiring TED use.

3. Attainment of a population of at least 10,000 females nesting in a season.

4. All priority one recovery tasks in the recovery plan are successfully implemented.

The current Recovery Plan for the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) was signed in 1992. Significant new information on the biology and population status of Kemp's ridley has become available since 1992. Consequently, a full revision of the recovery plan has been undertaken by the Service and NMFS and is nearing completion. The revised plan will provide updated species biology and population status information, objective and measurable recovery criteria, and updated and prioritized recovery actions. The Service and NMFS completed a five-year status review of the Kemp's ridley sea turtle in August 2007 (NMFS and Service 2007d). Recommendations provided in the five-year review focused on the protection of the species both in the water (enforcement of TED use) and on land (nesting habitat).

Common threats to sea turtles in Florida

Anthropogenic (human) factors that impact hatchlings and adult female turtles on land, or the success of nesting and hatching include: beach erosion, armoring and nourishment; artificial lighting; beach cleaning; increased human presence; recreational beach equipment; beach driving; coastal construction and fishing piers; exotic dune and beach vegetation; and poaching. An increased human presence at some nesting beaches or close to nesting beaches has led to secondary threats such as the introduction of exotic fire ants, feral hogs, dogs, and an increased presence of native species (*e.g.*, raccoons, armadillos, and opossums), which raid and

feed on turtle eggs. Although sea turtle nesting beaches are protected along large expanses of the western North Atlantic coast, other areas along these coasts have limited or no protection.

Anthropogenic threats in the marine environment include oil and gas exploration and transportation; marine pollution; underwater explosions; hopper dredging, offshore artificial lighting; power plant entrainment and/or impingement; entanglement in debris; ingestion of marine debris; marina and dock construction and operation; boat collisions; poaching and fishery interactions.

Fibropapillomatosis, a disease of sea turtles characterized by the development of multiple tumors on the skin and internal organs, is also a mortality factor, particularly for green turtles. This disease has seriously impacted green turtle populations in Florida, Hawaii, and other parts of the world. The tumors interfere with swimming, eating, breathing, vision, and reproduction, and turtles with heavy tumor burdens may die.

Coastal Development

Loss of nesting habitat related to coastal development has had the greatest impact on nesting sea turtles in Florida. Beachfront development not only causes the loss of suitable nesting habitat, but can result in the disruption of powerful coastal processes accelerating erosion and interrupting the natural shoreline migration (National Research Council 1990b). This may in turn cause the need to protect upland structures and infrastructure by armoring, groin placement, beach emergency berm construction and repair, and beach nourishment which cause changes in, additional loss or impact to the remaining sea turtle habitat.

Hurricanes

Hurricanes were probably responsible for maintaining coastal beach habitat upon which sea turtles depend through repeated cycles of destruction, alteration, and recovery of beach and dune habitat. Hurricanes generally produce damaging winds, storm tides and surges, and rain and can result in severe erosion of the beach and dune systems. Overwash and blowouts are common on barrier islands. Hurricanes and other storms can result in the direct or indirect loss of sea turtle nests, either by erosion or washing away of the nests by wave action or inundation or "drowning" of the eggs or hatchlings developing within the nest or indirectly by loss of nesting habitat. Depending on their frequency, storms can affect sea turtles on either a short-term basis (nests lost for one season and/or temporary loss of nesting habitat) or long term, if frequent (habitat unable to recover). How hurricanes affect sea turtle nesting also depends on its characteristics (winds, storm surge, rainfall), the time of year (within or outside of the nesting season), and where the northeast edge of the hurricane crosses land.

Because of the limited remaining nesting habitat, frequent or successive severe weather events could threaten the ability of certain sea turtle populations to survive and recover. Sea turtles evolved under natural coastal environmental events such as hurricanes. The extensive amount

of pre-development coastal beach and dune habitat allowed sea turtles to survive even the most severe hurricane events. It is only within the last 20 to 30 years that the combination of habitat loss to beachfront development and destruction of remaining habitat by hurricanes has increased the threat to sea turtle survival and recovery. On developed beaches, typically little space remains for sandy beaches to become re-established after periodic storms. While the beach itself moves landward during such storms, reconstruction or persistence of structures at their pre-storm locations can result in a major loss of nesting habitat.

The 2004 hurricane season was the most active storm season in Florida since weather records began in 1851. Hurricanes Charley, Frances, Ivan, and Jeanne, along with Tropical Storm Bonnie, damaged the beach and dune system, upland structures and properties, and infrastructure in the majority of Florida's coastal counties. The cumulative impact of these storms exacerbated erosion conditions throughout the state.

The 2005 hurricane season was a record-breaking season with 27 named storms. Hurricanes Dennis, Katrina, Ophelia, Rita, and Wilma, and Tropical Storms Arlene and Tammy impacted Florida. The cumulative impact of these storms exacerbated erosion conditions in south and northwest Florida.

Erosion

The designation of a Critically Eroded Beach is a planning requirement of the State's Beach Erosion Control Funding Assistance Program. A segment of beach shall first be designated as critically eroded in order to be eligible for State funding. A critically eroded area is a segment of the shoreline where natural processes or human activity have caused or contributed to erosion and recession of the beach or dune system to such a degree that upland development, recreational interests, wildlife habitat, or important cultural resources are threatened or lost. Critically eroded areas may also include peripheral segments or gaps between identified critically eroded areas which, although they may be stable or slightly erosional now, their inclusion is necessary for continuity of management of the coastal system or for the design integrity of adjacent beach management projects (FDEP 2005). It is important to note, that for an erosion problem area to be critical, there shall exist a threat to or loss of one of four specific interests – upland development, recreation, wildlife habitat, or important cultural resources. The total of critically eroded beaches statewide in Florida for 2007 is 388 miles of 497 miles of shoreline. Seventy-eight (78) percent of the State's shoreline is considered to be critically eroded.

Beachfront Lighting

Artificial beachfront lighting may cause disorientation (loss of bearings) and misorientation (incorrect orientation) of sea turtle hatchlings. Visual signs are the primary sea-finding mechanism for hatchlings (Mrosovsky and Carr 1967; Mrosovsky and Shettleworth 1968; Dickerson and Nelson 1989; Witherington and Bjorndal 1991). Artificial beachfront lighting is

a documented cause of hatchling disorientation and misorientation on nesting beaches (Philibosian 1976; Mann 1977; FWC 2006). The emergence from the nest and crawl to the sea is one of the most critical periods of a sea turtle's life. Hatchlings that do not make it to the sea quickly become food for ghost crabs, birds, and other predators or become dehydrated and may never reach the sea. Some types of beachfront lighting attract hatchlings away from the sea while some lights cause adult turtles to avoid stretches of brightly illuminated beach. Research has documented significant reduction in sea turtle nesting activity on beaches illuminated with artificial lights (Witherington 1992). During the 2007 sea turtle nesting season in Florida, over 64,000 turtle hatchlings were documented as being disoriented (**Table 4**) (FWC/FWRI 2007, http://www.myfwc.com/seaturtle/Lighting/Light_Disorient.htm). Exterior and interior lighting associated with condominiums had the greatest impact causing approximately 42 percent of documented hatchling disorientation/misorientation. Other causes included urban sky glow and street lights (http://www.myfwc.com/seaturtle/Lighting/Light_Disorient.htm).

Table 1. Documented Disorientations along the Florida coast.

Year	Total Number of Hatchling Disorientation Events	Total Number of Hatchlings Involved in Disorientation Events	Total Number of Adult Disorientation Events
2001	743	28,674	19
2002	896	43,226	37
2003	1,446	79,357	18
2004	888	46,487	24
2005	976	41,521	50
2006	1,521	71,798	40
2007	1,410	64,433	25

Predation

Depredation of sea turtle eggs and hatchlings by natural and introduced species occurs on almost all nesting beaches. Depredation by a variety of predators can considerably decrease sea turtle nest hatching success. The most common predators in the southeastern United States are ghost crabs (*Ocypode quadrata*), raccoons (*Procyon lotor*), feral hogs (*Sus scrofa*), foxes (*Urocyon cinereoargenteus* and *Vulpes vulpes*), coyotes (*Canis latrans*), armadillos (*Dasypus novemcinctus*), cats (*Felis catus)*, and fire ants (*Solenopsis* spp.) (Dodd 1988, Stancyk 1995). Raccoons are particularly destructive on the Atlantic coast and may take up to 96 percent of all nests deposited on a beach (Davis and Whiting 1977, Hopkins and Murphy 1980, Stancyk et al. 1980, Talbert et al. 1980, Schroeder 1981, Labisky et al. 1986). As nesting habitat dwindles, it

is essential that nest production be naturally maximized so the turtles may continue to exist in the wild.

In response to increasing depredation of sea turtle nests by coyote, fox, hog, and raccoon, multi-agency cooperative efforts have been initiated and are ongoing throughout Florida, particularly on public lands.

Driving on the Beach

The operation of motor vehicles on the beach affects sea turtle nesting by: interrupting a female turtle approaching the beach; headlights disorienting or misorienting emergent hatchlings; vehicles running over hatchlings attempting to reach the ocean; and vehicle tracks traversing the beach which interfere with hatchlings crawling to the ocean. Hatchlings appear to become diverted not because they cannot physically climb out of the rut (Hughes and Caine 1994), but because the sides of the track cast a shadow and the hatchlings lose their line of sight to the ocean horizon (Mann 1977). The extended period of travel required to negotiate tire tracks and ruts may increase the susceptibility of hatchlings to dehydration and depredation during migration to the ocean (Hosier et al. 1981). Driving directly above or over incubating egg clutches or on the beach can cause sand compaction which may result in adverse impacts on nest site selection, digging behavior, clutch viability, and emergence by hatchlings, decreasing nest success and directly killing pre-emergent hatchlings (Mann 1977, Nelson and Dickerson 1987, Nelson 1988).

The physical changes and loss of plant cover caused by vehicles on dunes can lead to various degrees of instability, and therefore encourage dune migration. As vehicles move either up or down a slope, sand is displaced downward, lowering the trail. Since the vehicles also inhibit plant growth, and open the area to wind erosion, dunes may become unstable, and begin to migrate. Unvegetated sand dunes may continue to migrate across stable areas as long as vehicle traffic continues. Vehicular traffic through dune breaches or low dunes on an eroding beach may cause accelerated rate of overwash and beach erosion (Godfrey et al. 1978). If driving is required, the area where the least amount of impact occurs is the beach between the low and high tide water lines. Vegetation on the dunes can quickly re-establish provided the mechanical impact is removed.

In 1985, the Florida Legislature severely restricted vehicular driving on Florida's beaches, except that which is necessary for cleanup, repair, or public safety. This legislation also allowed an exception for five counties to continue to allow vehicular access on coastal beaches due to the availability of less than 50 percent of its peak user demand for off-beach parking. The counties affected by this exception are Volusia, St. Johns, Gulf, Nassau, and Flagler Counties, as well as limited vehicular access on Walton County beaches for boat launching.

Analysis of the species/critical habitat likely to be affected

The presence of artificial lighting on CCAFS and PAFB has the potential to adversely affect nesting female and hatchling sea turtles. The effects of the proposed action on sea turtles will be considered further in the remaining sections of this biological opinion. Potential effects of the presence of artificial lighting on CCAFS and PAFB include the deterrence of female sea turtles from coming onto the beach to dig nests; harassment of nesting females that results in aborted nesting attempts; harassment in the form of misdirection of females attempting to return to sea

after nesting; mortality of nesting females that are misdirected and end up on coastal highways where they may be struck by vehicles; harassment in the form of misdirection of hatchling turtles as they emerge from the nest and attempt to crawl to the water; and mortality of hatchling turtles that are misdirected and made more vulnerable to predators, desiccation, exhaustion, and automobiles.

Critical habitat has not been designated in the continental United States; therefore, the proposed action would not result in an adverse modification.

ENVIRONMENTAL BASELINE

Status of the species within the action area

Loggerhead Sea Turtle

The loggerhead sea turtle nesting and hatching season for southern Florida Atlantic beaches extends from March 15 through November 30. Incubation ranges from about 45 to 95 days. Between 889 and 1,579 loggerhead nests were deposited annually on PAFB beach from 2000 through 2007. Between 1,195 and 3,395 nests were deposited annually on CCAFS beach from 2000 through 2007.

Green Sea Turtle

The green sea turtle nesting and hatching season for southern Florida Atlantic beaches extends from May 1 through November 30. Incubation ranges from about 45 to 75 days. Between 0 and 51 green turtle nests were deposited annually on PAFB beach from 2000 through 2007. Between 4 and 163 nests were deposited annually on CCAFS beach from 2000 through 2007.

Leatherback Sea Turtle

The leatherback sea turtle nesting and hatching season for Southern Florida Atlantic beaches extends from February 15 through November 15. Incubation ranges from about 55 to 85 days. Between 0 and 3 leatherback turtle nests were deposited annually on PAFB beach from 2000 through 2007. Between 0 and 8 nests were deposited annually on CCAFS beach from 2000 through 2007.

Hawksbill Sea Turtle

The hawksbill sea turtle nesting and hatching season for Southern Florida Atlantic beaches extends from June 1 through December 31. Incubation lasts approximately 60 days. Hawksbill sea turtle nesting is rare and restricted to the southeastern coast of Florida (Volusia through Dade Counties) and the Florida Keys (Monroe County) (Meylan 1992, Meylan *et al.* 1995). However, hawksbill tracks are difficult to differentiate from those of loggerheads and may not be recognized by surveyors. Therefore, surveys in Florida likely underestimate actual hawksbill nesting numbers (Meylan *et al.* 1995). Although no hawksbill nests have ever been recorded in Brevard County, one was reported at the Canaveral National Seashore in Volusia County in 1982 (Meylan *et al.* 1995). Therefore, the potential exists for such an occurrence at CCAFS and PAFB.

EFFECTS OF THE ACTION

Factors to be considered

Direct effects

Artificial lighting can be detrimental to sea turtles in several ways. Field observations have shown a correlation between lighted beaches and reduced loggerhead and green sea turtle nesting (Mortimer 1982, Raymond 1984, Mattison *et al.* 1993). Experimental field work by Witherington (1992a) directly implicated artificial lighting in deterring sea turtles from nesting. In these experiments, both green and loggerhead turtles showed a significant tendency to avoid stretches of beach with artificial lights that have predominantly blue and green wavelengths. Because adult females rely on visual brightness cues to find their way back to the ocean after nesting, those turtles that nest on lighted beaches may be disoriented by artificial lights and have difficulty finding their way back to the ocean. In the lighted-beach experiments described by Witherington (1992a), few nesting turtles returning to the sea were misdirected by lighting; however, those that were, spent a large portion of the night wandering in search of the ocean. In some cases, nesting females have ended up on coastal highways and been struck by vehicles. However, turtles returning to the sea after nesting are not misdirected nearly as often as hatchlings emerging on the same beaches (Witherington and Martin 1996).

Under natural conditions, hatchling sea turtles, which typically emerge from nests at night, move toward the brightest, most open horizon, which is over the ocean. However, when bright light sources are visible on the beach, they become the brightest spot on the horizon and attract hatchlings in the wrong direction, making them more vulnerable to predators, desiccation, entrapment in debris or vegetation, and exhaustion, and often luring them onto roadways and parking lots where they are run over. Artificial lights can also disorient hatchlings once they reach the water. Hatchlings have been observed to exit the surf onto land where lighting is nearby (Daniel and Smith 1947, Carr and Ogren 1960, Witherington 1986). Artificial beachfront lighting from buildings and streetlights is a well documented cause of hatchling disorientation (loss of bearings) and misorientation (incorrect orientation) on nesting beaches (McFarlane 1963, Philibosian, 1976, Mann 1978, Florida Fish and Wildlife Conservation Commission unpubl. data).

Extensive research has demonstrated that visual cues are the primary sea finding mechanism for hatchlings (Carr and Ogren 1960, Ehrenfeld and Carr 1967, Mrosovsky and Carr 1967, Mrosovsky and Shettleworth 1968, Dickerson and Nelson 1989, Witherington and Bjorndal 1991). Loggerhead, green and hawksbill hatchlings demonstrate a strong preference for short-wavelength light (Witherington and Bjorndal 1991, Witherington 1992b). Green and hawksbill turtles were most strongly attracted to light in the near-ultraviolet to yellow region of the spectrum and were weakly attracted or indifferent to orange and red light. Loggerheads were most strongly attracted to light in the near-ultraviolet to green region and showed differing responses to light in the yellow region of the spectrum depending on light intensities. At intensities of yellow light comparable to a full moon or a dawn sky, loggerhead hatchlings showed an aversion response to yellow light sources, but at low, nighttime intensities, loggerheads were weakly attracted to yellow light.

Although the attributes that can make a light source harmful to sea turtles are complex, a simple rule has proven useful in identifying problem lighting: "An artificial light source is likely to

cause problems for sea turtles if light from the source can be seen by an observer standing anywhere on the beach" (Witherington and Martin 1996). If any glowing portion of a luminaire (including the lamp, globe or reflector) is directly visible on the beach, then this source of light is likely to be a problem for sea turtles. But light may also reach the beach indirectly by reflecting off buildings or trees that are visible from the beach. Bright or numerous sources of lights, especially those directed upward, will illuminate sea mist and low clouds, creating a distinct sky glow visible from the beach. Field research suggests natural hatchling dispersal patterns may be disrupted by the glow from heavily lighted coastal areas (Witherington 1991).

Hatchling disorientation and misorientation incidents are well documented on CCAFS and PAFB. A few surveys may be missed during the course of the nesting and hatching season. Since the tracks of hatchlings are easily obscured by rain or windblown sand, the actual number of hatchling disorientation/misorientation incidents may be higher than what is actually observed and reported. Use of a standard monitoring and reporting protocol for disorientations/misorientations and estimating the percentage of all nests laid that produce hatchlings that are misdirected on an annual basis can be useful in assessing the success of light management activities.

Prior to implementation of approved LMPs and an internal light management policy, hatchlings from 4.4 percent of nests laid on CCAFS and Kennedy Space Center/Merritt Island National Wildlife Refuge in 1988 and 0.6 percent in 1989 were estimated to have been disoriented or misoriented by CCAFS lights. Hatchling disorientation and misorientation incidents recorded at PAFB in 1988 and 1989 were 0 and 0 percent, respectively, of all nests laid on PAFB.

Following implementation of approved LMPs and an internal light management policy, hatchlings from 0.005 percent of nests laid on CCAFS and Kennedy Space Center/Merritt Island National Wildlife Refuge in 1998 and 0.007 percent in 1999 were estimated to have been disoriented or misoriented by CCAFS lights. Hatchling disorientation and misorientation incidents recorded at PAFB in 1998 and 1999 were 0 and 0 percent, respectively, of all nests laid on PAFB. In 2005, hatchling and adult disorientation and misorientation incidents recorded at PAFB and CCAFS were 2.3% and 3.3% respectively. In 2006, using the marked sample hatchling disorientation calculation, disorientation recorded at PAFB and CCAFS was 0% and 3% respectively, and in 2007 it was 0% and 2.5% for PAFB and CCAFS respectively.

Prior to implementation of approved LMPs and an internal light management policy, over 4,000 artificial lights were associated with the facilities described above and contributed to the illumination of the nesting beach and light glow affecting CCAFS, PAFB, and adjacent nesting beaches. Incandescent, high pressure sodium, quartz, and mercury vapor lights were commonly used lights at CCAFS and PAFB facilities. These types of lights emit high levels of blue and green wavelengths and consequently present the greatest potential for deterring nesting activities and causing hatchling disorientations and misorientations. Light management at CCAFS and PAFB has resulted in a significant number of lights being converted to low pressure sodium lights, which are monochromatic and emit only yellow wavelengths. Although these lights could still cause some hatchling disorientations or misorientations if they are close to the beach and their lamps, globes, or reflectors are visible from the beach, they are much less likely to adversely impact nesting activities or hatchlings, particularly if they are shielded. In addition, many lights have been eliminated, replaced with cutoff shoebox fixtures, and/or shielded.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. The Service is not aware of any cumulative effects in the project area.

CONCLUSION

After reviewing the current status of the loggerhead, green, leatherback and hawksbill sea turtles, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of these species and is not likely to destroy or adversely modify designated critical habitat. No critical habitat has been designated for the sea turtles in the continental United States; therefore, none will be affected.

It is our opinion that considering the measures the 45th SW has implemented and will be implementing to minimize direct lighting of the nesting beaches and background lighting glow at CCAFS and PAFB, the proposed project is not likely to jeopardize the continued existence of listed sea turtles. We do, however, believe that adverse impacts to sea turtles will continue from lighting sources essential for human safety and national security at CCAFS and PAFB. We believe the reasonable and prudent measures provided with the incidental take statement below will effectively reduce the take of sea turtles.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered or threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. 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 to be prohibited under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be implemented by the Air Force's 45th SW so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The 45th SW has a continuing duty to regulate the activity covered by this incidental take statement. If the 45th SW (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the 45th SW must report the progress of the

action and its impacts on the species to the Service as specified in the incidental take statement. [50 CFR §402.14(i) (3)].

AMOUNT OR EXTENT OF TAKE

The Service has determined that incidental take of hatchlings will be described as the actual number of hatchlings that disoriented/misoriented from surveyed nests (based on hatchling track counts) divided by total number of hatchlings potentially emerging from surveyed nests based on an average hatchling emerging success rate from 2001 through 2005 (72 hatchlings per CCAFS and PAFB).

In addition, the previous method of assessing disorientations/misorientations will be calculated and provided to the Service as well. The previous method was the percentage of disoriented nests (more than four hatchlings tracks were observed disoriented/misoriented) divided by the total number of nests during the nesting season.

The Service anticipates that up to a total of 3 percent of all hatchlings disoriented/misoriented from a representative sample of all surveyed nests (marked) nests (based on hatchling track counts) divided by total number of hatchlings potentially emerging from marked nests based on an average hatchling emerging success rate each hatching season (72 hatchlings per CCAFS and PAFB) and 3 percent of females nesting at each installation (CCAFS and PAFB) during each nesting seasons could be taken as a result of this proposed action. The incidental take is expected to be in the form of hatchling and nesting female disorientations and misorientations. The 45th SW will be held responsible for disorientation or misorientation incidents caused by 45th SW lighting only, including those disorientation and misorientation incidents that might occur on Kennedy Space Center /Merritt Island National Wildlife Refuge as a result of CCAFS lighting. Areas south of kilometer 8 will be attributed to the glow produced by lights at Port Canaveral and nearby towns. Sky glow at PAFB from Cocoa Beach and Satellite beach may account for some disorientations and misorientations at PAFB. PAFB will be held responsible for disorientation or misorientation incidents that might occur on PAFB as a result of PAFB lighting.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of sea turtles.

1. Compliance monitoring shall be conducted to ensure operational constraints of approved LMPs at CCAFS and PAFB and the light management policies at CCAFS and PAFB are being followed.

2. All new CCAFS and PAFB facilities shall follow the 45th SW Instruction 32-7001. LMPs will be developed, in accordance with the respective light management policies at CCAFS and PAFB for all new facilities that are in close proximity to the beach.

3. Exterior lighting to be replaced at CCAFS and PAFB will use the best available light management technology to minimize sea turtle disorientations.

4. Operational constraints will preclude use of any noncompliant exterior lights between 9 p.m. and dawn from May 1 through October 31, unless essential to support launch-related activities at active launch complexes, safety/security lighting or night operations training.

5. The LC 41 door should be kept closed at night during the sea turtle nesting and hatching season.

6. Nesting surveys and monitoring of beaches for hatchling disorientation or misorientation incidents will continue at CCAFS and PAFB.

7. A minimum of five nighttime lighting surveys will be conducted at CCAFS and five at PAFB during the peak nesting and hatching period (May 1 through October 31) to ensure compliance with the LMPs and existing light management policies.

8. PAFB will continue to work with the Florida Department of Transportation and Brevard County Traffic Authority to minimize impacts from the traffic lights.

9. CCAFS will conduct a sea turtle lighting workshop once every two-years.

10. Calculations of disorientation/mosorientation events must be reported on an annual basis following the sea turtle nesting and hatching season.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the 45th SW 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. The 45th SW Environmental staff will inspect and record noncompliance and will also be notified of lighting violations by facility managers. Personnel responsible for rectifying violations will be notified by 45th SW Environmental staff on the current procedure, the 45th SW Instruction 32-7001, Exterior Lighting Management, will be followed.

2. All new CCAFS and PAFB facilities shall follow the 45th SW Instruction 32-7001. LMPs will be developed, in accordance with the respective light management policies at CCAFS and PAFB for all new facilities that are in close proximity to the beach.

LMPs must be reviewed and approved by the Service. Lighting directly visible from anywhere on the beach must be shielded and/or recessed so that the point source of light is not directly visible from the beach. No fixtures producing lighting visible from the beach and uplighting will be approved except in mission-critical applications. A letter of justification must be submitted to the 45th SW Environmental Staff with the request for this variance.

3. Exterior lighting at CCAFS and PAFB requiring replacement must be replaced with lighting that is in accordance with the 45 SW Instruction 32-7001. Exterior lighting that is producing lighting/glow visible from the beach will be replaced will full cut off/shielded fixtures to produce downward directed light that does not allow uplighting and minimizes lateral light spread. No fixtures producing lighting/glow visible from the beach and uplighting will be approved except in mission-critical applications. In cases where white lights, visible from the beach, are required for safety and/or security, and color reindition, these lights must be reviewed and approved by the 45th SW Environmental Branch.

4. Operational constraints will preclude use of any noncompliant exterior lights between 9 p.m. and dawn from May 1 through October 31, unless essential to support launch-related activities at active launch complexes, safety/security lighting or night operations training. If incubating nests are still present on the beach after October 31 that could be impacted by particular noncompliant light sources, the 45th SW Environmental Staff will notify facility managers of the visible lighting source. Lighting must be corrected to prevent potential disorientation/ misorientation events in those particular cases.

5. The LC 41 door should be kept closed at night during the nesting and hatching season (May 1 through October 31) except for brief periods as necessary for those periods of time required to support launch activities. If incubating nests are still present on the beach after October 31 that could be impacted by particular noncompliant light sources, the 45th SW Environmental Staff will notify facility managers of the visible lighting source. Lighting must be corrected to prevent potential disorientation/ misorientation events in those particular cases.

6. Surveys will continue annually at CCAFS and PAFB to record nesting activities and hatchling disorientation and misorientation events to evaluate the effectiveness of the LMPs and lighting management policies and identify needed modifications. Survey personnel must be experienced and trained in survey methodology and hold a valid Florida Fish and Wildlife Conservation Commission marine turtle permit.

7. A minimum of five nighttime lighting surveys will be conducted at CCAFS and five at PAFB during the peak nesting and hatching period (May 1 through October 31) to ensure compliance with the LMPs and existing light management policies. Additional lighting surveys will be conducted, as needed, to ensure any lighting violations observed are brought into compliance and to confirm sources of hatchling disorientation that cannot be identified during hatchling disorientation surveys.

8. PAFB will continue to work with the Florida Department of Transportation and Brevard County Traffic Authority to minimize impacts from the traffic lights at the Main Gate and the former Officers' Club/Blockhouse.

9. CCAFS will conduct a sea turtle lighting workshop once every two-years for the engineers, launch complex managers and any other representatives that design and/or enforce lighting at CCAFS and PAFB.

10. Both methods of calculating disorientation/mosorientation events must be reported on an annual basis following the sea turtle nesting and hatching season. These methods are as follows:

    i. Number of hatchlings that disoriented from surveyed nests
    Total number of potential hatchlings from surveyed nests

    ii. Number of surveyed nests that had disorientation hatchling events
    Total number of surveyed nest

In the event disoriented or misoriented hatchlings are discovered, the following procedures shall be followed:

1. Live hatchlings shall be maintained in covered, rigid walled containers on moist sand in a building protected from extremes of heat or cold. Hatchlings shall be released after dark on the first night subsequent to the disorientation/misorientation event if their health status permits.

2. A Florida Fish and Wildlife Conservation Commission "Marine Turtle Hatchling Disorientation Incident Report Form" shall be completed for each disorientation/misorientation incident. These forms shall be submitted to the Service's Jacksonville Field Office on a monthly basis.

The Service has determined that up to a total of 3 percent of all disoriented/misoriented from surveyed nests (based on hatchling track counts) divided by total number of hatchlings potentially emerging from surveyed nests based on an average hatchling emerging success rate from each hatching season (72 hatchlings per CCAFS and PAFB) and 3 percent of all females nesting at each installation (CCAFS and PAFB) for each nesting season will be incidentally taken as a result of the proposed action. 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. The Federal

agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a) (1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. The 45th SW should request budgetary funding for dune enhancement and native vegetation plantings to provide additional light screening of beach areas with a history of hatchling disorientation and/or misorientation incidents.

2. Educational information should be provided to personnel where appropriate at beach access points explaining the importance of the area to sea turtles and/or the life history of sea turtle species that nest in the area.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in the request for reinitiation. 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 (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency 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 or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation. The Service appreciates the cooperation of the Air Force during this consultation. We would like to continue working with you and your staff regarding the lighting at PAFB and CCAFS. For further coordination please contact Ann Marie Lauritsen at (904) 525-0661.

Sincerely,

David L. Hankla
Field Supervisor

cc: Jean Higgins, Florida Fish and Wildlife Conservation Commission, Tequesta, FL
Mike Legare, Merritt Island National Wildlife Refuge, Titusville, FL

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Active BO

Attachment B-1	Document Designation Letter	B

United States Department of the Interior

U. S. FISH AND WILDLIFE SERVICE

7915 BAYMEADOWS WAY, SUITE 200
JACKSONVILLE, FLORIDA 32256-7517

IN REPLY REFER TO:

FWS Log Number: 41910-2009-F-0110

December 23, 2008

Brigadier General Edward L. Bolton, Jr.
45th Space Wing, 45 CES/CEVP
1224 Edward H. White II Street, MS-7100
Patrick AFB, Florida 32925-3299
(ATTN: Robin Sutherland)

Re: FWS Log No: 41910-2009-F-0110

Dear General Bolton:

Enclosed is the U.S. Fish and Wildlife Service's (Service) programmatic biological opinion (PBO) for routine activities not resulting in permanent loss of beach mouse habitat on Cape Canaveral Air Force Station (CCAFS) and their effects on the southeastern (*Peromyscus polionotus niveiventris*) in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). These routine activities include trenching/digging for pipeline installation and repair, roadside mowing, soil remediation, pole placement, wells, soil boring, lines of sight, scrub restoration, etc. that will occur within the next five years. A complete administrative record of this consultation is on file at this office.

Consultation History

On August 22, 2002, the Service issued a Southeastern Beach Mouse (SEBM) PBO (FWS Log Number: 02-1286). The PBO covered routine activities not resulting in permanent loss of beach mouse habitat such as trenching/digging for pipeline installation and repair, roadside mowing, soil remediation, pole placement, wells, soil boring, lines of sight, scrub restoration, etc.) on CCAFS. On December 4, 2003, the Service extended the time period of the PBO (FWS Log Number 02-1286). On May 23, 2006, the Service received a report on the routine activities that occurred from 2004 to 2006. This report included the date the activities occurred, a brief project description, and acreage impacted. On May 24, 2006, the Service issued a second extension for the time period of the PBO. On September 10, 2008, the Service discussed amending the PBO.

Information for this PBO was obtained by email correspondence, meetings, several site visits, telephone conversations and other sources of information. A complete administrative record of this consultation is on file at the Service's Jacksonville Field Office.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The action area (area including all direct and indirect effects), for the purpose of this consultation, will include all of CCAFS.

The proposed action involves activities that do not result in permanent loss of beach mouse habitat on CCAFS. These routine activities include trenching/digging for pipeline installation and repair, roadside mowing, soil remediation, pole placement, wells, soil boring, lines of sight, scrub restoration, etc. that will occur within the next five years. The purpose of reinitiating consultation is due to the expiration of the PBO written on August 22, 2002, is to reevaluate the level of anticipated incidental take as a result, and modify the Service's minimization measures.

Southeastern beach mouse

STATUS OF THE SPECIES/CRITICAL HABITAT

Species/critical habitat description

The formal taxonomic classification of beach mouse subspecies follows the geographic variation in pelage and skeletal measurements documented by Bowen (1968). This peer-reviewed, published classification was also accepted by Hall (1981). Since the listing of the beach mice, further research concerning the taxonomic validity of the subspecific classification of beach mice has been initiated and/or conducted. Preliminary results from these studies support the separation of beach mice from inland forms, and support the currently accepted taxonomy (Bowen 1968) (*i.e.*, each beach mouse group represents a unique and isolated subspecies). Recent research using mitochondrial DNA data illustrates that Gulf Coast beach mouse subspecies form a well-supported and independent evolutionary cluster within the global population of the mainland or inland old field mice (J. Van Zant and M. Wooten, Auburn University, personal communication 2006).

The old-field mouse (*Peromyscus polionotus)* is different in form and structure as well as being genetically diverse throughout its range in the southeastern United States (Bowen 1968, Selander et al. 1971). Currently there are sixteen recognized subspecies of old-field mice (Hall 1981). Eight subspecies of the old-field mouse occupy coastal rather than inland habitat and are referred to as beach mice (Bowen 1968). Two existing subspecies of beach mouse and one extinct subspecies are known from the Atlantic coast of Florida and five subspecies of the beach mice live along the Gulf coast of Alabama and northwestern Florida.

Rivers and various inlets bisect the Atlantic beaches and naturally isolate habitats in which the beach mice live. The outer coastline and barrier islands are typically separated from the mainland by lagoons, swamps, tidal marshes, and flatwood areas with hardpan soil conditions. However, these dispersal barriers are not absolute; sections of sand peninsulas may from time to time be cut off by storms and shift over time due to wind and current action. Human development has also fragmented the ranges of the subspecies, and as a consequence of coastal development and the dynamic nature of the coastal environment; beach mouse populations are generally comprised of various disjunct populations.

The SEBM was listed as a threatened species under the Act in 1989 (54 FR 20598). Critical habitat was not designated for this subspecies. SEBM is also listed as threatened by the State of Florida. The original distribution of the SEBM was from Ponce Inlet, Volusia County, southward to Hollywood, Broward County, and possibly as far south as Miami in Miami-Dade County. It is currently restricted to Volusia, Brevard, and Indian River Counties. Formerly, this subspecies occurred along about 175 miles of Florida's southeast coast; it now occupies about 50 miles, a significant reduction in range (**Figure 1**).

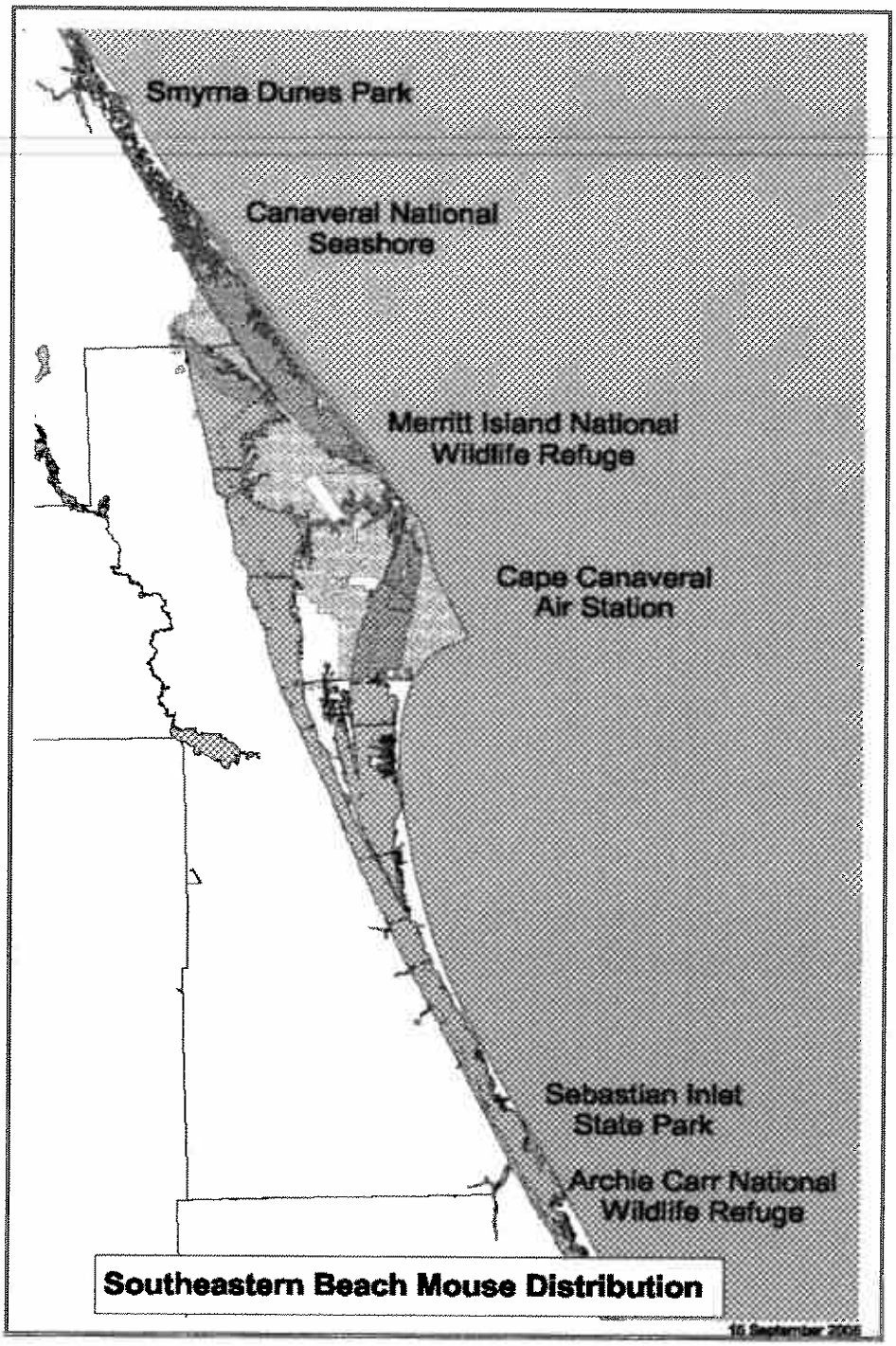

Figure 1. The distribution of the southeastern beach mouse.

This subspecies uses both beach dunes and inland areas of scrub vegetation. The most seaward vegetation typically consists of sea oats (*Uniola paniculata*), dune panic grass (*Panicum amarulum*), railroad vine (*Ipomoea pes-caprae*), beach morning glory (*Ipomoea stolonifera*), and camphor weed (*Heterotheca subaxillaris*). Further landward, vegetation is more diverse, including beach tea (*Croton punctatus*), prickly pear cactus (*Opuntia humifusa*), saw palmetto (*Serenoa repens)*, wax myrtle (*Myrica cerifera)*, and sea grape (*Coccoloba uvifera*).

Life history

Beach mice are differentiated from the inland subspecies by the variety of fur (pelage) patterns on the head, shoulders, and rump. The overall dorsal coloration in coastal subspecies is lighter in color and less extensive than on those of the inland subspecies (Sumner 1926, Bowen 1968). Similarly, beach mouse subspecies can be differentiated from each other by pelage pattern and coloration.

The SEBM averages 5.47 inches in total length (average of 10 individuals = 5.03 inches, with a 2.04-inch tail length (Osgood 1909, Stout 1992). Females are slightly larger than males. These beach mice are slightly darker in appearance than some other subspecies of beach mice, but paler than inland populations of *P. polionotus* (Osgood 1909). SEBM have pale, buffy coloration from the back of their head to their tail, and their underparts are white. The white hairs extend up on their flanks, high on their jaw, and within 0.07 to 0.12 inches of their eyes (Stout 1992). There are no white spots above the eyes as with AIBM (Osgood 1909). Their tail is also buffy above and white below. Juvenile SEBM are more grayish in coloration than adults; otherwise they are similar in appearance (Osgood 1909).

Population dynamics

Behavior

Peromyscus polionotus is the only member of the genus that digs an extensive burrow. Beach mice are semifossorial, using their complex burrows as a place to rest during the day and between nightly foraging bouts, escape from predators, have and care for young, and hold limited food caches. Burrows of *P. polionotus* generally consist of an entrance tunnel, nest chamber, and escape tunnel. Burrow entrances are usually placed on the sloping side of a dune at the base of a shrub or clump of grass. The nest chamber is formed at the end of the level portion of the entrance tunnel at a depth of 23.6 to 35.4 inches, and the escape tunnel rises from the nest chamber to within 9.8 inches of the surface (Blair 1951). Nests of beach mice are constructed in the nest chamber of their burrows, a spherical cavity about 1.5 to 2.5 inches in diameter. The nest comprises about one fourth of the size of the cavity and is composed of sea oat roots, stems, leaves and the chaffy parts of the panicles (Ivey 1949). Beach mice have been found to select burrow sites based on a suite of biotic and abiotic features including dune slope, soil compaction, vegetative cover, and height above sea level (Lynn 2000a; Sneckenberger 2001). A shortage of potential burrow sites is considered to be a possible limiting resource.

Reproduction and Demography

Studies on *Peromyscus* species in peninsular Florida suggest that these species may achieve greater densities and undergo more significant population fluctuations than their temperate relatives, partially because of their extended reproductive season (Bigler and Jenkins 1975). Subtropical beach mice can reproduce throughout the year; however their peak reproductive activity is generally during late summer, fall, and early winter. Extine (1980) reported peak reproductive activity for SEBM on Merritt Island during August and September, based on external characteristics of the adults. This peak in the timing and intensity of reproductive activity was also correlated to the subsequent peak in the proportion of juveniles in the

population in early winter (Extine 1980). Peak breeding season for Gulf Coast beach mice is autumn and winter, declining in spring, and falling to low levels in summer (Rave and Holler 1992, Blair 1951). However, pregnant and lactating beach mice have been observed in all seasons (Moyers et al. 1999).

Sex ratios in beach mouse populations are generally 1:1 (Extine 1980; Rave and Holler 1992). Beach mice are believed to be generally monogamous (Smith 1966, Foltz 1981, Lynn 2000a). While a majority of individuals appear to pair for life, paired males may sire extra litters with unpaired females. Beach mice are considered sexually mature at 55 days of age; however some are capable of breeding earlier (Weston 2007). Gestation averages 28 to 30 days (Weston 2007) and the average litter size is four pups (Fleming and Holler 1990). Littering intervals may be as short as 26 days (Bowen 1968).

Habitat and Movement

Beach mice inhabit coastal dune ecosystems on the Atlantic and Gulf Coasts of Florida and the Gulf Coast of Alabama. The dune habitat is generally categorized as: primary dunes (characterized by sea and other grasses), secondary dunes (similar to primary dunes, but also frequently include such plants as woody goldenrod (*Chrysoma pauciflosculosa*), false rosemary (*Conradina canescens*), and interior or scrub dunes (often dominated by scrub oaks and yaupon holly (*Ilex vomitoria*). Contrary to the early belief that beach mice were restricted to (Howell 1909, 1921, Ivey 1949), or preferred the frontal dunes (Blair 1951, Pournelle and Barrington 1953, Bowen 1968), more recent research has shown that scrub habitat serves an invaluable role in the persistence of beach mouse populations (Swilling et al. 1998, Sneckenberger 2001). Beach mice occupy scrub dunes on a permanent basis and studies have found no detectable differences between scrub and frontal dunes in beach mouse body mass, home range size, dispersal, reproduction, survival, food quality, and burrow site availability (Swilling et al. 1998, Swilling 2000, Sneckenberger 2001). While seasonally abundant, the availability of food resources in the primary and secondary dunes fluctuates (Sneckenberger 2001). In contrast, the scrub habitat provides a more stable level of food resources, which becomes crucial when food is scarce or nonexistent in the primary and secondary dunes. This suggests that access to primary, secondary, and scrub dune habitat is essential to beach mice at the individual level.

The sea oat zone of primary dunes is considered essential habitat of beach mice on the Atlantic Coast (Humphrey and Barbour 1981, Humphrey et al. 1987, Stout 1992). The SEBM has also been reported from sandy areas of adjoining coastal strand/scrub vegetation (Extine 1980, Extine and Stout 1987), which refers to a transition zone between the fore dune and the inland plant community (Johnson and Barbour 1990). Beach mouse habitat is heterogeneous, and distributed in patches that occur both parallel and perpendicular to the shoreline (Extine and Stout 1987). Because this habitat occurs in a narrow band along Florida's coast, structure and composition of the vegetative communities that form the habitat can change dramatically over distances of several feet.

Primary dune vegetation described from SEBM habitat includes sea oats, dune panic grass (*Panicum amarum*), railroad vine (*Ipomea pes-caprae)*, beach morning glory (*Ipomoea stolonifera*), salt meadow cordgrass (*Spartina patens*), lamb's quarters (*Chenopodium album*), saltgrass (*Distichlis spicata*), and camphorweed (*Heterotheca subaxillaris*) (Extine 1980). Coastal strand and inland vegetation is more diverse, and can include prickly pear cactus

(*Opuntia spinosisima*), saw palmetto (*Serenoa repens*), wax myrtle (*Myrica cerifera*), rosemary (*Ceratiola ericoides*), sea grape (*Coccoloba uvifera*) and sand pine (*Pinus clausa*) (Extine and Stout 1987). Extine (1980) observed this subspecies as far as 0.62 mile inland on Merritt Island; he concluded that the dune scrub communities he found them in represent only marginal habitat for the SEBM. SEBM have been documented in coastal scrub more than a mile from the beach habitat at Kennedy Space Center/Merritt Island NWR and Cape Canaveral Air Force Station (CCAFS) (J. Stout, University of Central Florida, personal communication 2004). Extine (1980) and Extine and Stout (1987) reported that the SEBM showed a preference for areas with clumps of palmetto, sea grape, and expanses of open sand.

Foraging

Beach mice are nocturnal and forage for food throughout the dune system. Beach mice feed primarily upon seeds and fruits, and appear to forage based on availability and have shown no preferences for particular seeds or fruits (Moyers 1996). Beach mice also eat small invertebrates, especially during late spring and early summer when seeds are scarce (Ehrhart 1978, Moyers 1996). Research suggests that the availability of food resources fluctuates seasonally in Gulf Coast coastal dune habitat, specifically that the frontal dunes appear to have more species of high quality foods, but these sources are primarily grasses and annuals that produce large quantities of small seeds in a short period of time. Foods available in the scrub consist of larger seeds and fruits that are produced throughout a greater length of time and linger in the landscape (Sneckenberger 2001). Nutritional analysis of foods available in each habitat revealed that seeds of plant species in both habitats provide a similar range of nutritional quality.

Population dynamics

Population size

Estimating animal abundance or population size is an important and challenging scientific issue in wildlife biology (Otis et al. 1978, Pollock et al. 1990). A number of different census methods are available to estimate wildlife populations, each with particular benefits and biases. Beach mouse surveys involve live trapping mark-recapture studies, which is a common method with small mammals. A five-night minimum trapping period has been standard practice since 1987 for Gulf Coast beach mice. As the referenced trapping events were not designed similarly or using a standardized sampling techniques, data should not be compared between subspecies or trapping events, nor should densities (mice per 100 trap nights) be inferred beyond the trapping area during that trapping session.

Population densities of beach mice typically reach peak numbers in the late autumn into spring (Rave and Holler 1992, Holler et al. 1997). Peak breeding period occurs in fall and winter, apparently coinciding with the increased availability of seeds and fruits from the previous growing season. Seasonal and annual variation in size of individual populations may be great (Rave and Holler 1992, Holler et al. 1997). Food supplementation studies showed that old field mouse populations increased when foods were abundant; thus, populations of old field mice appear to be food-limited (Smith 1971, Galindo-Leal and Krebs 1998). Similar studies have not been conducted with beach mouse populations.

Populations of the SEBM have been estimated to be around 5,000 to 6,000 mice. Recent surveys have confirmed that SEBM are found on the beaches of Canaveral National Seashore, Merritt Island NWR, and CCAFS in Brevard County, all on federally protected lands. In April 2002, a population of SEBM was documented at the Smyrna Dunes Park, at the north end of New Smyrna Beach (A. Sauzo, University of Central Florida, personal communication 2004). Prior to 2006, populations of the SEBM were thought extirpated from both sides of the Sebastian Inlet (A. Bard, FDEP personal communication 2004). However, during surveys in June 2006, a single mouse was located at the very southern end of the Sebastian Inlet State Park. Mice were also found at Jungle Trail on the Pelican Island National Wildlife Refuge, another area where they where thought extirpated. Additional surveys of other areas south of Brevard County have not located any mice and indicate the distribution of this subspecies in the counties south of Brevard, severely fragmented. SEBM are no longer believed to occur at Jupiter Island, Palm Beach, Lake Worth, Hillsboro Inlet or Hollywood Beach (Service 1999).

Population variability

Beach mouse populations fluctuate on a seasonal and annual basis. Attempts to explain population dynamics have revealed an incomplete understanding of the species and its population cycles. It is clear that beach mice, like all rodents, are known for high reproductive rates and experience extreme highs and lows in population numbers. Depressed beach mouse populations may be associated with tropical storms and drought, perhaps resulting from reduced habitat and food resources. These fluctuations can be a result of reproduction rates, food availability, habitat quality and quantity, catastrophic events, disease, and predation (Blair 1951, Bowen 1968, Smith 1971, Hill 1989, Rave and Holler 1992, Swilling et al. 1998, Swilling 2000).

Status and Distribution

The distribution of all the beach mouse subspecies is significantly reduced from their historic ranges due to modification and destruction of the coastal dune ecosystem inhabit. Habitat loss and alteration was likely a primary cause of the extinction of one subspecies, the Pallid beach mouse, which was endemic to barrier beach between Matanzas and Ponce de Leon inlets in Volusia and Flagler Counties (Humphrey 1992).

The distribution of the SEBM has declined significantly, particularly in the southern part of its range. Historically, it was reported to occur along about 174 miles of Florida's central and southeast Atlantic coast from Ponce (Mosquito) Inlet, Volusia County, to Hollywood Beach, Broward County (Hall 1981). Bangs (1898) reported it as extremely abundant on all the beaches of the east peninsula from Palm Beach at least to Mosquito (Ponce) Inlet. During the 1990s, the SEBM was reported only from Volusia County (Canaveral National Seashore); in Brevard County (Canaveral National Seashore, Kennedy Space Center/Merritt Island NWR, and CCAFS); a few localities in Indian River County (Sebastian Inlet SRA, Treasure Shores Park, and several private properties), and St. Lucie County (Pepper Beach County Park and Fort Pierce Inlet SRA) (Humphrey et al. 1987; Robson 1989; Land Planning Group, Inc. 1991; Humphrey and Frank 1992b; Service 1993). The SEBM is geographically isolated from all other subspecies of *P. polionotus*.

Populations of the SEBM are still found on the beaches of Canaveral National Seashore, Merritt Island NWR, and CCAFS in Brevard County, all on federally protected lands. In April 2002, a population of SEBM was documented at the Smyrna Dunes Park, at the north end of New Smyrna Beach (A. Sauzo, University of Central Florida, personal communication 2004). Populations from the north side of Sebastian Inlet appear to be extirpated (A. Bard, FDEP, personal communication 2004). SEBM were documented on the south side of Sebastian Inlet in 2006, although none have been found since then.
The status of the species south of Brevard County is currently unknown. The surveys done during the mid-1990s indicate the distribution of this subspecies in the counties south of Brevard was severely limited and fragmented. There are not enough data available to determine population trends for these populations. These surveys revealed that it occurred only in very small numbers where it was found. In Indian River County, the Treasure Shores Park population experienced a significant decline in the 1990s, and it is uncertain whether populations still exist at Turtle Trail or adjacent to the various private properties (D. Jennings, Service, personal communication 2004). Trapping efforts documented a decline from an estimated 300 individuals down to numbers in the single digits. In 2006, a population off Jungle Trail at Pelican Island National Wildlife Refuge was discovered (J. Van Zant, University of Central Florida, personal communication 2006). No beach mice were found during surveys in St. Lucie County and it is possible that this species is extirpated there. The SEBM no longer occurs at Jupiter Island, Palm Beach, Lake Worth, Hillsboro Inlet or Hollywood Beach (Service 1999).

The primary reason for the significant reduction in the range of the SEBM is the loss and alteration of coastal dunes. Large-scale commercial and residential development on the coast of Florida has eliminated SEBM habitat in the southern part of its range. This increased urbanization has also increased the recreational use of dunes, and harmed the vegetation essential for dune maintenance. Loss of dune vegetation results in widespread wind and water erosion and reduces the effectiveness of the dune to protect other beach mouse habitat. In addition to this increased urbanization, coastal erosion is responsible for the loss of the dune environment along the Atlantic coast, particularly during tropical storms and hurricanes. The extremely active 2004 hurricane season had a pronounced affect on Florida's Atlantic coast beaches and beach mouse habitat.

The encroachment of residential housing onto the Atlantic coast also increases the likelihood of predation and harassment by feral or uncontrolled cats and dogs. A healthy population of SEBM on the north side of Sebastian Inlet SRA in Brevard County was completely extirpated by 1972, presumably by feral cats (A. Bard, FDEP, personal communication 2004). Urbanization of coastal habitat could also lead to potential competition of beach mice with house mice and introduced rats.

The distribution of the beach mouse is limited due to modification and destruction of its coastal habitats. On the Atlantic coast of Florida, the SEBM were federally listed as endangered and threatened, respectively, in 1989 (54 FR 20602). One additional Atlantic coast subspecies, the pallid beach mouse (*P. p. decoloratus*), was formerly reported from two sites in Volusia County, but extensive surveys provide substantial evidence that this subspecies is extinct (Humphrey and Barbour 1981).

Recovery Criteria

The Recovery Plan (Service 1993) for the SEBM identifies the primary recovery objectives for the subspecies "The Southeastern beach mouse can be considered for delisting if 10 viable, self-sustaining populations can be established throughout a significant portion of its historic range. More specifically, delisting can be considered if the following conditions are met:

1. Viable populations are maintained on the 5 public land areas where the subspecies currently occurs. Each population should not fluctuate below an effective breeding size of 500 individuals.

2. Five additional viable populations are established throughout the historic range of the subspecies.

3. These populations should be monitored for at least 5 years.

Analysis of the Species/Critical Habitat Likely to be Affected

Beach mice are currently federally protected because of their low numbers caused by habitat loss with continuing threats to their habitat and resulting affects from storm and post-storm events. The primary reason for the significant reduction in their range is the loss and alteration of coastal dunes. Large-scale commercial and residential development on the coast of Florida has eliminated beach mouse habitat. Coastal urbanization has also increased the recreational use of beachfront areas. Dune habitat maintenance is an important component of beach mouse conservation. Providing a healthy and continuous dune system assures mouse population stability. Integral to this is keeping visitors to the beach off the dunes and replanting as necessary when impacts occur or are observed.

Climate change is evident from observations of increases in average global air and ocean temperatures, widespread melting of snow and ice, and rising sea level, according to the Intergovernmental Panel on Climate Change Report (IPCC 2007). The IPCC Report (2007) describes changes in natural ecosystems with potential wide-spread effects on many organisms, including marine mammals and migratory birds. The potential for rapid climate change poses a significant challenge for fish and wildlife conservation. Species' abundance and distribution are dynamic, relative to a variety of factors, including climate. As climate changes, the abundance and distribution of fish and wildlife will also change. Highly specialized or endemic species are likely to be most susceptible to the stresses of changing climate. Based on these findings and other similar studies, the Department of the Interior (DOI) requires agencies under its direction to consider potential climate change effects as part of their long-range planning activities (Service 2007).

Temperatures are predicted to rise from 2°C to 5°C for North America by the end of this century (IPCC 2007a,b). Other processes to be affected by this projected warming include rainfall (amount, seasonal timing and distribution), storms (frequency and intensity), and sea level rise.

Climatic changes in Florida could amplify current land management challenges involving habitat fragmentation, urbanization, invasive species, disease, parasites, and water management.

Global warming will be a particular challenge for endangered, threatened, and other "at risk" species. It is difficult to estimate, with any degree of precision, which species will be affected by climate change or exactly how they will be affected. The Service will use Strategic Habitat Conservation planning, an adaptive science-driven process that begins with explicit trust resource population objectives, as the framework for adjusting our management strategies in response to climate change (Service 2006). As the level of information increases concerning the effects of global climate change on the SEBM, the Service will have a better basis to address the nature and magnitude of this potential threat and will more effectively evaluate these effects to the range-wide status of the SEBM.

ENVIRONMENTAL BASELINE

Status of the species within the Action Area

The Action Area encompasses the entire ranges of the subspecies. Therefore, the previous discussion in "Status of the Species" applies here. The known distribution of the SEBM is a result of cursory surveys and intermittent trapping involving different projects. There has not been a systematic trapping study done in order to determine the status of the subspecies throughout their ranges.

Factors affecting the species environment within the action area

Habitat Loss or Degradation

Coastal dune ecosystems are continually responding to inlets, tides, waves, erosion and deposition, longshore sediment transport and depletion, and fluctuations in sea level. The location and shape of barrier island beaches perpetually adjusts to these physical forces. Winds move sediment across the dry beach forming dunes and the island interior landscape. The natural communities contain plants and animals that are subject to shoreline erosion and deposition, salt spray, wind, drought conditions, and sandy soils. Vegetative communities include foredunes, primary and secondary dunes, interdunal swales, sand pine scrub, and maritime forests. During storm events, overwash is common and may breach the island at dune gaps or other weak spots, depositing sediments on the interior and backsides of islands, increasing island elevation and accreting the sound shoreline. Breaches may result in new inlets through the island.

The quality of the dune habitat (primary, secondary, and scrub) is an important factor in maintaining and facilitating beach mouse recovery. Habitat manipulation is an old and widely used tool in wildlife management. It is especially useful in improving habitat suitability to increase local populations of a species. For beach mice, improving habitat can enhance the abundance and diversity of food resources, increase the chances of meeting a mate, and reduce competition for food and burrow sites.

Long term trapping data has shown that beach mouse densities are cyclic and fluctuate by magnitudes on a seasonal and annual basis. These fluctuations can be a result of reproduction rates, food availability, habitat quality and quantity, catastrophic events, disease, and predation (Blair 1951, Bowen 1968, Smith 1971, Hill 1989, Rave and Holler 1992, Swilling et al. 1998, Swilling 2000, Sneckenberger 2001). Without suitable habitat sufficient in size to support the

natural cyclic nature of beach mouse populations, subspecies are at risk from local extirpation and extinction, and may not attain the densities necessary to persist through storm events and seasonal fluctuations of resources.

Habitat loss and fragmentation associated with residential and commercial real estate development is the primary threat contributing to the endangered status of beach mice (Holler 1992a, 1992b; Humphrey 1992). Coastal development has fragmented all the subspecies into disjunct populations. Isolation of habitats by imposing barriers to species movement is an effect of fragmentation that equates to reduction in total habitat (Noss and Csuti 1997). Furthermore, isolation of small populations of beach mice reduces or precludes gene flow between populations and can result in the loss of genetic diversity. Demographic factors such as predation (especially by domestic cats), diseases, and competition with house mice, are intensified in small, isolated populations, which may be rapidly extirpated by these pressures. Especially when coupled with events such as storms, reduced food availability, and/or reduced reproductive success, isolated populations may experience severe declines or extirpation (Caughley and Gunn 1996). The influence these factors have on populations or individuals is largely dependent on the degree of isolation.

The conservation of multiple large, contiguous tracts of habitat is essential to the persistence of beach mice. At present, large parcels exist mainly on public lands. Protection, management, and recovery of beach mice on public areas have been complicated by increased recreational use as public lands are rapidly becoming the only natural areas left on the coast. Public lands and their staff are now under pressure to manage for both the recovery of endangered species and recreational use. Where protection of large contiguous tracts of beach mouse habitat along the coast is not possible, establishing multiple independent populations is the best defense against local and complete extinctions due to storms and other stochastic events (Danielson 2005). Protecting multiple populations increases the chance that at least one population within the range of a subspecies will survive episodic storm events and persist while vegetation and dune structure recover.

Habitat connectivity also becomes essential where mice occupy fragmented areas lacking one or more habitat types. If scrub habitat is lacking from a particular tract, adjacent or connected tracts with scrub habitat are necessary for food and burrow sites when resources are scarce in the frontal dunes, and are essential to beach mouse populations during and immediately after hurricanes. Trapping data suggests that beach mice occupying the scrub following hurricanes recolonize the frontal dunes once vegetation and some dune structure have recovered (Swilling et al. 1998, Sneckenberger 2001). Similarly, when frontal dune habitat is lacking from a tract and a functional pathway to frontal dune habitat does not exist, beach mice may not be able to attain the resources necessary to expand the population and reach the densities necessary to persist through the harsh summer season or the next storm. Functional pathways may allow for natural behavior such as dispersal and exploratory movements, as well as gene flow to maintain genetic variability of the population within fragmented or isolated areas. To that end, contiguous tracts or functionally connected patches of suitable habitat are essential to the long-term conservation of beach mice.

A lack of suitable burrow sites may be a consequence of habitat degradation. Beach mice use burrows to avoid predators, protect young, store food, and serve as refugia between foraging bouts and during periods of rest. Beach mice have been shown to select burrow sites based on a

suite of abiotic and biotic factors. A limitation in one or more factors may result in a shortage of suitable sites and the availability of potential burrow sites in each habitat may vary seasonally. Beach mice tend to construct burrows in areas with greater plant cover, less soil compaction, steep slopes, and higher elevations above sea level (Lynn 2000, Sneckenberger 2001). These factors are likely important in minimizing energy costs of burrow construction and maintenance while maximizing the benefits of burrow use by making a safe and physiologically efficient refuge. Similar to food resources, this fluctuation in availability of burrow sites suggests that a combination of primary, secondary and scrub dune habitat is essential to beach mice at the individual level.

Predation

Beach mice have a number of natural predators including coachwhip (*Masticophis flagellum*) corn snakes (*Elaphe guttata guttata*), pygmy rattlesnake (*Sistrurus miliarius*), Eastern diamondback rattlesnake (*Crotalus adamanteus*), short-eared (*Asio flammeus*) and great-horned owls (*Bubo virginianus*), great blue heron (*Ardea herodias*), northern harrier (*Circus cyaneus*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*) skunk (*Mephitis mephitis*), weasel (*Shallela frenata*), and raccoon (*Procyon lotor*) (Blair 1951; Bowen 1968; Holler 1992; Novak 1997; Moyers et al. 1999; Van Zant and Wooten 2003). Predation in beach mouse populations that have sufficient recruitment and habitat availability is natural and not a concern. However, predation pressure from natural and non-native predators may result in the extirpation of small, local populations of beach mice.

Free-roaming and feral pets are believed to have a devastating effect on beach mouse persistence (Bowen 1968, Linzey 1978) and are considered to be the main cause of the loss of at least one population of beach mice (Holliman 1983). Cat tracks have been observed in areas of low trapping success for beach mice (Moyers et al. 1999). The PHVA for the ABM indicated that if each population had as few as one cat, which ate one mouse a day, rapid extinction occurred in over 99 percent of all iterations (Taylor-Holzer 2005).

In response to increasing depredation of sea turtle nests by coyote, fox, hogs, and raccoon, multi-agency cooperative effort have been initiated and are ongoing throughout Florida, in particular on public lands. These programs also benefit beach mice.

Hurricanes

Hurricanes can severely affect beach mice and their habitat, as tidal surge and wave action overwash habitat, leaving a flat sand surface denuded of vegetation; sand is deposited inland, completely or partially covering vegetation; blowouts between the ocean and bays and lagoons leave patchy landscapes of bare sand; primary dunes are sheared or eroded; and habitat is completely breached, creating channels from the ocean to bays and lagoons. Other effects include direct mortality of individuals, relocation/dispersal, and subsequent effects of habitat alterations (that impact such factors as forage abundance/production and substrate elevation). Habitat impacts can be widespread, encompassing the range of the subspecies.

Until frontal dune topography and vegetation redevelop, scrub habitat maintains beach mice populations and provides the majority of food resources and potential burrow sites (Lynn

2000a, Sneckenberger 2001). While storms temporarily reduce population densities (often severely), this disturbance regime maintains open habitat and retards plant succession, yielding a habitat more suitable for beach mice than one lacking disturbance. The low-nutrient soil of the coastal dune ecosystem often receives a pulse of nutrients from the deposition of vegetative debris along the coastline (Lomascolo and Aide 2001). Therefore, as the primary and secondary dunes recover, beach mice recolonize this habitat readily as food plants develop to take advantage of the newly available nutrients. Recovery times vary depending upon factors such as hurricane characteristics (*i.e.*, severity, amount of associated rain, directional movement of the storm eye, storm speed), successional stage of habitat prior to hurricane, elevation, and restorative actions post hurricane. Depending on these factors, recovery of habitat may take from one year to over 40 years.

Although hurricanes can significantly alter beach mouse habitat and population densities in certain habitats, some physical effects may benefit the subspecies. Hurricanes are probably responsible for maintaining coastal dune habitat upon which beach mice depend through repeated cycles of destruction, alteration, and recovery of dune habitat. Holler et al. (1999) suggested that hurricanes could function to break up population subgroups and force population mixing. The resultant breeding between members of formerly isolated subgroups increases genetic heterogeneity and could decrease the probability of genetic drift and bottlenecks.

Beachfront Lighting

Artificial lighting increases the risk of predation and influences beach mouse foraging patterns and natural movements as it increases their perceived risk of predation. Foraging activities and other natural behaviors are influenced by many factors. Artificial lighting alters behavior patterns causing beach mice to avoid otherwise suitable habitat and decreases the amount of time they are active (Bird et al. 2004). The presence of vegetative cover reduces predation risk and perceived predation risk of foraging beach mice, and allows for normal movements, activity, and foraging patterns. Foraging in sites with vegetative cover is greater and more efficient than in sites without cover (Bird 2002). Beach mice have also been found to select habitat for increased percent cover of vegetation, and decreased distance between vegetated patches (Smith 2003).

Climate Change

Based on the present level of available information concerning the effects of global climate change on the status of the SEBM, the Service acknowledges the potential for changes to occur in the action area, but presently has no basis to evaluate if or how these changes are affecting the SEBM. Nor does our present knowledge allow the Service to project what the future effects from global climate change may be or the magnitude of these potential effects.

EFFECTS OF THE ACTION

Factors to be considered

Aspects of the routine activities will occur within habitat that is used by beach mice year round. The activities include the storage of equipment, work vehicles, or materials. The work, depending on the location, may be conducted any time of the year. The effects are expected to

be temporary. These short-term and temporary impacts could include loss of foraging habitat, altered beach mouse movement and dispersal activities.

Analysis for effects of the action

The Action Area consists of beach mouse habitat on CCAFS which could exist throughout scrub, secondary, or primary dunes. Beach mice would generally be found inhabiting stable primary, secondary, and scrub dunes on a permanent basis with other habitats being used periodically on a daily or seasonal basis for feeding and movement.

Direct and Indirect Impacts

Direct impacts are effects of the action on the species occurring as the project is implemented during the construction of the routine activities. Direct loss of individual beach mice may occur when heavy equipment clears the habitat. In general the length of time between the routine activities is expected to be sufficient for beach mouse habitat to be restored. Thus, it is not anticipated that the routine activities would result in permanent beach mouse habitat destruction. However, habitat for the SEBM that provides food or cover may be temporarily destroyed or altered from the activities.

Indirect effects are a result of a proposed action that occur later in time and are reasonably certain to occur. The indirect effect of the routine activities which result in temporary habitat loss could act as barriers to beach mouse movement for foraging, or population expansion or dispersal. Maintaining the connectivity among habitats is vital to persistence of beach mice recovery. Recovery actions needed to assure the connectivity include restoration and maintenance of the suitable habitat following project completion.

Species' response to a proposed action

This PBO is based on effects that are anticipated to beach mice (all life stages) as a result of the temporary physical disturbance of beach mouse habitat from the routine activities. Some beach mice (all life stages) may be lost during the initial construction where heavy equipment destroys suitable habitat. Any mice that survive the initial construction may move outside of the disturbed area and construct burrows elsewhere in the vicinity. Following construction, a bare gap of sand could form a barrier to limit beach mouse movement within the area altering regular movement patterns. These impacts are expected to be limited to the construction phase of the project (one month to one or two years). As the life span of a beach mouse is estimated to be approximately 9 months, the loss of individual mice or the temporary loss of habitat could affect several generations of beach mice, but because beach mice can reproduce rapidly with adequate resources, colonization or recolonization of the restored habitat would be expected.

Beach mice have evolved to adapt to catastrophic weather events. Additional factors such as surrounding development pressure and non-native predators may affect the species' ability to recover from the loss of individuals. However, the temporary loss of the habitat itself is not expected to permanently impact the populations as all beach mouse habitat within the project areas not permanently destroyed and would be restored and/or maintained as part of the conservation measures committed to by the Air Force. The temporary nature of the impacts to

suitable habitat is not expected to alter the function and conservation role of the remaining beach mouse habitat including designated critical habitat.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the Action Area considered in this PBO. Future Federal actions that are unrelated to the proposed project are not considered in this opinion because they require separate consultation pursuant to section 7 of the Act.

CONCLUSION

After reviewing the current status of the species of the SEBM, the environmental baseline for the Action Area, the effects of routine activities, the minimization of impacts from the 'Terms and Conditions', and the cumulative effects, it is the Service's biological opinion that the Programmatic action for these projects, as proposed, is not likely to jeopardize the continued existence of the SEBM.

As discussed in the Effects of the Action section of this opinion, we would not expect the carrying capacity of beach mouse habitat within the Action Area to be reduced. Beach mouse habitat will continue to provide for the biological needs of the subspecies as demonstrated below:

1. No permanent lost of beach mouse habitat will occur within the Action Area from the project construction or maintenance.

2. Temporary impacts to beach mouse habitat will be restored within the Action Area after project completion.

3. A full complement of beach mouse habitat will remain within the Action Area after project completion.

Temporary impacts are expected to be limited to the construction/maintenance phase of the project and habitat restoration period following the project, which could be completed between one month and six months.

While a few beach mice may be lost, beach mice recover well from population size reductions (Wooten 1994) given sufficient habitat is available for population expansion after the bottleneck occurs. Therefore, we do not consider the potential loss of individuals to be significant.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered or threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by

significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. 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 to be prohibited under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and shall be implemented by the Air Force so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Air Force has a continuing duty to regulate the activity covered by this incidental take statement. If the Air Force (1) fails to assume and implement the terms and conditions or (2) fails to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Air Force shall report the progress of the action and its impacts on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

AMOUNT OF EXTENT OF TAKE ANTICIPATED

The Service has reviewed the biological information and other information relevant to this action. Based on this review, incidental take is anticipated from the routine activities may occur any time of the year within the five-year period. The Service anticipates incidental take of beach mice would be difficult to detect for the following reasons: (1) an unknown number of beach mice may be injured, crushed or buried during beach access construction work and remain entombed in the sand; (2) beach mice are nocturnal, are small, and finding a dead or injured body is unlikely because of predation, and (3) changes in beach mouse essential life behaviors may not be detectable in standardized monitoring surveys.

The incidental take is expected to be in the form of: (1) harm or harassment to all beach mice occupying the area to be disturbed; (2) harassment of beach mice from disturbance of foraging opportunities within the temporary disturbed area; (3) harassment of beach mice from temporary loss of foraging and burrow habitat; and (4) harassment of beach mice from temporary restriction of movement across access areas.

EFFECT OF THE TAKE

In the PBO, the Service determined that this level of anticipated take is not likely to result in jeopardy to SEBM. Critical habitat for the SEBM has not been designated; therefore, the project will not result in destruction or adverse modification of critical habitat for either subspecies.

Incidental take of SEBM is anticipated to occur in beach mouse occupied habitat where the routine activities will occur. Take will occur during the routine activities and where equipment is staged or stored within beach mouse habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the SEBM.

1. Avoid potential for southeastern beach mice to be injured or killed and the burrows destroyed by heavy equipment to the maximum extent practicable.

2. Construction equipment and vehicle staging/ parking/ storage areas must be stored in a manner that will minimize impacts to beach mice.

3. Lighting associated with the routine activities must be minimized to reduce the possibility of disrupting nocturnal activities of beach mice.

4. Any suitable beach mouse habitat which constitutes the primary dunes (characterized by sea and other grasses), secondary dunes (similar to primary dunes, but also frequently includes such plants as woody goldenrod, false rosemary), and interior or scrub areas impacted must be restored to pre-construction conditions. The habitat restoration must consist of planting with appropriate native dune vegetation (i.e., native to coastal dunes in the respective county and grown from plant stock from that region of Florida).

5. Once every five years during November or February, a beach mouse population study must be conducted to determine the status of the SEBM population on CCAFS. A report of the results must be sent to the Service.

6. The Service and the FWC must be notified if a beach mouse is harmed or destroyed as a result of the proposed routine activities.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the 45th SW 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. Beach mouse habitat must be avoided when selecting sites for equipment, pipes, vehicle storage and staging to the maximum extent practicable. Suitable beach mouse habitat constitutes the primary dunes (characterized by sea and other grasses), secondary dunes (similar to primary dunes, but also frequently includes such plants as woody goldenrod, false rosemary), and interior or scrub dunes.

2. Construction equipment and vehicle staging/ parking/ storage areas must be stored in a manner that will minimize impacts to beach mice. Movement of equipment and vehicles shall be restricted to roadways and roadbeds or outside of vegetated areas to the maximum extent practicable

3. Lighting associated with the routine activities must be minimized to reduce the possibility of disrupting nocturnal activities of beach mice.

4. Routine activities that impact beach mouse habitat must be replanted within 6 months following project completion. The habitat restoration must consist of restoring the dune topography and planting with at least three species of appropriate native dune vegetation (i.e., native to Brevard County and grown from plant stock from that region of Florida). Examples along the Atlantic coast include: *Panicum amarum* (panic grass), *Uniola paniculata* (sea oats must be grown from local genetic stock), *Ipomoea stolonifera* (beach morning glory) or *Ipomea pes-caprae* (railroad vine).

5. Once every five years during November or February, a beach mouse population viability study consisting of trapping a representative sample of suitable beach mouse areas on CCAFS must be conducted on CCAFS to determine the status of the SEBM population on CCAFS. A report of the results must be sent to the Service. The information in the report is necessary to order to access the SEBM population on CCAFS to renew the PBO after the five-year period has expired.

6. Upon locating a dead or injured beach mouse that may have been harmed or destroyed as a direct or indirect result of the project, the Air Force must be responsible for notifying FWC Wildlife Alert at 1-888-404-FWCC (3922) and the Service.

Care must be taken in handling injured beach mice to ensure effective treatment or disposition, and in handling dead specimens to preserve biological materials in the best possible state for later analysis.

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. The Service believes that within the five-year period, for each routine activity that occurs within beach mouse habitat all the beach mice could be incidentally taken. If during the course of the action, this level is exceeded; such incidental take represents new information requiring initiation of consultation and review of the reasonable and prudent measures. The Air Force must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the Reasonable and Prudent Measures.

CONSERVATION RECOMMENDATIONS

Section 7(a) (1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. To increase public awareness about beach mice, informational signs should be placed where appropriate. The signs should explain the importance of beach mice, and/or the life history of the beach mice.

2. Predator control programs should be implemented when necessary.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in the request for reinitiation. 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 (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency 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 or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation. The Service appreciates the cooperation of the Air Force during this consultation. For further coordination please contact Ann Marie Lauritsen at (904) 525-0661.

Sincerely,

David L. Hankla
Field Supervisor

cc: Annie Dziergowski- FWS/JAXFO

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TRAPPING PROTOCOL FOR BEACH MICE

1. Individuals conducting the trapping must have previous experience in live trapping, handling, and identification of small mammals.

2. Surveys must include the entire dune system within the project area and, if permission can be obtained, adjacent lands with beach mouse habitat. Trapping areas must include all suitable habitat types such as: frontal dunes, secondary dunes, scrub dunes, and dry flats behind dune systems, regardless of distance from the beach.

3. Trapping must be conducted along linear transects with live-traps spaced at 32.8 feet (10 to 15 meter) intervals. Linear transects should be parallel to the frontal dune system, and at least one transect should be placed in each habitat type.

4. Transects must extend the full length of each habitat type except where long blocks of habitat are involved ($\geq$ 2,640 feet/750 meters). In those cases, the habitat may be covered by several non-contiguous transects.

5. Two traps per trapping station are desirable, but one trap per station is acceptable.

6. Traps must be operated for five nights per trapping season or until a beach mouse is caught. At least three nights of trapping should be consecutive.

7. Traps must be checked and all mice released between 12 a.m. and thirty minutes after official sunrise time. All traps should be closed after checking and reset late each afternoon to preclude mortality of mice and other small mammals during the day.

8. When nighttime temperatures are forecast to be $<15^{\circ}C$ ($60^{\circ}F$), a ball of cotton batting (or similar synthetic material) must be placed in each trap for insulation purposes. Trapping should not be conducted when nighttime temperatures are forecast to be $<10^{\circ}C$ ($50^{\circ}F$), without prior coordination from the permitting agencies.

9. Trapping must not be conducted when the moon phase is three-quarters to full, if feasible.

10. Bait must consist of either long-cooking rolled oats, sunflower seeds or safflower seeds.

11. Each trap must be visually inspected before closing to assure no small mammals or other animals are inadvertently left in the trap.

12. Captured mice must be gently released on the ground near protective vegetation immediately adjacent to the trapping station.

13. Any exotic species captured during beach mouse trapping must be euthanized humanely.

14. Presence of beach mice can be documented in a single trapping period, but to determine absence with any degree of certainty will require multiple trapping periods. In that respect, trapping must be conducted seasonally (fall, winter, spring, summer) and in all dune habitats for at least two consecutive years or until mice are caught.

15. All traps must be individually numbered and labeled with identification of ownership.

16. Site description and trapping data must be recorded. The site description must include project location, habitat on the project area and adjacent lands, and trapping design relative to habitat distribution. Daily trapping data must include number of beach mice captured per day, non-target species captured, weather conditions, lost or missing traps, and moon phase. If population data is being collected, sex, age, and reproductive status of beach mice must also be reported. All information must be submitted to the following offices:

Protected Species Permit Coordinator
Bureau of Wildlife Diversity Conservation
Florida Fish and Wildlife Conservation Commission
620 South Meridian Street, Mail Station WLD-BLX
Tallahassee, Florida 32399-1600
(850) 921-5990
Fax (850) 921-1847

Terry J. Doonan
Regional Biologist
Bureau of Wildlife Diversity Conservation
Florida Fish and Wildlife Conservation Commission
3377 East U.S. Highway 90
Lake City, FL 32055

Deputy Field Supervisor
U.S. Fish and Wildlife Service
7915 Baymeadows Way Suite 200
Jacksonville, FL 32256
(904)731-3336
Fax (904) 731-3045

Attachment B-2

Copies of Project Biological Opinions

Project BO

Attachment B-2	Document Designation Letter	C

United States Department of the Interior
U. S. FISH AND WILDLIFE SERVICE
7915 BAYMEADOWS WAY, SUITE 200
JACKSONVILLE, FLORIDA 32256-7517

IN REPLY REFER TO:

October 29, 2013

Michael A. Blaylock
Chief, Conservation/Natural Areas
45CES/CEIE
Patrick Air Force Base, Florida 32925-3343
(Attn: Keitha Dattilo-Bain)

Dear Mr. Blaylock,

This document is the U.S. Fish and Wildlife Service's (Service's) modification letter pertaining to our biological opinion (BO) of June 2, 2009, (2009-F-0336) for beach nourishment and dune restoration at Patrick Air Force Base (PAFB). It also references aspects of our BO of October 19, 2005, (05-1125) and subsequent modifications regarding designation of an area on Cape Canaveral Air Force Station (CCAFB) as a borrow source for shore protection projects along the PAFB shoreline. We are responding to your letter of September 6, 2013, and amended letter of September 19, 2013, proposing a dune restoration project at PAFB. The project would also require excavation of sand from the established borrow site at CCAFS. Both PAFB and CCAFS are in Brevard County, Florida. Your letters state that the previous Air Force commitments and the conditions of Service BOs of June 2, 2009, for PAFB and October 20, 2008, (2009-F-0037) for CCAFS, and applicable provisions of State Joint Coastal Permit 294526-001-JC would be maintained to address the potential impacts of the proposed project to federally-listed species. On that basis, you determined in your letter of September 6, 2013, that the proposed project is "not likely to adversely affect" four species of sea turtles, the southeastern beach mouse (*Peromyscus polionotus niveiventris*), and the piping plover (*Charadrius melodus*). Provisions of the proposed project would also limit the potential for impacts to other migratory birds, including shorebirds.

Following your letter of September 6, 2013, coordination between our staffs (phone calls and email correspondence) determined that, consistent with the 2009 BO for beach nourishment and dune restoration at PAFB, the proposed project is likely to adversely affect the Northwest Atlantic population of the loggerhead (*Caretta caretta*), as well as the green (*Chelonia mydas*), leatherback (*Dermochelys coriacea*), and Kemp's ridley (*Lepidochelys kempii*) sea turtles at PAFB. Your letter of September 19, 2013, confirmed this revision of your earlier determination.

Since aspects of the currently proposed project differ from actions addressed in previous Service BOs issued for PAFB dune restoration and the CCAFS borrow site, and 2013 has proven to be a record-setting year for sea turtle nesting, reinitiation of consultations under section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*) is appropriate.

Our June 2, 2009, BO addressed the proposed dune restoration of 8,500 linear feet of beach from Florida Department of Environmental Protection R-Monument 65 to R-Monument 75 (using 80,000 cubic yards of sand to be excavated and truck hauled from the CCAFS borrow site) and beach restoration of 11,580 linear feet from R-Monument 53 to R-Monument 65 (using 350,000 cubic yards

of sand dredged from offshore). The BO concluded that the project would result in direct and indirect take of four species of sea turtle and authorized that take. It provided reasonable and prudent measures to reduce the impacts of take, and terms and conditions to implement the reasonable and prudent measures. The Service also concluded that the proposed project may affect, but was not likely to adversely affect the West Indian (Florida) manatee (*Trichechus manatus*).

Subsequently, a dune restoration project was completed at PAFB (R-Monument 65 to R-Monument 75) from January to April 2011. The project used approximately 56,000 cubic yards of sand excavated from the CCAFB borrow site to restore dunes over 10,032 linear feet of shoreline. While it was of much smaller scope than the project addressed in the 2009 BO, it was a modification to the project that the BO addressed. The changed project should have prompted renewed coordination with the Service prior to construction. In addition, consistent with the terms and conditions of the 2009 BO, a report should have been submitted to the Service documenting the 2011 work. To our knowledge neither occurred.

Our October 19, 2005, BO (05-1125) addressed designation of an area on CCAFB extending 3,600 linear feet north of the Canaveral Harbor Inlet as a borrow source for shore protection along the PAFB shoreline. A 2008 modification (2009-F-0037) of the 2005 BO was referenced in your letter. The project included excavation of vegetated upland and creation of a new dune landward of the borrow area. The 2005 BO concluded that the action would not jeopardize the existence of the southeastern beach mouse, but would result in both direct and indirect take. Our BO authorized take, provided reasonable and prudent measures to minimize the impact of take, and terms and conditions to implement those measures. We also determined that the proposed work may affect, but was not likely to adversely affect the eastern indigo snake (*Drymarchon corais couperi*), or the loggerhead, green, and leatherback sea turtles. We cited protection measures agreed upon by the Air Force to avoid possible take of the eastern indigo snake and the sea turtles, and a requirement that prior to the proposed excavation, a survey be conducted to ensure that wintering piping plover were not present within the work area. Modifications of this BO in 2006 (2006-F-0707) and 2008 (2009-F-0037) regarded only the southeastern beach mouse.

The currently proposed project would entail dune restoration in three areas of PAFB where severe dune erosion has occurred since 2011: Hangers Central Beach (R-Monument 64); Tides Club Beach (R-Monument 68-69); and the Radar (Facility 969) Beach (R-Monument 70). Dune restoration would be consistent with a Federal Emergency Management Agency dune restoration template, entirely above mean high water, and would occur over approximately 3,800 linear feet of shoreline. The total construction area would include approximately 7,392 linear feet (R-Monument 63 to R-Monument 71) due to equipment traversing the beach to access restoration areas. The project would require 16,000 cubic yards of beach compatible fill, trucked from the CCAFS borrow site. Unlike the project addressed in the 2005 BO and its modifications, the currently proposed would excavate only material from unvegetated areas waterward of the primary dune. Access to the beach would be via an established road along the jetty. Construction is planned to begin about November 7, 2013, and is expected to last 2 to 3 months.

Potential impacts to migrating and wintering piping plover at PAFB were not addressed in our 2009 BO. Beaches in the vicinity of the proposed dune restoration at PAFB may be utilized by migrating or wintering piping plover; however, winter shorebird surveys at PAFB have not documented use. In a letter to the Service dated March 8, 2012, the U.S. Army Corps of Engineers (Corps) requested Service concurrence with the determination of "may affect, not likely adversely affect" for the piping plover for the proposed beach nourishment at PAFB as addressed under a Joint Coastal Permit.

Conditions proposed to avoid possible impacts to piping plover included a pre-construction meeting where wintering migratory birds, associated regulations, and measures to avoid impacts would be discussed. The Corps also referenced management practices covered in the 45 Space Wing Integrated Natural Resource Management Plan that addresses on-beach driving and the installation of educational signs at public access points. The Service concurred with the Corps' determination for the project, as conditioned. While the project described in the Joint Coastal Permit (beach nourishment from offshore sources) has not gone forward, the Air Force has confirmed that the same measures to safeguard wintering piping plovers at PAFB would apply to the presently proposed dune restoration project.

Our 2005 BO for the borrow site at CCAFS and subsequent modifications addressed adverse impacts to the southeastern beach mouse from work in the borrow area and authorized take of the southeastern beach mouse. Given conservation measures agreed to by the Air Force, we concluded that a determination of "may affect, not likely to adversely affect" was appropriate for the eastern indigo snake. Since the currently proposed project would only excavate material from unvegetated areas waterward of the primary dune and access to the beach would be via an established road along the jetty, we conclude that the currently proposed excavation at the CCAFS borrow site would not affect the southeastern beach mouse, the eastern indigo snake, or their habitat.

Our 2005 BO for the borrow area at CCAFS included a provision that, "Prior to the proposed excavation, a shorebird survey will be conducted to ensure that the piping plover is not present within the action area." While piping plover have been recorded using beaches in the project area, a February Winter Shorebird Survey conducted for the last 4 years has not documented use of CCAFS by wintering piping plovers. Overall, piping plovers are reportedly rare at CCAFS. Recent site visits, including daily visits by turtle monitors, have not reported piping plover presence in the vicinity of the borrow site.

Given the above, we concur with the Air Force's determination that the proposed project is not likely to adversely affect the southeastern beach mouse or the piping plover.

We concur with the Air Force's determination that the currently proposed dune restoration project may affect and conclude that it will adversely affect the Northwest Atlantic population of the loggerhead sea turtle, the green, the leatherback, and the Kemp's ridley sea turtles at PAFB. The Air Force has committed to following conservation measures and all terms and conditions that were included in the 2009 BO for the currently proposed dune restoration at PAFB. The wording of some terms and conditions addresses beach nourishment as opposed to dune restoration, but the terms and conditions are generally applicable to the presently proposed project. These conditions include, but are not limited to the following:

Conservation measures:

- The Air Force will place material on the beach between November 1 and April 30 to avoid the majority of sea turtle nesting activities.
- The Air Force currently conducts sea turtle monitoring and will continue for a minimum of two additional nesting seasons after the nourishment event if placed-sand remains.

Terms and conditions (additional conditions and details are provided in the 2009 BO):

- Beach compatible fill must be placed on the beach or any dune system.

- Beach nourishment must be started after October 31 and be completed before May 1. During the May 1 through October 31 period, no construction equipment or pipes will be stored on the beach.
- For sand placement projects that occur during the period from November 1 through November 30, daily early morning sea turtle nesting surveys must be conducted 65 days prior to project initiation and continue through September 30, and eggs must be relocated.
- A meeting between representatives of the Air Force, the contractor, the Service, and the permitted sea turtle surveyor, must be held prior to the commencement of work on this project. At least 10-business days advance notice must be provided prior to conducting this meeting.
- Sand compaction must be monitored in the area of sand placement immediately after completion of the project and prior to March 1 for 3 subsequent years in accordance with a protocol agreed to by the Service, the Florida Fish and Wildlife Conservation Commission, and the applicant or local sponsor.
- Visual surveys for escarpments along the project area must be made immediately after completion of the beach nourishment project or dredged channel material placement and during 30 days prior to March 1 for 3 subsequent years if sand still remains on the beach.
- Staging areas for construction equipment must be located off the beach from March 1 through April 30 and November 1 through November 30, if off-beach staging areas are available. Nighttime storage of construction equipment not in use must be off the beach to minimize disturbance to sea turtle nesting and hatching activities.
- Direct lighting of the beach and nearshore waters must be limited to the immediate construction area from March 1 through April 30 and November 1 through November 30, and must comply with safety requirements.
- A report describing the projects conducted during the year and actions taken to implement the reasonable and prudent alternatives and terms and conditions of this incidental take statement shall be submitted to the Service by March 1.

Other terms and conditions address early spring turtle nesting (March 1 through April 30). The current project schedule would avoid work after March 1. If proposed dune restoration were to continue to March 1, these terms and conditions would apply. Following coordination with the Service, the Air Force has agreed to the extension of 2013 daily nesting surveys and nest relocation at the PAFB project site as follows. Daily early morning sea turtle nest surveys will continue through at least September 30 and, if nesting is observed at PAFB in the 7 days prior to September 30, daily nest surveys in the construction area will continue through October 14.

The Air Force has also committed to following BO conditions applicable to the CCAFS borrow site. The Service's 2005 BO concurred that the proposed work "may affect, but is not likely to adversely affect" sea turtles. The BO cited the following measure agreed to by the Air Force.

- Excavation activities must not occur from May 1 through October 31, the period of peak sea turtle egg laying and egg hatching, to reduce the possibility of crushing of sea turtle eggs, or nest excavation. During the May 1 through October 31 period, no construction equipment will be stored on the beach.

Other conditions in the 2005 BO for the borrow site regarded sea turtles nesting in the spring season. Subsequent revisions of the BO (including our 2008 modification referenced in your letter) addressed only the southeastern beach mouse. Following coordination with the Service, the Air Force agreed to the extension of 2013 daily nesting surveys at the CCAFS borrow site through October 5. All nests in the project area are being marked and any unhatched nests present during construction will be avoided. Provide that conditions of the 2005 BO are adhered to, daily nesting surveys are extended as described above, nests in the project area are marked, and any unhatched nests are

avoided during excavation, we conclude that proposed work at CCAFS is not likely to adversely affect listed sea turtles.

We conclude that the proposed work at PAFB is likely to adversely affect the Northwest Atlantic population of the loggerhead sea turtle, the green, the leatherback, and the Kemp's ridley sea turtles, but will not jeopardize the existence of any of these sea turtles. All conservation measures, and terms and conditions in our 2009 BO continue to apply.

Critical habitat has been proposed for the Northwest Atlantic distinct population segment of the loggerhead sea turtle. The Service exempted Department of Defense installations including CCAFS and PAFB from proposed critical habitat because their Integrated Natural Resources Management Plans incorporate measures that provide a benefit for the conservation of the loggerhead sea turtle. Thus the proposed work will not affect proposed critical habitat.

Our 2009 BO anticipated that sea turtles may be directly lost via: (1) destruction of all nests that may be constructed and eggs that may be deposited from March 1 through April 30 and from September 1 through September 30, and missed by a nest survey and egg relocation program within the boundaries of the proposed project; (2) destruction of all nests deposited from October 1 through February 28 (or 29 as applicable) when a nest survey and egg relocation program is not required to be in place within the boundaries of the proposed project; (3) reduced hatching success due to egg mortality during relocation and adverse conditions at the relocation site; (4) harassment in the form of disturbing or interfering with female turtles attempting to nest within the construction area or on adjacent beaches as a result of construction activities; (5) misdirection of hatchling turtles on beaches adjacent to the construction area as they emerge from the nest and crawl to the water as a result of project lighting; (6) behavior modification of nesting females due to escarpment formation within the project area during a nesting season, resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs; and (7) destruction of nests from escarpment leveling within a nesting season when such leveling has been approved by the Service. Similar effects on the sea turtles are anticipated for the currently proposed dune restoration project, though proposed timing and project differences will minimize the potential for some of these losses.

Provided that all conservation measures proposed by the Air Force are adhered to, including modifications to extend daily nesting surveys and relocation as described above, and that required terms and conditions in the June 2, 2009, BO are followed, modification of our 2009 BO to include the currently proposed dune reconstruction is appropriate. Take of sea turtles in the form of harm or harassment is granted for the current dune restoration project.

The Service anticipates incidental take of sea turtles will be difficult to detect for the following reasons: (1) the turtles nest primarily at night and all nests are not found; (2) the total number of hatchlings per undiscovered nest is unknown; (3) the reduction in percent hatching and emerging success per relocated nest over the natural nest site is unknown; (4) an unknown number of females may avoid the project beach and be forced to nest in a less than optimal area; (5) lights may misdirect an unknown number of hatchlings and cause death; and (6) escarpments may form and prevent an unknown number of females from accessing a suitable nesting site. However, the level of take of these species can be anticipated by the extent of dune restoration and the disturbance of suitable turtle nesting beach habitat because: (1) turtles nest within the project area; (2) project may occur during a portion of the nesting season; (3) the dune restoration project will likely modify the incubation substrate, beach slope, and sand compaction.

The 2009 BO anticipated take in the form of harm or harassment throughout 8,500 linear feet of beach for dune restoration and 11,235 linear feet for beach nourishment. We modify the BO to include incidental take associated with proposed project construction over 7,392 linear feet (R-Monument 63 to R-Monument 71), of which 3,800 linear feet comprise dune restoration.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the action outlined in the 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 (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion or the project has not been completed within five years of the issuance of this BO; (3) the agency 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 or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

In closing, we appreciate the efforts of PAFB and KSC in conserving listed species. Unless modified via further consultation with the Service, conservation measures agreed to by the Air Force, and terms and conditions included in BOs and their modifications are binding. Failure to reinitiate consultation as required may nullify take authorization as granted and the Air Force's exception from take prohibitions under section 9 of the Act. Consistent with term and condition number 12 in our 2009 BO, we anticipate receiving a report describing work conducted and actions taken to implement reasonable and prudent measures, and terms and conditions by March 1, 2014.

The above findings and recommendations constitute the report of the Service for the proposed action. If you have any questions regarding this BO modification, please contact Peter Plage at (904-731-3085, peter_plage@fws.gov)

Sincerely,

Mike Jennings
Field Office Supervisor
acting

cc: Robbin Trindell, FWC (Tallahassee)

Project BO

Attachment B-2	Document Designation Letter	D

United States Department of the Interior

FISH AND WILDLIFE SERVICE
6620 Southpoint Drive, South
Suite 310
Jacksonville, Florida 32216-0912

IN REPLY REFER TO:

41910-2006-F-0707

July 20, 2006

Brigadier General Susan J. Helms
1201 Edward H. White II Street,
Patrick AFB, Florida 32925

FWS Log No: 41910-2006-F-0707

Dear Brigadier Helms:

Based on further review and discussions, the U.S. Fish and Wildlife Service (Service) is modifying our October 19, 2005 biological opinion (05-1125) on the proposed utilization of 3,600 linear feet of beach and dune habitat within Cape Canaveral Air Force Station (CCAFS), as a borrow source for sand to protect ocean shoreline within Patrick Air Force Base (PAFB) in Brevard County, Florida. The modification addresses the project's anticipated incidental take of southeastern beach mice (*Peromyscus polionotus niveiventris*).

The proposed borrow site is located immediately north of the Canaveral Harbor Inlet. The proposal is to excavate sand across the beach face into contiguous upland, and haul the material by truck for placement on the shoreline of PAFB. The proposal also includes constructing a new dune at the borrow site with a seaward toe located approximately 15 to 20 feet behind the landward limit of the cut. The dune will have 25% side slopes, a crest width between 3 and 15 feet, elevation between 8 to 13 feet, and be 5 feet high and 2 to 3 cy/ft along the shore. Material used in dune construction will come from the upper 6 to 12 inches of material initially removed from the borrow area, which consists of vegetation, roots, or other organics. Additional plantings of sea oats and other native dune vegetation are expected to recreate beach mouse habitat along the primary and secondary dune.

The Service has re-written the "Reasonable and Prudent Measures" and "Terms and Conditions" provided in the biological opinion in order to further minimize direct take of southeastern beach mice. Please replace those sections with the following changes. All other parts of the original biological opinion (05-1125) will remain the same.

REASONABLE AND PRUDENT MEASURES

When providing an incidental take statement, the Service is required to provide those reasonable and prudent measures it considers necessary and appropriate to minimize that take, and the terms and conditions needed to implement the reasonable and prudent measures. Furthermore, the Service also must specify the procedures used to handle or dispose of any individuals taken. The Service believes the following reasonable and prudent measures are necessary and appropriate to reduce take:

1. The transportation, operation, and staging of vehicles, equipment, and other project-related materials and supplies shall be conducted in a manner that avoids death or injury of southeastern beach mice either directly or through destruction of burrows, within contiguous, unexcavated habitat.

2. Prior to hurricane season (June 1), once every two years, trap mice within the action area and translocate them to suitable habitat within the Archie Carr National Wildlife Refuge (ACNWR). The trapping event will depend on suitable beach mouse habitat within the action area. These two-year trapping events will not occur if the Service has determined that there is not sufficient suitable habitat for beach mice.

3. In-between the two-year trapping event and prior to any excavation, trap mice in the area of direct impact for two nights and relocate them to suitable habitat at least 1000 feet from direct impact area on CCAFS.

4. Rebuild the dune and vegetate using native plants. For subsequent excavations avoid this rebuilt dune area. The rebuilt dune will be assessed to determine if further excavations will impact the new dune in ten years. The Service will determine at that point if further two-year trapping and relocation events will be necessary.

5. Determine the survivability of translocated mice at CCAFS.

6. Notify the Service of any unauthorized take of southeastern beach mice.

TERMS AND CONDITIONS

To implement the above reasonable and prudent measures, the Service has outlined the following terms and conditions for incidental take. In accordance with the Interagency Cooperation Regulation (50 CFR 402), these terms and conditions must be complied with to implement the reasonable and prudent measures for incidental take:

1. The Air Force will follow the trapping protocol (copy attached) prepared by the Service. Point 6 of the trapping protocol is modified as follows: "Trapping shall be done for five (5) consecutive nights once every two years". The trapping event that occurs every two years will be conducted by representatives of the Air Force's 45th Space Wing (SW), the Service, and the Florida Fish and Wildlife Conservation Commission (FWC). The

relocation to the ACNWR and the monitoring at ACNWR will be done by FWC and the ACNWR.

2. The captured mice will be relocated using a "soft release" technique. The mice will be reintroduced on suitable habitat within the Archie Carr National Wildlife Refuge, where mice are currently extirpated. All mice trapped during the two-year event will be relocated to ACNWR unless otherwise determined by the Service.

3. In-between the two-year trapping event, prior to excavation, the area should be assessed for storm damage of beach mouse habitat. Representatives of the 45th SW will contact the Service via email including a description of the habitat and photographs depicting the habitat. If the area to be excavated has beach mouse habitat, beach mice will be trapped in that immediate area of excavation for two nights and relocated on CCAFS. Suitable areas of relocation will be determined prior to trapping. The areas will be determined by the availability of suitable habitat and the most recent beach mice surveys in that area.

4. Rebuild the dune and vegetate using native plants, including sea oats, in accordance with currently established standards and protocols for dune vegetation restoration. The required dune photographs (see # 3 above) shall be used as references for the pre-excavation condition of the dune plant community. A dune vegetation restoration plan shall be submitted to the Service for review and approval prior to initial excavation. That plan shall include, but not be limited to, a purpose, goals, objectives, strategies, and implementing actions. The plan in general shall describe materials and methods, success criteria, and monitoring. Regarding subsequent excavations, in order to protect the rebuilt dune from such excavations and associated activities, the project plans and specifications will include a requirement for a 10-foot, no action buffer between any rebuilt dune segment and contiguous area of excavation. The rebuilt dune will be assessed in ten years to determine if further excavations will impact the new dune. The Service will determine at that point if further two-year event trapping and relocation will be necessary.

5. The Air Force shall determine the survivability of the mice translocated to grids on CCAFS by tagging relocated mice and conducting a second trapping one month following relocation. The trapping event will follow the Service's three day trapping protocol. The Air Force shall report Presence or absence of relocated mice to the Service within two weeks following completion of the trapping.

6. If a dead southeastern beach mouse is found on the project site, the specimen should be thoroughly soaked in water and frozen, and the applicant should notify the Jacksonville Field Office immediately at (904)232-2580. Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

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. The Service has determined that all the southeastern beach mice utilizing areas

of dune access for the excavation project along the 3600 linear feet of shoreline will be incidentally taken. If, during the course of the action, this level of incidental take (3600 linear feet) is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

REINITIATION OF SECTION 7 CONSULTATION

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR Section 402.16, reinitiation of formal consultation is required when 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 agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this biological opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation. For further coordination please contact Ann Marie Lauritsen at (904) 232-2580 ext. 111 of this office.

Sincerely,

David L. Hankla
Field Supervisor

Cc:
Annie Dziergowski- Jacksonville Field Office
Paul Tritaik- Archie Carr National Wildlife Refuge

TRAPPING PROTOCOL FOR BEACH MICE

1. Individuals conducting the trapping must have previous experience in live trapping, handling, and identification of small mammals.

2. Surveys must include the entire dune system within the project area and, if permission can be obtained, adjacent lands with beach mouse habitat. Trapping areas must include all suitable habitat types such as: frontal dunes, secondary dunes, scrub dunes, and dry flats behind dune systems, regardless of distance from the beach.

3. Trapping must be conducted along linear transects with live-traps spaced at 32.8 feet (10 to 15 meter) intervals. Linear transects should be parallel to the frontal dune system, and at least one transect should be placed in each habitat type.

4. Transects must extend the full length of each habitat type except where long blocks of habitat are involved ($\geq$ 2,640 feet/750 meters). In those cases, the habitat may be covered by several non-contiguous transects.

5. Two traps per trapping station are desirable, but one trap per station is acceptable.

6. Traps must be operated for five nights per trapping season or until a beach mouse is caught. At least three nights of trapping should be consecutive.

7. Traps must be checked and all mice released between 12 a.m. and thirty minutes after official sunrise time. All traps should be closed after checking and reset late each afternoon to preclude mortality of mice and other small mammals during the day.

8. When nighttime temperatures are forecast to be <15°C (60°F), a ball of cotton batting (or similar synthetic material) must be placed in each trap for insulation purposes. Trapping should not be conducted when nighttime temperatures are forecast to be <10°C (50°F), without prior coordination from the permitting agencies.

9. Trapping must not be conducted when the moon phase is three-quarters to full, if feasible.

10. Bait must consist of either long-cooking rolled oats, sunflower seeds or safflower seeds.

11. Each trap must be visually inspected before closing to assure no small mammals or other animals are inadvertently left in the trap.
12. Captured mice must be gently released on the ground near protective vegetation immediately adjacent to the trapping station.

13. Any exotic species captured during beach mouse trapping must be euthanized humanely.

14. Presence of beach mice can be documented in a single trapping period, but to determine absence with any degree of certainty will require multiple trapping periods. In that respect, trapping must be conducted seasonally (fall, winter, spring, summer) and in all dune habitats for at least two consecutive years or until mice are caught.

15. All traps must be individually numbered and labeled with identification of ownership.

16. Site description and trapping data must be recorded. The site description must include project location, habitat on the project area and adjacent lands, and trapping design relative to habitat distribution. Daily trapping data must include number of beach mice captured per day, non-target species captured, weather conditions, lost or missing traps, and moon phase. If population data is being collected, sex, age, and reproductive status of beach mice must also be reported. All information must be submitted to the following offices:

Protected Species Permit Coordinator
Bureau of Wildlife Diversity Conservation
Florida Fish and Wildlife Conservation Commission
620 South Meridian Street, Mail Station WLD-BLX
Tallahassee, Florida 32399-1600
(850) 921-5990
Fax (850) 921-1847

Terry J. Doonan
Regional Biologist
Bureau of Wildlife Diversity Conservation
Florida Fish and Wildlife Conservation Commission
3377 East U.S. Highway 90
Lake City, FL 32055

Deputy Field Supervisor
U.S. Fish and Wildlife Service
6620 Southpoint Drive South, Suite 310
Jacksonville, FL 32216
(904) 232-2580
Fax (904) 232-2404

Project BO

Attachment B-2	Document Designation Letter	E

United States Department of the Interior
U. S. FISH AND WILDLIFE SERVICE
7915 BAYMEADOWS WAY, SUITE 200
JACKSONVILLE, FLORIDA 32256-7517

IN REPLY REFER TO:

FWS Log Number: 41910-2009-F-0037

October 20, 2008

Brigadier General Susan Helms
45th Space Wing, 45 CES/CEVP
1224 Edward H. White II Street, MS-7100
Patrick AFB, Florida 32925-3299
(ATTN: Robin Sutherland)

FWS Log Number: 41910-2009-F-0037

Dear General Helms:

This document is the U.S. Fish and Wildlife Service's (Service) modification letter to the biological opinion (05-1125) written on October 19, 2005 and amended on June 26, 2006, based on our review and discussions of the proposed designation of 3,600 linear feet immediately north of the Canaveral Harbor Inlet as an upland borrow source for shore protection along the Patrick Air Force Base (PAFB) ocean shoreline, on Cape Canaveral Air Force Station (CCAFS) in Brevard County, Florida, and its effects on the southeastern beach mouse (*Peromyscus polionotus niveiventris*).

The 45th Space Wing proposes to designate approximately 3,600 linear feet immediately north of the Canaveral Harbor Inlet as an upland borrow source for purposes of shore protection along the PAFB ocean shoreline. The sand from the upland borrow source will be excavated across the beach face into the upland, and truck-hauled to be placed on the shoreline of PAFB. A new dune will be constructed with a seaward toe located approximately 15 to 20 feet behind the landward limit of cut. The dune will be constructed with 25% side slopes and a crest width between 3 and 15 feet, and with elevation between 8 to 13 feet. The dune will be 5 feet high and 2 to 3 cy/ft alongshore. The dune feature will be constructed from the upper 6 to 12 inches of material initially removed from the borrow area, which consists of vegetation, roots, or other

organics. The dune will be vegetated with native plants such as sea oats to recreate beach mouse habitat along the primary and secondary dune.

The Service has modified the Reasonable and Prudent Measures and 'Terms and Condition' written in the biological opinion dated October 19, 2005, and modified on June 26, 2006, based on new information of the habitat within the action area.

The following will replace the 'Reasonable and Prudent Measures' and 'Terms and Conditions' for the southeastern beach mouse in the Biological Opinion dated October 19, 2005 and amended on June 26, 2006. All other parts of the Biological Opinion (05-1125) will remain the same.

Reasonable and Prudent Measures

When providing an incidental take statement the Service is required to give reasonable and prudent measures it considers necessary or appropriate to minimize the take along with terms and conditions that must be complied with, to implement the reasonable and prudent measures. Furthermore, the Service must also specify procedures to be used to handle or dispose of any individuals taken. The Service believes the following reasonable and prudent measures are necessary and appropriate to reduce take:

1. Avoid potential for southeastern beach mice to be injured or killed by heavy equipment and the destruction of burrows.

2. Prior to hurricane season, representatives from the Florida Fish and Wildlife Conservation Commission (FWC), the Service, the University of Central Florida (UCF) and the Air Force, will trap mice within the action area and adjacent areas on CCAFS every two years and translocate them to suitable habitat within the Archie Carr National Wildlife Refuge (ACNWR).

3. Prior to the one-time excavation of the existing dune, conduct a beach mouse habitat assessment of the area of direct impact. Optimal beach mouse habitat must be avoided to the maximum extent practicable.

4. Rebuild the dune and vegetate using native plants. For subsequent excavations avoid this rebuilt dune area.

5. Notify the Service of any unauthorized take of southeastern beach mice.

TERMS AND CONDITIONS

To implement the above reasonable and prudent measures, the Service has outlined the following terms and conditions for incidental take. In accordance with the Interagency Cooperation Regulation (50 CFR 402), these terms and conditions must be complied with to implement the reasonable and prudent measures for incidental take:

1. Avoid potential for southeastern beach mice to be injured or killed by heavy equipment and the destruction of burrows.

2. Prior to hurricane season, representatives from the FWC, the Service, the UCF and the Air Force, will trap mice within the action area and adjacent areas on CCAFS every two years and translocate them to suitable habitat within the ACNWR. The trapping protocol (copy attached) prepared by the Service will be followed. Point 6 of the trapping protocol is modified as follows: "Trapping shall be done for five (5) consecutive nights once every two years". The captured mice will be relocated using a "soft release" technique. The mice will be reintroduced on suitable habitat within the ACNWR, where mice are currently extirpated.

3. Two weeks prior to the excavation of the existing dune, a beach mouse habitat assessment must be conducted within the area of impact. Optimal beach mouse habitat, beach mouse burrows and tracks within the impact area must be mapped. The Air Force must contact the Service with this information and arrange a meeting and site visit to discuss the feasibility of avoiding these areas to the maximum extent practicable.

4. A new primary dune must be rebuilt and vegetated with native plant species following the initial excavation event. The Air Force will not destroy this new primary dune during subsequent excavations. The created dune must be planted with at least three species of appropriate native salt-resistant dune vegetation. Examples along the Atlantic coast include: *Panicum amarum* (panic grass), *Uniola paniculata* (sea oats must be grown from local genetic stock), *Ipomoea stolonifera* (beach morning glory) or *Ipomea pes-caprae* (railroad vine).

5. If a dead southeastern beach mouse is found on the project site, the specimen should be thoroughly soaked in water and frozen, and the applicant should notify the Jacksonville Field Office immediately at (904)731-3336. Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

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. The Service believes that all the southeastern beach mice utilizing areas of dune assess for the rubble removal project along the 3600 linear feet of shoreline will be incidentally taken. 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. The Federal agency must immediately

provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

REINITIATION OF SECTION 7 CONSULTATION

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR Section 402.16, reinitiation of formal consultation is required when 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 agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this biological opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

The above findings and recommendations constitute the report of the Service. If you have any questions, please contact Ann Marie Lauritsen of this office at (904) 525-0661.

Sincerely,

for David L. Hankla
Field Supervisor

Cc:
Annie Dziergowski- Jacksonville Field Office

TRAPPING PROTOCOL FOR BEACH MICE

1. Individuals conducting the trapping must have previous experience in live trapping, handling, and identification of small mammals.

2. Surveys must include the entire dune system within the project area and, if permission can be obtained, adjacent lands with beach mouse habitat. Trapping areas must include all suitable habitat types such as: frontal dunes, secondary dunes, scrub dunes, and dry flats behind dune systems, regardless of distance from the beach.

3. Trapping must be conducted along linear transects with live-traps spaced at 32.8 feet (10 to 15 meter) intervals. Linear transects should be parallel to the frontal dune system, and at least one transect should be placed in each habitat type.

4. Transects must extend the full length of each habitat type except where long blocks of habitat are involved ($\geq$ 2,640 feet/750 meters). In those cases, the habitat may be covered by several non-contiguous transects.

5. Two traps per trapping station are desirable, but one trap per station is acceptable.

6. Traps must be operated for five nights per trapping season or until a beach mouse is caught. At least three nights of trapping should be consecutive.

7. Traps must be checked and all mice released between 12 a.m. and thirty minutes after official sunrise time. All traps should be closed after checking and reset late each afternoon to preclude mortality of mice and other small mammals during the day.

8. When nighttime temperatures are forecast to be <15°C (60°F), a ball of cotton batting (or similar synthetic material) must be placed in each trap for insulation purposes. Trapping should not be conducted when nighttime temperatures are forecast to be <10°C (50°F), without prior coordination from the permitting agencies.

9. Trapping must not be conducted when the moon phase is three-quarters to full, if feasible.

10. Bait must consist of either long-cooking rolled oats, sunflower seeds or safflower seeds.

11. Each trap must be visually inspected before closing to assure no small mammals or other animals are inadvertently left in the trap.
12. Captured mice must be gently released on the ground near protective vegetation immediately adjacent to the trapping station.

13. Any exotic species captured during beach mouse trapping must be euthanized humanely.

14. Presence of beach mice can be documented in a single trapping period, but to determine absence with any degree of certainty will require multiple trapping periods. In that respect, trapping must be conducted seasonally (fall, winter, spring, summer) and in all dune habitats for at least two consecutive years or until mice are caught.

15. All traps must be individually numbered and labeled with identification of ownership.

16. Site description and trapping data must be recorded. The site description must include project location, habitat on the project area and adjacent lands, and trapping design relative to habitat distribution. Daily trapping data must include number of beach mice captured per day, non-target species captured, weather conditions, lost or missing traps, and moon phase. If population data is being collected, sex, age, and reproductive status of beach mice must also be reported. All information must be submitted to the following offices:

Protected Species Permit Coordinator
Bureau of Wildlife Diversity Conservation
Florida Fish and Wildlife Conservation Commission
620 South Meridian Street, Mail Station WLD-BLX
Tallahassee, Florida 32399-1600
(850) 921-5990
Fax (850) 921-1847

Terry J. Doonan
Regional Biologist
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3377 East U.S. Highway 90
Lake City, FL 32055

Deputy Field Supervisor
U.S. Fish and Wildlife Service
6620 Southpoint Drive South, Suite 310
Jacksonville, FL 32216
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Project BO

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
6620 Southpoint Drive, South
Suite 310
Jacksonville, Florida 32216-0912

IN REPLY REFER TO:

FWS Log Number: 41910-2008-F-0148

May 8, 2008

45 SW/CC
Attn: Brigadier General Susan J. Helms
1201 Edward H. White II Street, MS-7100
Patrick AFB, Florida 32925-3299

FWS Log Number: 41910-2008-F-0148

Dear Brigadier Helms:

This document is the U.S. Fish and Wildlife Service's (Service) biological opinion (BO) based on our review of the proposed Skid Strip modification on Cape Canaveral Air Force Station (CCAFS) in Brevard County, Florida, and its effects on the Florida scrub-jay (*Aphelocoma coerulescens*), southeastern beach mouse (*Peromyscus polionotus niveiventris*), eastern indigo snake (*Drymarchon corais couperi*), loggerhead (*Caretta caretta*), green (*Chelonia mydas*), leatherback (*Dermochelys coriacea*), hawksbill (*Eretmochelys imbricata*), and Kemp's ridley (*Lepidochelys kempii*) sea turtles, pursuant to section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). Your request for formal consultation for these species was received on January 15, 2008.

The 45th Space Wing (SW) has determined that the proposed project may affect and is likely to adversely affect the Florida scrub-jay, southeastern beach mouse and the eastern indigo snake. The Service concurs with your determination. The 45th SW also determined that the proposed project may affect but is not likely to adversely affect the loggerhead, green, leatherback, hawksbill, and Kemp's ridley sea turtles. Based on our discussions and review of the project plans, the Service concurs with this determination provided the Light Management Plan for the Skid Strip modification and associated facilities are reviewed and approved by the Service.

This BO is based on information provided in the final Biological Assessment (BA) for the Skid Strip modification received on January 15, 2008, a meeting conducted on July 25, 2006, and March 27, 2007, with representatives from the 45th SW, and the Service, email correspondence on February 12, 2008, and March 10, 2008, with Angy Chambers, a representative of the 45th

SW, and other sources of information. A complete administrative record is on file at the Ecological Services Office in Jacksonville, Florida.

CONSULTATION HISTORY

On July 20, 2001, the Service received a letter requesting informal consultation on the installation of three electronic wind indicators near the east and west terminus and mid-point of the CCAFS existing Skid Strip. In accordance with the CCAFS Scrub Habitat Compensation Plan, compensation for the loss of 25 acres was completed through the restoration (cutting/burning) of 100 acres of mature scrub located on the south portion of CCAFS.

On July 25, 2006, the Service met with representatives of the 45th SW to discuss another project. At that meeting, the Skid Strip was briefly discussed. On March 27, 2007, the Service met with representatives from CCAFS to discuss the Skid Strip. At that meeting, the Service discussed with representatives of the 45th SW the impacts of the proposed project on the scrub-jay recovery goals at CCAFS. Clearing the 410.83 acres of scrub-habitat will not remove them from achieving their recovery goals. The proposed restoration will create two scrub-jay corridors and will take place in addition to the 500 acres of scrub restoration per year using mechanical treatment followed by controlled burning as a goal in the Integrated National Resources Management Plan (INRMP).

On January 15, 2008, the Service received the BA initiating formal consultation on the Skid Strip modification.

Scrub management at CCAFS through prescribed burning has its limitations due to the sensitivity of equipment to smoke in the various facilities. A prescribed burn working group has been established at CCAFS to help resolve some of these issues. On March 10, 2008, the Service received an email from Angy Chambers, a representative of the 45th SW, with information on burn restrictions on the skid strip modification and associated facilities. The new facilities are not expected to have any more control burn restrictions than the current facilities. The current facilities have never restricted prescribed burning windows and that is not expected to change.

The Service notified the representatives of the 45th Space Wing that all the necessary information from the Air Force was received to complete the BO.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Air Force proposes to modify and expand the Skid Strip (runway/airfield) at CCAFS in Brevard County, Florida. The Skid Strip at CCAFS was originally constructed in 1952 as a missile Landing Facility. Aircrafts used the runway for take-offs and landings. In 1994, property category code change and application of guidance occurred for the skid strip. Operational deficiencies were found and an initial phase of corrective actions was taken to

eliminate immediate concerns. Remaining deficiencies and longer term projects to support growth and planning strategies were developed.

The proposed action consists of several projects schedules to begin in the fiscal year 2008 and end in the fiscal year 2017. These projects consist of construction of a new apron, air traffic control tower, airfield operations building, and removal of vegetation that currently violates airfield criteria. The vegetation located within the airfield surface zone must be removed to bring the airfield into compliance with certain criteria that require no obstructions to be located within a certain distance around the entire airfield, as well as the approach and departure zones. The new facilities are meant to bring the airfield up to current standards.

The action area (area including all direct and indirect effects), for the purpose of this consultation, will include all of CCAFS. The perimeter of the airfield is located in the central portion of CCAFS. Currently, regularly mowed and maintained grasses are found approximately 500 feet from the centerline of the runway. The remaining vegetation beyond this is forested and categorized as coastal/oak scrub. Along the southeastern side of the airfield, the coastal strand indicator species such as wax myrtle (*Myrica cerifera*) are found in higher densities. The vegetation types have developed into a closed canopy, and tree heights are typical in a xeric hammock. Fifty years of fire suppression at CCAFS has created this expansive hammock scrub.

The coastal/oak scrub around the airfield consists of oaks with a maximum height of approximately 25 feet to 30 feet. Tree-sized cabbage palms (*Sabal palmetto*) and red bays (*Persea borbonia*) are interspersed with shrubby saw palmetto (*Serenoa repens*), wax myrtle, tough buckthorn (*Bumelia tenax*), nakedwood (*Myrsianthes fragrans*) and rusty lyonia (*Lyonia ferruginea*). All areas surrounding the airfield, excluding treated scrub and some disturbed areas, range from 5 feet to 30 feet in height. The extreme western edge of the airfield is the only area that has undergone scrub restoration treatment. The canopy of these areas is low-stature, averaging approximately 5 feet to 15 feet.

The clearing of vegetation around the airfield will be phased over several years, with the first proposed project to begin in the later part of 2008. The total clearing of the vegetation around the airfield will result in the removal of just over 373 acres. The construction of the new facilities proposed will occur in fiscal year 2012 and will result in the removal of approximately 37 acres if vegetation.

Table 1. Acreage and location of vegetation removal for Skid Strip modification on CCAFS.

Area	**Acreage**	**Land Management Units Impacted (LMU)**	**Proposed fiscal year**
Area 1	57.27	72, 73	2009
Area 2	56.57	38, 39, 49	2010
Area 3	27.07	73	2010
Area 4	20.61	70, 72	2010
Area 5	26.30	75	2011
Area 6	37.94	65, 70, 71	2012

Area 7	37.00	66	2012
Area 8	26.30	75	2013
Area 9	46.68	66	2014
Area 10	32.04	47	2015
Area 11	18.31	66	2016
Area 12	24.74	48	2017
TOTAL ACREAGE 410.83			

The amount of scrub habitat or degraded scrub habitat to be removed for the proposed project is 410.83 acres. All of this habitat was or is oak scrub.

Currently, LMU 38, 39, 66, 48 and 49 is occupied by scrub-jays. This includes five groups of scrub-jays totally 12 individual birds documented in these areas.

Conservation measures agreed to by CCAFS include restoration of the following LMUs:

Table 2. Proposed Restoration acreage for each LMU.

Area	**Land Management Units Impacted (LMU)**	**Proposed fiscal year**	**Proposed Restoration LMUs**	**Proposed Restoration Acreage**
Area 1	72, 73	2009	72, 89	121.66
Area 2	38, 39, 49	2010	40, 36, 37, 38	178.98
Area 3	73	2010	74	68.74
Area 4	70, 72	2010	65	46.05
Area 5	75	2011	76	54.48
Area 6	65, 70, 71	2012	70	165.89
Area 7	66	2012	67, 78	54.91
Area 8	75	2013	78	63.75
Area 9	66	2014	66, 79	61.20
Area 10	47	2015	55, 36	103.98
Area 11	66	2016	33	71.06
Area 12	48	17	84, 48	166.78
TOTAL ACREAGE 410.83			**TOTAL RESTORATION ACREAGE 1157.48**	

The Air Force proposes to restore unoccupied scrub-jay habitat at a ratio of 3:1. Before any clearing is conducted on scrub-jay occupied areas, the LMU adjacent to the impacted area proposed for restoration will be conducted. The proposed areas to be restored will help create two scrub-jay corridors. The first will connect the population of scrub-jays along Phillips Parkway and Pier Road with the population to the north. The second will connect the population

along Phillips Parkways to that along Pier Road. A combination of mechanical treatments and prescribed burning will be used to restore the habitat.

The new facilities associated with the skid strip are not expected to have any more burn restrictions than the current facilities on CCAFS. The current facilities have never restricted prescribed burning and this is not expected to change with the additional facilities.

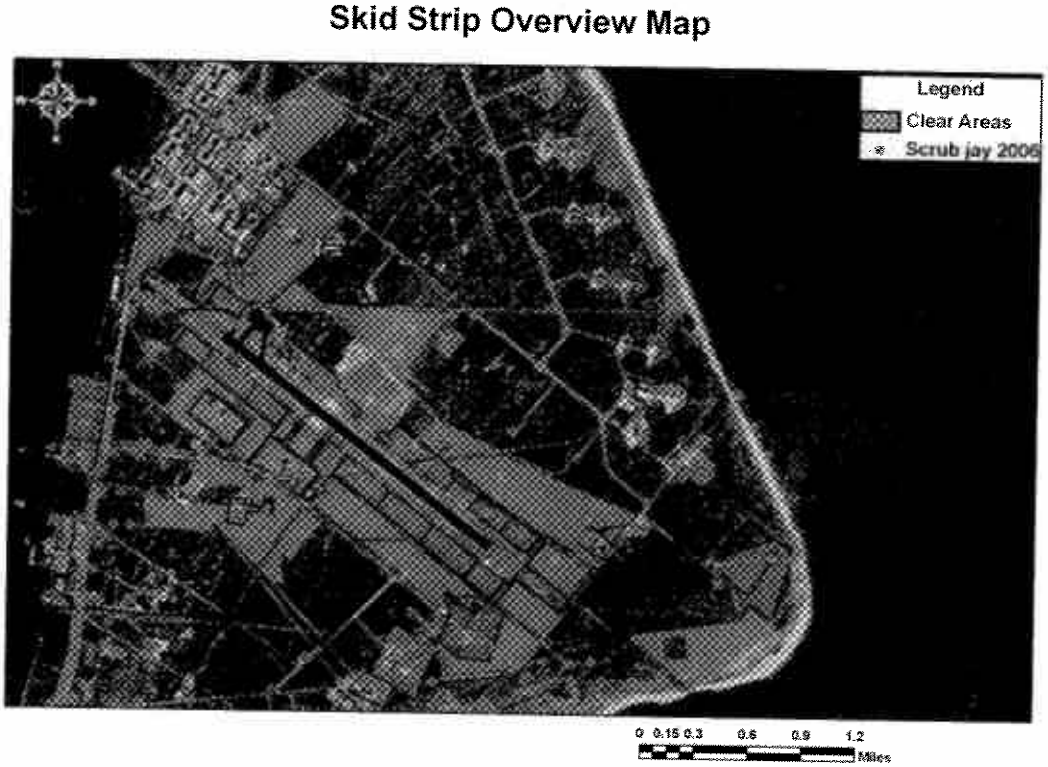

Figure 1. Overlay of Skid Strip and scrub-jay occupied areas on CCAFS.

STATUS OF THE SPECIES/CRITICAL HABITAT

This section provides pertinent biological and ecological information for the Florida scrub-jay, southeastern beach mouse, and eastern indigo snake, as well as information about their status and trends throughout their entire range. We use this information to assess whether a federal action is likely to jeopardize the continued existence of the above-mentioned species. The "Environmental Baseline" section summarizes information on status and trends of the Florida scrub-jay, southeastern beach mouse, and eastern indigo snake specifically within the action area. These summaries provide the foundation for our assessment of the effects of the proposed action, as presented in the "Effects of the Action" section.

FLORIDA SCRUB-JAY (*APHELOCOMA COERULESCENS*)

Species/Critical Habitat Description

Florida scrub-jays are about 10 to 12 inches long and weigh about 3 ounces. They are similar in size and shape to the blue jay (*Cyanocitta cristata*), but differ significantly in coloration (Woolfenden and Fitzpatrick 1996a). Unlike the blue jay, the scrub-jay lacks a crest. It also lacks the conspicuous white-tipped wing and tail feathers, black barring, and bridle of the blue jay. The Florida scrub-jay's head, nape, wings, and tail are pale blue, and its body is pale grey on its back and belly. Its throat and upper breast are lightly striped and bordered by a pale blue-grey "bib." Scrub-jay sexes are not distinguishable by plumage, and males, on the average, are only slightly larger than females (Woolfenden 1978). The sexes may be differentiated by a distinct "hiccup" call vocalized only by females (Woolfenden and Fitzpatrick 1986). Scrub-jays that are less than about five months of age are easily distinguishable from adults; their plumage is smokey grey on the head and back, and they lack the blue crown and nape of adults. Molting occurs between early June and late November and peaks between mid-July and late September (Bancroft and Woolfenden 1982). During late summer and early fall, when the first basic molt is nearly done, fledgling scrub-jays may be indistinguishable from adults in the field (Woolfenden and Fitzpatrick 1984). The wide variety of vocalizations of the scrub-jay is described in detail in Woolfenden and Fitzpatrick (1996b).

No critical habitat has been designated for this species; therefore none will be affected by the proposed project.

Life History/Population Dynamics

Scrub-jays are non-migratory, extremely sedentary, and have very specific habitat requirements (Woolfenden 1978). They usually reside in oak scrub vegetated with sand live oak, myrtle oak, inopine oak, and Chapman oak, along with saw palmetto, scrub palmetto, scattered sand pine, and rosemary. Such habitat occurs only on fine, white, drained sand, along the coastlines in Florida, and in dunes deposited during the Pleistocene, when sea levels were much higher than at present (Laessle 1958, 1968). Scrub-jays are rarely found in habitats with more than 50 percent canopy cover over three meters in height (U.S. Fish and Wildlife Service 1990). The habitat required for the scrub-jay greatly restricts the bird's distribution. Active management either through burning or mechanical clearing is necessary to maintain optimum conditions. In general, scrub-jay habitat consists of dense thickets of scrub oaks less than nine feet tall, interspersed with bare sand used for foraging and storing of acorns (U.S. Fish and Wildlife Service 1990).

Florida scrub-jays are monogamous and remain mated throughout the year (Sprunt 1946; Woolfenden 1978). Scrub-jays have a social structure that involves cooperative breeding, a trait that the other North American species of scrub-jays do not show (Woolfenden and Fitzpatrick 1984). Scrub-jays live in families ranging from two birds (a single mated pair) to extended families of eight adults and one to four juveniles. Fledgling scrub-jays stay with the breeding pair in their natal territory as "helpers, forming a closely-knit cooperative family group. Pre-breeding numbers are generally reduced to either a pair with no helpers or families of three to four individuals (a pair plus one or two helpers). The presence of helpers generally increases

reproductive success and survival within the group, which naturally causes family size to increase (Woolfenden and Fitzpatrick 1978).

Scrub-jays have a well-developed intrafamilial dominance hierarchy with breeder males most dominant, followed by helper males, breeder females, and finally, female helpers (Woolfenden and Fitzpatrick 1977). Helpers take part in sentinel duties (McGowan and Woolfenden 1989), territorial defense, predator-mobbing, and the feeding of both nestlings (Stallcup and Woolfenden 1978) and fledglings (McGowan and Woolfenden 1990). The well-developed sentinel system involves having one individual occupying an exposed perch watching for predators or territory intruders. When a predator is seen, the sentinel scrub-jay gives a distinctive warning call, and all family members seek cover in dense shrub vegetation (Fitzpatrick *et al.* 1991).

Florida scrub-jay pairs occupy year-round, multi-purpose territories (Woolfenden and Fitzpatrick 1984; Fitzpatrick *et al.* 1991). Territory size averages 22 to 25 acres, with a minimum size of about 12 acres. The availability of territories is a limiting factor for scrub-jay populations. Because of this limitation, non-breeding adult males may stay at the natal territory as helpers for up to five years, waiting for either a mate or territory to become available (Fitzpatrick *et al.* 1991). Birds may become breeders in several ways: (1) by replacing a lost breeder on a non-natal territory (Woolfenden and Fitzpatrick 1984); (2) through "territorial budding," where a helper male becomes a breeder in a segment of its natal territory (Woolfenden and Fitzpatrick 1978); (3) by inheriting a natal territory following the death of a breeder; (4) by establishing a new territory between existing territories (Woolfenden and Fitzpatrick 1984); or (5) through "adoption" of an unrelated helper by a neighboring family followed by resident mate replacement (B. Toland, USFWS, pers. comm. 1996). Territories can also be created by restoring habitat through effective habitat management efforts in areas that are overgrown (Thaxton and Hingtgen 1994).

To become a breeder, a scrub-jay must find a territory and a mate. Evidence presented by Woolfenden and Fitzpatrick (1984) suggests that scrub-jays are monogamous. The pair retains ownership and sole breeding privileges in its particular territory year after year. Courtship to form the pair is lengthy and ritualized, and involves posturing and vocalizations made by the male to the female (Woolfenden and Fitzpatrick 1996b). Copulation between the pair is generally out of sight of other scrub-jays (Woolfenden and Fitzpatrick 1984). These authors also reported never observing copulation between unpaired scrub-jays or courtship behavior between a female and a scrub-jay other than her mate. Age at first breeding in the scrub-jay varies from one to seven years, although most individuals become breeders between two and four years of age (Fitzpatrick and Woolfenden 1988). Persistent breeding populations of scrub-jays exist only where there are scrub oaks in sufficient quantities to provide an ample winter acorn supply, cover from predators, and nest sites during spring (Woolfenden and Fitzpatrick 1996a).

Nesting is synchronous, normally occurring from 1 March through 30 June (Woolfenden and Fitzpatrick 1990; Fitzpatrick *et al.* 1991). On the Atlantic Coastal Ridge and southern Gulf coast, nesting may be protracted through the end of July (B. Toland, USFWS, pers. comm.. 1996; J. Thaxton, Uplands, Inc., pers.comm. 1998). In suburban habitats, nesting is consistently

initiated earlier (March) than in natural scrub habitat (Fleischer 1996), although the reason for this difference is unknown.

Clutch size ranges from 1 to 5 eggs, but is typically 3 or 4 eggs. Clutch size is generally larger (up to 6 eggs) in suburban habitats, and the birds try to rear more broods per year (Fleischer 1996). Eggs are incubated for 17 to 18 days, and fledging occurs 16 to 21 days after hatching (Woolfenden 1974, 1978; Fitzpatrick *et al.* 1991). Only the breeding female incubates and broods eggs and nestlings (Woolfenden and Fitzpatrick 1984). Annual productivity must average at least two fledged per pair for a population of scrub-jays to support long-term stability (Woolfenden and Fitzpatrick 1990; Fitzpatrick *et al.* 1991).

Fledglings depend upon adults for food for about 10 weeks, during, which time they are fed by both breeders and helpers (Woolfenden 1975; McGowan and Woolfenden 1990). Survival of scrub-jay fledglings to yearling age class averages about 35 percent in optimal scrub, while annual survival of both adult males and females averages about 80 percent (Fitzpatrick *et al.* unpubl. data). Data from Archbold Biological Station, however, suggest that survival and reproductive success of scrub-jays in sub-optimal habitat is substantially lower (Woolfenden and Fitzpatrick 1991). These data help explain why local populations inhabiting unburned, late successional habitats become extirpated. The longest observed lifespan of a Florida scrub-jay is 15.5 years at Archbold Biological Station in Highlands County (Woolfenden and Fitzpatrick 1996b).

Scrub-jays are nonmigratory and permanently territorial. Juveniles stay in their natal (Woolfenden and Fitzpatrick 1984). Once scrub-jays pair and become breeders, they stay on their breeding territory until death. In suitable habitat, fewer than five percent of scrub-jays disperse more than five miles (Fitzpatrick *et al.* 1991). All documented long distance dispersals have been in unsuitable habitat such as woodland, pasture, or suburban plantations. Scrub-jay dispersal behavior is affected by intervening land uses. Protected scrub habitats will most effectively sustain scrub-jay populations if they are located within surrounding habitat types that can be used and traversed by scrub-jays.

Brushy pastures, scrubby corridors along railways and road rights-of-way, and open burned flatwoods offer links for colonization among scrub-jay subpopulations. Stith *et al.* (1996) believed that a dispersal distance of five miles is close to the biological maximum for scrub-jays.

Scrub-jays forage mostly on or near the ground, often along the edge of natural or man-made openings. They visually search for food by hopping or running along the ground beneath the scrub or by jumping from shrub to shrub. Insects, particularly orthopterans (e.g., locusts, crickets, grasshoppers, beetles) and lepidopteran (e.g., butterfly and moth) larvae, form most of the animal diet throughout most of the year (Woolfenden and Fitzpatrick 1984). Acorns are the most important plant food (Fitzpatrick *et al.* 1991). From August to November each year, scrub-jays may harvest and cache 6,000 to 8,000 oak acorns throughout their territory . It is estimated that 1/3 of these acorns are later recovered and eaten. Caching allows scrub-jays to eat acorns every month of the year. This reliance on acorns and caching may constitute a major reason for the scrub-jay's restriction to the oak scrub and sandy ridges within Florida (Fitzpatrick *et al.* 1991).

Status and Distribution

The Florida scrub-jay is found exclusively in peninsular Florida, and is restricted to scrub habitat (U.S. Fish and Wildlife Service 1990). The Florida scrub-jay was listed as a threatened species on June 3, 1987 (52 FR 20715-20719). The main causes responsible for the decline were as follows:

The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range: The existence of scrub-jays throughout their range depends on the existence of a particular seral stage of oak scrub habitat with unvegetated openings in sandy soils. This habitat occurs naturally only in localized patches associated with recent or ancient shoreline deposits. By the time of listing, large proportions of these habitat patches had been converted for human use, or were slated for imminent conversion. Most of the coastal scrub habitat had already been cleared for beachfront hotels, houses, and condominiums, and much of the central Florida scrub had been converted to citrus groves, housing developments, and commercial real estate. It was estimated that 40 percent of occupied scrub habitat had already been converted to other uses, and total population of the species had declined by at least half. As a result of rapid increase in human population numbers throughout central Florida, the pace of housing and agricultural development had accelerated since the 1960s, and it showed no signs of slowing.

Overutilization for Commercial, Recreational, Scientific, or Educational Purposes: Reported shooting of scrub-jays and collection of the species as pets were considered threats.

Disease or Predation: Disease and predation were not believed to be major threats at the time of listing.

The Inadequacy of Existing Regulatory Mechanisms: The only laws protecting the Florida scrub-jay prior to the time of listing were the Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. 703 *et seq.*) and Florida State Law (Chapter 68A-27.004, Florida Administrative Code). Neither of these laws protected the birds from habitat destruction, which constituted the major threat to the species.

Other Natural or Manmade Factors Affecting its Continued Existence: Suppression of fire by humans was identified as a factor in species' decline at the time of the listing. Historically, lightning strikes started fires, which maintained the sparse low scrub habitat needed by Florida scrub-jays. Human efforts to suppress these fires to protect human interests allowed the scrub to become too dense and tall to support populations of scrub-jays. Vehicular mortality of scrub-jays due to accidental collisions along roadsides was recognized as a cause of the decline in some parts of the species' range.

Continued and current threats to the species include:

The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range: Scrub habitats continued to decline throughout peninsular Florida since listing occurred, and habitat destruction continues to be one of the main threats to the Florida scrub-jay. Cox (1987) noted local extirpations and major decreases in numbers of scrub-jays and attributed them to the

clearing of scrub for housing and citrus groves. Eighty percent or more of the scrub habitats have been destroyed along the Lake Wales Ridge since pre-human settlement (Fitzpatrick *et al.* 1991). Fernald (1989), Fitzpatrick *et al.* (1991, 1994), and Woolfenden and Fitzpatrick (1996a) noted that habitat losses due to agriculture, silviculture, and commercial and residential development have continued to play a role in the decline in numbers of scrub-jays throughout the state. State-wide, estimates of scrub habitat loss range from 70 to 90 percent (Bergen 1994; Woolfenden and Fitzpatrick 1996a; Fitzpatrick *et al.* unpubl. data).

Toland (1999) estimated that about 85 percent of pre-European settlement scrub habitats had been converted to other uses in Brevard County. This is due mainly to development activity and citrus conversion, which were the most important factors that contributed to the scrub-jay decline between 1940 and 1990. A total of only 10,656 acres of scrub and scrubby flatwoods remain in Brevard County (excluding federal ownership), of which only 1,600 acres (15 percent) is in public ownership for the purposes of conservation. Less than 1,977 acres of an estimated pre-settlement of 14,826 acres of scrubby flatwoods habitat remain in Sarasota County, mostly occurring in patches averaging less than 2.5 acres in size (Thaxton and Hingtgen 1996). Only 10,673 acres of viable coastal scrubby flatwoods remained in the Treasure Coast region of Florida (Indian River, Saint Lucie, Martin, and Palm Beach Counties) according to Fernald (1989). He estimated that 95 percent of scrub had already been destroyed for development purposes in Palm Beach County.

Habitat destruction not only reduces the amount of area scrub-jays can occupy, but also increases fragmentation of habitat. As more scrub habitat is altered, the habitat is cut into smaller and smaller pieces, separated from other patches by larger distances; such fragmentation increases the probability of genetic isolation, which is likely to increase extinction probability (Fitzpatrick *et al.* 1991; Woolfenden and Fitzpatrick 1991; Snodgrass *et al.* 1993; Stith *et al.* 1996; Thaxton and Hingtgen 1996). Dispersal distances of scrub-jays in fragmented habitat are further than in optimal unfragmented habitats, and demographic success is poor (Thaxton and Hingtgen 1996; Breininger 1999).

Overutilization for Commercial, Recreational, Scientific, or Educational Purposes: The Service knows of only a few cases where scrub-jays have been shot. One was in Volusia County which was investigated and prosecuted under the MBTA (J. Oliveros, USFWS, pers. comm.). The Florida Fish and Wildlife Conservation Commission (FWC) investigated a case in which three scrub-jays were shot in Highlands County (N. Douglass, FWC, pers. comm.). It does not seem that the small number and infrequent occurrence of scrub-jays taken in this manner has had an impact on the species.

Disease or Predation: Most Florida scrub-jays mortality probably is from predation (Woolfenden and Fitzpatrick 1996b). The second most frequent cause may be disease, or predation on disease-weakened jays (Woolfenden and Fitzpatrick 1996b). Known predators of Florida scrub-jays are listed by Woolfenden and Fitzpatrick (1990), Fitzpatrick *et al.* (1991), Breininger (1999), and K. Miller (FWC, in litt. 2004); the list includes eastern coachwhip (*Masticophis flagellum*, known to eat adults, nestlings, and fledglings), eastern indigo snake (*Drymarchon corais couperi*, known to eat adults and fledglings), rat snake (*Elaphe obsolete*), and corn snake (*E. guttata*). Mammalian predators include bobcats (*Lynx rufus*), raccoons (*Procyon lotor*),

sometimes cotton rats (*Sigmodon hispidus*, known to eat eggs), and domestic cats (*Felis cattus*, known to eat adults). Franzreb and Puschock (2004) also have documented spotted skunks (*Spilogale putorius*) and grey fox (*Urocyon cinereoargenteus*) as mammalian predators of scrub-jay nests. Fitzpatrick *et al.* (1991) suspect that populations of domestic cats are able to eliminate small populations of scrub-jays. Avian nest predators include great horned owls (*Bubo virginianus*), eastern screech-owl (*Otus asio*), red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), fish crow (*Corvus ossifragus*), boat-tailed grackle (*Quiscalus major*), common grackle (*Q. quiscula*), American crow (*C. brachyrhynchos*), blue jay (*Cyanocitta cristata*), and swallow-tailed kites (*Elanoides forficatus*). Fitzpatrick *et al.* (1991) reported that overgrown scrub habitats are often occupied by the blue jay, which may be one factor limiting scrub-jay populations in such areas. Raptors which seem to be important predators of adult scrub-jays are merlin (*Falco columbarius*), sharp-shinned hawk (*Accipiter striatus*), and Cooper's hawk (*A. cooperii*), and northern harrier. During migration and winter, these four raptor species are present in areas which contain scrub habitat, and scrub-jays may experience frequent confrontations (as many as one pursuit a day) with them (Woolfenden and Fitzpatrick 1990). In coastal scrub, Woolfenden and Fitzpatrick (1996b) report that scrub-jays are vulnerable to predation by raptors in October, March, and April, when high densities of migrating accipiters and falcons are present. Woolfenden and Fitzpatrick (1996b) and Toland (1999) suggest that in overgrown scrub habitats, hunting efficiency for scrub-jay predators is increased. Bowman and Averill (1993) noted that scrub-jays occupying fragments of scrub found in or near housing developments were more prone to predation by house cats and competition from blue jays and mockingbirds. Woolfenden and Fitzpatrick (1996a, 1996b) stated that proximity to housing developments (and increased exposure to domestic cats) needs to be taken into consideration when designing scrub preserves. Young scrub-jays are especially vulnerable to ground predators (e.g., snakes and mammals) before they are fully capable of sustained flight.

The Florida scrub-jay hosts 2 protozoan blood parasites (*Plasmodium cathemerium* and *Haemoproteus danilewskyi*), but incidence is low (M. Garvin pers. comm., cited in Woolfenden and Fitzpatrick 1996b). Several scrub-jays sick from these two agents in March 1992 survived to become breeders. The Florida scrub-jay carries at least 3 types of mosquito-borne encephalitis (St. Louis, eastern equine, and "Highlands jay"; M. Garvin and J. Day pers. comm., cited in Woolfenden and Fitzpatrick 1996b). Of particular concern is the arrival of West Nile virus (the agent of another type of encephalitis) in Florida during 2001; since corvids have been particularly susceptible to the disease in states north of Florida, it is expected that scrub-jays will be affected.

Woolfenden and Fitzpatrick (1996b) noted 3 episodes of elevated mortality (especially among juveniles) in 26 years at Archbold Biological Station. Each of these incidents occurred in conjunction with elevated water levels following unusually heavy rains in the fall, although high mortality does not occur in all such years. During the most severe of these presumed epidemics (August 1979 through March 1980), all but one of the juvenile cohort and almost half of the breeding adults died (Woolfenden and Fitzpatrick 1984; Woolfenden and Fitzpatrick 1990). The 1979-1980 incident coincided with a known outbreak of eastern equine encephalitis among domestic birds in central Florida (J. Day pers. comm., cited in Woolfenden and Fitzpatrick 1996b). From the fall of 1997 through the spring of 1998, the continuing population decline of

Florida scrub-jays along the Atlantic coast and in central Florida may have been augmented by an epidemic of unknown origin (Breininger 1999).

At CCAFS, Stevens and Hardesty (1999) noted a decline in juvenile survival from 60 to 70 percent in the preceding years to only 16 percent in 1997-98. It stayed low (only 25 percent) in 1998-99 before again climbing into the mid-60 percent range. Also, adult survival dropped from 70 to 80 percent survival in the preceding years to 50 to 60 percent in 1997-98. Overall, their annual surveys documented the largest one-year drop (pairs decreased by 17 percent and birds by 20 percent) in this population at the same time as the presumed state-wide epidemic.

In winter-summer of 1973, 15 species of helminth fauna (including 8 nematodes, 5 trematodes, 1 cestode, and 1 acanthocephalan) were found in 45 Florida scrub-jays collected in south-central Florida; the parasite load was attributed to a varied arthropod diet (Kinsella 1974). These naturally-occurring parasites are not believed to have a negative impact on scrub-jay population levels.

Larvae of a fly, *Philornis* (= *Neomusca*) *porteri*, occur irregularly on scrub-jay nestlings. The species pupates in the base of the nest; larvae locate in nares, mouth flanges, bases of remiges, and toes; apparently no serious effect on the scrub-jay host occurs (Woolfenden and Fitpatrick 1996b). Additionally, one indescribable chewing louse (*Myrsidea* sp., R. Price pers. comm., cited in Woolfenden and Fitzpatrick 1996b), one wing-feather mite (*Pterodectes* sp.), two chiggers (*Eutrombicula lipovskyana*), and a flea (*Echidnophaga gallinacea*; J. Kinsella pers. comm., cited in Woolfenden and Fitzpatrick 1996b) occur on some individuals, usually at low densities. Nymphs and larvae of four ticks (*Amblyomma americanum*, *A. tuberculatum*, *Haemaphysalis leporispalustris*, and *Ixodes scapularis*) are known to occur on scrub-jays, as well as the larvae of the tick *Amblyomma maculatum* (L. Durden and J. Keirans pers. comm., cited in Woolfenden and Fitzpatrick 1996b). These naturally occurring parasites are not believed to have a negative impact on scrub-jay population levels.

The Inadequacy of Existing Regulatory Mechanisms: Woolfenden and Fitzpatrick (1996a) state the importance of enforcing existing federal laws regarding the management of federal lands as natural ecosystems for the long-term survival of the Florida scrub-jay. The Service consults regularly on activities on federal lands which may affect scrub-jays and also works with private landowners through section 10(a) (1) (B) incidental take permitting process of the Act when take is likely to occur and no federal nexus is present. Florida's State Comprehensive Plan and Growth Management Act of 1985 is administered mostly by regional and local governments. Regional Planning Councils administer the law through Development of Regional Impact Reviews; at the local level, although comprehensive plans contain policy statements and natural resource protection objectives, they are only effective if counties enact and enforce ordinances. As a general rule, counties have not enacted and/or enforced ordinances that are effective in protecting scrub-jays (Fernald 1989).

The Wildlife Code of the state of Florida (Chapter 68A, Florida Administrative Code) prohibits taking of individuals of threatened species, or parts thereof, or their nests or eggs, except as authorized. The statute does not prohibit clearing of habitat occupied by protected species, which limits the ability of the FWC to protect the Florida scrub-jay and its habitat.

Other Natural or Manmade Factors Affecting its Continued Existence: Human interference with natural fire regimes has continued to play a major part in the decline of the scrub-jay and today may exceed habitat loss as the single most important factor (Woolfenden and Fitzpatrick 1991, 1996a; Fitzpatrick *et al.* 1994). Lightning strikes cause virtually all naturally-occurring fires in south Florida scrub habitat (Abrahamson 1984; Hofstetter 1984). Fire has been noted to be important in maintenance of scrub habitat for decades (Nash 1895; Harper 1927; Webber 1935; Davis 1943; Laessle 1968; Abrahamson *et al.* 1984). Human efforts to prevent and/or control natural fires have allowed the scrub to become too dense and tall to support populations of scrub-jays, resulting in the decline of local populations of scrub-jays throughout the state (Fernald 1989; Fitzpatrick *et al.* 1994; Percival *et al.* 1995; Stith *et al.* 1996; Thaxton and Hingtgen 1996; Woolfenden and Fitzpatrick 1990, 1996a; Toland 1999). Woolfenden and Fitzpatrick (1996a) cautioned, however, that fire applied too often to scrub habitat also can result in local extirpations. Experimental data at Archbold Biological Station (Fitzpatrick and Woolfenden, unpubl. data) show that fire-return intervals varying between 5 and 15 years are optimal for long-term maintenance of productive Florida scrub-jay populations in central Florida. These intervals also correspond with those yielding healthy populations of listed scrub plants (Menges and Kohfeldt 1995; Menges and Hawkes 1998). Optimal fire-return intervals may, however, be shorter in coastal habitats (Breininger and Schmalzer 1990; Schmalzer and Hinkle 1992a, b; Breininger *et al.* 1995, 1998).

Stith *et al.* (1996) estimated that at least 2,100 breeding pairs were living in overgrown habitat. Toland (1999) reported that most of Brevard County's remaining scrub (estimated to be only 15 percent of the original acreage) is extremely overgrown due to fire suppression. He further suggests that the overgrowth of scrub habitats reduces the number and size of sand openings which are crucial to not only scrub-jays, but also many other scrub plants and animals. Reduction in the number of potential scrub-jay nesting sites, acorn cache sites, and foraging sites presents a problem for scrub-jays. Fernald (1989) reported that overgrowth of scrub results not only in the decline of species diversity and abundance but also a reduction in the percentage of open sandy patches (Fernald 1989; Woolfenden and Fitzpatrick 1996b). Fitzpatrick *et al.* (1994) believed that fire suppression was just as responsible as habitat loss in the decline of the scrub-jay, especially in the northern third of its range. Likewise, the continued population decline of scrub-jays within Brevard County between 1991 and 1999 has been attributed mainly to the overgrowth of remaining habitat patches (Breininger *et al.* 2001). Breininger *et al.* (1999a) concluded that optimal habitat management is essential in fragmented ecosystems maintained by periodic fire, especially to lessen risks of decline and extinction resulting from epidemics and hurricanes.

Fitzpatrick *et al.* (1991, 1994) and Woolfenden and Fitzpatrick (1996a) expressed concern for the management practices taking place on federal lands at Ocala National Forest, MINWR/KSC, and CCAFS, all supporting large contiguous populations of Florida scrub-jays. They predicted that fire suppression and/or too frequent fires (on the latter two) and silvicultural activities involving the cultivation of sand pine on Ocala National Forest would be responsible for continuing decline of scrub-jays in these large contiguous areas of scrub. These areas should be those where populations are most secure because of federal agencies' responsibilities under section 7(a) (1) of the Act. Monitoring of scrub-jay populations, demography, and nesting

success is ongoing on all of these properties to assess the effectiveness of management practices in meeting scrub-jay recovery objectives.

Housing and commercial developments within scrub habitats are accompanied by the development of roads. Since scrub-jays often forage along roadsides and other openings in the scrub, they are often killed by passing cars. Research by Mumme *et al.* (2000) along a two-lane paved road indicated that clusters of Florida scrub-jay territories found next to the roadside represented population sinks (breeder mortality exceeds production of breeding-aged recruits), which could be supported only by immigration. Since this species may be attracted to roadsides because of the open habitat characteristics, road mortality presents a significant and growing management problem throughout the remaining range of the Florida scrub-jay (Dreschel *et al.* 1990; Mumme *et al.* 2000), and proximity to high-speed paved roads needs to be considered when designing scrub preserves (Woolfenden and Fitzpatrick 1996a).

Another potential problem in suburban areas supporting Florida scrub-jays is supplemental feeding by humans (Bowman and Averill 1993; R. Bowman unpubl. data, cited in Woolfenden and Fitzpatrick 1996a; Bowman 1998). The presence of additional food may allow scrub-jays to persist in fragmented habitats, but recruitment in these populations is lower than in native habitats. However, even though human-feeding may postpone local extirpations, long-term survival cannot be ensured in the absence of protecting native oak scrub habitat, necessary for nesting.

Scrub-jays in suburban settings often nest high in tall shrubbery. During March winds, these nests tend to be susceptible to destruction (R. Bowman and G.E. Woolfenden unpubl data, cited in Woolfenden and Fitzpatrick 1996b; Bowman 1998).

Hurricanes pose a potential risk for Florida scrub-jays, although the exact impact of such catastrophic events remains unknown. Breininger *et al.* (1999b) modeled the effects of epidemics and hurricanes on scrub-jay populations in varying levels of habitat quality. Small populations of scrub-jays are more vulnerable to extirpation where epidemics and hurricanes are common. Storm surge from a category 3 to 5 hurricane could inundate entire small populations of scrub-jays, and existing habitat fragmentation could prevent repopulation of affected areas. However, this model also predicted that long-term habitat degradation had greater influence on extinction risk than hurricanes or epidemics.

Fernald (1989) reported that many of the relatively few remaining patches of scrub within the Treasure Coast region of Florida had been degraded by trails created by off-road vehicles, illegal dumping of construction debris, abandoned cars and appliances, or household waste. The invasion of these areas by exotic species, including Brazilian pepper (*Schinus terebinthifolius*), cypress pine (*Callitris* sp.), and Australian pine (*Casuarina equisetifolia*) also was a problem. Other human-induced impacts identified by Fernald include the introduction of domestic dogs (*Canis familiaris*) and cats, black rats (*Rattus rattus*), greenhouse frogs (*Eleutherodactylus planirostris*), giant toads (*Bufo marinus*), Cuban tree frogs (*Osteopilus septentrionalis*), brown anoles (*Anolis sagrei*), and other exotic animal species. These exotic species may compete with scrub-jays for both space and food, although scrub-jays sometimes feed on them.

A statewide scrub-jay census was last conducted in 1992-1993, at which time there were an estimated 4,000 pairs of scrub-jays left in the Florida (Fitzpatrick *et al.* 1994). The scrub-jay was considered extirpated in 10 counties (Alachua, Broward, Clay, Dade, Duval, Gilchrist, Hernando, Hendry, Pinellas, and St. Johns), and were considered functionally extinct in an additional 5 counties (Flagler, Hardee, Levy, Orange, and Putnam), where ten or fewer pairs remained. Recent information indicates that there are at least 12 to 14 breeding pairs of scrub-jays located within Levy County, higher than previously though (K. Miller, FWC, pers. comm.. 2004), and there is at least one breeding pair of scrub-jays remaining in Clay County (K. Miller, FWC, pers. comm.. 2004). A scrub-jay has been documented in St. Johns County as recently as 2003 (J.B. Miller, FDEP, in litt. 5/13/03). Populations are close to becoming extirpated in Gulf coast counties (from Levy south to Collier) (Fitzpatrick *et al.* 1994; Woolfenden and Fitzpatrick 1996a). In 1992-1993, population numbers in 19 of the counties were below 30 or fewer breeding pairs. In the past, most of these counties would have contained hundreds or even thousands of groups (Fitzpatrick *et al.* 1994). Based on the amount of destroyed scrub habitat, scrub-jay population loss along the Lake Wales Ridge is 80 percent or more since pre-European settlement (Fitzpatrick *et al.* 1991). Since the early 1980s, Fitzpatrick *et al.* (1994) estimated that in the northern third of the species' range, the Florida scrub-jay has declined somewhere between 25 and 50 percent. The species may have declined by as much as 25 to 50 percent in the last decade alone (Stith *et al.* 1996).

On protected lands, scrub-jays have continued to decline due to inadequate habitat management (Stith 1999). However, over the last several years, steps to reverse this decline have occurred, and management of scrub habitat is continuing in many areas of Florida (Hastie and Eckl 1999; Stith 1999; TNC 2001; A. Birch, Brevard County Environmentally Endangered Lands (EEL), pers. comm.; M. Camardese, CCAFS, pers.comm.).

Analysis of Brevard County historic aerial photography and soil maps suggest that pre-European settlement oak scrub, scrubby pine flatwoods, and coastal scrub/strand covered at least 53,000 acres outside of federal lands (Toland 1999). Assuming average territory size of 25 acres per breeding pair, there were probably originally 2,200 to 2,500 Florida scrub-jay territories within Brevard County. The 1992-1993 statewide survey estimated that on federal lands within Brevard County, there were 860 pairs of Florida scrub-jays remaining; outside of federal lands, 276 breeding pairs of scrub-jays were present (Fitzpatrick *et al.* 1994). The figure on non-federal lands within Brevard County had dropped to 185 in 1999 (Toland 1999), illustrating a precipitous decline of the scrub-jay population within the county. Part of this decline may be attributed to a possible rare epidemic in 1997-1998. A total of 1,620 acres of scrub habitat have been purchased (outside federal ownership) for preservation by Brevard County EEL, the St. Johns River Water Management District (SJRWMD), and the Florida Department of Environmental Protection (FDEP); 2,500 acres more of potential scrub-jay habitat are proposed for acquisition by EEL and the SJRWMD (Toland 1999). All of these parcels need extensive restoration and management to obtain maximum usage by scrub-jays. Over the last several years, an extensive effort to restore and manage these parcels has been undertaken by EEL, the SJRWMD, and FDEP (A. Birch, pers. comm.).

In some areas of the range of the scrub-jay, it appears that the 1992-1993 state-wide census underestimated populations of scrub-jays, especially in areas where little was known about the

status of the species. The state-wide census in 1992-1993 estimated about 145 pairs of scrub-jays remained within Sarasota County (Fitzpatrick *et al.* 1994), although Christman (2000) found 196 pairs of scrub-jays. Likewise, Miller and Stith (2002) documented 54 pairs of scrub-jays within the Deep Creek area of Charlotte County, while the state-wide census in 1992-1993 documented only 19 pairs (Fitzpatrick *et al.* 1994). Given that habitat has continued to degrade and development activity has increased in these areas, it is unlikely that these increased numbers reflect a population increase, but rather a greater effort in the survey process over that undertaken in 1992-1993 (Miller and Stith 2002). Two possible reasons that the 1992-1993 state-wide census underestimated some populations are (1) there was inadequate time and/or resources to survey poorly-known areas and (2) scrubby flatwoods were often overlooked because surveyors relied on soil maps, which are not reliable predictors of where scrubby flatwoods occur.

Stith (1999) utilized a spatially explicit individual-based population model developed specifically for the Florida scrub-jay to complete a metapopulation viability analysis of the species. The species' range was divided into 21 metapopulations demographically isolated from each other. Metapopulations are defined as collections of relatively discrete demographic populations distributed over the landscape; these populations are connected within the metapopulations through dispersal or migration (National Research Council 1995). A series of simulations were run for each of the 21 metapopulations based on different scenarios of reserve design ranging from the minimal configuration consisting of only currently protected patches of scrub (no acquisition option) to the maximum configuration, where all remaining significant scrub patches were acquired for protection (complete acquisition option). The assumption was made that all areas that were protected were also restored and properly managed.

Results from Stith's (1999) simulation model included estimates of extinction, quasi-extinction (the probability of a scrub-jay metapopulation falling below 10 pairs), and percent population decline. These were then used to rank the different state-wide metapopulations by vulnerability. The model predicted that five metapopulations (NE Lake, Martin, Merritt Island, Ocala National Forest, and Lake Wales Ridge, see Figure 1) have low risk of quasi-extinction. Two of the five (Martin and NE Lake), however, experienced significant population declines under the "no acquisition" option; the probability for survival of both of these metapopulations could be improved by more acquisitions.

Eleven of the remaining 21 metapopulations were shown to be highly vulnerable to quasi-extinction if no more habitat was acquired (Central Brevard, N Brevard, Central Charlotte, NW Charlotte, Citrus, Lee, Levy, Manatee, Pasco, St. Lucie, and W Volusia). The model predicted that the risk of quasi-extinction would be greatly reduced for 7 of the 11 metapopulations (Central Brevard, N Brevard, Central Charlotte, NW Charlotte, Levy, St. Lucie, and W Volusia) by acquiring all or most of the remaining scrub habitat. The model predicted that the remaining four metapopulations (Citrus, Lee, Manatee, and Pasco) would moderately benefit if more acquisitions were made.

Stith (1999) classified two metapopulations (S Brevard and Sarasota) as moderately vulnerable with a moderate potential for improvement; they both had one or more fairly stable subpopulations of scrub-jays under protection, but the model predicted large population declines.

The rest of the metapopulations could collapse without further acquisitions, making the protected subpopulations there vulnerable to epidemics or other catastrophes.

Three of the metapopulations evaluated by Stith (1999) (Flagler, Central Lake, and S Palm Beach) were classified as highly vulnerable to quasi-extinction and had low potential for improvement, since little or no habitat is available to acquire or restore.

Analysis of the Species/Critical Habitat Likely to be Affected

The Florida scrub-jay's status since it's listing in 1987 has not improved. The above analysis clearly shows two items that are essential for recovery of this species: (1) additional purchase of scrub lands for preservation in key areas and (2) restoration and management of publicly-owned scrub lands already under preservation. Without both, it is unlikely that recovery can be achieved.

SOUTHEASTERN BEACH MOUSE (*PEROMYSCUS POLIONOTUS NIVEIVENTRIS*)

Species/Critical Habitat Description

The southeastern beach mouse was listed as a threatened species under the Act in 1989 (54 FR 20598). Critical habitat was not designated for this subspecies.

Life History/Population Dynamics

The following account is from the South Florida Multi-Species Recovery Plan, Southeastern Beach Mouse Chapter (U.S. Fish and Wildlife Service 1999) and includes minor additions and changes to update the information.

Taxonomy

Peromyscus polionotus is a member of the order Rodentia and family Cricetidae. The southeastern beach mouse (SEBM) is one of 16 recognized subspecies of oldfield mice *P. polionotis* (Hall 1981); it is one of the eight of those subspecies that are called beach mice. The SEBM was first described by Chapman (1889) as *Hesperomys niveiventris*. Bangs (1898) subsequently placed it in the genus *Peromyscus*, and Osgood (1909) assigned it the subspecific name *P. polionotus niveiventris*.

Description

The SEBM is the largest of the eight recognized subspecies of beach mice, averaging 139 mm in total length (range of 10 individuals = 128 to 153 mm), with a 52 mm tail length (Osgood 1909; Stout 1992). Females are slightly larger than males. These beach mice are slightly darker in appearance than some other subspecies of beach mice, but paler than inland populations of *P. polionotus* (Osgood 1909). Southeastern beach mice have pale, buffy coloration from the back of their head to their tail, and their under parts are white. The white hairs extend up on their flanks, high on their jaw, and within 2 to 3 mm of their eyes (Stout 1992). There are no white spots above the eyes as with *P. p. phasma* (Osgood 1909). Their tail is also buffy above and

white below. Juvenile *P. p. niveiventris* are more grayish in coloration than adults; otherwise they are similar in appearance (Osgood 1909).

Habitat

Essential habitat of the SEBM is the sea oats *(Uniola paniculata)* zone of primary coastal dunes (Humphrey and Barbour 1981; Humphrey *et al.* 1987; Stout 1992). This subspecies has also been reported from sandy areas of adjoining coastal strand/scrub vegetation (Extine 1980; Extine and Stout; 1987; Rich *et al.* 1993), which refers to a transition zone between the fore dune and the inland plant community (Johnson and Barbour 1990). Beach mouse habitat is heterogeneous, and distributed in patches that occur both parallel and perpendicular to the shoreline (Extine and Stout 1987). Because this habitat occurs in a narrow band along Florida's coast, structure and composition of the vegetative communities that form the habitat can change dramatically over distances of only a few meters.

Primary dune vegetation described from SEBM habitat includes sea oats, dune panic grass (*Panicum amarum*), railroad vine (*Ipomaea pes-caprae*), beach morning glory (*Ipomaea stolonifera*), salt meadow cordgrass (*Spartina patens*), lamb's quarters (*Chenopodium album*), saltgrass (*Distichlis spicata*), and camphor weed (*Heterotheca subaxillaris*) (Extine 1980). Coastal strand and inland vegetation is more diverse, and can include beach tea (*Croton punctatus*), prickly pear cactus (*Opuntia humifusa*), saw palmetto (*Serenoa repens*), wax myrtle (*Myrica cerifera*), rosemary (*Ceratiola ericoides*), sea grape (*Coccoloba uvifera*), oaks (*Quercus sp.*) and sand pine (*Pinus clausa*) (Extine and Stout 1987). Extine (1980) observed this subspecies as far as 1 km inland on Merritt Island; he concluded that the dune scrub communities he found them in represent only marginal habitat for the SEBM. SEBM have been documented in coastal scrub several km from the beach habitat at Kennedy Space Center/Merritt Island NWR and CCAFS (Stout, personal communication, 2004). Extine (1980) and Extine and Stout (1987) reported that the SEBM showed a preference for areas with clumps of palmetto, sea grape, and expanses of open sand.

Within their dune habitat, beach mice construct burrows to use as refuges, nesting sites, and food storage areas. Burrows of *P. polionotus*, in general, consist of an entrance tunnel, nest chamber, and escape tunnel. Burrow entrances are usually placed on the sloping side of a dune at the base of a shrub or clump of grass. The nest chamber is formed at the end of the level portion of the entrance tunnel at a depth of 0.6 to 0.9 m, and the escape tunnel rises from the nest chamber to within 2.5 cm of the surface (Blair 1951). A beach mouse may have as many as 20 burrows within its home range. They are also known to use old burrows constructed by ghost crabs (*Ocypode quadrata*).

Foraging

Beach mice typically feed on seeds of sea oats and dune panic grass (Blair 1951). The SEBM probably also eats the seeds of other dune grasses, railroad vine, and prickly pear cactus. Although beach mice prefer the seeds of sea oats, these seeds are only available as food after they have been dispersed by the wind. Beach mice also eat small invertebrates, especially during late spring and early summer when seeds are scarce (Ehrhardt 1978). Beach mice will store food in their burrows.

Behavior

P. polionotus is the only member of the genus that digs an extensive burrow for refuge, nesting, and food storage (Ehrhart 1978). To dig the burrow, the mouse assumes a straddling position and throws sand back between the hind legs with the forefeet. The hind feet are then used to kick sand back while the mouse backs slowly up and out of the burrow (Ivey 1949). Burrows usually contain multiple entrances, some of which are used as escape tunnels. When mice are disturbed in their burrows, they open escape tunnels and quickly flee to another burrow or to other cover (Ehrhart 1978). Beach mice, in general, are nocturnal. They are more active under stormy conditions or moonless nights and less active on moonlit nights. Movements are primarily for foraging, breeding, and burrow maintenance. Extine and Stout (1987) reported movements of the SEBM between primary dune and interior scrub on Merritt Island, and concluded that their home ranges overlap and can reach high densities in their preferred habitats.

Reproduction and Demography

Studies on *Peromyscus* species in peninsular Florida suggest that these species may achieve greater densities and undergo more significant population fluctuations than their temperate relatives, partially because of their extended reproductive season (Bigler and Jenkins 1975). Subtropical beach mice can reproduce throughout the year; however their peak reproductive activity is generally during late summer, fall, and early winter. Extine (1980) reported peak reproductive activity for *P. p. niveiventris* on Merritt Island during August and September, based on external characteristics of the adults. This peak in the timing and intensity of reproductive activity was also correlated to the subsequent peak in the proportion of juveniles in the population in early winter (Extine 1980). This pattern is typical of other beach mice as well (Rave and Holler 1992).

Sex ratios in beach mouse populations are generally 1:1 (Extine 1980; Rave and Holler 1992). Blair (1951) indicated that beach mice are monogamous; once a pair is mated they tend to remain together until death. He also found, however, that some adult mice of each sex show no desire to pair. Nests of beach mice are constructed in the nest chamber of their burrows, a spherical cavity about 4 to 6 cm in diameter. The nest comprises about one fourth of the size of the cavity and is composed of sea oat roots, stems, leaves and the chaffy parts of the panicles (Ivey 1949).

The reproductive potential of beach mice is generally high (Ehrhardt 1978). In captivity, beach mice are capable of producing 80 or more young in their lifetime, and producing litters regularly at 26-day intervals (Bowen 1968). Litter size of beach mice, in general, ranges from two to seven, with an average of four. Beach mice reach reproductive maturity as early as 6 weeks of age (Ehrhart 1978).

Population Dynamics

Status and Trends

The distribution of the beach mouse is limited due to modification and destruction of its coastal habitats. On the Atlantic coast of Florida, the Anastasia Island beach mouse (*P. p. phasma*) and the SEBM were federally listed as endangered and threatened, respectively, in 1989 (54 FR 20602). One additional Atlantic coast subspecies, the pallid beach mouse (*P. p. decoloratus*),

was formerly reported from two sites in Volusia County, but extensive surveys provide substantial evidence that this subspecies is extinct (Humphrey and Frank 1992).

The distribution of the SEBM has declined significantly, particularly in the southern part of its range. Historically, it was reported to occur along about 280 km of Florida's central and southeast Atlantic coast from Ponce (Mosquito) Inlet, Volusia County, to Hollywood Beach, Broward County (Hall 1981). Bangs (1898) reported it as extremely abundant on all the beaches of the east peninsula from Palm Beach at least to Mosquito (Ponce) Inlet. During the 1990s, the SEBM was reported only from Volusia County (Canaveral National Seashore); in Brevard County (Canaveral National Seashore, Kennedy Space Center/Merritt Island NWR, and CCAFS); a few localities in Indian River County (Sebastian Inlet SRA, Treasure Shores Park, and several private properties), and St. Lucie County (Pepper Beach County Park and Fort Pierce Inlet SRA) (Humphrey *et al.* 1987; Robson 1989; Land Planning Group, Inc. 1991; Humphrey and Frank 1992; U.S. Fish and Wildlife Service 1993). The SEBM is geographically isolated from all other subspecies of *P. polionotus*.

Populations of the SEBM are still found on the beaches of Canaveral National Seashore, Merritt Island NWR, and CCAFS in Brevard County, all on federally protected lands. In April 2002, a population of SEBM was documented at the Smyrna Dunes Park, at the north end of New Smyrna Beach (A. Sauzo, personal communication, 2004). Populations from both sides of Sebastian Inlet appear to be extirpated (A. Bard, personal communication, 2004).

The status of the species south of Brevard County is currently unknown. The surveys done during the mid-1990s indicate the distribution of this subspecies in the counties south of Brevard was severely limited and fragmented. There are not enough data available to determine population trends for these populations. These surveys revealed that it occurred only in very small numbers where it was found. In Indian River County, the Treasure Shores Park population experienced a significant decline in the 1990s, and it is uncertain whether populations still exist at Turtle Trail or adjacent to the various private properties (D. Jennings, personal communication, 2004). Trapping efforts documented a decline from an estimated 300 individuals down to numbers in the single digits. No beach mice were found during surveys in St. Lucie County and it is possible that this species is extirpated there. The SEBM no longer occurs at Jupiter Island, Palm Beach, Lake Worth, Hillsboro Inlet or Hollywood Beach (U.S. Fish and Wildlife Service 1999).

The primary reason for the significant reduction in the range of the SEBM is the loss and alteration of coastal dunes. Large-scale commercial and residential development on the coast of Florida has eliminated SEBM habitat in the southern part of its range. This increased urbanization has also increased the recreational use of dunes, and harmed the vegetation essential for dune maintenance. Loss of dune vegetation results in widespread wind and water erosion and reduces the effectiveness of the dune to protect other beach mouse habitat. In addition to this increased urbanization, coastal erosion is responsible for the loss of the dune environment along the Atlantic coast, particularly during tropical storms and hurricanes. The extremely active 2004 hurricane season had a pronounced affect on Florida's Atlantic coast beaches and beach mouse habitat.

The encroachment of residential housing onto the Atlantic coast also increases the likelihood of predation by domestic cats and dogs. A healthy population of SEBM on the north side of Sebastian Inlet SRA in Brevard County was completely extirpated by 1972, presumably by feral cats (A. Bard, personal communication 2004). Urbanization of coastal habitat could also lead to potential competition of beach mice with house mice and introduced rats.

Beach mice along the Gulf Coasts of Florida and Alabama generally live about nine months (Swilling 2000). Field trapping research indicates that 68 percent (average) of mice alive in one month will survive to the next month. Actual survival rates indicate that 18.5 to 87 percent of individuals survive no more than four months and some mice live between 12 and 20 months (Blair 1951; Rave and Holler 1992). Holler *et al.* (1997) found that 44.26 percent of beach mice captured for the first time survived to the next season (winter, spring, summer, and fall). The mean survival rate for mice captured for a second time to subsequent capture was higher (53.90 percent). More than ten percent of mice survived three seasons after first capture, and four to eight percent survived more than one year after initial capture. Mice held in captivity by Blair (1951) and at Auburn University (Holler 1995) have lived three years or more.

Analysis of the Species/Critical Habitat Likely to be Affected

The southeastern beach mouse was listed as an endangered species primarily because of the fragmentation, adverse alteration and loss of habitat due to coastal development. The above analysis shows three items that are essential for recovery of this species: (1) purchase of coastal dune habitat for preservation; (2) removal of predation or competition by animals related to human development (cats and house mice); and (3) increase the regulations regarding coastal development.

EASTERN INDIGO SNAKE (*DRYMARCHON CORAIS COUPERI*)

Species/Critical Habitat Description

The eastern indigo snake is one of eight subspecies of a primarily tropical species; only the eastern indigo and the Texas indigo (*Drymarchon corais erebennus*) occur within the United States (U.S. Fish and Wildlife Service 1982). The eastern indigo snake is isolated from the Texas indigo snake by more than 600 miles (Moler 1992). The eastern indigo snake is the longest snake in North America, obtaining lengths of up to 104 inches (Ashton and Ashton 1981). Its color is uniformly lustrous-black, dorsally and ventrally, except for a red or cream-colored suffusion of the chin, throat, and sometimes the cheeks. Its scales are large and smooth (central 3-5 scale rows are lightly keeled in adult males) in 17 scale rows at midbody. Its anal plate is undivided. Its antepenultimate supralabial scale does not contact the temporal postocular scales.

The eastern indigo snake was listed as a threatened under the Act in 1978 (43 FR 4621). No critical habitat has been designated for this species; therefore none will be affected by the proposed project.

Life History/Population Dynamics

Historically, the eastern indigo snake occurred throughout Florida and into the coastal plain of Georgia, Alabama, and Mississippi (Loding 1922; Haltom 1931; Carr 1940; Cook 1954; Diemer and Speake 1983; Moler 1985a). It may have occurred in South Carolina, but its occurrence there cannot be confirmed. Georgia and Florida currently support the remaining endemic populations of eastern indigo snake (Lawler 1977). In 1982, only a few populations remained in the Florida panhandle, and the species was considered rare in that region. Nevertheless, based on museum specimens and field sightings, the eastern indigo snake still occurs throughout Florida, even though they are not commonly seen (Moler 1985a).

In south Florida, the eastern indigo snake is thought to be widely distributed and probably more abundant than in the northern limits of the range, especially compared to the low densities found in the panhandle of Florida. Given their preference for upland habitats, indigos are not found in great numbers in wetland complexes of the Everglades region, even though they are found in pinelands and tropical hardwood hammocks in extreme south Florida (Steiner *et al.* 1983).

Indigo snakes also occur in the Florida Keys. They have been collected from Big Pine and Middle Torch Keys, and are reliably reported from Big Torch, Little Torch, Summerland, Cudjoe, Sugarloaf, and Boca Chica Keys (Lazell 1989). Given the ubiquitous nature of the eastern indigo throughout the remainder of its range, it is likely that it also occurs on other Keys.

Over most of its range, the eastern indigo snake frequents a diversity of habitat types such as pine flatwoods, scrubby flatwoods, xeric sandhill communities, and tropical hardwood hammocks, edges of freshwater marshes, agricultural fields, coastal dunes, and human altered habitats. Eastern indigo snakes need a mosaic of habitats to complete their annual cycle. Interspersion of tortoise-inhabited sandhills and wetlands improves habitat quality for the indigo snakes (Landers and Speake 1980; Auffenberg and Franz 1982). Eastern indigo snakes require sheltered retreats from winter cold and desiccation (Bogert and Cowles 1947). Whenever the eastern indigo snake occurs in xeric habitats, it is closely associated with the gopher tortoise (*Gopherus polyphemus*), the burrows of which shelter the indigo snakes from the winter cold and desiccating sandhills environment (Bogert and Cowles 1947; Speake *et al.* 1978; Layne and Steiner 1996). This dependence seems especially pronounced in Georgia, Alabama, and the panhandle of Florida, where the eastern indigo snake is largely restricted to the vicinity of the sandhill habitats occupied by gopher tortoises (Diemer and Speake 1981; Moler 1985b; Mount 1975). The high use of xeric sandhill habitats throughout the northern portion of the eastern indigo's range can be attributed primarily to the availability of thermal refuge afforded by gopher tortoise burrows in the winter. No such refugia is widely available off of the sandhills regions of southern Georgia and northern Florida. In wetter habitats that lack gopher tortoises, eastern indigo snakes may take shelter in hollowed root channels, hollow logs, or the burrows of rodents, armadillos (*Dasypus novemcinctus*), or crabs (Lawler 1977; Moler 1985b; Layne and Steiner 1996).

In the milder climates of central and southern Florida, eastern indigo snakes exist in a more stable thermal environment, where the availability of thermal refugia may not be as critical to the snake's survival, especially in extreme southern Florida. Throughout peninsular Florida, the

eastern indigo snake can be found in all terrestrial habitats, which have not suffered high urban development. They are especially common in hydric hammocks throughout this region (Moler 1985a). In central and coastal Florida, eastern indigo snakes are typically found in the state's high sandy ridges. In extreme south Florida, these snakes are mainly found in pine flatwoods, pine rockland, tropical hardwood hammock habitats, and in most other undeveloped areas (Kuntz 1977). Eastern indigo snakes also use some agricultural lands (e.g., citrus) and various types of wetlands (Layne and Steiner 1996).

Even though thermal stresses may not be a year-round limiting factor in southern Florida, eastern indigo snakes seek and use underground refugia. On the sandy central and coastal ridges of south Florida, indigo snakes use gopher tortoise burrows (62 percent) more than other underground refugia (Layne and Steiner 1996). Other underground refugia used by indigo snakes include burrows of armadillos, cotton rats (*Sigmodon hispidus*), and land crabs; burrows of unknown origin; natural ground holes; hollows at the base of trees or shrubs; ground litter; trash piles; and in the crevices of rock-lined ditch walls (Layne and Steiner 1996). These refugia sites are used most frequently where tortoise burrows are not available, principally in the low-lying areas off of the central and coastal ridges.

Smith (1987) radio-tagged hatchling, yearling, and gravid eastern indigo snakes and released them in different habitat types on St. Marks National Wildlife Refuge in Wakulla County, Florida, in 1985 and 1986. Smith monitored the behavior, habitat use, and oviposition sites selected by gravid female snakes and concluded that the diverse habitats, including high pineland, pine-palmetto flatwoods, and permanent open ponds were important for the eastern indigo snake's seasonal activity. In this study, habitat use also differed by age-class and season; adult indigo snakes often used gopher tortoise burrows during April and May, while juveniles used root and rodent holes. The indigo snakes used gopher tortoise burrows for oviposition sites in high pineland areas, but stumps were chosen in flatwoods and pond edge habitats (Smith 1987).

Monitoring of radio-fitted indigo snakes on the central ridge of south Florida indicate that snakes in this part of the state use a wide variety of natural, disturbed, and non-natural habitat types throughout the year. On the ridge itself, indigos favor mature oak phase scrub, turkey oak sandhill, and abandoned citrus grove habitats, while snakes found off the sandy ridges use flatwoods, seasonal ponds, improved pasture, and active and inactive agricultural lands. There was no apparent selection for one habitat type over another as the use of habitats closely reflected the relative availability and distribution of the vegetation types in these areas (Layne and Steiner 1996).

In extreme south Florida (the Everglades and Florida Keys), indigo snakes are found in tropical hardwood hammocks, freshwater marshes, abandoned agricultural lands, coastal prairie, mangrove swamps, and human altered habitats (Steiner *et al.* 1983). It is suspected that they prefer hammocks and pine forests since most observations occur there, and use of these areas are disproportionate compared to the relatively small total area of these habitats (Steiner *et al.* 1983).

Reproduction: Most information on the reproductive cycle of the eastern indigo snake is from data collected in northern Florida. Here, breeding occurs between November and April, and

females deposit four to twelve eggs during May or June (Moler 1992). Speake (1993) reported an average clutch size of 9.4 for 20 captive bred females. Young hatch in approximately three months, from late May through August. Peak hatching activity occurs during August and September, while yearling activity peaks in April and May (Groves 1960; Smith 1987). Limited information on the reproductive cycle in south-central Florida suggests that the breeding and egg-laying season may be extended in south-central and south Florida. In this region, breeding extends from June to January, laying occurs from April to July, and hatching occurs during mid-summer to early fall (Layne and Steiner 1996).

Female indigo snakes can store sperm and delay fertilization of eggs; there is a single record of a captive snake laying five eggs (at least one of which was fertilized) after being isolated for more than four years (Carson 1945). There is no information on how long eastern indigo snakes live in the wild; in captivity, the longest an eastern indigo snake lived was 25 years, 11 months (Shaw 1959).

Feeding: The eastern indigo snake is an active terrestrial and fossorial predator that will eat any vertebrate small enough to be overpowered. Layne and Steiner (1996) documented several instances of indigos flushing prey from cover and then chasing it. Though unusual, indigo snakes may also climb shrubs or trees in search of prey. An adult eastern indigo snake's diet may include fish, frogs, toads, snakes (venomous and nonvenomous), lizards, turtles, turtle eggs, juvenile gopher tortoises, small alligators, birds, and small mammals (Keegan 1944; Babis 1949; Kochman 1978; Steiner *et al.* 1983). Juvenile indigo snakes eat mostly invertebrates (Layne and Steiner 1996).

Movements: Indigo snakes range over large areas and into various habitats throughout the year, with most activity occurring during summer and fall (Smith 1987; Moler 1985b; Speake 1993). The average home range of an eastern indigo snake is 12 acres during the winter (December - April), 106 acres during late spring early summer (May - July), and 241 acres during late summer and fall (August - November) (Speake *et al.* 1978). Adult male eastern indigo snakes have larger home ranges than adult females and juveniles; their home range may encompass as much as 553 acres in the summer (Moler 1985b; Speake 1993). By contrast, a gravid female may use from 4 to 106 acres (Smith 1987). These estimates are comparable to those found by Layne and Steiner (1996) in south central Florida, who determined adult male home ranges average about 183 acres, while adult females average about 42 acres.

Status and Distribution

As stated earlier, the eastern indigo snake was listed based on population decline caused by habitat loss, over-collection for the pet trade, and mortality from gassing gopher tortoise burrows to collect rattlesnakes (Speake and Mount 1973; Speake and McGlincy 1981). At the time of listing, the main factor in the decline of the eastern indigo snake was attributed to exploitation for the pet trade. As a result of effective law enforcement, the pressure from collectors has declined, but still remains a concern (Moler 1992).

The eastern indigo snake utilizes a majority of habitats available, but tends to prefer open, undeveloped areas (Kuntz 1977). Because of its relatively large home range, this snake is

especially vulnerable to habitat loss, degradation, and fragmentation (Lawler 1977; Moler 1985b). Lawler (1977) noted that eastern indigo snake habitat had been destroyed by residential and commercial construction, agriculture, and timbering. He stated that the loss of natural habitat is increasing because of these threats in Florida and that indigo snake habitat is being lost at a rate of five percent per year. Low-density residential housing is also a potential threat to the species, increasing the likelihood that the snake will be killed by property owners and domestic pets. Extensive tracts of wild land are the most important refuge for large numbers of eastern indigo snakes (Diemer and Speake 1981; Moler 1985b).

Additional human population growth will increase the risk of direct mortality of the eastern indigo snake from property owners and domestic animals. Pesticides that bioaccumulate through the food chain may present a potential hazard to the snake as well pesticide use on crops or for forestry/silviculture would propose a pulse effect to the indigo snake (Speake 1993). Direct exposure to treated areas and secondary exposure by ingestion of contaminated prey could occur. Secondary exposure to rodenticides used to control black rats may also occur (Speake 1993).

The wide distribution and territory size requirements of the eastern indigo snake makes evaluation of status and trends very difficult. We believe that activities such as collecting and gassing have been largely abated through effective enforcement and protective laws. However, despite these apparent gains in indigo snake conservation, we believe that the threats described above are acting individually and collectively against the eastern indigo snake. Though we have no quantitative data with which to evaluate trends of the eastern indigo snake in Florida, we surmise that the population as a whole is declining because of continued habitat destruction and degradation. Natural communities continue to be altered for agriculture, residential, and commercial purposes, most of which are incompatible with the habitat needs of the eastern indigo snake (Kautz 1993). Habitat destruction and alteration is probably most substantial along the coasts, Keys, and high central ridges of southcentral Florida, where human population growth is expected to continue to accelerate. Agricultural interests (principally citrus) continue to destroy large expanses of suitable natural habitat in south Florida.

Even with continued habitat destruction and alterations, indigo snakes will probably persist in most localities where small, fragmented pieces of natural habitat remain. Tracts of appropriate habitat of a few hundred to several thousand acres may be sufficient to support a small number of snakes. Unfortunately, we believe that current and anticipated habitat fragmentation will result in a large number of isolated, small groups of indigo snakes. Fragmented habitat patches probably cannot support a sufficient number of indigo snakes to ensure viable populations.

One of the primary reasons for listing of the species was the pressure on wild populations caused by over-collecting for the pet trade and commerce. Since the listing of the species, private collectors have engaged in a very active captive breeding program to fulfill the desires of individuals wanting specimens for personal pets. The Service controls the interstate commerce of the species via a permit program. The Service believes that this has significantly reduced the collection pressures on the species.

Analysis of the Species/Critical Habitat Likely to be affected

The eastern indigo snake was listed in January 1978 as a threatened species primarily due to habitat loss and to over-collecting for the pet trade. The above analysis shows two items that are essential for recovery of this species: (1) acquire and/or manage habitat to maintain viable populations and (2) study their movement, food habitats, and population ecology.

ENVIRONMENTAL BASELINE

Action Area

The action area for this biological opinion is defined as all habitat within the boundaries of CCAFS.

Status of the Species in the Action Area

Florida scrub-jay: The Florida scrub-jay population on CCAFS was approximately 391 birds (126 groups) in 2007. In 2005, the scrub-jay census resulted in 308 birds (103 groups of two or more birds and nine single birds). This represents a slight net increase in groups (6) from the 2004 breeding season. The population on CCAFS was approximately 276 birds (99 groups of two or more birds and seven single birds) in 2003-2004. The number of jays decreased slightly (9 percent) from the previous year. The trend in population size over the last ten years has been downward, with an occasional increase in numbers within the ten-year study. The smaller population size was partly due to low reproductive success in 2002-2003, when breeding pairs fledged at a rate of 40 percent and 44 percent, respectively. Significant numbers of young were lost after they fledged (about 50 percent), likely due to predation. Adult survivorship was 74 percent between 2003 and 2004, which is about average for the eight years of study. Breeder survivorship was slightly higher than average (81 percent), and juvenile survivorship was above average (68 percent). Forty-seven percent of the 91 nesting groups produced young, yielding 73 juveniles by the end of the 2003-2004 breeding season (Stevens and Knight 2004).

The populations of scrub-jays occurring on CCAFS are a subset of the larger MINWR/KSC/ CCAFS metapopulation. Based on the amount of existing and potentially restorable scrub habitat on the stations, CCAFS has responsibility for approximately one-third of the recovery of this metapopulation. The current INRMP for CCAFS has a goal of 300 breeding pairs of scrub-jays to be established; without continued management and restoration of overgrown scrub on the facility, this number will be impossible to reach.

As stated in the cumulative effects analysis provided by the representatives of the 45th SW, CCAFS has approximately 5,175 acres of unoccupied scrub habitat within existing management compartments. Based upon 25 acres/breeding pair of scrub-jays, restoration of these areas could result in habitat for an additional 206 breeding pairs, bringing the total to 312 breeding pairs at CCAFS, if all available habitat could be managed for scrub-jays.

The restoration of the 1157.48 acres (Table 2) will occur as part of the proposed action, which is important to the recovery of the metapopulation, as restoration of this area will link the groups of

scrub-jays found at CCAFS and KSC. Fire suppression over the years created an area of unsuitable habitat between CCAFS and KSC, and restoration of this scrub will provide habitat suitable for occupation between the two facilities. Accordingly, restoration of the habitat will allow mixing of the two existing populations, and lead to further expansion and growth of scrub-jays and their territories.

Southeastern beach mouse: The southeastern beach mouse is found along the entire reach of coastline on CCAFS in addition to the KSC and Cape Canaveral National Seashore. The known distribution is a result of cursory surveys and intermittent trapping involving different construction projects. There has been a three-year trapping study done in order to determine the status throughout its range on these Federal lands. The species is found within the action area.

Eastern indigo snake: The eastern indigo snake is likely to occur within the boundaries of the project site due to the presence of suitable habitat, although none have been seen. The eastern indigo snake standard protection measures will be used during the construction of the project.

Factors Affecting Species' Environment within the Action Area

This analysis describes factors affecting the environment for scrub-jays, southeastern beach mice, and eastern indigo snakes in the action area. There are no State, tribal, local, or private actions affecting the species or that will occur contemporaneously with this consultation. Federal actions have taken place within the action areas that have impacted Florida scrub-jays, southeastern beach mice, and eastern indigo snakes. These projects sometimes resulted in incidental take anticipated through section 7 of the Act. The impacts associated with some of these projects resulted in the loss of occupied habitat or habitat suitable for occupation within the action area.

Prescribed burning and restoration of overgrown scrub for the benefit of the scrub-jay have occurred and are ongoing on CCAFS. The Air Force continues to pursue its goal of 300 breeding pairs of scrub-jays, as outlined in their INRMP. The INRMP identifies burning and/or mechanical management of 500 acres per year. In 2007, 1300 acres of habitat were restored through a combination of control burning and mechanical treatment. At this rate of habitat management, we estimate that CCAFS will be able to reach their goal of 300 breeding pairs of scrub-jays. This goal may be achieved more quickly if existing burning constraints are reduced in the future. CCAFS has a prescribed burn working group that deals with issues of burn restrictions on CCAFS. This group meets regularly at CCAFS.

A 5-year study to compare mechanical clearing and burning to effectively manage scrub is underway and is expected to result in development of better management practices in lieu of delayed prescribed burns that have previously led to overgrown scrub-jay habitat.

EFFECTS OF THE ACTION

This section includes an analysis of the direct and indirect effects of the proposed action on the species and its interrelated and interdependent activities. To determine whether the proposed action is likely to jeopardize the continued existence of threatened or endangered species in the

action area, we focus on consequences of the proposed action that affect rates of birth, death, immigration, and emigration because the probability of extinction in plant and animal populations is most sensitive to changes in these rates.

Factors to Be Considered

The effects of the proposed project of the Florida scrub-jay, southeastern beach mouse, and eastern indigo snake may occur as direct and indirect effects.

Direct Effects

The Skid Strip modification and associated facilities may result in the direct "take" of Florida scrub-jays, eastern indigo snakes, and southeastern beach mice as a result of permanent loss of 410.83 acres of sub-optimal scrub habitat. Approximately 20-acres of this are currently occupied by scrub-jays. The probability and level of incidental take is dependent upon the number of Florida scrub-jays, southeastern beach mice, and eastern indigo snakes within the region; their ability to disperse; and the amount and distribution of available suitable habitat. It is possible that as construction proceeds, they will move away from the construction site; however, the Service anticipates that "take" will occur.

The proposed activity will result in the direct permanent loss of approximately 20-acres of scrub habitat occupied by five groups of Florida scrub-jays totaling 12 individual birds. The proposed project will impact a portion of each Florida scrub-jay family's territory in LMU 38, 39, 48, and 49. The proposed activity will result in the direct permanent loss of approximately 410.83 acres of sub-optimal scrub habitat over a nine-year period (FY 2009 to FY 2017) occupied by southeastern beach mice and eastern indigo snakes. The proposed project will permanently impact existing southeastern beach mouse burrows and habitat found within the project area. It is possible that as construction proceeds, they will move away from the construction site; however, the Service anticipates that "take" will occur. Similar direct effects are expected for any eastern indigo snakes occurring within the project site. Impacts to the species will be minimized by restoring 1157.48 acres of potential scrub-jay, beach mouse and eastern indigo snake habitat at CCAFS over a nine-year period.

Indirect Effects

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Indirect effects may occur outside of the area directly affected by the action. Indirect effects may include other Federal actions that have not undergone section 7 consultations, but will result from the action under consideration. The indirect effects will occur in two ways: (1) operation of the skid strip will add traffic along roadways adjacent to occupied habitat, possibly resulting in scrub-jays and snakes being struck by vehicles or (2) proposed habitat restoration and management activities are expected to enhance scrub-jay dispersal when complete.

Dreschel *et al.* (1990), Fitzpatrick *et al.* (1991), and Mumme *et al.* (2000) provide the best scientific and commercial data on the likelihood of incidental take as the result of scrub-jays

being killed by the vehicles. The only scientific documentation of road-kill mortality in Florida scrub-jays are from jays living in a territory immediately adjacent to a road, not from dispersing some unknown distance across a road to a new territory.

Indirect effects will result from continued loss of foraging habitat for the southeastern beach mouse.

The eastern indigo snake has a high probability of being impacted by increased traffic on the roads. Since a portion of their suitable habitat will be impacted by the proposed development, the snakes may have to go elsewhere and cause them to cross busy roads which could result in road-kill mortality.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

CONCLUSION

After reviewing the current status of the Florida scrub-jay, southeastern beach mouse, and the eastern indigo snake, the environmental baseline for the action area, the effects of the proposed skid strip modification and the cumulative effects, it is the Service's BO that the Skid Strip modification, as proposed, is not likely to jeopardize the continued existence of the Florida scrub-jay, the southeastern beach mouse, and the eastern indigo snake. No critical habitat has been designated for the three species; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation under section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. 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 to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be implemented by the agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply.

The Federal agency has a continuing responsibility to regulate the activity that is covered by this incidental take statement. If the agency (1) fails to assume and implement the terms and conditions or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the agency must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. (50 CFR 402.14(I) (3))

Sections 7(b) (4) and 7(o) (2) of the Act do not apply to the incidental take of listed plant species. However, protection of listed plants is provided to the extent that the Act requires a Federal permit for removal or reduction to possession of endangered plants from areas under Federal jurisdiction, or for any act that would remove, cut, dig up, or damage or destroy any such species on any State or in the course of any violation of a State criminal trespass law.

AMOUNT OR EXTENT OF TAKE ANTICIPATED

The Service has reviewed the biological information for this species, information presented by the applicant's consultant, and other available information relevant to this action, and based on our review; incidental take in the form of harm or harassment is anticipated for five (5) Florida scrub-jay groups totaling 12 individuals.

The Service expects the level of incidental take of southeastern beach mice and eastern indigo snakes will be difficult to determine for the following reasons: eastern indigo snakes are wide-ranging and elusive; southeastern beach mice are elusive because of their burrowing habits; finding a dead or impaired specimen is unlikely; losses may be masked by predators removing dead or injured animals. The Service has reviewed the biological information for these species, information provided by representatives of the 45th SW, and has determined that incidental take in the form of harm or harassment is anticipated for all the southeastern beach mice and eastern indigo snakes utilizing the 410.83-acre area.

If during the course of this action, the project description changes, this would represent new information requiring review of the reasonable and prudent measures provided. The Federal agency must immediately provide modification of the reasonable and prudent measures.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and minimize impacts of incidental take of Florida scrub-jays, southeastern beach mice, and eastern indigo snakes:

Florida scrub-jay

1. Avoid construction in scrub-jay occupied areas during the nesting season from March 1 through June 30.

2. Notify the Service of any unauthorized take of Florida scrub-jays identified during the construction of the proposed facility.

3. Ensure that prior to clearing of scrub-jay occupied habitat there is suitable habitat within 1200 feet.

4. Restore 1157.48 acres of scrub habitat within LMU 72, 89, 40, 36, 37, 38, 74, 65, 76, 70, 67, 78,66, 79, 55, 36, 33, 84, and 48 by using prescribed burning and mechanical means over the 9-year period (in addition to the 500 acres of prescribed burning per year).

5. Manage the 1157.48 acres for scrub-jays within LMU 72, 89, 40, 36, 37, 38, 74, 65, 76, 70, 67, 78,66, 79, 55, 36, 33, 84, and 48 by using prescribed burning and mechanical means.

6. Conduct scrub-jay monitoring in the restoration areas.

7. A report describing the actions taken to implement the terms and conditions of this incidental take statement shall be submitted to the Service for the proposed work and restoration for each year when the activity has occurred.

Southeastern beach mouse

1. Notify the Service of any unauthorized take of southeastern beach mice identified during the construction activity.

Eastern indigo snake

1. Minimize impacts to eastern indigo snakes from heavy equipment by implementing the standard protection measures.

2. Only individuals with permits should attempt to capture the eastern indigo snakes.

3. If an eastern indigo snake is held in captivity, it should be released as soon as possible in release sites approved by the Service on the CCAFS.

4. Notify the Service of any unauthorized take of eastern indigo snakes identified during the construction of the proposed facility.

TERMS AND CONDITIONS

To implement the above reasonable and prudent measures, the Service has outlined the following terms and conditions for incidental take. In accordance with the Interagency Cooperation Regulation (50 CFR 402), these terms and conditions must be complied with to implement the reasonable and prudent measures for incidental take:

Florida scrub-jay

1. Avoid construction and/or clearing in scrub-jay occupied areas during the nesting season from March 1 through June 30.

2. Unauthorized take of scrub-jays associated with the proposed activity should be reported immediately by calling the Jacksonville Field Office of the U.S. Fish and Wildlife Service in Jacksonville at 904-232-2580. If a dead Florida scrub-jay is found on the project site, the specimen should be thoroughly soaked in water and frozen for later analysis of cause of death or injury.

3. If there is no suitable habitat within 1200 feet of the proposed cleared areas that are occupied by scrub-jays, the 45th SW will conduct restoration in LMUs adjacent to the impact areas prior to any clearing activities.

4. The 45th SW will restore 1157.48 acres of scrub habitat within LMU 72, 89, 40, 36, 37, 38, 74, 65, 76, 70, 67, 78, 66, 79, 55, 36, 33, 84, and 48 by using prescribed burning and mechanical means over the 9-year period (this will occur in addition to the 500 acres of restoration per year using mechanical treatment followed by controlled burning).

5. The 45th SW will manage the 1157.48 acres of scrub habitat for continued scrub-jay use of the created corridors within LMU 72, 89, 40, 36, 37, 38, 74, 65, 76, 70, 67, 78, 66, 79, 55, 36, 33, 84, and 48 by using prescribed burning and mechanical means (this will occur in addition to the 500 acres of restoration per year using mechanical treatment followed by controlled burning).

6. Conduct scrub-jay monitoring to demonstrate that the impacted birds successfully use the restoration areas and these areas are successful in creating corridors and providing habitat for those birds displaced by the proposed project. Color band scrub-jays occupying habitat to be cleared and monitor their dispersal and habitat use following vegetation clearing at impact sites. Monitoring should continue until such time that it is determined that impacted scrub-jays have established new territories, joined scrub-jay families with existing territories, or have died.

7. A report describing the project conducted during the year and actions taken to implement the reasonable and prudent measures and terms and conditions of this incidental take statement shall be submitted to the Service for each year of completing the proposed work and restoration. This report will include acreage cleared, location of clearing, acreage of LMU restored, and a scrub-jay monitoring report in the restoration areas.

Southeastern beach mouse

1. If a dead southeastern beach mouse is found on the project site, the specimen should be thoroughly soaked in water and frozen, and the applicant should notify the Jacksonville Field Office immediately at (904) 232-2580. Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

Eastern indigo snake

1. An eastern indigo snake protection/education plan shall be developed by the 45th Space Wing for all construction personnel to follow. The plan shall be provided to the Service for review and approval at least 30 days prior to any clearing activities. The educational materials for the plan may consist of a combination of posters, videos, pamphlets, and lectures (*e.g.*, an observer trained to identify eastern indigo snakes could use the protection/education plan to instruct construction personnel before any clearing activities occur). Informational signs should be posted throughout the construction site and contain the following information:
   a. A description of the eastern indigo snake, its habits, and protection under Federal Law;
   b. Instructions not to injure, harm, harass or kill this species;
   c. Directions to cease clearing activities and allow the eastern indigo snake sufficient time to move away from the site on its own before resuming clearing; and,
   d. Telephone numbers of pertinent agencies to be contacted if a dead eastern indigo snake is encountered. The dead specimen should be thoroughly soaked in water, and then frozen.

2. Only an individual who has been either authorized by a section 10(a) (1) (A) permit issued by the Service, or authorized by the Florida Fish and Wildlife Conservation Commission for such activities, is permitted to come in contact with or relocate an eastern indigo snake.

3. If necessary, eastern indigo snakes shall be held in captivity only long enough to transport them to a release site; at no time shall two snakes be kept in the same container during transportation.

4. An eastern indigo snake monitoring report must be submitted to the Jacksonville Field Office within 60 days of the conclusion of clearing activity. The report should be submitted when any eastern indigo snakes are observed or relocated. The report should contain the following information:
   a. Any sightings of eastern indigo snakes;
   b. Summaries of any relocated snakes if relocation was approved for the project (*e.g.*, locations of where and when they were found and relocated);
   c. Other obligations required by the Florida Fish and Wildlife Conservation Commission, as stipulated in the permit.

5. If a dead eastern indigo snake is found on the project site, the specimen should be thoroughly soaked in water and frozen, and the applicant should notify the Jacksonville Field Office immediately at (904) 232-2580. Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

These 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. The Service believes that no more that five groups of Florida scrub-jays utilizing the 20-acre area will be incidentally taken, and all the southeastern beach mice, and all eastern indigo snakes utilizing the 410.83-acre of sub-optimal scrub habitat will be incidentally taken over the nine-year period. If, during the course of the action, this level of incidental take is exceeded (e.g., burning restrictions placed on scrub habitat adjacent to the skid strip modification and associated facilities, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a) (1) of the Act directs Federal agencies to use their authority to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help carry out recovery plans, or to develop information.

1. Leave and use native scrub vegetation in landscaping around the retention areas and the right-of-way to provide scrub habitat for the scrub-jays utilizing the site.

2. Signs should be placed on the fences that explain to the occupants the importance of the onsite and adjacent scrub areas for the listed species.

3. In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation measures.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR Section 402.16, reinitiation of formal consultation is required when 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 agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this biological opinion; (3) the Air Force's action is later modified in a manner that causes an effect to the listed species or critical habitat not considered in this biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

For this BO, the incidental take would be exceeded when the take exceeds five (5) groups of Florida scrub-jays utilizing the 20 acres of scrub, and all the southeastern beach mice and eastern indigo snakes utilizing the 410.83 of sub-optimal of scrub habitat over the nine-year period, which is what has been exempted from the prohibitions of section 9 by this opinion. The Service appreciates the cooperation of the Air Force during this consultation. We would like to continue working with you and your staff regarding the Skid Strip modification project. For further coordination please contact Ann Marie Lauritsen at (904) 525-0661 of this office.

Sincerely,

David L. Hankla
Field Supervisor

cc: Mike Jennings-FWS/JAXFO
Downie Wolfe-FWS/JAXLE
Annie Dziergowski- FWS/JAXFO
Ken Graham- FWS/Atlanta RO

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Project BO

Attachment B-2	Document Designation Letter	G

United States Department of the Interior
U. S. FISH AND WILDLIFE SERVICE
7915 BAYMEADOWS WAY, SUITE 200
JACKSONVILLE, FLORIDA 32256-7517

CC BW
CD WJ
CEP CRD
CEA —

IN REPLY REFER TO:
FWS Log No. 41910-2010-F-0019

November 30, 2009

Brian D. Weidmann, LT Col, USAF
Commander
45 CES/CC
1224 Jupiter St., MS 9125
Patrick AFB, FL 32925-3343
(ATTN: Angy Chambers)

Dear Commander Weidmann:

This document is the U.S. Fish and Wildlife Service's (Service) modification letter to the Biological Opinion (BO) (41910-2008-F-0148) written on April 21, 2008, based on our review of the proposed construction of a transporter road in association with the Skid Strip modification project on Cape Canaveral Air Force Station (CCAFS) in Brevard County, Florida, and its effects on the Florida scrub-jay (*Aphelocoma coerulescens*), southeastern beach mouse (*Peromyscus polionotus niveiventris*), eastern indigo snake (*Drymarchon corais couperi*), pursuant to section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). Your request for reinitiating formal consultation for these species was received on September 24, 2009.

The 45th Space Wing (SW) proposes to construct a transporter road between CCAFS Skid Strip and the Spacecraft Processing Area (SPA), known as Area 59. The road will be approximately 1,470 feet long, 28 feet wide and will include swales on either side of the road, as well as a stormwater retention area located at the southeast terminus of the road.

The new road is required to transport payloads from the Skid Strip to Area 59 without utilizing major CCAFS roadways. Construction of this road and associated swales/retention areas will result in the permanent loss of approximately 4.29 additional acres of oak scrub. A large portion of the project is located within the area proposed to be cleared through the Skid Strip modification project.

The proposed transporter road is located on the south side of the CCAFS Skid Strip within Land Management Unit (LMU) 48. The vegetation consists of oak scrub of optimal height

for scrub-jays. The habitat is fairly thick with few openings. The area where the retention pond is proposed has good sized openings. This LMU was partially cut and burned in 2005. The road will be used to transport satellites/payloads from the airfield to Area 59, which is a payload processing facility. These payloads are expected to be slow moving vehicles.

Breeding surveys conducted between 1996 and 2009 document the continuous presence of one group of scrub-jays in LMU 48. Scrub-jay surveys were conducted in May and July 2009. Two groups of jays are utilizing the area proposed to be cleared for the transporter road.

Group 1 consists of four birds, two adults and two juveniles. This group's territory extended south toward the Area 59 perimeter fence and west to the northwest corner of the fence,

Group 2 consists of three birds, two adults and one juvenile. This group was observed along the canal that runs along the northeastern edge of LMU 48.

AMOUNT OR EXTENT OF TAKE ANTICIPATED

The Service has reviewed the biological information for this species, information presented by the applicant's consultant, and other available information relevant to this action, and based on our review; incidental take in the form of harm or harassment is anticipated for two additional Florida scrub-jay groups totaling seven (7) Florida scrub-jay groups for the Skid Strip modification project and the associated transporter road. The seven groups consist of 19 individual birds.

The Service expects the level of incidental take of southeastern beach mice and eastern indigo snakes will be difficult to determine for the following reasons: eastern indigo snakes are wide-ranging and elusive; southeastern beach mice are elusive because of their burrowing habits; finding a dead or impaired specimen is unlikely; losses may be masked by predators removing dead or injured animals. The Service has reviewed the biological information for these species, information provided by representatives of the 45th SW, and has determined that incidental take in the form of harm or harassment is anticipated for all the southeastern beach mice and eastern indigo snakes utilizing the additional 4.29 additional acres of oak scrub totaling 415.12-acres for the entire Skid Strip modification and transporter road.

If during the course of this action, the project description changes, this would represent new information requiring review of the reasonable and prudent measures provided. The Federal agency must immediately provide modification of the reasonable and prudent measures.

The Service has modified the Reasonable and Prudent Measures and 'Terms and Condition' written in the biological opinion dated April 21, 2008, in order to further minimize the direct 'take' of the Florida scrub-jay, southeastern beach mouse, and the eastern indigo snake.

The following will replace the 'Reasonable and Prudent Measures' and 'Terms and Conditions' in the Biological Opinion dated April 21, 2008. All other parts of the BO (41910-2008-F-0148) will remain the same.

Table 1. Acreage and location of vegetation removal for Skid Strip modification and transporter road on CCAFS and Proposed Restoration acreage for each LMU.

		Proposed Clearing		Proposed Compensation	
Area	FY	Acreage	LMU #	LMU #	Acreage
1	09	57.27	72, 73	72, 89, 144	121.66
2	10	56.57	38, 39, 49	40, 36, 37, 38, 147	178.98
3	10	27.07	73	74	68.74
4	10	20.61	70, 72	65	46.05
5	11	26.30	75	76	54.48
6	12	37.94	65, 70	70	165.89
7	12	37.00	66	67, 78	54.91
8	13	26.30	75	78	63.75
9	14	46.68	66	66, 79	61.20
10	15	32.04	47	55, 36	103.98
11	16	18.31	66	33	71.06
12	17	24.74	48	84, 48	166.78
	10	4.29	48	68, 69	133.0
		415.12		Total	1290.48

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and minimize impacts of incidental take of Florida scrub-jays, southeastern beach mice, and eastern indigo snakes:

Florida scrub-jay

1. Avoid construction in scrub-jay occupied areas during the nesting season from March 1 through June 30.

2. Notify the Service of any unauthorized take of Florida scrub-jays identified during the construction of the proposed facility.

3. Ensure that prior to clearing of scrub-jay occupied habitat there is suitable habitat within 1200 feet.

4. Restore 1290.48 acres of scrub habitat within LMU 72, 89, 144, 40, 36, 37, 38, 147, 74, 65, 76, 70, 67, 78,66, 79, 55, 36, 33, 84, 48, 68, and 69 by using prescribed burning and mechanical means over the 9-year project period.

5. Manage the 1290.48 acres for scrub-jays within LMU 72, 89, 144, 40, 36, 37, 38, 147, 74, 65, 76, 70, 67, 78,66, 79, 55, 36, 33, 84, 48, 68, and 69 by using prescribed burning and mechanical means.

6. Conduct scrub-jay monitoring in the restoration areas.

7. A report describing the actions taken to implement the terms and conditions of this incidental take statement shall be submitted to the Service for the proposed work and restoration for each year when the activity has occurred.

Southeastern beach mouse

1. Notify the Service of any unauthorized take of southeastern beach mice identified during the construction activity.

Eastern indigo snake

1. Minimize impacts to eastern indigo snakes from heavy equipment by implementing the standard protection measures.

2. Only individuals with permits should attempt to capture the eastern indigo snakes.

3. If an eastern indigo snake is held in captivity, it should be released as soon as possible in release sites approved by the Service on the CCAFS.

4. Notify the Service of any unauthorized take of eastern indigo snakes identified during the construction of the proposed facility.

TERMS AND CONDITIONS

To implement the above reasonable and prudent measures, the Service has outlined the following terms and conditions for incidental take. In accordance with the Interagency Cooperation Regulation (50 CFR 402), these terms and conditions must be complied with to implement the reasonable and prudent measures for incidental take:

Florida scrub-jay

1. Avoid construction and/or clearing in scrub-jay occupied areas during the nesting season from March 1 through June 30.

2. Unauthorized take of scrub-jays associated with the proposed activity should be reported immediately by calling the Jacksonville Field Office of the Service in Jacksonville at (904) 731-3336. If a dead Florida scrub-jay is found on the project site, the specimen should be thoroughly soaked in water and frozen for later analysis of cause of death or injury.

3. If there is no suitable habitat within 1200 feet of the proposed cleared areas that are occupied by scrub-jays, the 45th SW will conduct restoration in LMUs adjacent to the impact areas at least one year prior to any clearing activities.

4. The 45th SW will restore 1290.48 acres of scrub habitat within LMU 72, 89, 144, 40, 36, 37, 38, 147, 74, 65, 76, 70, 67, 78, 66, 79, 55, 36, 33, 84, 48, 68 and 69 by using prescribed burning and mechanical means over the 9-year period (this will occur in addition to the 500 acres of restoration per year using mechanical treatment followed by controlled burning). Habitat restoration shall be accomplished according to the schedule and timing specified in Table 1. This restoration is in addition to the 500 acres of prescribed burning per year as stated in the CCAFS Integrated Natural Resource Plan.

5. The 45th SW will manage the 1290.48 acres of scrub habitat for continued scrub-jay use of the created corridors within LMU 72, 89, 144, 40, 36, 37, 38, 147, 74, 65, 76, 70, 67, 78, 66, 79, 55, 36, 33, 84, 48, 68 and 69 by using prescribed burning and mechanical means (this will occur in addition to the 500 acres of restoration per year using mechanical treatment followed by controlled burning).

6. Conduct scrub-jay monitoring to evaluate dispersal of impacted birds and to determine whether impacted birds successfully colonize restored areas. Color band scrub-jays occupying habitat to be cleared and monitor their dispersal and habitat use following vegetation clearing at impact sites. Monitoring should continue until such time that it is determined that impacted scrub-jays have established new territories, joined scrub-jay families with existing territories, or have died.

7. A report describing the project conducted during the year and actions taken to implement the reasonable and prudent measures and terms and conditions of this incidental take statement shall be submitted to the Service for each year of completing the proposed work and restoration. This report will include acreage cleared, location of clearing, acreage of LMU restored, and a scrub-jay monitoring report in the restoration areas.

Southeastern beach mouse

1. If a dead southeastern beach mouse is found on the project site, the specimen should be thoroughly soaked in water and frozen, and the applicant should notify the Jacksonville Field Office immediately at (904) 731-3336. Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

Eastern indigo snake

1. An eastern indigo snake protection/education plan shall be developed by the 45th Space Wing for all construction personnel to follow. The plan shall be provided to the Service for review and approval at least 30 days prior to any clearing activities. The educational materials for the plan may consist of a combination of posters, videos, pamphlets, and lectures (*e.g.*, an observer trained to identify eastern indigo snakes could use the protection/education plan to instruct construction personnel before any clearing activities occur). Informational signs should be posted throughout the construction site and contain the following information:
   a. A description of the eastern indigo snake, its habits, and protection under Federal Law;
   b. Instructions not to injure, harm, harass or kill this species;
   c. Directions to cease clearing activities and allow the eastern indigo snake sufficient time to move away from the site on its own before resuming clearing; and,
   d. Telephone numbers of pertinent agencies to be contacted if a dead eastern indigo snake is encountered. The dead specimen should be thoroughly soaked in water, and then frozen.

2. Only an individual who has been either authorized by a section 10(a)(1)(A) permit issued by the Service, or authorized by the Florida Fish and Wildlife Conservation Commission for such activities, is permitted to come in contact with or relocate an eastern indigo snake.

3. If necessary, eastern indigo snakes shall be held in captivity only long enough to transport them to a release site; at no time shall two snakes be kept in the same container during transportation.

4. An eastern indigo snake monitoring report must be submitted to the Jacksonville Field Office within 60 days of the conclusion of clearing activity. The report should be submitted when any eastern indigo snakes are observed or relocated. The report should contain the following information:
   a. Any sightings of eastern indigo snakes;
   b. Summaries of any relocated snakes if relocation was approved for the project (*e.g.*, locations of where and when they were found and relocated);
   c. Other obligations required by the Florida Fish and Wildlife Conservation Commission, as stipulated in the permit.

5. If a dead eastern indigo snake is found on the project site, the specimen should be thoroughly soaked in water and frozen, and the applicant should notify the Jacksonville Field Office immediately at (904) 731-3336. Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

These 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. The Service believes that no more that seven groups of Florida scrub-jays will be incidentally taken, and

all the southeastern beach mice, and all eastern indigo snakes utilizing the 415.12-acre of scrub habitat will be incidentally taken over the nine-year period. If, during the course of the action, this level of incidental take is exceeded (e.g., burning restrictions placed on scrub habitat adjacent to the skid strip modification and associated facilities) such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

REINITIATION OF SECTION 7 CONSULTATION

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR Section 402.16, reinitiation of formal consultation is required when 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 agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this biological opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation. For further coordination please contact Ann Marie Lauritsen at (904) 525-0661 of this office.

Sincerely,

David L. Hankla
Field Supervisor

cc:
Mike Jennings- FWS/JAX FO
Annie Dziergowski- FWS/JAX FO

Project BO

Attachment B-2	Document Designation Letter	H

United States Department of the Interior

U. S. FISH AND WILDLIFE SERVICE

7915 BAYMEADOWS WAY, SUITE 200
JACKSONVILLE, FLORIDA 32256-7517

IN REPLY REFER TO:

FWS Log No. 41910-2010-F-0386

September 15, 2011

Angy L. Chambers
Acting Chief, Natural Assets
45 CES/CEAN
1224 Jupiter Street, MS 9125
Patrick AFB, FL 32925

Dear Ms. Chambers:

This document is the U.S. Fish and Wildlife Service's (Service) amendment to the biological opinion (41910-2010-F-0019, 10/30/2009) that was based on the Service's original biological opinion (41910-2008-F-0148, 4/21/2008) for various activities associated with the modification to the Skid Strip and transporter road. This amendment addresses changes to the proposed land management units (LMU) restoration, acreages of vegetation management, and the scheduled vegetative restoration activities that will occur at Cape Canaveral Air Force Station (CCAFS) in Brevard County, Florida, and its effects on the threatened Florida scrub-jay (*Aphelocoma coerulescens*) per section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Your request for reinitiating formal consultation was received on 11 June 2010.

CCAFS's original proposed action consists of the construction of a new apron, an air traffic control tower, airfield operation buildings, the removal of 410.83 acres of vegetation that currently violates airfield criteria, and the restoration of 1157.48 acres of xeric vegetation. The 2009 modification included the additional construction of a transporter road between the Skid Strip and the Spacecraft Processing Area known as Area 39. The transporter road's impacts (4.29 acres) increased the vegetation removal to 415.12 acres accompanied by a revised plan to restore 1290.48 acres of xeric vegetation over a ten year time frame.

A draft amended biological opinion was prepared on 22 March 2011for your office's review. The Service received comments from CCAFS on 18 April 2011 and a meeting was held on 24 June 2011 to discuss the *Reasonable and Prudent Measures* and the implementing *Terms and Conditions*. CCAFS responded to the Service on 16 August 2011 addressing the concerns discussed in the meeting and provided a revised proposed action.

The current proposed action is the permanent removal of 383.12 acres of vegetation for Skid Strip operations. As conservation measures, CCAFS will restore approximately 974 acres of xeric vegetation on site for Florida scrub-jay utilization. The clearing of habitat and restoration activities will occur in five phases and are scheduled to be completed in fiscal year 2015. The proposed clearing of vegetation for Skid Strip operations as well as the proposed conservation measures for the impacted habitats are dependent on available funding. If funding in any given year is not obtained during the proposed scheduled fiscal year, a revised schedule will be submitted to the Service.

LMUs 33, 36, 37, 38, 40, 48, 55, 65, 66, 67, 68, 69, 70, 72, 74, 76, 78, 79, 84, 89, 144, and 147 were originally proposed to have restoration activities completed by fiscal year 2017. The proposed amended LMUs include 36, 37, 38, 40, 50, 66, 67, 68, 69, 72, 78, 84, 86, 87, 89, 112, 114, 119, 144, 147, and 165 having restoration activities completed in fiscal year 2015. A table summarizing the proposed LMUs schedule for restoration and maps identifying the units in the landscape are included in Appendix A.

At the request of CCAFS staff, the following is intended as clarification regarding long-term management discussed during the 16 August 2011 meeting. Operational and mission constraints have inhibited the ability of CCAFS to meet prior agreed upon goals. CCAFS anticipates increased management constraints as their mission's transition from primarily governmental contracts towards increasingly nongovernmental uses. The Integrated Natural Resources Management Plan's (INRMP) burn goal, which is independent of section 7 consultation, was 500 acres per year. A consensus was reached that an average of 300 acres per year over a rolling 10-year time frame is more realistic. In addition, future section 7 consultation conservation measures will occur at a 2:1 ratio targeting areas adjacent to occupied habitat.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered or threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. 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 to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are nondiscretionary and must be undertaken by the CCAFS so that they become binding conditions of any CCAFS action proposed for this consultation, as appropriate, for the exemption in section 7(o)(2) to apply. CCAFS has a continuing duty

to regulate the activity covered by this incidental take statement. If CCAFS fails to assume and implement the terms and conditions of the incidental take statement through enforceable terms the protection coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, CCAFS must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR § 402.14(i)(3)].

The *Amount or Extent of Take Anticipated* for the proposed action has not changed from the 30 November 2009 modification letter for the biological opinion dated 21 April 2008 nor have the *Reasonable and Prudent Measures* or *Terms and Conditions* for the southeastern beach mouse or eastern indigo snake; however, the following reasonable and prudent measures and their implementing terms and conditions supersede the previous reasonable and prudent measures and terms and conditions for the Florida scrub-jay.

Reasonable and Prudent Measures

The Service considers the following reasonable and prudent measures are necessary and minimize impacts of incidental take of Florida scrub-jays:

1. Avoid construction during the scrub-jay nesting season from March 1 through June 30 to the maximum extent practicable.

2. Notify the Service of any unauthorized take of scrub-jays during the construction of the proposed action.

3. Ensure prior to clearing of occupied scrub-jay habitat that there is suitable habitat within 1200 feet.

4. Restore 974 acres of scrub habitat within LMUs 36, 37, 38, 40, 50, 66, 67, 68, 69, 72, 78, 84, 86, 87, 89, 112, 114, 119, 144, 147, and 165 utilizing mechanical treatment and prescribed burning by the end of fiscal year 2015.

5. Conduct scrub-jay monitoring.

6. Reporting requirements describing the actions taken to implement the terms and conditions for the proposed action.

Terms and Conditions

To implement the above reasonable and prudent measures, the Service has outlined the following terms and conditions for incidental take. In accordance with the Interagency Cooperation Regulation (50 CFR 402), these terms and conditions must be complied with to implement the reasonable and prudent measures for incidental take:

1. If clearing of occupied scrub-jay habitat is to occur within the species' nesting season (typically March 1 through June 30), the areas must be surveyed prior to clearing to determine if there are any active scrub-jay nests located within the

vegetation. If an active scrub-jay nest is located, to the maximum extent practicable, clearing activities must not take place within 150 feet of the nest site until nestlings have fledged or until it has been determined that the nest has failed.

2. Unauthorized take of scrub-jays associated with the proposed activity should be reported immediately to the Service's Jacksonville Field Office (904) 731-3336. If a dead scrub-jay is found on the project site, the specimen should be thoroughly soaked in water and frozen for later analysis.

3. If there is no suitable habitat within 1200 feet of the proposed cleared areas that are occupied by scrub-jays, restoration activities of the LMUs adjacent to the impact areas must be completed at least one year prior to any clearing activities.

4. Restore 974 acres of scrub habitat within LMUs 36, 37, 38, 40, 50, 66, 67, 68, 69, 72, 78, 84, 86, 87, 89, 112, 114, 119, 144, 147, and 165 utilizing mechanical treatment and prescribed burning by the completion of fiscal year 2015. Habitat restoration must be accomplished according to the schedule and timing specified in Table 1. These restoration activities are in addition to the previously noted INRMP's goals.

5. Conduct scrub-jay monitoring to evaluate dispersal of impacted birds and to determine whether impacted birds successfully colonize restored areas. Color band scrub-jays occupying habitat to be impacted and monitor their dispersal and habitat use following vegetation clearing at impact sites.

   In order for the Service to evaluate indirect and cumulative impacts, a monitoring program assessing the CCAFS's scrub-jay extant distribution and demographic performance is essential. Banding birds and annual surveys encompassing the entire facility are warranted. To ensure accurate data is obtained a minimum of one individual per family group must be color banded, preferably a breeder. Annual surveys should then be performed at a minimum in March and if possible in June/July to document demographic performance. We recommend each survey point to be surveyed a minimum of three times on separate days. Three consecutive days is ideal. Data should be recorded similar to the Jay Watch Monitoring datasheets provided in previous correspondence; however, variations from this are acceptable.

6. Provide the Service annual reports describing the activities conducted during each fiscal year and actions taken to implement the reasonable and prudent measures and terms and conditions of this incidental take statement. These reports must include acreage cleared, LMUs cleared, acreage of LMUs restored by mechanical treatment, acreage of LMUs restored by burning, future fire-return interval for LMUs restored, dates of all activities, and scrub-jay monitoring reports.

Failure to maintain the proposed restoration schedule will require CCAFS to reinitiate consultation to be in compliance with the *Reasonable and Prudent Measures* and

implementing *Terms and Conditions* or the protection coverage of section 7(o)(2) may lapse.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

- Expand the Florida scrub-jay monitoring program to include studies addressing recruitment and survival.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in the 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 (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency 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 or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

The Service appreciates the cooperation of the CCAFS during this consultation. The Service will continue working with your agency regarding this action and the overall management of CCAFS properties. If you have any questions regarding this biological opinion modification, please contact Todd Mecklenborg at (727) 820-3705.

Sincerely,

for David L. Hankla
Field Supervisor

Appendix A

Airfield Clearing			Mitigation Plan	
Fiscal Year	Area	Acreage	LMU #	Acreage
11	East and West Clear Zones, Zone of Frangibility, Approach Departure	113.84	36, 37, 38, 40, 72, 89, 144, 147	300
11	Transporter Road	4.29	68, 69	142
12	Primary/Transitional	73.98	50, 86, 165	89
12	Hangar/Apron/Taxiway (partial development)	5	67	24
13	Primary/Transitional	37.94	112, 114, 119	78
14	Primary/Transitional	91.29	66, 78	130
15	Primary/Transitional	56.78	84, 87	231
Total		**383.12**		**994**

Skid Strip Clearing

Mitigation

Phase 1 Cearing
and Mitigation Areas

N

W E

S

Skid Strip Clearing

Mitigation

Phase 2 Cearing
and Mitigation Areas

N
W
E
S

Skid Strip Clearing

Mitigation

Phase 3 Cearing
and Mitigation Areas

N

W E

S

Skid Strip Clearing

Mitigation

Phase 4 Cearing
and Mitigation Areas

N

W E

S

Attachment B-3

Copies of Inactive Biological Opinions

Inactive BO

Attachment B-3	Document Designation Letter	I

United States Department of the Interior

FISH AND WILDLIFE SERVICE
6620 Southpoint Drive, South
Suite 310
Jacksonville, Florida 32216-0912

IN REPLY REFER TO:

FWS/R4/ES-JAFL/05-1125-MSBO

October 19, 2005

Colonel Mark H. Owen
Commander, 45th Space Wing, 45 CES/CEVP
1224 Jupiter Street, MS-9125
Patrick AFB, Florida 32925

FWS Log No: 05-1125

Dear Colonel Owen:

This document is the Fish and Wildlife Service's (Service) biological opinion based on our review of the proposed designation of 3,600 linear feet immediately north of the Canaveral Harbor Inlet as an upland borrow source for shore protection along the Patrick Air Force Base (PAFB) ocean shoreline, on Cape Canaveral Air Force Station (CCAFS) in Brevard County, Florida, and its effects on the southeastern beach mouse (*Peromyscus polionotus niveiventris*), the eastern indigo snake (*Drymarchon corais couperi*), the loggerhead turtle (*Caretta caretta*), green turtle (*Chelonia mydas*), and the leatherback turtle (*Dermochelys coriacea*) per section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). Your request for formal consultation was received on January 27, 2005.

This biological opinion is based on information provided in the January 11, 2005 draft programmatic Environmental Assessment, telephone conversation of February 23, 2005 with Angy Chambers, a site visit on May 27, 2005, and other sources of information. A complete administrative record is on file at the Ecological Service Office in Jacksonville, Florida.

Consultation History

On January 27, 2005, representatives of the 45th Space Wing sent the Service a letter requesting formal consultation on the proposed project.

On February 23, 2005, the Service telephoned the representatives of the 45th Space Wing to discuss the effects of the project. It was determined that the project "may affect" the southeastern beach mouse, loggerhead, green, and leatherback sea turtles.

On May 27, 2005, the Service met with representatives of the 45th Space Wing on site to discuss possible minimization measures. The Service requested a beach mouse transect be conducted to determine the density of mice within the action area. It was determined that the project "may affect" the southeastern beach mouse, and "may affect but not likely to adversely affect" the eastern indigo snake, loggerhead, green, and leatherback sea turtle provided measures are included in the project to avoid and minimize potential take of the indigo snake, loggerhead, green, and leatherback sea turtles.

On June 15, 2005, the Service received an email from representatives of the 45th Space Wing requesting information to the type of survey needed.

On September 22, 2005, the Service received an email with the report of the beach mouse survey report attached.

On September 27, 2005, the Service met with representatives of the 45th Space Wing to discuss relocation efforts for this project.

On September 29, 2005, the Service had all the necessary information to complete a Biological Opinion.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The 45th Space Wing proposes to designate approximately 3,600 linear feet immediately north of the Canaveral Harbor Inlet as an upland borrow source for purposes of shore protection along the PAFB ocean shoreline. The sand from the upland borrow source will be excavated across the beach face into the upland, and truck-hauled to be placed on the shoreline of PAFB. A new dune will be constructed with a seaward toe located approximately 15 to 20 feet behind the landward limit of cut. The dune will be constructed with 25% side slopes and a crest width between 3 and 15 feet, and with elevation between 8 to 13 feet. The dune will be 5 feet high and 2 to 3 cy/ft alongshore. The dune feature will be constructed from the upper 6 to 12 inches of material initially removed from the borrow area, which consists of vegetation, roots, or other organics. The dune will be vegetated with native plants such as sea oats to recreate beach mouse habitat along the primary and secondary dune.

The proposed project will only remove the dune system one time. A primary and secondary dune will be created and vegetated following removal of existing dune. After the creation of the new dune it will remain intact permanently and no further impacts will be done to the beach mouse habitat, subsequent projects will only excavate excess sand from the beach face that has been accreted due to the presence of the jetty and its recent extension. For subsequent excavation events, the Air Force will trap in areas of suitable habitat, and relocate mice to areas designated by the Service.

Prior to the proposed excavation, a shore bird survey will be conducted to ensure that the piping plover is not present within the action area. The Service has described the action area to include 3,600 linear feet of beach and dune immediately north of the Canaveral Harbor Inlet for reasons that will be explained and discussed in the "EFFECTS OF THE ACTION" section of this consultation. The following are measures to minimize the effects on the eastern indigo snake, this is just a protection measure and does not authorize for take or relocation of eastern indigo snakes.

STANDARD PROTECTION MEASURES FOR THE EASTERN INDIGO SNAKE

1. An eastern indigo snake protection/education plan shall be developed by the applicant or requestor for all construction personnel to follow. The plan shall be provided to the Service for review and approval at least 30 days prior to any clearing activities. The educational materials for the plan may consist of a combination of posters, videos, pamphlets, and lectures (*e.g.*, an observer trained to identify eastern indigo snakes could use the protection/education plan to instruct construction personnel

before any clearing activities occur). Informational signs should be posted throughout the construction site and in area easily observed by future homeowners and contain the following information:

a. a description of the eastern indigo snake, its habits, and protection under Federal Law;

b. instructions not to injure, harm, harass or kill this species;

c. directions to cease clearing activities and allow the eastern indigo snake sufficient time to move away from the site on its own before resuming clearing; and,

d. telephone numbers of pertinent agencies to be contacted if a dead eastern indigo snake is encountered. The dead specimen should be thoroughly soaked in water, then frozen.

2. Only an individual who has been either authorized by a section 10(a)(1)(A) permit issued by the Service, or designated as an agent of the State of Florida by the Florida Fish and Wildlife Conservation Commission for such activities, is permitted to come in contact with or relocate an eastern indigo snake.

3. If necessary, eastern indigo snakes shall be held in captivity only long enough to transport them to a release site; at no time shall two snakes be kept in the same container during transportation.

4. An eastern indigo snake monitoring report must be submitted to the appropriate Florida Field Office within 60 days of the conclusion of clearing phases. The report should be submitted whether or not eastern indigo snakes are observed. The report should contain the following information:

a. any sightings of eastern indigo snakes;

b. summaries of any relocated snakes if relocation was approved for the project (*e.g.*, locations of where and when they were found and relocated);

c. other obligations required by the Florida Fish and Wildlife Conservation Commission, as stipulated in the permit.

The utilization of the borrow source will be completed by March 1. The applicant has agreed to the following measures to avoid "take" of the loggerhead, green, and leatherback sea turtles.

The Service has determined the following minimization measures are necessary and appropriate to minimize take of the federally threatened loggerhead sea turtles, endangered green sea turtles, endangered leatherback sea turtles, and endangered hawksbill sea turtles.

1. Excavation activities must not occur from May 1 through October 31, the period of peak sea turtle egg laying and egg hatching, to reduce the possibility of crushing of sea turtle eggs, or nest excavation. During the May 1 through October 31 period, no construction equipment will be stored on the beach.

2. If the excavation project will be conducted during the period from March 1 through April 30, daily early morning surveys for loggerhead, green and leatherback sea turtle nests must be conducted from March 1 through April 30 or until completion of the project (whichever is earliest), and nests must be avoided.

2a. Nesting surveys will only be conducted by personnel with prior experience and training in nesting survey and egg relocation procedures. Surveyors must have a valid FWC permit. Nesting surveys must be conducted daily between sunrise and 9 a.m. Surveys must be performed in such a manner so as to ensure that construction activity does not occur in any location prior to completion of the necessary sea turtle protection measures.

3. The applicant must ensure that contractors doing the excavation work fully understand the sea turtle protection measures detailed in this incidental take statement.

4. If the excavation project will be conducted at night during the period from March 1 through April 30, nighttime surveys for leatherback sea turtle nests must be conducted from March 1 through April 30 or until completion of the project (whichever is earliest), and nests must be avoided.

4a. Nesting surveys will only be conducted by personnel with prior experience and training in nesting survey procedures. Surveyors must have a valid FWC permit. Nesting surveys must be conducted nightly from 9:00 p.m. until 6:00 a.m. The project area must be surveyed at 1-hour intervals (since leatherbacks require at least 1½ hours to complete nesting, this will ensure that all nesting leatherbacks are encountered).

5. If the excavation project will be conducted during daylight hours from March 1 through April 30, nighttime surveys for leatherback sea turtle nests are not required. All leatherback sea turtle crawls must be assumed to have resulted in nests if the nesting process has proceeded to or beyond the stage of the primary body pit. The entire area of disturbed sand plus a 10 foot buffer zone must be conspicuously marked. Neither the operation of equipment, nor the placement of fill, is permitted in the marked nest location. Any nests left in the active construction area must be clearly marked, and all mechanical equipment must avoid nests by at least 10 feet.

6. From March 1 through April 30, staging areas for construction equipment must be located off the beach to the maximum extent practicable. Nighttime storage of construction equipment not in use must be off the beach to minimize disturbance to sea turtle nesting and hatching activities.

7. From March 1 through April 30, direct lighting of the beach and near shore waters must be limited to the immediate construction area and must comply with safety requirements. Lighting on offshore or onshore equipment must be minimized through reduction, shielding, lowering, and appropriate placement to avoid excessive illumination of the waters surface and nesting beach while meeting all Coast Guard, EM 385-1-1, and OSHA requirements. Light intensity of lighting plants must be reduced to the minimum standard required by OSHA for General Construction areas, in order not to misdirect sea turtles. Shields must be affixed to the light housing and be large enough to block light from all lamps from being transmitted outside the construction area (Figure 1).

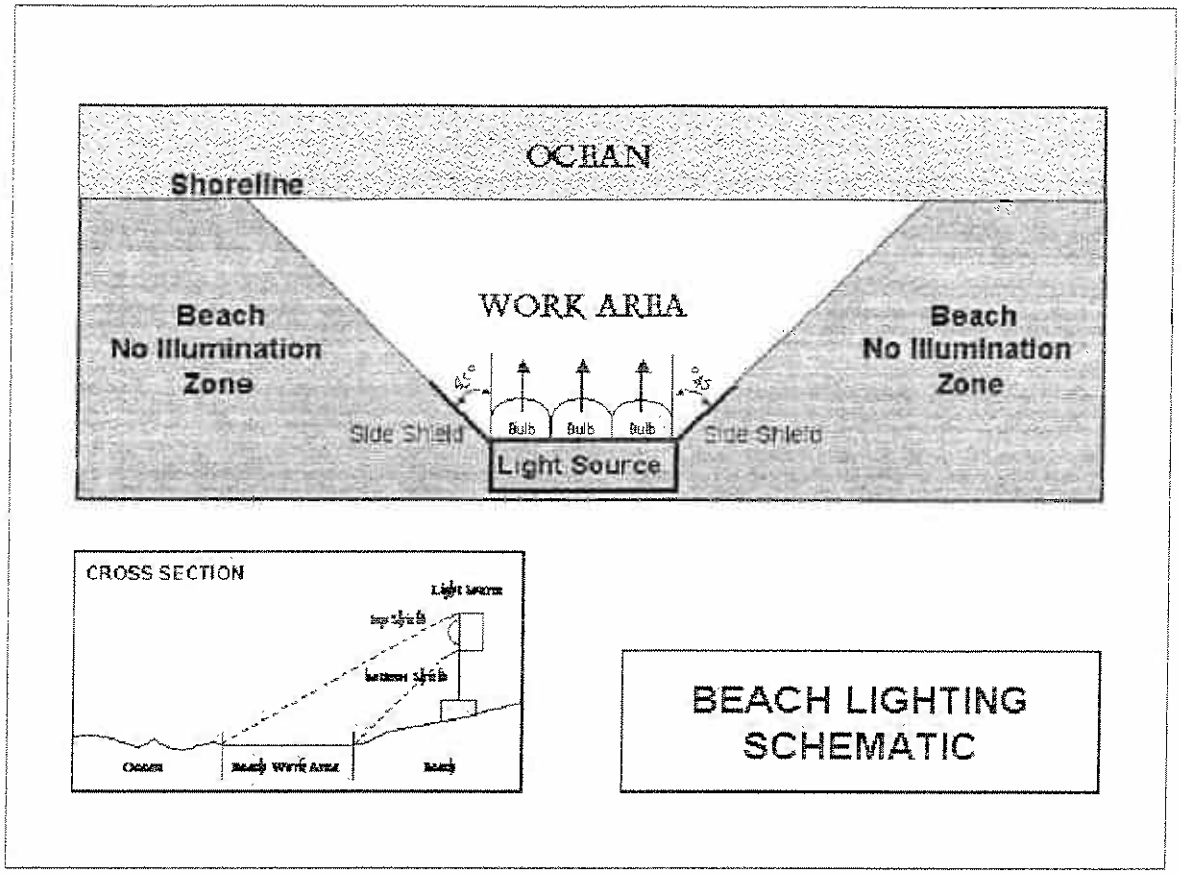

Figure 1. Lighting diagram.

STATUS OF THE SPECIES/CRITICAL HABITAT

SOUTHEASTERN BEACH MOUSE (*PEROMYSCUS POLIONOTUS NIVEIVENTRIS*)

Species/Critical Habitat Description

The southeastern beach mouse was listed as a threatened species under the Act in 1989 (54 FR 20598). Critical habitat was not designated for this subspecies.

Life History/Population Dynamics

The following account is from the South Florida Multi-Species Recovery Plan, Southeastern Beach Mouse Chapter (U.S. Fish and Wildlife Service 1999) and includes minor additions and changes to update the information.

Taxonomy

Peromyscus polionotus is a member of the order Rodentia and family Cricetidae. The southeastern beach mouse (SEBM) is one of 16 recognized subspecies of oldfield mice *P. polionotis* (Hall 1981); it is one of the eight of those subspecies that are called beach mice. The SEBM was first described by Chapman (1889) as *Hesperomys niveiventris*. Bangs (1898) subsequently placed it in the genus *Peromyscus*, and Osgood (1909) assigned it the subspecific name *P. polionotus niveiventris*.

Description

The SEBM is the largest of the eight recognized subspecies of beach mice, averaging 139 mm in total length (range of 10 individuals = 128 to 153 mm), with a 52 mm tail length (Osgood 1909; Stout 1992). Females are slightly larger than males. These beach mice are slightly darker in appearance than some other subspecies of beach mice, but paler than inland populations of *P. polionotus* (Osgood 1909). Southeastern beach mice have pale, buffy coloration from the back of their head to their tail, and their underparts are white. The white hairs extend up on their flanks, high on their jaw, and within 2 to 3 mm of their eyes (Stout 1992). There are no white spots above the eyes as with *P. p. phasma* (Osgood 1909). Their tail is also buffy above and white below. Juvenile *P. p. niveiventris* are more grayish in coloration than adults; otherwise they are similar in appearance (Osgood 1909).

Habitat

Essential habitat of the SEBM is the sea oats *(Uniola paniculata)* zone of primary coastal dunes (Humphrey and Barbour 1981; Humphrey *et al.* 1987; Stout 1992). This subspecies has also been reported from sandy areas of adjoining coastal strand/scrub vegetation (Extine 1980; Extine and Stout; 1987; Rich *et al.* 1993), which refers to a transition zone between the fore dune and the inland plant community (Johnson and Barbour 1990). Beach mouse habitat is heterogeneous, and distributed in patches that occur both parallel and perpendicular to the shoreline (Extine and Stout 1987). Because this habitat occurs in a narrow band along Florida's coast, structure and composition of the vegetative communities that form the habitat can change dramatically over distances of only a few meters.

Primary dune vegetation described from SEBM habitat includes sea oats, dune panic grass (*Panicum amarum*), railroad vine (*Ipomaea pes-caprae*), beach morning glory (*Ipomaea stolonifera*), salt meadow cordgrass (*Spartina patens*), lamb's quarters (*Chenopodium album*), saltgrass (*Distichlis spicata*), and camphor weed (*Heterotheca subaxillaris*) (Extine 1980). Coastal strand and inland vegetation is more diverse, and can include beach tea (*Croton punctatus*), prickly pear cactus (*Opuntia humifusa*), saw palmetto (*Serenoa repens*), wax myrtle (*Myrica cerifera*), rosemary (*Ceratiola ericoides*), sea grape (*Coccoloba uvifera*), oaks (*Quercus sp.*) and sand pine (*Pinus clausa*) (Extine and Stout 1987). Extine (1980) observed this subspecies as far as 1 km inland on Merritt Island; he concluded that the dune scrub communities he found them in represent only marginal habitat for the SEBM. SEBM have been documented in coastal scrub several km from the beach habitat at Kennedy Space Center/Merritt Island NWR and CCAFS (Stout, personal communication, 2004). Extine (1980) and Extine and Stout (1987) reported that the SEBM showed a preference for areas with clumps of palmetto, sea grape, and expanses of open sand.

Within their dune habitat, beach mice construct burrows to use as refuges, nesting sites, and food storage areas. Burrows of *P. polionotus*, in general, consist of an entrance tunnel, nest chamber, and escape tunnel. Burrow entrances are usually placed on the sloping side of a dune at the base of a shrub or clump of grass. The nest chamber is formed at the end of the level portion of the entrance tunnel at a depth of 0.6 to 0.9 m, and the escape tunnel rises from the nest chamber to within 2.5 cm of the surface (Blair 1951). A beach mouse may have as many as 20 burrows within its home range. They are also known to use old burrows constructed by ghost crabs (*Ocypode quadrata*).

Foraging

Beach mice typically feed on seeds of sea oats and dune panic grass (Blair 1951). The SEBM probably also eats the seeds of other dune grasses, railroad vine, and prickly pear cactus. Although beach mice prefer the seeds of sea oats, these seeds are only available as food after they have been dispersed by the wind. Beach mice also eat small invertebrates, especially during late spring and early summer when seeds are scarce (Ehrhardt 1978). Beach mice will store food in their burrows.

Behavior

P. polionotus is the only member of the genus that digs an extensive burrow for refuge, nesting, and food storage (Ehrhart 1978). To dig the burrow, the mouse assumes a straddling position and throws sand back between the hind legs with the forefeet. The hind feet are then used to kick sand back while the mouse backs slowly up and out of the burrow (Ivey 1949). Burrows usually contain multiple entrances, some of which are used as escape tunnels. When mice are disturbed in their burrows, they open escape tunnels and quickly flee to another burrow or to other cover (Ehrhart 1978). Beach mice, in general, are nocturnal. They are more active under stormy conditions or moonless nights and less active on moonlit nights. Movements are primarily for foraging, breeding, and burrow maintenance. Extine and Stout (1987) reported movements of the SEBM between primary dune and interior scrub on Merritt Island, and concluded that their home ranges overlap and can reach high densities in their preferred habitats.

Reproduction and Demography

Studies on *Peromyscus* species in peninsular Florida suggest that these species may achieve greater densities and undergo more significant population fluctuations than their temperate relatives, partially because of their extended reproductive season (Bigler and Jenkins 1975). Subtropical beach mice can reproduce throughout the year; however their peak reproductive activity is generally during late summer, fall, and early winter. Extine (1980) reported peak reproductive activity for *P. p. niveiventris* on Merritt Island during August and September, based on external characteristics of the adults. This peak in the timing and intensity of reproductive activity was also correlated to the subsequent peak in the proportion of juveniles in the population in early winter (Extine 1980). This pattern is typical of other beach mice as well (Rave and Holler 1992).

Sex ratios in beach mouse populations are generally 1:1 (Extine 1980; Rave and Holler 1992). Blair (1951) indicated that beach mice are monogamous; once a pair is mated they tend to remain together until death. He also found, however, that some adult mice of each sex show no desire to pair. Nests of beach mice are constructed in the nest chamber of their burrows, a spherical cavity about 4 to 6 cm in diameter. The nest comprises about one fourth of the size of the cavity and is composed of sea oat roots, stems, leaves and the chaffy parts of the panicles (Ivey 1949).

The reproductive potential of beach mice is generally high (Ehrhardt 1978). In captivity, beach mice are capable of producing 80 or more young in their lifetime, and producing litters regularly at 26-day intervals (Bowen 1968). Litter size of beach mice, in general, ranges from two to seven, with an average of four. Beach mice reach reproductive maturity as early as 6 weeks of age (Ehrhart 1978).

Population Dynamics

Status and Trends

The distribution of the beach mouse is limited due to modification and destruction of its coastal habitats. On the Atlantic coast of Florida, the Anastasia Island beach mouse (*P. p. phasma*) and the SEBM were federally listed as endangered and threatened, respectively, in 1989 (54 FR 20602). One additional Atlantic coast subspecies, the pallid beach mouse (*P. p. decoloratus*), was formerly reported from two sites in Volusia County, but extensive surveys provide substantial evidence that this subspecies is extinct (Humphrey and Frank 1992).

The distribution of the SEBM has declined significantly, particularly in the southern part of its range. Historically, it was reported to occur along about 280 km of Florida's central and southeast Atlantic coast from Ponce (Mosquito) Inlet, Volusia County, to Hollywood Beach, Broward County (Hall 1981). Bangs (1898) reported it as extremely abundant on all the beaches of the east peninsula from Palm Beach

at least to Mosquito (Ponce) Inlet. During the 1990s, the SEBM was reported only from Volusia County (Canaveral National Seashore); in Brevard County (Canaveral National Seashore, Kennedy Space Center/Merritt Island NWR, and CCAFS); a few localities in Indian River County (Sebastian Inlet SRA, Treasure Shores Park, and several private properties), and St. Lucie County (Pepper Beach County Park and Fort Pierce Inlet SRA) (Humphrey *et al.* 1987; Robson 1989; Land Planning Group, Inc. 1991; Humphrey and Frank 1992; U.S. Fish and Wildlife Service 1993). The SEBM is geographically isolated from all other subspecies of *P. polionotus*.

Populations of the SEBM are still found on the beaches of Canaveral National Seashore, Merritt Island NWR, and CCAFS in Brevard County, all on federally protected lands. In April 2002, a population of SEBM was documented at the Smyrna Dunes Park, at the north end of New Smyrna Beach (A. Sauzo, personal communication, 2004). Populations from both sides of Sebastian Inlet appear to be extirpated (A. Bard, personal communication, 2004).

The status of the species south of Brevard County is currently unknown. The surveys done during the mid-1990s indicate the distribution of this subspecies in the counties south of Brevard was severely limited and fragmented. There are not enough data available to determine population trends for these populations. These surveys revealed that it occurred only in very small numbers where it was found. In Indian River County, the Treasure Shores Park population experienced a significant decline in the 1990s, and it is uncertain whether populations still exist at Turtle Trail or adjacent to the various private properties (D. Jennings, personal communication, 2004). Trapping efforts documented a decline from an estimated 300 individuals down to numbers in the single digits. No beach mice were found during surveys in St. Lucie County and it is possible that this species is extirpated there. The SEBM no longer occurs at Jupiter Island, Palm Beach, Lake Worth, Hillsboro Inlet or Hollywood Beach (U.S. Fish and Wildlife Service 1999).

The primary reason for the significant reduction in the range of the SEBM is the loss and alteration of coastal dunes. Large-scale commercial and residential development on the coast of Florida has eliminated SEBM habitat in the southern part of its range. This increased urbanization has also increased the recreational use of dunes, and harmed the vegetation essential for dune maintenance. Loss of dune vegetation results in widespread wind and water erosion and reduces the effectiveness of the dune to protect other beach mouse habitat. In addition to this increased urbanization, coastal erosion is responsible for the loss of the dune environment along the Atlantic coast, particularly during tropical storms and hurricanes. The extremely active 2004 hurricane season had a pronounced affect on Florida's Atlantic coast beaches and beach mouse habitat.

The encroachment of residential housing onto the Atlantic coast also increases the likelihood of predation by domestic cats and dogs. A healthy population of SEBM on the north side of Sebastian Inlet SRA in Brevard County was completely extirpated by 1972, presumably by feral cats (A. Bard, personal communication 2004). Urbanization of coastal habitat could also lead to potential competition of beach mice with house mice and introduced rats.

Beach mice along the Gulf Coasts of Florida and Alabama generally live about nine months (Swilling 2000). Field trapping research indicates that 68 percent (average) of mice alive in one month will survive to the next month. Actual survival rates indicate that 18.5 to 87 percent of individuals survive no more than four months and some mice live between 12 and 20 months (Blair 1951; Rave and Holler 1992). Holler *et al.* (1997) found that 44.26 percent of beach mice captured for the first time survived to the next season (winter, spring, summer, and fall). The mean survival rate for mice captured for a second time to subsequent capture was higher (53.90 percent). More than ten percent of mice survived three seasons after first capture, and four to eight percent survived more than one year after initial capture.

Mice held in captivity by Blair (1951) and at Auburn University (Holler 1995) have lived three years or more.

Analysis of the Species/Critical Habitat Likely to be Affected

The southeastern beach mouse was listed as an endangered species primarily because of the fragmentation, adverse alteration and loss of habitat due to coastal development. The above analysis shows three items that are essential for recovery of this species: (1) purchase of coastal dune habitat for preservation; (2) removal of predation or competition by animals related to human development (cats and house mice); and (3) increase the regulations regarding coastal development.

ENVIRONMENTAL BASELINE

Action Area

The action area for this biological opinion is defined as all habitat within the boundaries of CCAFS.

Status of the Species in the Action Area

The southeastern beach mouse is found along the entire reach of coastline on CCAFS in addition to the KSC and Cape Canaveral National Seashore. The known distribution is a result of cursory surveys and intermittent trapping involving different construction projects. There has not been a systematic trapping study done in order to determine the status throughout its range on these Federal lands. The species is found within the action area.

Factors affecting species environment within the action area

Federal actions have taken place within the action area that has impacted the southeastern beach mouse. These projects resulted in incidental take through section 7 of the Act. The impacts associated with these projects resulted in the loss of occupied habitat within the action area. However, the adverse effects of the southeastern beach mouse from these projects were off-set through on-site preservation and improvement of scrub habitat; resulting in a net increase in scrub habitat under active management. On CCAFS, southeastern beach mice have been located in the scrub habitat and further inland than in the coastal strand. Improvements to the management of scrub have increased the amount of habitat used by the southeastern beach mouse.

EFFECTS OF THE ACTION

This section includes an analysis of the direct and indirect effects of the proposed action on the species and its interrelated and interdependent activities. To determine whether the proposed action is likely to jeopardize the continued existence of threatened or endangered species in the action area, we focus on consequences of the proposed action that affect rates of birth, death, immigration, and emigration because the probability of extinction in plant and animal populations is most sensitive to changes in these rates.

Factors to be considered

The effects of the proposed project of the southeastern beach mouse may occur as direct and indirect effects.

Direct Effects

The excavation of the beach face and dune may result in the direct "take" of southeastern beach mice as a result of habitat loss. The project will result in the inadvertent injury or death of southeastern beach mice that may be found within the action area. It is possible that as construction proceeds, they will move away from the construction site; however, the Service anticipates that "take" will occur. The proposed project will permanently impact existing southeastern beach mouse burrows that may be found within the action area and temporarily impact beach mouse habitat within the action area. It is possible that as construction proceeds, they will move away from the construction site; however, the Service anticipates that "take" will occur.

Indirect Effects

Indirect effects will result from continued loss of foraging habitat for the southeastern beach mouse.

Cumulative Effects

Cumulative effects include the effects of future State, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The Service has considered cumulative effects with respect to this project and determined they do not apply in this instance.

Conclusion

After reviewing the current status of the southeastern beach mouse, 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 proposed project is not likely to jeopardize the continued existence of the southeastern beach mouse. No critical habitat has been designated for the three species; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation under section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. 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 to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be implemented by the agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply.

The Federal agency has a continuing responsibility to regulate the activity that is covered by this incidental take statement. If the agency (1) fails to assume and implement the terms and conditions or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the agency must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. (50 CFR 402.14(I) (3))

Sections 7(b) (4) and 7(o) (2) of the Act do not apply to the incidental take of listed plant species. However, protection of listed plants is provided to the extent that the Act requires a Federal permit for removal or reduction to possession of endangered plants from areas under Federal jurisdiction, or for any act that would remove, cut, dig up, or damage or destroy any such species on any State or in the course of any violation of a State criminal trespass law.

AMOUNT OR EXTENT OF TAKE ANTICIPATED

The Service has reviewed the biological information for this species, information presented by the representatives for the agency, and based on our review; incidental take in the form of harm or harassment is anticipated for all the southeastern beach mice utilizing the dune assess points for rubble removal along the four segments of shoreline totaling 3,600 feet. If during the course of this action, this level of take is exceeded; such take would represent new information requiring review of the reasonable and prudent measures provided. The Federal agency must immediately provide modification of the reasonable and prudent measures.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

Reasonable and Prudent Measures

When providing an incidental take statement the Service is required to give reasonable and prudent measures it considers necessary or appropriate to minimize the take along with terms and conditions that must be complied with, to implement the reasonable and prudent measures. Furthermore, the Service must also specify procedures to be used to handle or dispose of any individuals taken. The Service believes the following reasonable and prudent measures are necessary and appropriate to reduce take:

1. Avoid potential for southeastern beach mice to be injured or killed by heavy equipment and the destruction of burrows.
2. Prior to hurricane season, trap mice within the action area and translocate them to suitable habitat within the Archie Carr National Wildlife Refuge. For subsequent excavations, in areas of suitable habitat, trap and relocate mice.
3. Rebuild the dune and vegetate using native plants. For subsequent excavations avoid this rebuilt dune area.
4. Fund a research project to determine the survivability of translocated mice.
5. Notify the Service of any unauthorized take of southeastern beach mice.

TERMS AND CONDITIONS

To implement the above reasonable and prudent measures, the Service has outlined the following terms and conditions for incidental take. In accordance with the Interagency Cooperation Regulation (50 CFR 402), these terms and conditions must be complied with to implement the reasonable and prudent measures for incidental take:

1. The Air Force will follow the trapping protocol (copy attached) prepared by the Fish and Wildlife Service. Point 6 of the trapping protocol is modified as follows: "Trapping shall be done for five (5) consecutive nights just prior to work. If for some reason work is not initiated on the day following the fifth trapping night, trapping will be repeated for five consecutive nights following the above protocol."

2. The captured mice will be relocated using a "soft release" technique. The mice will be reintroduced on suitable habitat within the Archie Carr National Wildlife Refuge, where mice are currently extirpated.

3. The Air Force will fund a research project to investigate the survivability of the mice when translocated to the Archie Carr National Wildlife Refuge. The research project will include quarterly trapping for two years following the translocation event.

4. The dune will be rebuilt and vegetated with native plant species such as sea oats. The Air Force will not destroy this new primary dune during subsequent excavations.

5. If a dead southeastern beach mouse is found on the project site, the specimen should be thoroughly soaked in water and frozen, and the applicant should notify the Jacksonville Field Office immediately at (904)232-2580. Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

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. The Service believes that all the southeastern beach mice utilizing areas of dune assess for the rubble removal project along the 3600 linear feet of shoreline will be incidentally taken. 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. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a) (1) of the Act directs Federal agencies to use their authority to further the purposed of the act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help carry out recovery plans, or to develop information.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the conservation recommendations carried out.

1. The Air Force should fund a research project to determine the frequency with which mice repopulate the new dune.

2. In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation measures.

REINITIATION OF SECTION 7 CONSULTATION

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR Section 402.16, reinitiation of formal consultation is required when 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 agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this biological opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation. For further coordination please contact Ann Marie Maharaj at (904) 232-2580 ext. 111 of this office.

Sincerely,

David L. Hankla
Field Supervisor

Cc:
Joe Johnston-ES, Atlanta RO
Annie Dziergowski- Jacksonville Field Office

REFERENCES

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TRAPPING PROTOCOL FOR BEACH MICE

1. Individuals conducting the trapping must have previous experience in live trapping, handling, and identification of small mammals.

2. Surveys must include the entire dune system within the project area and, if permission can be obtained, adjacent lands with beach mouse habitat. Trapping areas must include all suitable habitat types such as: frontal dunes, secondary dunes, scrub dunes, and dry flats behind dune systems, regardless of distance from the beach.

3. Trapping must be conducted along linear transects with live-traps spaced at 32.8 feet (10 to 15 meter) intervals. Linear transects should be parallel to the frontal dune system, and at least one transect should be placed in each habitat type.

4. Transects must extend the full length of each habitat type except where long blocks of habitat are involved ($\geq$ 2,640 feet/750 meters). In those cases, the habitat may be covered by several non-contiguous transects.

5. Two traps per trapping station are desirable, but one trap per station is acceptable.

6. Traps must be operated for five nights per trapping season or until a beach mouse is caught. At least three nights of trapping should be consecutive.

7. Traps must be checked and all mice released between 12 a.m. and thirty minutes after official sunrise time. All traps should be closed after checking and reset late each afternoon to preclude mortality of mice and other small mammals during the day.

8. When nighttime temperatures are forecast to be <15°C (60°F), a ball of cotton batting (or similar synthetic material) must be placed in each trap for insulation purposes. Trapping should not be conducted when nighttime temperatures are forecast to be <10°C (50°F), without prior coordination from the permitting agencies.

9. Trapping must not be conducted when the moon phase is three-quarters to full, if feasible.

10. Bait must consist of either long-cooking rolled oats, sunflower seeds or safflower seeds.

11. Each trap must be visually inspected before closing to assure no small mammals or other animals are inadvertently left in the trap.
12. Captured mice must be gently released on the ground near protective vegetation immediately adjacent to the trapping station.

13. Any exotic species captured during beach mouse trapping must be euthanized humanely.

14. Presence of beach mice can be documented in a single trapping period, but to determine absence with any degree of certainty will require multiple trapping periods. In that respect, trapping must be conducted seasonally (fall, winter, spring, summer) and in all dune habitats for at least two consecutive years or until mice are caught.

15. All traps must be individually numbered and labeled with identification of ownership.

16. Site description and trapping data must be recorded. The site description must include project location, habitat on the project area and adjacent lands, and trapping design relative to habitat distribution. Daily trapping data must include number of beach mice captured per day, non-target species captured, weather conditions, lost or missing traps, and moon phase. If population data is being collected, sex, age, and reproductive status of beach mice must also be reported. All information must be submitted to the following offices:

Protected Species Permit Coordinator
Bureau of Wildlife Diversity Conservation
Florida Fish and Wildlife Conservation Commission
620 South Meridian Street, Mail Station WLD-BLX
Tallahassee, Florida 32399-1600
(850) 921-5990
Fax (850) 921-1847

Terry J. Doonan
Regional Biologist
Bureau of Wildlife Diversity Conservation
Florida Fish and Wildlife Conservation Commission
3377 East U.S. Highway 90
Lake City, FL 32055

Deputy Field Supervisor
U.S. Fish and Wildlife Service
6620 Southpoint Drive South, Suite 310
Jacksonville, FL 32216
(904) 232-2580
Fax (904) 232-2404

Inactive BO

Attachment B-3	Document Designation Letter	J

United States Department of the Interior

FISH AND WILDLIFE SERVICE
6620 Southpoint Drive South
Suite 310
Jacksonville, Florida 32216-0912

August 22, 2002

Mr. William J. Gibson
Deputy, Range/Base Civil Engineer
45 CES/CEV
1224 Jupiter Street, MS-9125
Patrick AFB, Florida 32925

FWS Log No:02-617

Dear Mr. Gordon:

This represents the biological opinion of the U.S. Fish and Wildlife Service (Service) in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 *et seq.*). The biological opinion satisfies the consultation requirements of section 7(a)(2) of the Act. This report does not address the requirements of other environmental statutes, such as the National Environmental Policy Act. A complete administrative record of this consultation is on file in this office.

CONSULTATION HISTORY

On or about February 19, 2002, the 45th Space Wing (45 SW) contacted our office to request formal consultation on the southeastern beach mouse as a result of inadvertent trapping of this species in several buildings on Cape Canaveral Air Force Station (CCAFS).

On March 19, 2002, biologists from this office met with 45 SW representatives and their contractors to discuss the issue.

Subsequent to the March 2002, meeting, this office met with representatives from the Florida Fish and Wildlife Conservation Commission (FWC) to discuss the trapping program on the installation and evaluate alternatives.

On June 15, 2002, the 45 SW submitted, at our request, additional information about the trapping effort, and minimization measures to be implemented..

BIOLOGICAL OPINION

Description of Proposed Action

There has been and continues to be a rodent control program on CCAFS. The rodent control program is conducted in buildings throughout the installation on a "request only" basis. Both live-trapping and snap-trapping are used to control rodents that find their way into the buildings. In the process of trapping for rodents, it was determined that southeastern beach mice were moving into the buildings and were being captured, both in the snap-traps and live-traps.

The 45 SW does not have incidental take authorization for this incidental trapping of beach mice while conducting rodent control. In our discussions with the 45 SW representatives, we recommended they initiate section 7 consultation on the rodent control program, followed by a biological opinion issued by the Service with incidental take authorization. This biological opinion will be valid for one year from the date of issuance. At the end of the year, we will evaluate the trapping program and will either revalidate the biological opinion or modify the opinion.

Status of the Species

The old field mouse (*Peromyscus polionotus*) is distributed throughout northeastern Mississippi, Alabama, Georgia, South Carolina and Florida. Certain subspecies of the oldfield mouse occur on beaches and dunes of the Atlantic coast of Florida and the Gulf coast of Alabama and Florida, and are collectively known as "beach mice". These dune dwelling mice are distinctly paler than inland populations and have been classified into eight subspecies.

The southeastern beach mouse (*P.p. niveiventris*) is classified as threatened. This species is slightly darker than the Anastasia beach mouse (*P.p. phasma*). The original distribution of the southeastern beach mouse was from Ponce Inlet, Volusia County, southward to Hollywood, Broward County, and possibly as far south as Miami in Dade County. It is currently restricted to Volusia, Brevard, and St. Lucie Counties. Formerly, this subspecies occurred along about 175 miles of Florida's southeast coast; it now occupies about 50 miles, a significant reduction. This species is found in coastal dunes, the most seaward vegetation typically consists of sea oats, dune panic grass, railroad vine, beach morning glory, and camphor weed. Further landward, vegetation is more diverse, including beach tea, prickly pear cactus, saw palmetto, wax myrtle, and sea grape.

This subspecies use both beach dunes and inland areas of scrub vegetation. The southeastern beach mouse may use up to 20 burrows, usually located on the sloping side of a dune. Each burrow consists of an entrance tunnel, nest chamber, and escape tunnel. Beach mice are nocturnal, with most activity occurring on moonlit nights and less activity under stormy conditions or moonless nights.

Reproduction may occur throughout the year, but peak population levels usually occur in winter. Breeding activity was most evident from November though early January. There appears to be a

high turnover in the population. Captive beach mice are capable of producing 80 or more young in their lifetime, with litters produced as often as 26-day intervals.

Beach mice typically feed on seeds of sea oats and dune panic grass and also eat small invertebrates. Potential predators include snakes, bobcats, foxes, raccoons, skunks, owls, and feral cats and dogs. House mice may compete with the southeastern beach mouse.

Environmental Baseline

Action Area

The action area for this biological opinion is defined as CCAFS.

Status of the Species in the Action Area

The southeastern beach mouse is found along the entire reach of coastline on CCAFS, in addition to the Kennedy Space Center and Cape Canaveral National Seashore. The known distribution is a result of cursory surveys and intermittent trapping involving different construction projects. There has not been a systematic trapping study done in order to determine the status throughout its range on these Federal lands. However, there are plans to start a post-wide trapping survey possibly in FY 03.

Beach mice invading buildings has not been well documented until now. From January through June 2002, there have been 40 beach mice caught in a number of buildings on CCAFS, 26 were snapped-trapped and 14 were live-trapped and released just outside of the building in which the animal was captured. A total to 23 facilities were involved, three east of Pier, Lighthouse, ICBM roads and N. Phillips Parkway, and 20 west of these roadways. Of the 40 mice captured, 18 were captured in the three building east of the above identified roads and the balance (22) west of the roadways. At our request, the pest control operators are recording all captures, as either beach mice, mice or rats.

To minimize the risk to beach mice, the 45 SW will continue to use live-traps in those facilities east of the above referenced roads. The captured mouse will be released outside of the building in which it was trapped. In addition, facility managers have been instructed to identify and seal any openings that could provide access to mice. To further minimize the use of facilities by rodents, facility occupants have been directed to remove accumulated paper, food, cloth and other items that could provide feeding or nesting material.

Effects of the Action on the Southeastern Beach Mouse

The continuation of the rodent control program on CCAFS will result in the inadvertent injury or death of southeastern beach mice that are found inside buildings.

Cumulative effects

Cumulative effects include the effects of future State, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The Service has considered cumulative effects with respect to this project and determined they do not apply in this instance.

Conclusion

After reviewing the current status of the southeastern beach mouse , 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 rodent control program is not likely to jeopardize the continued existence of the southeastern beach mouse. No critical habitat has been designated for this species, therefore, none will be affected.

INCIDENTAL TAKE

Sections 4(d) and 9 of the Act, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or to attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. "Harm" and "harass" are further defined in Service regulations (50 CFR 17.3). "Harm" is 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 an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns, which include, but are not limited to, breeding, feeding or sheltering.

Under the terms of sections 7(b)(4) and 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.

The measures described below are non-discretionary, and must be implemented by the agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply.

The Federal agency has a continuing responsibility to regulate the activity that is covered by this incidental take statement. If the agency (1) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

The Service has reviewed the biological information for this species, information presented by the applicant's consultants, and other available information relevant to this action, and based on our review, incidental take is anticipated for 50 southeastern beach mice within the action area for a one year period, beginning with the date of this biological opinion.

Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

Reasonable and Prudent Measures

When providing an incidental take statement the Service is required to give reasonable and prudent measures it considers necessary or appropriate to minimize the take along with terms and conditions that must be complied with, to implement the reasonable and prudent measures. Furthermore, the Service must also specify procedures to be used to handle or dispose of any individuals taken. The Service believes the following reasonable and prudent measure is necessary and appropriate to reduce take:

> The 45 SW will implement a live-trapping program to remove southeastern beach mice from those facilities east of Pier, Lighthouse and ICBM roads and N. Phillips Parkway.

Terms and Conditions

To implement the above reasonable and prudent measure, the Service has outlined the following terms and conditions for incidental take. In accordance with the Interagency Cooperation Regulation (50 CFR 402), these terms and conditions must be complied with to implement the reasonable and prudent measure for incidental take:

> 1. The 45 SW will live-trap southeastern beach mice from those facilities east of Pier, Lighthouse and ICBM roads and N. Phillips Parkway. Facilities west of these roads, snap-traps may be used. Live-trapping is not necessary.
>
> 2. The 45 SW will submit to the Jacksonville Field Office and to the Florida Fish and Wildlife Conservation Commission's Endangered Species Coordinator at 620 South Meridian, Tallahassee, Florida 32399 a monthly report identifying which species of rodents trapped, method of capture, and facility

location. This report is only required if beach mice were captured during the reporting month. If no beach mice were captured, no report is required.

3. Dead southeastern beach mice should be frozen.

REINITIATION OF SECTION 7 CONSULTATION

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR Section 402.16, reinitiation of formal consultation is required when 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 agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this biological opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation. This biological opinion is valid for one year from the date of issuance.

Sincerely,

Don Palmer

for Peter M. Benjamin
Assistant Field Supervisor

cc

Joe Johnston-ES, Atlanta RO
Tom Logan-FWC

S: palmer\02-617\acm\08.22.02

Attachment B-4

Copies of Permits

Permit

Attachment B-4	Document Designation Letter	K

MEMORANDUM FOR RECORD

MAY 7 2014

FROM: 45 CES/CEIE
1224 Jupiter Street
Patrick AFB FL 32925-3343

SUBJECT: DESIGNATION OF SUBPERMITTEE AUTHORIZATION FOR U. S. FISH AND WILDLIFE SERVICE FEDERAL MIGRATORY BIRD DEPREDATION PERMIT MB673776-0

1. This memo for record serves to designate individuals in writing authorization to conduct activities listed in Conditions and Authorizations contained within the above referenced federal depredation permit (attached).

2. The following individuals are authorized as subpermittees in 45 CES/CEIE to conduct authorized activities: Angy Chambers, Martha Carroll, Keitha Dattilo-Bain, Richard Brust, Rachel Mandel, and Lynda Dawe.

3. In addition, approved personnel in 45 OSS Airfield Operations, and/or those contracted through 45 SW Flight Safety, are authorized to perform depredation activities at airfields at Patrick Air Force Base and Cape Canaveral Air Force Station. Upon receiving the depredation permit, the 45 OSS Airfield Operations must provide a list of all individuals performing depredation activities to the principle permit holder, Mr. Mike Blaylock, and all personnel must be trained in proper bird identification.

4. The depredation permit renewal package is processed annually through 45 CES/CEIE, and data must be submitted to Ms. Angy Chambers and Ms. Keitha Dattilo-Bain by the second week in January for the previous calendar year. E-mail notifications are sent annually in December to 45 OSS Airfield Operations and 45 SW Flight Safety requesting the depredation logs noting the number of birds per species depredated each month, active nests or eggs destroyed, as well as bird strike data where aircraft damage was reported for that year.

5. All personnel designated as subpermittees must read and understand the conditions and authorizations listed within the permit.

6. POC for this action is Ms. Angy Chambers, 45 CES/CEIE, 321-853-6822 or E-mail, angy.chambers@us.af.mil.

MICHAEL A. BLAYLOCK
Chief, Environmental Conservation

Attachment:
Federal Fish and Wildlife Depredation Permit

cc:
Angy Chambers, 45 CES/CEIE
Keitha Dattilo-Bain, 45 CES/CEIE
Martha Carroll, 45 CES/CEIE
Richard Brust, 45 CES/CEIE
Rachel Mandel, 45 CES/CEIE
Lynda Dawe, 45 CES/CEIE
James Fidler, 45 SW/SEF
MSgt Clint Harper, 45 OSS/OSA

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

FEDERAL FISH AND WILDLIFE PERMIT

2. AUTHORITY-STATUTES
16 USD 703-712

REGULATIONS
50 CFR Part 13
50 CFR 21.41

1. PERMITTEE

PATRICK AIR FORCE BASE
1224 JUPITER STREET
MS 9125
PATRICK AFB, FL 32925-3343

3. NUMBER
MB673776-0

4. RENEWABLE	5. MAY COPY
☒ YES ☐ NO	☒ YES ☐ NO

6. EFFECTIVE	7. EXPIRES
04/01/2014	03/31/2015

8. NAME AND TITLE OF PRINCIPAL OFFICER *(If #1 is a business)*
MICHAEL A BLAYLOCK
CHIEF, ENVIRONMENTAL CONSERVATION

9. TYPE OF PERMIT
DEPREDATION AT AIRPORTS

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED
Patrick AFB and Cape Canaveral AFS, Florida

11. CONDITIONS AND AUTHORIZATIONS

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL, TRIBAL, OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE.

D. You are authorized to take, temporarily possess, and transport the migratory birds specified below to relieve or prevent injurious situations impacting public safety. All take must be done as part of an integrated wildlife damage management program that emphasizes nonlethal management techniques. You may not use this authority for situations in which migratory birds are merely causing a nuisance.

(1) The following may be lethally taken: Minimum numbers and species

(2) The following may be live-trapped and relocated: Minimum numbers and species

E. You are authorized in emergency situations only to take, trap, or relocate any migratory birds, nests and eggs, including species that are not listed in Condition D (except bald eagles, golden eagles, or endangered or threatened species) when the migratory birds, nests, or eggs are posing a direct threat to human safety. A direct threat to human safety is one which involves a threat of serious bodily injury or a risk to human life.

You must report any emergency take activity to your migratory bird permit issuing office U.S. Fish and Wildlife Service, Post Office Box 49208, Atlanta, GA 30359 within 72 hours after the emergency take action. Your report must include the species and number of birds taken, method, and a complete description of the circumstances warranting the emergency action.

F. You are authorized to salvage and temporarily possess migratory birds found dead or taken under this permit for (1) disposal, (2) transfer to the U.S. Department of Agriculture, (3) diagnostic purposes, (4) purposes of training airport personnel, (5) donation to a public scientific or educational institution as defined in 50 CFR 10.12, (6) donation to persons authorized by permit or regulation to possess them, or (7) donation of migratory game birds only to a public charity (those suitable for human consumption). Any dead bald eagles or golden eagles salvaged must be reported within 48 hours to the National Eagle Repository at 303/287-2110 and to the migratory bird permit issuing office at U.S. Fish and Wildlife Service, Post Office Box 49208, Atlanta, GA 30359. The Repository will provide directions for shipment of these specimens.

☒ ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS

ANNUAL REPORT DUE: 01/31
You must submit a report to your Regional Migratory Bird Permit Office even if you had no activity. Report form is at www.fws.gov/forms/3-202-9.pdf.

ISSUED BY	TITLE	DATE
Carmen P. Swanson	CHIEF, MIGRATORY BIRD PERMIT OFFICE - REGION 4	03/31/2014

G. You may not salvage and must immediately report to U.S. Fish and Wildlife Service Office of Law Enforcement any dead or injured migratory birds that you encounter that appear to have been poisoned, shot, electrocuted, have collided with industrial power generation equipment, or were otherwise killed or injured as the result of potential criminal activity. See USFWS OLE contact information below.

H You may use the following methods of take: (1) firearms; (2) nets; (3) registered animal drugs (excluding nicarbazin), pesticides and repellents; (4) falconry abatement; and (5) legal lethal and live traps (excluding pole traps). Birds caught live may be euthanized or transported and relocated to another site approved by the appropriate State wildlife agency, if required. When using firearms, you may use rifles or air rifles to shoot any bird when you determine that the use of a shotgun is inadequate to resolve the injurious situation. You may use paint ball guns to haze birds or deter birds only when other methods of hazing are ineffective.

Anyone who takes migratory birds under the authority of this permit must follow the American Veterinary Medical Association Guidelines on Euthanasia when euthanization of a bird is necessary (http://www.avma.org/issues/animal_welfare/euthanasia.pdf).

I. You may temporarily possess and stabilize sick and injured migratory birds and immediately transport them to a federally licensed rehabilitator for care.

J. The following subpermittees are authorized: any other person who is (1) employed by or under contract to you for the activities specified in this permit, or (2) otherwise designated a subpermittee by you in writing, may exercise the authority of this permit.

K. You and any subpermittee(s) must comply with the attached Standard Conditions for Migratory Bird Depredation Permits. **These standard conditions are a continuation of your permit conditions *and must remain with your permit.***

For suspected illegal activity, immediately contact USFWS Law Enforcement at: (305) 526-2610

Standard Conditions
Migratory Bird Depredation Permits
50 CFR 21.41

All of the provisions and conditions of the governing regulations at 50 CFR part 13 and 50 CFR part 21.41 are conditions of your permit. Failure to comply with the conditions of your permit could be cause for suspension of the permit. The standard conditions below are a continuation of your permit conditions and must remain with your permit. If you have questions regarding these conditions, refer to the regulations or, if necessary, contact your migratory bird permit issuing office. For copies of the regulations and forms, or to obtain contact information for your issuing office, visit: http://www.fws.gov/migratorybirds/mbpermits.html.

1. To minimize the lethal take of migratory birds, you are required to continually apply non-lethal methods of harassment in conjunction with lethal control.
   [*Note: Explosive Pest Control Devices (EPCDs) are regulated by the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF). If you plan to use EPCDs, you require a Federal explosives permit, unless you are exempt under 27 CFR 555.141. Information and contacts may be found at www.atf.gov/explosives/how-to/become-an-fel.htm.*]

2. Shotguns used to take migratory birds can be no larger than 10-gauge and must be fired from the shoulder. You must use nontoxic shot listed in 50 CFR 20.21(j).

3. You may not use blinds, pits, or other means of concealment, decoys, duck calls, or other devices to lure or entice migratory birds into gun range.

4. You are not authorized to take, capture, harass, or disturb bald eagles or golden eagles, or species listed as threatened or endangered under the Endangered Species Act found in 50 CFR 17, without additional authorization.

   For a list of threatened and endangered species in your state, visit the U.S. Fish and Wildlife Service's Threatened and Endangered Species System (TESS) at: http://www.fws.gov/endangered.

5. If you encounter a migratory bird with a Federal band issued by the U.S. Geological Survey Bird Banding Laboratory, Laurel, MD, report the band number to 1-800-327-BAND (2263) or http://www.reportband.gov.

6. This permit does not authorize take or release of any migratory birds, nests, or eggs on Federal lands without additional prior written authorization from the applicable Federal agency, or on State lands or other public or private property without prior written permission or permits from the landowner or custodian.

7. Unless otherwise specified on the face of the permit, migratory birds, nests, or eggs taken under this permit must be:
   (a) turned over to the U.S. Department of Agriculture for official purposes, or
   (b) donated to a public educational or scientific institution as defined by 50 CFR 10, or
   (c) completely destroyed by burial or incineration, or
   (d) with prior approval from the permit issuing office, donated to persons authorized by permit or regulation to possess them.

8. A subpermittee is an individual to whom you have provided written authorization to conduct some or all of the permitted activities in your absence. Subpermittees must be at least 18 years of age. As the permittee, you are legally responsible for ensuring that your subpermittees are adequately trained and adhere to the terms of your permit. You are responsible for maintaining current records of who you have designated as a subpermittee, including copies of designation letters you have provided.

9. You and any subpermittees must carry a legible copy of this permit, *including these Standard Conditions,* and display it upon request whenever you are exercising its authority.

10. You must maintain records as required in 50 CFR 13.46 and 50 CFR 21.41. All records relating to the permitted activities must be kept at the location indicated in writing by you to the migratory bird permit issuing office.

11. Acceptance of this permit authorizes the U.S. Fish and Wildlife Service to inspect any wildlife held, and to audit or copy any permits, books, or records required to be kept by the permit and governing regulations.

12. You may not conduct the activities authorized by this permit if doing so would violate the laws of the applicable State, county, municipal or tribal government or any other applicable law.

(DPRD - 12/3/2011)

Permit

Attachment B-4	Document Designation Letter	L

DEPARTMENT OF THE AIR FORCE
45TH SPACE WING (AFSPC)

AUG 2 2 2014

MEMORANDUM FOR RECORD

FROM: 45 CES/CEIE
1224 Jupiter Street
Patrick AFB FL 32925-3343

SUBJECT: DESIGNATION OF AUTHORIZED AGENTS FOR FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION SPECIAL PURPOSE PERMIT SPGS-14-67, CAPTURE, HOLD AND RELEASE OF NUISANCE ALLIGATORS

1. This memo for record serves to designate individuals in writing authorization to conduct activities listed in Conditions and Provisions contained within the above referenced state permit

2. The following individuals are authorized as agents in 45 CES/CEIE to conduct permitted activities: Mike Blaylock, Martha Carroll, Keitha Dattilo-Bain, Tod Zechiel, Richard Brust, Rachel Mandel.

3. All personnel designated as authorized agents must read and understand the conditions and authorizations listed within the permit.

4. POC for this action is Ms. Angy Chambers, 45 CES/CEIE, 321-853-6822 or E-mail, angy.chambers@us.af.mil.

Angy L. Chambers

ANGY L. CHAMBERS
Biological Scientist

Attachment:
FWC Special Purpose Permit
d

Special Purpose Permit

Florida Fish And Wildlife Conservation Commission
Division Of Hunting And Game Management
Alligator Management Program
620 S. Meridian Street, Tallahassee, Fl 32399-1600
(850) 488-3831

Permittee Name:	Angy L. Chambers, Wildlife Manager	Permit No.: SPGS-14-67
Permittee Address:	45 CES/CEIE	Effective Date: 08/22/2014
	Patrick Air Force Base	Expiration Date: 08/22/2019
	1224 Jupiter Street	
	Patrick AFB, FL 32925-3343	
	(angy.chambers@us.af.mil)	
	Comm (321-853-6822, office; 321-794-5268, cell)	

IS AUTHORIZED TO: Capture, hold, and relocate nuisance American alligators (*Alligator mississippiensis*), pursuant to Rules 68A-9.002 and 68A-27.003, F.A.C., under the following conditions/provisions.

AUTHORIZED LOCATION(S): Air Force 45th SW Installations - Cape Canaveral Air Station, Patrick Air Force Base, and Malabar Transmitter Annex in Brevard County, Florida (See attached Map #1)

Permittee Signature Angy L Chambers Date 8/22/14

This permit is not valid unless signed. By signature, the permittee confirms that all information provided to issue the permit is accurate and complete, and indicates acceptance and understanding of the provisions and conditions listed below. **Any false statements or misrepresentations when applying for this permit may result in felony charges and will result in revocation of this permit.**

Authorized by: Harry J. Dutton, Coordinator, Alligator Management Program

Authorizing Signature Harry J. Dutton Date 08/22/2014

PERMIT CONDITIONS AND PROVISIONS:

1. Alligators within the authorized location may be captured by the permittee or his/her authorized agents. Alligators to be relocated must be captured using non-injurious methods and may only be relocated within the authorized location.

2. Alligators killed, dying while in possession, or captured for removal from the wild shall be immediately noticed through the Nuisance Alligator Hotline [866-FWC-GATOR (392-4286)], and shall be relinquished to a Commission contracted nuisance alligator trapper responsible for the area. If a Commission contracted nuisance alligator trapper declines receipt of the alligator(s), the alligator(s) may be disposed of or buried within the authorized location. No alligator parts may be removed from the carcass prior to disposal.

Special Purpose Permit

Florida Fish And Wildlife Conservation Commission
Division Of Hunting And Game Management
Alligator Management Program
620 S. Meridian Street, Tallahassee, Fl 32399-1600
(850) 488-3831

3. To coordinate the transfer of alligators held for a Commission contracted nuisance alligator trapper under Provisions 2, the permittee or his/her authorized agents should contact the Nuisance Alligator Hotline [866-FWC-Gator (392-4286)] between 8am and 5pm, seven days a week. If calling outside of these hours, a voice message should be left stating that a nuisance alligator transfer is needed in accordance with **Special Purpose Permit 14-67**. A trapper will be notified the following morning and will make contact to arrange a pick-up of the alligator.

4. Alligators held live for more than 24 hours must be housed in facilities in compliance with the standard Caging Specifications for Captive Wildlife as provided by Rule 68A-6.004, F.A.C.

5. All individuals must have this permit in their possession when engaged in capture, possession, or relocation of nuisance alligators.

6. This permit expires on **August 22, 2019** but is subject to revocation prior to that time pursuant to Chapter 120, Florida Statues and Rule 68-1.010, F.A.C.

7. If you have any questions regarding any provision of this permit, contact the Statewide Nuisance Alligator Program (SNAP) at: SNAP@myfwc.com or (866) 392-4286.

A person whose substantial interests are affected by FWC's action may petition for an administrative proceeding (hearing) under sections 120.569 and 120.57 of the Florida Statutes. A person seeking a hearing on FWC's action shall file a petition for hearing with the agency within 21 days of receipt of written notice of the decision. The petition must contain the information and otherwise comply with section 120.569, Florida Statutes, and the uniform rules of the Florida Division of Administration, chapter 28-106, Florida Administrative Code. Upon such notification, the Permittee shall cease all work authorized by this permit until the petition is resolved. The enclosed Explanation of Rights statement provides additional information as to the rights of parties whose substantial interests are or may be affected by this action.

Florida Fish and Wildlife Conservation Commission
Nuisance Alligator Harvest Permit
(68-25.003)

Time: 4:40 PM **Date:** 5/21/2009 **County:** BREVARD **Permit No:** 64331

Complainant: AIR FORCE 45TH SPACE , WING INSTALLATIONS **Phone #:**

Address: 1224 JUPITER ST, MAIN CONTACT LOCATION **Cell #:** (321) 794-5268

City: PATRICK AFB **Zip Code:** 32925-334 **Other #:** (321) 853-6822

Email: angy.chambers@us.af.mil **Note:**

Community/Subdivision: CAPE CANAVERAL-PATRICK AFB-MALABAR TA

Area Type: Targeted Harvest Area

Body of Water: OTHER **Water Source:** OTHER

Water Ownership: PUBLIC **Property Ownership:** OTHER

Date Last Seen: **Time in Area:** **Approximate size (ft):** 4+

Do you feel the alligator is a threat to people? YES

Is the alligator threatening pets or livestock? YES

Has the alligator been fed? NOT SURE

Directions/Comments: THE AIR FORCE 45 SW INSTALLATIONS TARGETED HARVEST AREAS ARE IN EFFECT SUBJECT TO:

Specific Complaint:

1. THE ATTACHED CONDITIONS AND PROVISIONS (SEE PAGE 2).

2. THE ATTACHED MAP(S) DELINEATING THE THA BOUNDARIES.

Received By: blair.hayman

Valid Permit: YES **Date Issued:** 5/21/2009 **Permit Expires:** 5/21/2019

This permit authorizes Alligator Control Agent: **WALRATH, GEORGE** to take **50** alligators at **4+** feet in length as outlined by 68A-25.003, Florida Administrative Code.

Permit Conditions: ATTACHED PAGE 2.

Approving Signature: HARRY.DUTTON

Removal of all equipment is required upon closure or expiration of permit

CONDITIONS AND PROVISIONS

1. This permit, complete with all conditions and maps, shall be in the possession of the Trapper or Designated Agent during the take of alligators under this permit.

2. Alligators shall only be removed at the request and direction of the following Air Force 45th Space Wing Installations, Environmental Conservation personnel or designees:

    - Angy Chamber, Wildlife Manager (**321-853-6822 office; 321-794-5268, cell)** or
    - Mike Blaylock; or
    - Martha Carroll; or
    - Keitha Dattilo-Bain; or
    - Tod Zechiel; or
    - Rick Brust; or
    - Rachel Mandel.

3. Targeted Harvest Areas boundaries are the **CAPE CANAVERAL AIR FORCE STATION, PATRICK AIR FORCE BASE, and MALABAR TRANSMITTER ANNEX** located in Brevard County, which the 45th Space Wing maintains managing authority.

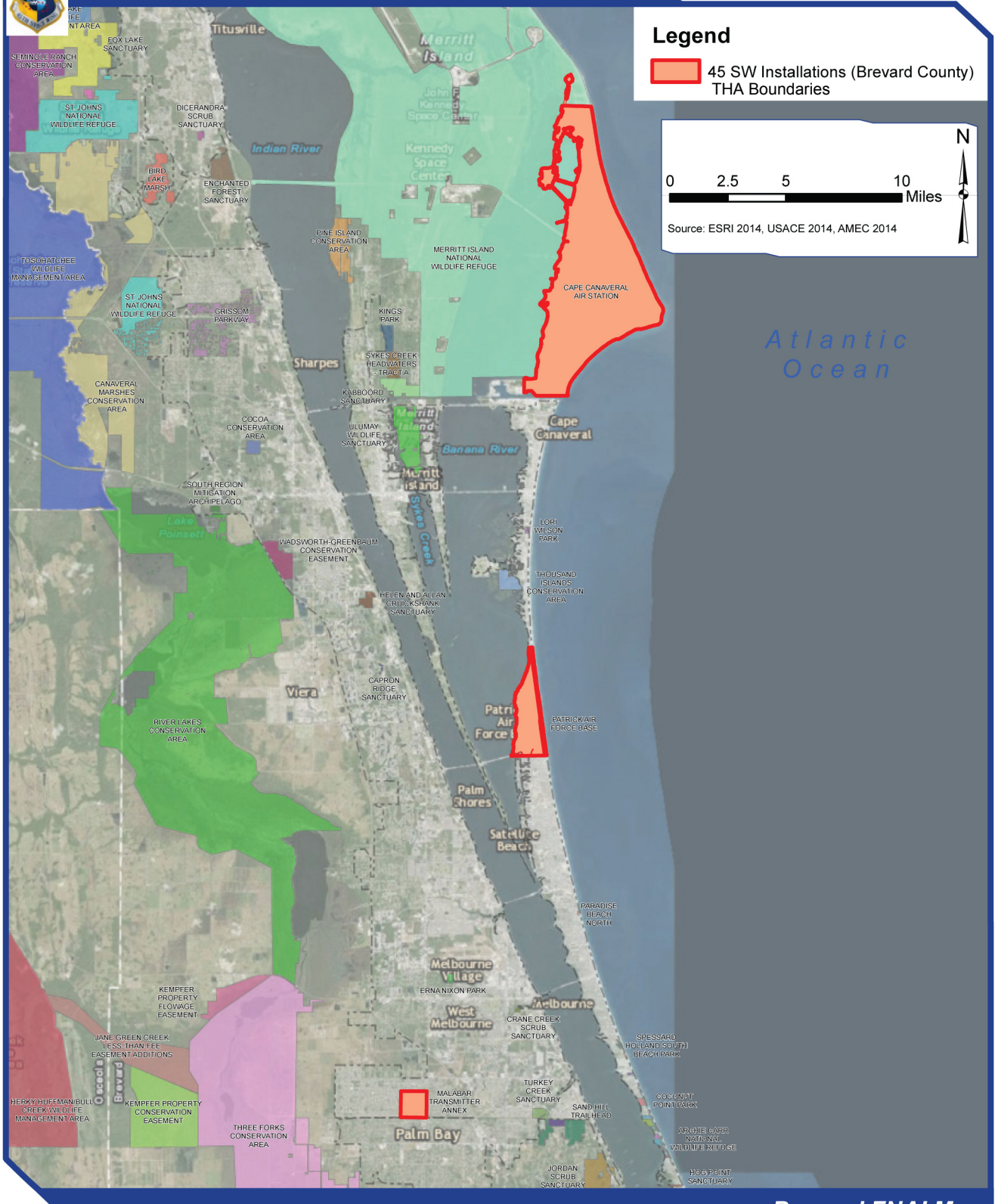
4. As designated by the attached maps, all areas located on public waters the THA boundary is 100 feet from any part of the property line. Only alligators within this 100 feet area shall be harvested.

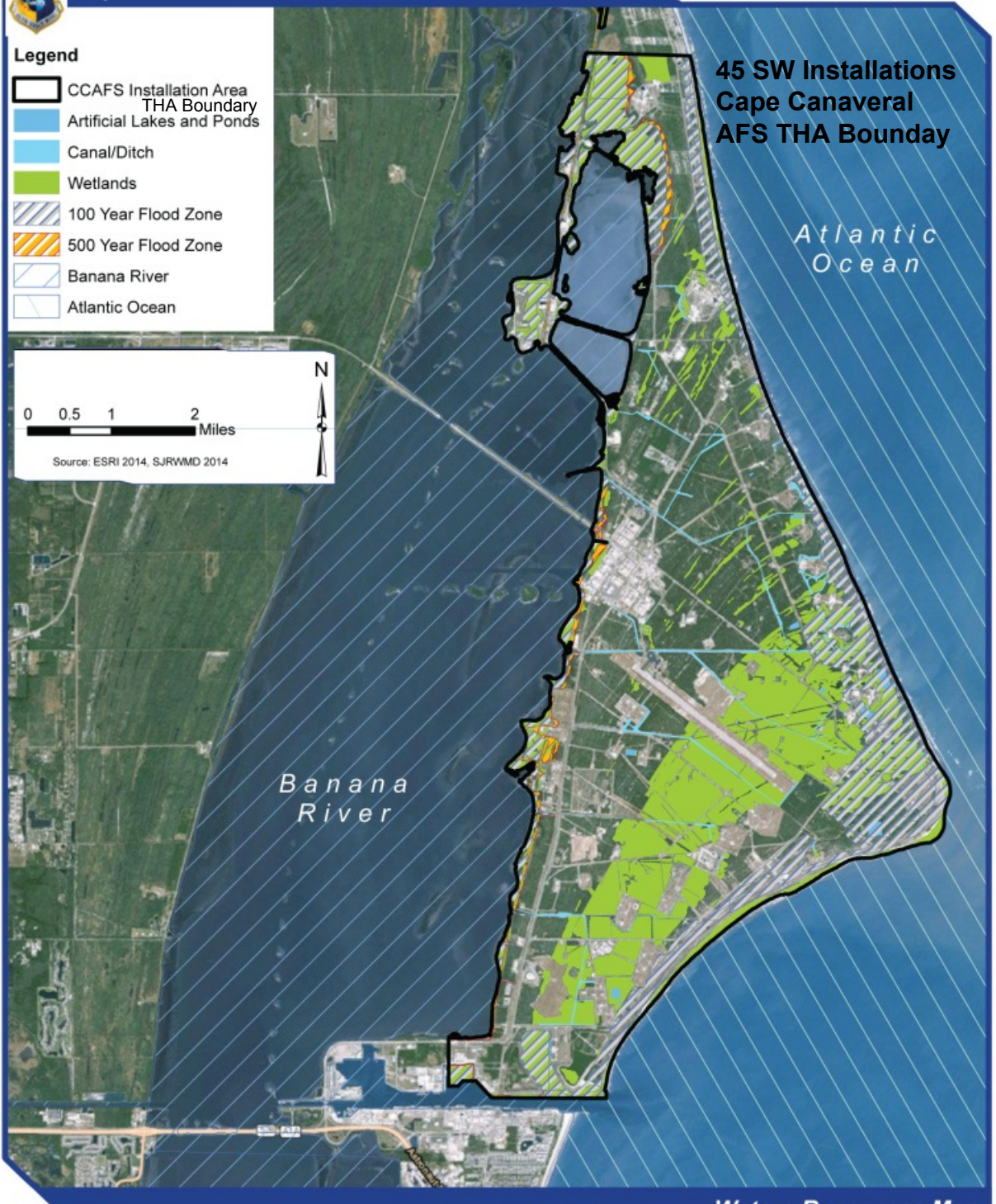
5. You must contact one of the designated Air Force 45th Space Wing Installations, Environmental Conservation personnel (**321-853-6822 office; 321-794-5268, cell)** prior to working any Nuisance Alligator Harvest Permit received from SNAP which falls within this area.

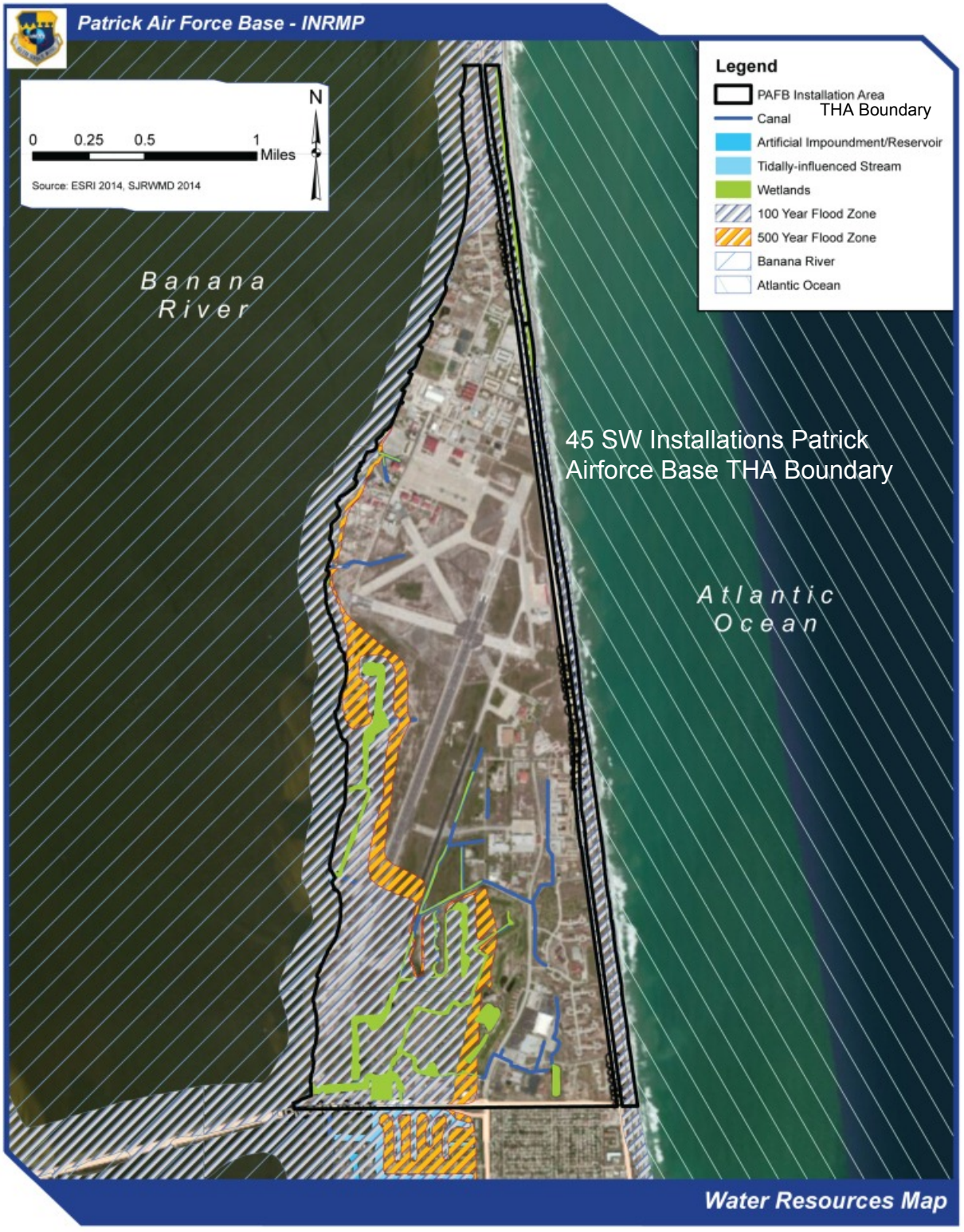
6. No alligators shall be harvested from sovereign waters under the permit unless those sovereign waters are specifically listed on the permit.

7. This permit shall be revoked or reassigned should the Contracted Nuisance Alligator Trapper under contract with the Florida Fish and Wildlife Conservation Commission resigns or upon the contract expiring or being terminated.

8. The permit may be rescinded at any time by request of Air Force 45th Space Wing Installations managing personnel via phone (866-392-4286) or e-mail (snap@myfwc.com) to SNAP.


Legend
45 SW Installations (Brevard County)
THA Boundaries
N
0
2.5
5
10
Miles
Source: ESRI 2014, USACE 2014, AMEC 2014
Titusville
Merritt Island
Indian River
Kennedy Space Center
Cape Canaveral
Atlantic Ocean
Sharpes
Banana River
Viera
Palm Shores
Satellite Beach
Melbourne Village
West Melbourne
Melbourne
Palm Bay
CAPE CANAVERAL AIR STATION
PATRICK AIR FORCE BASE
MERRITT ISLAND NATIONAL WILDLIFE REFUGE
ST JOHNS NATIONAL WILDLIFE REFUGE
TOSOHATCHEE WILDLIFE MANAGEMENT AREA
HERKY HUFFMAN/BULL CREEK WILDLIFE MANAGEMENT AREA
SEMINOLE RANCH CONSERVATION AREA
EOX LAKE SANCTUARY
DICERANDRA SCRUB SANCTUARY
BIRD LAKE MARSH
ENCHANTED FOREST SANCTUARY
PINE ISLAND CONSERVATION AREA
GRISSOM PARKWAY
KINGS PARK
SYKES CREEK HEADWATERS - TRACT A
KABBOORD SANCTUARY
CANAVERAL MARSHES CONSERVATION AREA
COCOA CONSERVATION AREA
ULUMAY WILDLIFE SANCTUARY
SOUTH REGION MITIGATION ARCHIPELAGO
WADSWORTH-GREENBAUM CONSERVATION EASEMENT
HELEN AND ALLAN CRUICKSHANK SANCTUARY
CAPRON RIDGE SANCTUARY
RIVER LAKES CONSERVATION AREA
KEMPFER PROPERTY FLOWAGE EASEMENT
JANE GREEN CREEK LESS THAN FEE EASEMENT ADDITIONS
KEMPFER PROPERTY CONSERVATION EASEMENT
THREE FORKS CONSERVATION AREA
LORI WILSON PARK
THOUSAND ISLANDS CONSERVATION AREA
PARADISE BEACH NORTH
ERNA NIXON PARK
CRANE CREEK SCRUB SANCTUARY
SPESSARD HOLLAND SOUTH BEACH PARK
MALABAR TRANSMITTER ANNEX
TURKEY CREEK SANCTUARY
SAND HILL TRAILHEAD
COCONUT POINT PARK
ARCHIE CARR NATIONAL WILDLIFE REFUGE
JORDAN SCRUB SANCTUARY
HOG POINT SANCTUARY
Osceola
Brevard


Legend
CCAFS Installation Area
THA Boundary
Artificial Lakes and Ponds
Canal/Ditch
Wetlands
100 Year Flood Zone
500 Year Flood Zone
Banana River
Atlantic Ocean
N
0 0.5 1 2
Miles
Source: ESRI 2014, SJRWMD 2014
45 SW Installations
Cape Canaveral
AFS THA Bounday
Atlantic Ocean
Banana River


Patrick Air Force Base - INRMP
N
0 0.25 0.5 1 Miles
Source: ESRI 2014, SJRWMD 2014
Legend
PAFB Installation Area
THA Boundary
Canal
Artificial Impoundment/Reservoir
Tidally-influenced Stream
Wetlands
100 Year Flood Zone
500 Year Flood Zone
Banana River
Atlantic Ocean
Banana River
45 SW Installations Patrick Airforce Base THA Boundary
Atlantic Ocean
Water Resources Map


Malabar Transmitter Annex - INRMP
Legend
Malabar Transmitter Annex THA Boundary
Canal
Artificail Lakes and Ponds
Wetlands
45 SW Installations Malabar Transmitter Annex
THA Boundary
DRAINED FARMLAND
Hield Rd
Sharon Dr
Krefeld Rd NW
Thuringer St NW
Emerson Dr NW
Ulm Rd NW
Trier Rd NW
Rhoane Rd NW
Milton Rd NE
Emerson Dr NE
Olivick Cir NE
Lisa Rd NE
Banks St NW
Custer St NW
Pampas St NW
Norse St NW
Munich St NW
Lynbrook St NW
Niagara St NW
Altona St NW
Peake St NE
Narragansett
Dickinson St NE
Driskell St NE
Naylor St NE
Nesbitt St NE
Hurst Rd NE
Fernandina St NW
Pyracantha St NW
Sorrel St NW
Ivanhoe St NW
Americana Blvd NW
Alcantarra St NW
Ontario St NW
Brescia St NE
Americana Blvd NE
Buccaneer St NE
Eva St NE
Altamira St NW
Bougainvillea St NW
Abalone Rd NW
Masten St NW
Aladdin St NE
Malabar Rd NW
Malabar Rd NE
0 0.125 0.25 0.5 Miles
N
Source: ESRI 2014, SJRWMD 2014
Water Resources Map

Permit

Attachment B-4	Document Designation Letter	N

Marine Turtle Permit

Florida Fish and Wildlife Conservation Commission
Imperiled Species Management Section - Tequesta Field Laboratory
19100 SE Federal Highway
Tequesta, Florida 33469
(561) 882-5975

Permittee: Angy Chambers

DEPARTMENT OF DEFENSE CAPE CANAVERAL AIR FORCE STATION
45 CES/CEAN 1224 JUPITER STREET, MS 9125
PATRICK AFB, FLORIDA 32925
UNITED STATES

Permit#: MTP-14-075
Effective Date: 01/01/2014
Expiration Date: 12/31/2014

Is Authorized to:

1. conduct nesting surveys;
2. relocate nests for conservation purposes;
3. outfit nests with self-releasing screen/cage;
4. conduct hatchling orientation index (HOI) surveys;
5. conduct stranding/salvage activities;
6. conduct public turtle watches; and
7. maintain & display preserved specimens.

Authorized Nesting Survey Area:

1. Cape Canaveral Air Force Station; and
2. Patrick Air Force Base - northern boundary of Patrick AFB (7km north of SR-404) to Pineda Causeway (SR-404). Monitoring of Patrick Air Force Base beaches is permitted to capture early season nesting activity and may only be monitored under this permit through April 30. All SNBS and INBS reporting to FWC is conducted under Marine Turtle Permit #186.

Permittee Signature: Angy C Chambers Date: 3/12/14

Not valid unless signed. By signature, the permittee confirms that all information provided to issue the permit is accurate and complete, and indicates acceptance and understanding of the provisions and conditions listed below. **Any false statements or misrepresentations when applying for this permit may result in felony charges and will result in revocation of this permit.**

By signature, I acknowledge that I have read and understand this permit. Signature of this permit indicates that I and all authorized personnel listed below have read and agree to abide by all Florida Fish and Wildlife Conservation Commision(FWC) 'SeaTurtle Conservation Guidelines' that pertain to the authorized activity(s) listed on this marine turtle permit. I understand that it is my responsibility to transmit all future information updates to all authorized personnel listed on my permit. **Permittee must provide a signed copy of this permit to the FWC address above to activate this permit.**

Authorized By: ROBBIN TRINDELL Authorized for: Nick Wiley, Executive Director

Authorizing Signature: _____ Date: 02/09/2014

Marine Turtle Permit

Authorized Research Projects: None.
Authorized Monitoring Projects:

1. Monitoring for sand placement & excavation activities on a portion of Patrick Air Force Base (FWS Log No. 41910-2013-F-0262), authorized 2014.

Authorized Personnel:

Martha Carroll; Keitha Dattilo-Bain; Lynda Dawe; Donald George; Michael Blaylock; Richard Brust; Rachel Mandel.

PERMIT CONDITIONS AND PROVISIONS:

1 Permitted individuals must adhere to the FWC marine turtle permit guidelines developed under a Section 6 Cooperative Agreement between FWC and the U.S. Fish and Wildlife Service.

2 All transfers of marine turtles or specimens into or out of the State of Florida must be accompanied by a specific consent permit from FWC.

3 See attached Marine Turtle Monitoring for beach restoration projects.

4 Patrick AFB beaches will be surveyed under Marine Turtle Permit #075 March 1 through April 30. Patrick AFB beaches will be surveyed under Marine Turtle Permit #186 May 1 through October 31.

A person whose substantial interests are affected by FWC's action may petition for an administrative proceeding (hearing) under sections 120.569 and 120.57 of the Florida Statutes. A person seeking a hearing on FWC's action shall file a petition for hearing with the agency within 21 days of receipt of written notice of the decision. The petition must contain the information and otherwise comply with section 120.569, Florida Statutes, and the uniform rules of the Florida Division of Administration, chapter 28-106, Florida Administrative Code. If the FWC receives a petition, FWC will notify the Permittee. Upon such notification, the Permittee shall cease all work authorized by this permit until the petition is resolved. The enclosed Explanation of Rights statement provides additional information as to the rights of parties whose substantial interests are or may be affected by this action.

Permit

Attachment B-4	Document Designation Letter	O

DEPARTMENT OF THE AIR FORCE
45TH SPACE WING (AFSPC)

MEMORADUM FOR FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION
DIVISION OF HABITAT AND SPECIES CONSERVATION
SPECIES CONSERVATION PLANNING SECTION
620 SOUTH MERIDIAN STREET, MAIL STATION 2A
TALLAHASSEE, FL 32399-1600

FROM: 45 CES/CEIE
1224 Jupiter Street
Patrick AFB FL 32925-3343

SUBJECT: Special Purpose Permit LSSP-12-00005B, Designated Assistants Contact Information

1. Per Condition and Provision #7, the following employees of VZ Technologies, LLC, have been designated as assistants to perform activities authorized under the above referenced permit:

- Ken Burkett 321-607-1005
- Bryon Tate Ledford 321-747-3202
- Wayne Simmons 321-536-7105
- Cody Tyree 321-480-6298
- Garry Amos 321-289-6139

2. The point of contact for this matter is Ms. Angy Chambers, 45 CES/CEIE. She can be reached at 321-853-6822 or E-mail at angy.chamber@us.af.mil.

Angy L Chambers

ANGY L. CHAMBERS, USAF
Wildlife Biologist

cc:
Brian Barfus, VZ Technologies LLC

DEPARTMENT OF THE AIR FORCE
45TH SPACE WING (AFSPC)

MAR 1 1 2014

MEMORADUM FOR VZ Technologies, LLC

FROM: 45 CES/CEIE
1224 Jupiter Street
Patrick AFB FL 32925-3343

SUBJECT: Steel Trap Letter of Designation

1. The purpose of this memorandum is to designate currently contracted VZ Technologies, LLC, under Contract Number FA2521-11-D-0005, to use steel leg traps to capture coyotes, as designated under Special Purpose Permit Number LSSP-12-00005B.

2. I hereby designate Ken Burkett, Bryon Tate Ledford, Wayne Simmons, Cody Tyree, and Garry Amos, employees of VZ Technologies, LLC, to conduct these activities as my assistants. All permit conditions and provisions will be followed as directed by Florida Fish and Wildlife Conservation Commission. All assistants must have this written authorization and a copy of the Special Purpose Permit in their possession while conducting these duties.

3. VZ Technologies, LLC, will provide 45 CES/CEIE a monthly report identifying all trapping activities to include dates, locations of where the traps were set and status. A map will be provided to CEIE showing the location of all traps, and will be updated and provided immediately following the removal, addition or relocation of any traps. All traps will be clearly marked with a warning sign that is visible from 360 degrees.

4. The point of contact for this matter is Ms. Angy Chambers, 45 CES/CEIE. She can be reached at 321-853-6822 or E-mail at angy.chamber@us.af.mil.

Angy L Chambers

ANGY L. CHAMBERS, USAF
Wildlife Biologist

ATTACHMENT:
FWC Special Purpose Permit for Use of Steel Leg Traps

cc:
William Cannon, 45 SFS/S5S
Sonny Witt, 45 MSG/Det 1
Dale Hawkins, 45 CES/CEZP-PMO
Mike Blaylock, 45 CES/CEIE
Brian Barfus, VZ Technologies LLC

Special Purpose

FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION
Division of Habitat and Species Conservation, Species Conservation Planning Section
620 South Meridian Street, Mail Station 2A, Tallahassee, Florida 32399-1600
(850) 921-5990, WildlifePermits@myFWC.com

Permittee Name: Angy Chambers
Permittee Address U.S. Air Force
1224 Jupiter Street, MS 9125
Patrick AFB, FL 32925-3343
angy.chambers@us.af.mil

Permit Number: LSSP-12-00005**B**

Effective Date: March 10, 2014
Expiration Date: December 31, 2014

IS AUTHORIZED TO: Use steel traps to capture wildlife that are depredating protected and listed wildlife species in Florida, pursuant to Rules **68-1**, 68A-9.002, 68A-9.010 and 68A-27, F.A.C., in accordance with the following provisions/conditions.

AUTHORIZED LOCATION(S): Cape Canaveral Air Force Station, 185 West Skid Strip Road, Building 60600, Room 2015, T23S R37E S13, 28°28'3.38" 80°33'59.7", Cape Canaveral, Brevard County

Permittee Signature Angy L Chambers Date 3/11/14

Not valid unless signed. By signature, confirms that all information provided to issue the permit is accurate and complete, and indicates acceptance and understanding of the provisions and conditions listed below. **Any false statements or misrepresentations when applying for this permit may result in felony charges and will result in revocation of this permit.**

Authorized by: Bradley J. Gruver, Ph.D., as designated by Nick Wiley, Executive Director

Authorizing Signature Bradley J. Gruver Date 3/10/14
Species Conservation Planning Section

PERMIT CONDITIONS AND PROVISIONS:

1. Padded foot hold type steel traps are the only allowable trap type that may be used under this permit. All foot hold type steel traps[1] must be commercially manufactured padded jaw traps with inside jaw spread no greater than 7".

2. This permit allows the use of 17 additional steel traps; for a total of 25. All traps must be disabled or tripped then removed at the end of the permit period.

[1] A steel trap is defined as any mechanical device (other than a snare, household mousetraps or devices commonly used to take household and lawn nuisance rodents) designed and used to take wildlife by seizing and holding a part of the body [68A-1.004(78), F.A.C.].

PERMIT CONDITIONS AND PROVISIONS CONTINUED:

3. All traps must be tagged with the Permittee's name and checked at least once every 24 hours.

4. Traps may be used by the Permittee and his or her assistants to perform the activities authorized under this permit. The Permittee may designate any number of assistants to use steel traps. Assistants must have written authorization from the Permittee and a copy of the permit in their possession.

5. Disposition of all captured wildlife must occur within 24 hours of capture or inspection of trap containing wildlife.

   a. Non-target wildlife, with the exception of raccoons (see 5.e. below), shall be released immediately at site of capture.
   b. Target Wildlife
      i. Coyotes must be either:
         (1) released on the property of the landowner or
         (2) euthanized.

   c. Euthanasia of target species shall be humane as defined by the American Association of Zoo Veterinarians (http://www.aazv.org/) or the American Veterinary Medical Association (http://www.avma.org/).

   d. This permit allows the transportation of TARGET WILDLIFE ONLY (as indicated above) for the purpose of disposition as described above. However, this permit does not supersede the provisions of any rabies alert or area quarantine issued by County Health Departments or County Animal services.

   e. Permittee may euthanize raccoons (per provision 5.e. above) incidentally caught in steel traps while trapping for target species.

6. Permit is valid only for the location/property listed above.

7. The Permittee shall be as fully responsible for any such activities of the Assistants as if they had themselves carried out those activities under this permit. The Permittee shall submit the name and contact information of designated Assistants to the Protected Species Permit Coordinator at WildlifePermits@myFWC.com prior to that Assistant conducting any activities authorized under this permit. The FWC reserves the right to deny a Permittee's designation of an individual as its Assistant for just cause.

8. Commission law enforcement personnel shall have access to all lands described in the permit and Permittees and designees shall be subject to inspection. The Permittee by signature above confirms that representatives of the Florida Fish and Wildlife Conservation Commission (Commission) have his/her permission as the Permittee, and that of the landowner(s) to enter on and inspect the property(ies) described in the application (herein incorporated by reference) and any documents associated with this permit for all reasonable purposes pertaining to applicable Commission rules.

PERMIT CONDITIONS AND PROVISIONS CONTINUED:

9. By accepting this permit and by conducting the activities authorized herein, the Permittee and his designees agree to assume liability for any and all damages, costs or losses resulting from said activities and further agrees to save and hold the Florida Fish and Wildlife Conservation Commission and its employees harmless from any and all liability, costs or damage resulting from said activities.

10. FWC recommends Permittees follow established Best Management Practices (BMP's) outlined by the Association of Fish and Wildlife Agencies. BMPs can be found at http://jjcdev.com/~fishwild/?section=best_management_practices.

11. **This permit is in effect an amendment of permit LSSP-12-00005A which was issued on January 17, 2013 and supersedes all previous versions. All new or amended text is indicated in bold.**

12. The Permittee is required to submit a final report (see enclosed report form) of all trapping activities engaged in pursuant to this permit. Said report(s) are due 45 days subsequent to the expiration date or upon request for a renewal. The report shall be directed to the Protected Species Permit Coordinator, Species Conservation Planning Section, by mail at the address given on the form or by email at wildlifepermits@myfwc.com. Request for permit renewal should be submitted at least 45 days prior to the time it is needed. All permit renewal (or amendment) requests must contain a copy of the referenced report. Copies of any other reports or publications, which result from the work, must also be provided upon their availability.

13. This permit is subject to revocation at any time pursuant to Chapter 120, Florida Statutes. This permit may be revoked if the Permittee or designees violate or fail to comply with permit conditions. Permit violations or noncompliance may also be grounds for denying future applications for steel trap or other fish and wildlife permits.

A person whose substantial interests are affected by FWC's action may petition for an administrative proceeding (hearing) under sections 120.569 and 120.57 of the Florida Statutes. A person seeking a hearing on FWC's action shall file a petition for hearing with the agency within 21 days of receipt of written notice of the decision. The petition must contain the information and otherwise comply with section 120.569, Florida Statutes, and the uniform rules of the Florida Division of Administration, chapter 28-106, Florida Administrative Code. If the FWC receives a petition, FWC will notify the Permittee. Upon such notification, the Permittee shall cease all work authorized by this permit until the petition is resolved. The enclosed Explanation of Rights statement provides additional information as to the rights of parties whose substantial interests are or may be affected by this action.

Permit

Attachment B-4	Document Designation Letter	P

Florida Fish and Wildlife Conservation Commission

Florida - Fishing Capital of the World

Triploid Carp Permit: **MT-19-CR-94-0873**
August 12, 2005

KEITHA BAIN
45 CES/CEV, 1224 JUPITER, M.S. 9125
PATRICK AFB, FL 329253343

is authorized to import, possess and release up to **1360** triploid grass carp into **34** acre **PATRICK AFB GOLF COURSE PONDS #1-13** for aquatic vegetation control purposes, in accordance with **Rule 68A-23.088** of the Florida Fish and Wildlife Conservation Commission and the permit provisions listed below:

(1) Only triploid grass carp certified by the Florida Fish and Wildlife Conservation Commission may be stocked.

(2) A copy of this document must be on board any vehicle transporting the triploid grass carp authorized under this permit. No exchange, transfer or removal of triploid grass carp from the stocking site is allowed.

(3) This permit will remain valid unless revoked by the Executive Director.

(4) Triploid grass carp will be subject to seizure by Commission representatives if permit provisions or Commission rules are violated.

Kenneth D. Haddad
Executive Director

David Douglas
Florida Fish and Wildlife Conservation Commission
Aquatic Plant Management
Eustis Fisheries Research Lab
601 W. Woodward Avenue
Eustis, FL 32726

Phone: (352) 742-6438
357 3521

Florida Fish and Wildlife Conservation Commission
Florida - Fishing Capital of the World

TRIPLOID GRASS CARP SUPPLIERS
As of 8/12/2005

The following list of approved suppliers/producers of Triploid Grass Carp is provided for your convenience. It is not an endorsement of either the suppliers/producers or their services/products. Any transaction involving grass carp that are to be possessed/transported or stocked in Florida must comply with Rule 68A-23.088.

JENNIFER BUSTOS
ALLSTATE FISH & WILDLIFE MANAGEMENT
2041 SW 70TH AVE.
BLDG D-11
DAVIE, FL 33317-7326
954-382-9766

CHERYL CALCAGINO
ALLSTATE FISH AND WILDLIFE MANAGEMENT
3207 E. 3RD STREET
LEHIGH, FL 33972
800-270-6558

STEVEN WEINSIER
ALLSTATE RESOURCE MANAGEMENT
2041 SW 70TH AVE.
BLDG D-11
DAVIE, FL 33317-7326
954-382-9766

KEVIN YOUNGBERG
AMERICAN ECOSYSTEMS, INC.
P.O. BOX 40517
ST. PETERSBURG, FL 33743
727-545-4404

BARRY W SMITH
AMERICAN SPORTFISH HATCHERY
P.O. DRAWER 20050
MONTGOMERY, AL 36120
334-281-7703

ROGER VICK
AQUAGENIX
1374 N KILLIAN DRIVE, SUITE A
LAKE PARK, FL 33403
561-881-1291

LOWELL TRENT
AQUATIC BIOLOGIST & CONSULTANT
4919 SYCAMORE STREET
APOPKA, FL 32712
407-889-0276

LOPEZ ANGEL
AQUATIC VEGETATION CONTROL
6753 GARDEN ROAD, #109
RIVIERA BEACH, FL 33404
800-327-8745

RUSS HOFFMAN
BEAUTIFUL PONDS
824 FOOTHILL COURT
OSPREY, FL 34229
941-284-0440

CLARK BUFORD
BUFORD BAIT COMPANY
3301 S.E. 38TH AVE.
OKEECHOBEE, FL 34974
863-467-1575

MARK GRAHAM
CLEAR WATERS, INC.
P.O. BOX 291522
PORT ORANGE, FL 32129
386-767-4928

MATT COOPER
COOPER AQUATIC SERV., INC.
4720 SW 166TH AVE.
SOUTHWEST RANCHES, FL 33331
954-252-6108

MIKE FISCHER
DE ANGELO BROTHERS, INC. DBA, AQUAGENIX
5605 FLORIDA MINING BLVD. SOUTH
BLDG. 200, SUITE 201
JACKSONVILLE, FL 32256
904-262-2001

KEITH GRECO
DIAMOND DOLPHIN AQUATIC
465 NW 47TH COURT
FT. LAUDERDALE, FL 33309
954-776-8212

MIKE GAROUST
ECOR AQUATIC WEED CONTROL
2820 ELECTRONICS DRIVE
MELBOURNE, FL 32935
321-254-0930

YOSEPH KIDANE
ENVIRONMENTAL & WETLAND SERVICE PROVIDERS
1501 NE 48TH COURT
OAKLAND PARK, FL 33334
954-491-1278

ROBERT W ROUSSEAU
ENVIRONMENTAL CONSULTING ASSOCIATES
5046 RED FOX RUN
TALLAHASSEE, FL 32303
850-524-3474

STEVEN GREEN
FL AQUATIC MANAGEMENT
P.O. BOX 1315
PALM HARBOR, FL 34682
727-461-2611
813-657-2611

JOHN LAYER
FLORIDA ENVIRONMENTAL CONSULTANTS
P.O. DRAWER 1358
PALATKA, FL 32178-1358
386-659-2389

RON SLAY
FLORIDA FISH FARMS
9684 CR 705
CENTER HILL, FL 33514
800-962-3474
352-793-4224

RON GULAU
GULF COAST AQUATICS, INC.
34600 WAHSINGTON LOOP ROAD
PUNTA GORDA, FL 33982
941-575-1213

PETER BANDRE
INCREDIBLE PETS, INC.
1270 N. WICKHAM ROAD, #41
MELBOURNE, FL 32935
321-255-9091

JIM MALONE
J.M. MALONE & SON, INC.
BOX 158
LONOKE, AR 72086
501-676-2800
501-676-6554

RON BRANNEN
JIM'S CATFISH FARM
24988 NW 22ND AVE.
LAWTEY, FL 32058
904-782-1694

H. K. HOLYOAK
KEN'S HATCHERY & FISH FARM
P.O. BOX 449
ALAPAHA, GA 31622
229-532-6135

MIKE FREEZE
KEO FISH FARM
P.O. BOX 166
KEO, AR 72083
501-842-2872

FREDDY LANGFORD
LANGFORD AQUATICS
502 LAUREL LANE
LAKELAND, FL 33813
863-644-0702

ED TREMBLE
MALLARD ENVIRONMENTAL SERV.
3045 KERSHAW COURT
MELBOURNE, FL 32934
321-259-0475

PAUL WILLIAMS
OWEN & WILLIAMS FISH FARM
ROUTE 5, BOX 22390
HAWKINSVILLE, GA 31036
478-892-3144
478-783-2309

JULIAN PAUL, JR.
PAUL FISH FARMS
3256 HIGHWAY 2
BONIFAY, FL 32425
850-547-2215

CARWELL W TROTTER
PONDSTOCKER
1306 MALABAR ROAD
PALM BAY, FL 32910
321-952-9176

JOEL SHIREMAN
SHONGALOO FISHERIES
P.O. BOX 359
HAMPTON, FL 32044
352-468-1251

W A RAY
SOUTHEASTERN AQUATIC SERV.
301 RAY ROAD
DEFUNIAK SPRINGS, FL 32433
850-859-2786

JACK F DEQUINE
SOUTHERN FISH CULTURISTS
P.O. BOX 490251
LEESBURG, FL 34749-0251
352-787-1360

CHRIS YORK
SUPERIOR WATERWAY SERVICES, INC.
8111 GARDEN ROAD, SUITE I
RIVIERA BEACH, FL 33404, FL 33418
561-799-5852

MARK BOSSARD
THE LAKE DOCTORS, INC.
10840 76TH COURT N.
LARGO, FL 33777
727-544-7644

ROBERT LUNETTA
THE LAKE DOCTORS, INC.
3434 NE SECOND AVE.
FT. LAUDERDALE, FL 33334
800-683-5253

JAMES L WILLIAMS
THE LAKE DOCTORS, INC.
3523 SR 419
WINTER SPRINGS, FL 32708
800-666-5253

Florida Fish and Wildlife Conservation Commission

Florida - Fishing Capital of the World

To whom it may concern:

Attached you will find your permit to import, possess, and transport triploid grass carp for aquatic vegetation purposes in accordance with Rule 68A-23.088 and a list of Authorized Triploid Grass Carp Dealers.

When you arrange to purchase fish, please present a photocopy of the permit to the supplier. If the supplier does not receive this permit, he will not be able to deliver your fish to you.

The recommended number of fish to keep the aquatic vegetation in your water area under control has been determined by preliminary research conducted on 10 inch or larger fish. Stocking smaller fish, which are subject to higher mortality rates, or stocking fewer fish than recommended will result in decreased success in obtaining control of aquatic vegetation in your water area. If you choose to stock fewer fish than the recommended amount, you may continue to use your permit for future purchases until the total number permitted are stocked.

If you have questions concerning this matter or require additional information, please contact the Aquatic Plant Management Division of the Florida Fish and Wildlife Conservation Commission field office listed below.

David Douglas
Florida Fish and Wildlife Conservation Commission
North Central and Northeast Aquatic Plant Management
Eustis Fisheries Research Lab
601 W. Woodward Avenue
Eustis, FL 32726
Phone: (352) 742-6438

Attachment B-5

Copy of Cooperative Agreement

Cooperative Agreement

Attachment B-5	Document Designation Letter	Q

CANDIDATE CONSERVATION AGREEMENT

FOR THE GOPHER TORTOISE

(GOPHERUS POLYPHEMUS)

EASTERN POPULATION

November 2008

(Photo Source: http://www.wildherps.com/species/G.polyphemus.html; Photo taken April 8, 2004 at Oscar Scherer State Park, Sarasota County, Florida)

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TABLE OF CONTENTS

1. INTRODUCTION

This Candidate Conservation Agreement (CCA or Agreement) for the gopher tortoise, *Gopherus polyphemus*, has been developed as a cooperative effort among state, federal, non-governmental, and private organizations. The purpose of this Agreement is to collectively implement proactive gopher tortoise conservation measures across its eastern range. With this Agreement, the Parties (see Section 4) hope to organize a cooperative, range-wide approach to gopher tortoise management and conservation. This Agreement will allow the Parties to leverage knowledge and funding within a common conservation approach and framework. The Agreement is voluntary and flexible in nature, and has been developed so different conservation and management actions can be agreed to and implemented at different levels.

Under Executive Order 13352, *Facilitation of Cooperative Conservation,* the Departments of the Interior, Agriculture, Commerce, and Defense and the Environmental Protection Agency are to carry out their environmental and natural resource programs in a manner that facilitates cooperative conservation. This Agreement is an example of a such a cooperative conservation approach. The terms of this Agreement shall be governed by and construed in accordance with applicable federal and state law. Nothing in this Agreement is intended to limit the authority of the US Fish & Wildlife Service (USFWS) to fulfill its responsibilities under federal laws. Additionally, nothing in this Agreement is intended to supersede applicable state authorities. All activities undertaken pursuant to this Agreement must be in compliance with all applicable state and federal laws and regulations. Consistent with the specific commitments by, and the available resources of, the Parties, conservation actions set forth in this Agreement will be implemented and will remain in effect for the duration of the Agreement.

2. BACKGROUND

Initial efforts to create a gopher tortoise conservation agreement between multiple parties began in June 2005. Out of these efforts, the Gopher Tortoise Team (GTT) was established, currently consisting of the organizations listed in Section 4. This group came together to address suspected decline in the tortoise population and explore conservation measures that could create an environment throughout the eastern range of the gopher tortoise for its population to thrive. One of the team's first initiatives included the development of a Memorandum of Intent (MOI), *Conservation of the Gopher Tortoise in its Eastern Distribution*, signed in 2006. The aim of the MOI was to foster an increased level of communication, collaboration, and conservation among the signatories to actively manage and conserve gopher tortoise populations and habitat. In the MOI the signatories agreed that:

- Gopher tortoise populations and habitat are in need of assistance
- Action is needed to improve gopher tortoise status throughout its range
- Each party could benefit from reversing the declining trend in gopher tortoise populations

Organizations involved in the MOI development were the Department of Defense (DoD), Southern Regional Environmental Office (SREO), USFWS, and US Forest Service (USFS), state Departments of Natural Resources (DNRs) or equivalent, The Nature Conservancy, Partners in Amphibian and Reptile Conservation, the Gopher Tortoise Council, and The Conservation

Fund. The MOI allows any public or private entity or landowner within the range of the gopher tortoise to become a cooperating Party to the agreement.

In January of 2006, the USFWS received a petition to list the eastern population of the gopher tortoise as a threatened species under the Endangered Species Act (ESA). A listing decision can create considerable regulatory constraints for both public and private landowners, a situation which prompted the Southeast Regional Partnership for Planning and Sustainability (SERPPAS) to adopt the efforts of the GTT to better resource and enhance gopher tortoise conservation efforts. Established in 2005, SERPPAS is a partnership of state and federal environmental and natural resource officials from across the southeast that was formed to promote better collaboration in making resource-use decisions. The SERPPAS mission is to coordinate and leverage partner resources to promote sustainable use of natural resources balanced with the health and safety of the environment and surrounding communities, while promoting economic development and military readiness.

The states of Alabama, Florida, Georgia, and South Carolina signed the original MOI. While the MOI was developed to increase the level of communication, collaboration, and conservation among the signatories to actively manage and conserve gopher tortoise populations and habitat, those commitments are general in nature. This CCA is focused on outlining more specific conservation commitments. With this Agreement, the Parties hope to implement an organized, range-wide approach with conservation actions that all can adhere to.

3. GOALS AND OBJECTIVES

The goals and objectives of this Agreement fall into two main categories.

1. Range-wide Conservation and Management: By addressing gopher tortoise conservation holistically across its eastern range, the Parties hope to more effectively identify and conserve gopher tortoise habitat and populations; develop and implement management strategies that maintain or enhance gopher tortoise habitat; and monitor the response of the species to conservation and management.

2. Cooperation and Collaboration: By managing gopher tortoise conservation actions in a proactive and collaborative manner, the Parties plan to highlight existing individual gopher tortoise conservation actions and efforts and to share knowledge and information across a wide range and diverse collection of organizations. This also allows for an organized conservation approach that encourages uniform actions and reporting, integrates monitoring and research efforts with management, and supports partnership formation.

By striving for and achieving these goals and objectives, the Parties believe that the gopher tortoise and its habitat can be conserved in its non-federally listed distribution in the states of Alabama, Georgia, Florida, and South Carolina such that any current or potential threats are significantly reduced. These actions would be considered in any future determination to list the gopher tortoise and may make it unnecessary to list the gopher tortoise in the foreseeable future. The Parties also believe that numerous listed and at-risk animal and plant species associated with the gopher tortoise will benefit from this Agreement and that implementation of this Agreement

may significantly reduce or eliminate threats to species such as the gopher frog and federally listed indigo snake.

4. PARTIES

4.1. FEDERAL AGENCIES

- Department of Defense (DoD)
- United States Army
- United States Navy
- United States Air Force (USAF)
- United States Marine Corps (USMC)
- United States Forest Service (USFS)
- United States Fish and Wildlife Service (USFWS)

4.2. STATE AND TRIBAL AGENCIES

- Alabama Department of Conservation and Natural Resources (ADCNR)
- Florida Fish and Wildlife Conservation Commission (FWC)
- Georgia Department of Natural Resources (GaDNR)
- South Carolina Department of Natural Resources (SCDNR)
- Poarch Band of Creek Indians

4.3. NON-GOVERNMENTAL ORGANIZATIONS

- American Forest Foundation (AFF)

The Parties listed above share a common interest in gopher tortoise conservation. Each state comprising the geographic area of the gopher tortoise's eastern range is represented, as are non-governmental organizations (NGOs), tribal agencies, and federal agencies such as the Military Services. The Parties share a desire to conserve gopher tortoise populations and habitat in order to prevent regulatory constraints and carry out their missions to the best of their ability, be it training missions on military installations or forest management on USFS lands. Additional Parties that fit into the above categories are welcome to sign on at any time, at which point they shall provide legal authority and specific conservation commitment input to the GTT. This input will be incorporated into Appendix E. Upon execution of this Agreement by the Parties, the management actions outlined in this document will be implemented where appropriate and as funding allows.

5. THE ROLE OF THE PRIVATE LANDOWNER

To meet the goals and objectives of this Agreement, the Parties acknowledge and recognize the value and role of private landowner(s) within the geographic scope of this Agreement. It is generally agreed that significant conservation opportunities on private lands exist and that the overall status and trend of the gopher tortoise and its habitat will depend upon the individual and collective actions of private landowners. Thus, the Parties expect that this Agreement will provide guidance and a framework within which interested private landowners can participate in gopher tortoise conservation in a voluntary and proactive manner. Other tools and programs will

emerge as a result of implementation of this Agreement whose sole purpose will be to assist landowners conserve gopher tortoise habitat. The tools include, but are not limited to, the development of CCAs with Assurances (CCAAs) – either at the local or landscape levels.

The CCAA program is an aspect of the USFWS's implementation of the ESA that is intended to facilitate the conservation of proposed and candidate species, and species that may become candidates, by giving non-federal property owners incentives to implement conservation measures for declining or at-risk species. The incentives available through CCAAs include providing property owners certainty that no further land, water, or resource use restrictions beyond those agreed to in the CCAA will be imposed if the species later becomes listed under the ESA. Further, a level of incidental take is provided to landowners within the CCAA. Implementation of the stated conservation measures within the CCAA should produce a level of benefit, assuming that conservation measures are also implemented on other necessary properties, that would preclude or remove any need to list the covered species. "Other necessary properties" are other properties on which conservation measures would have to be implemented in order to preclude or remove any need to list the covered species.

By precluding or removing any need to list a species through early conservation efforts, property owners can maintain land use and development flexibility. In addition, initiating or expanding conservation efforts before a species and its habitat are critically imperiled increases the likelihood that simpler, more cost-effective conservation options will still be available and that conservation will ultimately be successful. The CCAA has been an effective mechanism for conserving declining species, particularly candidate species, and have, in some instances, precluded or removed any need to list some species. Currently, CCAA development is already underway in Georgia between GaDNR, USFWS and Georgia Power Company at Plant Vogtle.

A CCAA will involve the USFWS, one or more non-federal property owners, and possibly other cooperators. State fish and wildlife agencies, which have primary jurisdiction over species that are not federally listed, may be a cooperator in any program and some of the states participating in this Agreement are contemplating the implementation of programmatic CCAAs. Other potential cooperators include neighboring property owners, state or local agencies, tribal governments, federal property owners, or NGOs. However, it is important to note that only non-federal property owners may receive regulatory assurances offered in the CCAA programs.

6. AUTHORITY

The Parties enter into this Agreement under authority provided by federal and state law. Nothing in this Agreement is intended to limit the authority of the USFWS to fulfill its responsibilities under federal laws. Nothing in this Agreement is to imply that any Party is in any way abrogating or ceding any responsibility or authority inherent in its sovereign ownership of, jurisdiction over, and control of its property interests or wildlife. All activities undertaken pursuant to this Agreement must be in compliance with all applicable state and federal laws and regulations.

6.1. FEDERAL AGENCY AUTHORITIES

6.1.1. Department of Defense

The Sikes Act, 16 United States Code (U.S.C.) §§ 670a-670o, requires the Secretary of Defense to prepare and implement integrated natural resource management plans (INRMPs) for the conservation and rehabilitation of natural resources on military installations. These plans reflect mutual agreement between the USFWS and the head of each appropriate state fish and wildlife agency concerning conservation, protection, and management of fish and wildlife resources. DoD may enter into cooperative agreements with states, local governments, nongovernmental organizations and individuals to provide for the maintenance and improvement of natural resources on, or to benefit natural and historic research on, DoD installations.

An INRMP is a comprehensive plan used to manage installation natural resources by providing and ensuring the sustained use of a landscape necessary to support the military mission in accordance with accepted stewardship principles. It replaces the need for separate management plans for particular natural resources (for example, endangered species management, forest management, wetlands management, and fish and wildlife management). The INRMP describes how natural resources will be managed for military mission needs and in compliance with applicable laws and regulations. It ensures that management of natural resources does not result in a "net loss" of mission training land and describes how ecosystems will be managed to create and maintain certain landscape characteristics needed to enhance military training opportunities.

Department of Defense Instruction (DoDI) 4715.3, *Environmental Conservation Program*, provides guidance to the Services for the integrated management of natural resources on property under DoD control. It also states that natural resources under the stewardship and control of the DoD shall be managed to support and be consistent with the military mission, while protecting and enhancing those resources for multiple use, sustainable yield, and biological integrity.

Additionally, Section 2684(a) of Title 10 U.S.C., known as the buffering authority, authorizes the Services to enter into partnerships with private conservation organizations or state and local governments to preserve land and prevent incompatible development around military installations.

6.1.2. Army

Sections of Department of the Army Regulation (AR) 200-1 set forth policy, procedures, and responsibilities for the conservation, management, and restoration of land and natural resources consistent with the military mission and in consonance with national policies. In fulfilling their conservation responsibilities, paragraph 4-3d(5)(v) authorizes installations to participate in regional/habitat-wide efforts to conserve candidate species and Army-designated species at risk (SAR). Paragraph 4-3d(6) provides authority for managing SAR and their habitats. Specific SAR guidance is found in *Army Species at Risk Policy and Implementing Guidance*, dated 15 September 2006. This Army SAR policy memorandum specifically identifies the gopher tortoise as a priority Army species at risk. The SAR policy encourages proactive management efforts for SAR and their habitats, before federal protection under the ESA is necessitated, and

further encourages installations to capitalize on partnerships and agreements when managing for such species.

The DoD buffering authority mentioned above is implemented by the Department of the Army with the Army Compatible Use Buffer (ACUB) Program. Installations with approved ACUB plans have authority to work with partners to protect and restore habitat outside the installation if those activities are deemed beneficial to sustaining the installation's military mission. Installations with pending or approved ACUB plans within the geographic extent of this CCA include Fort Stewart, Camp Blanding, Fort Gordon, Fort Benning, and Fort Rucker.

6.1.3. Navy

Operational Navy Instruction OPNAV 5090.1C, *Environmental and Natural Resources Program Manual*, provides installation requirements for the implementation of The Sikes Act regarding the management of natural resources on Navy lands. Additionally, the *Integrated Natural Resources Management Plan Guidance for Navy Installations, April 2006* provides Navy natural resource managers with information necessary to prepare, update, and implement Integrated Natural Resources Management Plans (INRMPs). Natural resources at Navy installations are managed in accordance with installation INRMPs which are developed cooperatively with USFWS and state fish and wildlife agencies as stakeholders and are reviewed annually by the stakeholders for content, project implementation, and updates.

6.1.4. Air Force

Air Force Instruction (AFI) 32-7064, *Integrated Natural Resources Management*, provides guidance to manage natural resources on USAF installations and ranges. In addition, AFI 13-212, *Range Planning and Operations*, provides specific guidance for range management. These resources are managed in accordance with the relevant federal laws, including the Sikes Act, using an INRMP as the principal tool under AFI 32-7064 and the sole tool under AFI 13-212. The INRMP is developed in cooperation with the USFWS, NOAA Fisheries (for installations that include or border marine environments), and the appropriate state fish and wildlife agency for the state in which the Air Force installation is located. Changes in an INRMP affecting its goals and objectives (including addition and/or deletion of projects) must be coordinated within and among appropriate USAF personnel, and should be coordinated with USFWS and the appropriate state fish and wildlife agency before they are implemented.

6.1.5. Marine Corps

Marine Corps Order (MCO) P5090.2A Change 1 (22 Jan 08), *Environmental Compliance and Protection Manual,* establishes Marine Corps policy and responsibilities for compliance with both statutory/regulatory requirements and the management of Marine Corps programs, to include the preservation of natural resources. As with the other Military Services, all Natural Resource management activities at Marine Corps installations are conducted under that installation's INRMP. In accordance with Chapter 11 of MCO 5090.2A, *Natural Resource Management,* Marine Corps installations will survey and take other appropriate actions to document the presence of state rare and endangered species. Marine Corps installations should also inventory and monitor state-listed species as NEPA may require the consideration of a

proposed action's impact on these species, and because state laws and regulation may govern their possession, propagation, sale, or taking on an installation. Additionally, Marine Corps installations will inventory and monitor candidate species to evaluate and document any effects that military activities may have upon them. MCO 5090.2A also allows the Marine Corps to execute cooperative agreements to exchange information, conduct research, or study projects that contribute to an installation's INRMP.

6.1.6. Forest Service

The USDA Forest Service has recognized the need to implement special management direction for rare species on the lands it administers. The Regional Forester may designate these species as Sensitive as described in the Forest Service Manual 2670.22. The objectives of management for such species are to ensure their continued viability throughout their range on National Forest lands, and to ensure that they do not become threatened or endangered because of Forest Service actions. The gopher tortoise is designated Sensitive on the Regional Forester's Sensitive list.

6.1.7. Fish & Wildlife Service

Sections 2, 6, and 7 of the ESA, 16 U.S.C §§ 1531-1544, authorize the USFWS and other federal parties to enter into this Agreement. Section 2 of the ESA states that encouraging parties to develop and maintain conservation programs is a key to safeguarding the nation's heritage in fish, wildlife, and plants. Section 2(c)(1) of the ESA, (16 U.S.C. 1531(c)(1)), states "the policy of Congress is that all federal departments and agencies shall seek to conserve endangered and threatened species and shall utilize their authorities in furtherance of the purposes." Under Section 6 of the ESA, the "Secretary shall cooperate to the maximum extent with the States...", 16 U.S.C. §1535(a). Further, under Section 6, the Secretary may authorize under cooperative agreement with a state program, a state agency to establish conservation initiatives; and may provide financial assistance to the state to monitor the status of a species within a state to prevent significant risk to the well-being of any such species, 16 U.S.C. §1535(c). Section 7 of the ESA requires federal agencies to review programs that they administer and to utilize such programs in furtherance of the purposes of the ESA. Entering into this Agreement is an important and proactive initiative that follows the intent of Section 7 to provide for the conservation of the nation's fish, wildlife, and plants.

In addition to the ESA, the Fish and Wildlife Act of 1956 provides that the Secretary shall "...take such steps as may be required for the development, advancement, management, conservation, and protection of fish and wildlife resources...". The Fish and Wildlife Coordination Act states that the Secretary is authorized "to provide assistance to, and cooperate with, Federal, State, and public or private agencies and organizations in the development, protection, rearing, and stocking of all species of wildlife, resources thereof, and their habitat...". Lastly, the Sikes Act requires DoD installations to develop INRMPs to support the military mission in cooperation with USFWS and state fish and wildlife agencies.

Perhaps the largest driving force behind the USFWS's authority to conserve wildlife and habitat is the National Wildlife Refuge System and the laws and regulations that established and manage this system. Refuges are special places where the USFWS and its partners restore, protect, and manage habitat for America's wildlife.

A history of laws directs the USFWS's administration of the National Wildlife Refuge System. Early legislative acts laid the groundwork for President Roosevelt's 1903 Executive Order establishing the first refuge, and acts of Congress as recent as 1997 continue to shape the administration of our Nation's refuges. The National Wildlife Refuge Improvement Act of 1997 requires that each National Wildlife Refuge create a Comprehensive Conservation Plan (CCP).

This Refuge planning process is consistent with the provisions of various Acts, including but not limited to: the National Wildlife Refuge Improvement Act of 1997 (16 U.S.C. 668dd *et seq.*); the Migratory Bird Treaty Act (16 U.S.C. 703-712); the National Environmental Policy Act of 1969, as amended (42 U.S.C. 94321 *et seq.*); the Administrative Procedures Act (5 U.S.C. 5706); the Estuary Protection Act (16 U.S.C. 1221-1226); the Coastal Zone Management Act of 1972 (16 U.S.C. 1451-1464); the Acts listed in the paragraphs above; and various Executive Orders and internal Federal Policy and Procedure Memoranda.

In addition, The National Wildlife Refuge System Improvement Act of 1997 requires the USFWS to maintain the ecological health, diversity, and integrity of refuges. In this context, gopher tortoise is frequently a focus species for managing and restoring open woodlands and savannas, as well as xeric scrub habitats represented on National Wildlife Refuges.

6.2. STATE AND TRIBAL AGENCY AUTHORITIES

6.2.1. Alabama

In Alabama, the gopher tortoise is a protected non-game species. Populations west of the Tombigbee and Mobile Rivers are federally listed as Threatened. Additionally, under the Nongame Species Regulation 220-2-92, the gopher tortoise is on the list of species in Alabama that legally prohibits the take, capture, kill, or attempt to take, capture or kill; possess, sell, trade for anything of monetary value, or offer to sell or trade for anything of monetary value, the nongame wildlife species on that list (or any parts or reproductive products of such species) without a scientific collection permit or written permit from the Alabama Department of Conservation and Natural Resources, which shall specifically state what the permittee may do.

6.2.2. Florida

In 2007, the Florida Fish and Wildlife Conservation Commission (Commission) released its updated Gopher Tortoise Management Plan in accordance with the Threatened and Endangered Species regulation, Florida Administrative Code, Rule 68A-27. The gopher tortoise is designated as a threatened species within the state of Florida effective November 2007. Rule 68A-27.004 states that "No person shall take, attempt to take, pursue, hunt, harass, capture, possess, sell or transport any gopher tortoise or parts thereof or their eggs, or molest, damage, or destroy gopher tortoise burrows, except as authorized by Commission permit or when complying with Commission approved guidelines for specific actions which may impact gopher tortoises and their burrows. A gopher tortoise burrow is a tunnel with a cross-section that closely approximates the shape of a gopher tortoise. Permits will be issued based upon whether issuance would further management plan goals and objectives."

6.2.3. Georgia

The state of Georgia has regulations (GaDNR Rules Chapter 391-4-10) for the protection of plant and animal species, including the gopher tortoise, which is listed as threatened within the state. GaDNR may issue permits for the collection, transportation, and/or possession of gopher tortoise for scientific or educational use only. Such permits do not alleviate the responsibility to acquire specific federal permits, if required. Georgia law specifically states that rules and regulations related to the protection of state protected species shall not affect rights on private property. Prohibitions are limited to the capture, killing, or selling of protected species and the protection of the habitat of these species on public lands. GaDNR has statutory and regulatory authority to enter into cooperative agreements with federal agencies and other states' agencies in carrying out its objectives, including management programs for the purpose of conserving any endangered or threatened species (O.C.G.A. §§ 12-2-6 & 27-1-6; Board Rule 391-4-10-.05).

6.2.4. South Carolina

The gopher tortoise is listed by the state of South Carolina as a critically endangered species within the state of South Carolina. This state designation requires that the federal ESA is observed in reference to gopher tortoise, meaning it is unlawful for any person to take, possess, transport, export, process, sell or offer for sale or shipment, and for any common or contract carrier knowingly to transport or receive for shipment any species or subspecies of wildlife that is endangered within the state. Very few tortoises reside in South Carolina, but known populations are protected on wildlife management areas, where it is illegal to take tortoises without written permission from the Department of Natural Resources (Wildlife Management Area Regulation 11.1).

6.2.5. Poarch Band of Creek Indians

The gopher tortoise is a culturally significant species for the Poarch Band of Creek Indians. Tortoises have historically been part of cultural and religious practices as well as a food and utilitarian use source for thousands of years. The Tribe protects gopher tortoise populations according to federal laws and regulations on the Tribal Reservation and Trust lands. Additionally, the Tribe protects gopher tortoises on "fee lands" according to federal and appropriate state laws and regulations. Tribal members also have certain protections for collecting native flora and fauna for cultural and religious practices covered under federal laws and regulations. Tribal Code, Chapter 26, Environmental Protection, covers the regulations for protecting wildlife habitat and improving it to benefit wildlife.

6.3. NON-GOVERNMENTAL ORGANIZATIONS

6.3.1. American Forest Foundation

AFF is a private, not for profit organization organized under U.S.C. 501.c.3, that works with forest owners across the nation to promote sustainable forest management on family forest lands. AFF's Center for Conservation Solutions works with partners and family forest owners to conserve and create habitat for imperiled species. Through the promotion of conservation incentives and regulatory assurances, AFF engages family forest owners and encourages their active habitat management for the gopher tortoise and associated species. The organization is

uniquely qualified to develop educational materials for and outreach to family forest owners and other interested stakeholders regarding the gopher tortoise.

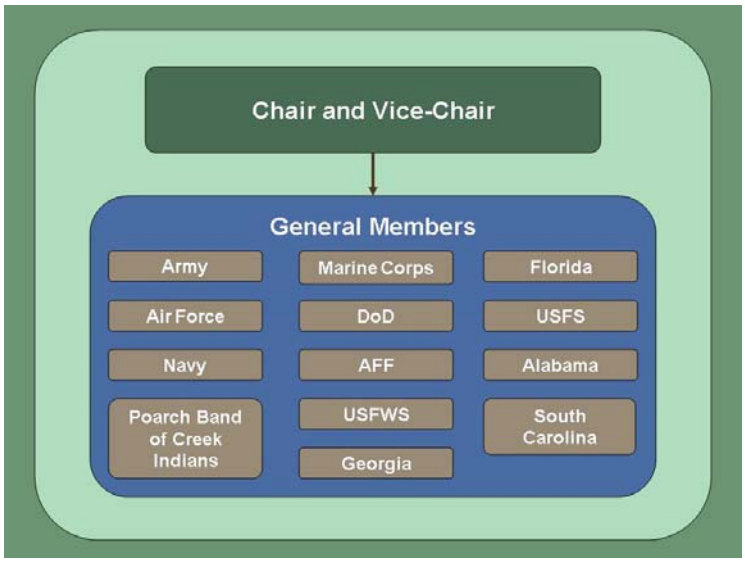
7. CCA MANAGEMENT AND ADMINISTRATION

In order to meet the objectives of this Agreement, the GTT will manage, administer, and periodically review this Agreement. The responsibility of this team is to coordinate the implementation and administration of the Agreement without superseding the jurisdictional authorities of any party. The GTT will develop and make recommendations for the conservation and research needs of the gopher tortoise and identify new threats in its eastern distribution.

7.1. GOPHER TORTOISE TEAM ORGANIZATION AND LEADERSHIP

The GTT will consist of one or more designated representatives from each Party to this Agreement and may include technical and legal advisors and other members as deemed necessary. Parties may have multiple sub-organizations involved; e.g., Wildlife, Forestry, and Endangered Species divisions of a state. The GTT will be chaired by participating state representatives only. On 1 July of each year the Chair with be succeeded by the Vice Chair. Alabama will hold the first chairmanship followed by Florida; the states will follow in alphabetical order. The GTT's organizational structure is outlined below in Figure 7.1 and will be updated as needed.

Figure 7.1: Gopher Tortoise Team's Organizational Structure



7.2. ASSESSING AND MANAGING THE AGREEMENT

The GTT is responsible for the coordination of the conservation activities and monitoring of the conservation actions being conducted by the Parties to encourage all actions to be in accordance with the Agreement. The GTT will develop an annual assessment of the Parties' progress towards implementing the conservation actions described in this Agreement. This assessment will be comprised of an annual report and recommendations for CCA revisions and actions. The annual report will be based on input provided to the GTT by the Parties. The GTT will devise a

standardized reporting format for the Parties to use when providing input. Following the annual assessment, the GTT will publish an announcement that details the progress made to date on implementation of conservation actions described in the Agreement.

7.3. EDUCATION AND OUTREACH

The GTT will assess the need to develop and/or distribute outreach materials to promote gopher tortoise conservation. Parties that develop new outreach materials related to the gopher tortoise and/or its habitat will share the materials with other GTT members. Outreach materials include, but are not limited to, pamphlets, newsletter articles and announcements, fact sheets, and other educational materials. In addition, the GTT will reach out to and utilize partnering organizations such as SERPPAS or the Partnership for Amphibian and Reptile Conservation for support.

The GTT will also create a repository or utilize an existing repository for gopher tortoise conservation research and information (e.g., a GTT website). This repository will include items such as gopher tortoise research, habitat management strategies, population densities, and outreach materials. Each Party to this Agreement will post gopher tortoise information and/or links to other appropriate sites on the information repository as well as their own internal websites if applicable.

8. STATUS AND DISTRIBUTION OF THE GOPHER TORTOISE

8.1. DESCRIPTION

The gopher tortoise is a member of the Class Reptilia, Order Testudines, and Family Testudinidae. Of four North American tortoise species (genus *Gopherus*), the gopher tortoise is the only one that occurs east of the Mississippi River. The gopher tortoise is a moderately-sized terrestrial turtle, averaging 23–28 centimeters in length. The species is identified by its stumpy, elephantine hind feet and flattened, shovel-like forelimbs adapted for digging. The shell is oblong and generally tan, brown, or gray in coloration.

8.2. LIFE HISTORY

The gopher tortoise is slow to reach sexual maturity, has low fecundity, and has a long life span. Females reach sexual maturity at 9–21 years of age, depending on local resource abundance and latitude; males mature at a slightly younger age. The breeding season is generally April–November. Nests are constructed (often in burrow mounds) from mid-May to mid-June, and only one clutch is produced annually. Clutch size is usually five to nine eggs, with an average of six. Predation on nests and hatchlings is heavy.

Gopher tortoises feed primarily on broadleaf grasses, wiregrass, grass-like asters, legumes, and fruits, but they are known to eat more than 300 species of plants. Tortoise densities and movements are affected by the amount of herbaceous ground cover. Generally, feeding activity is confined to within 50 meters of the burrow, but a tortoise may travel up to 100 meters from its burrow for specific forage requirements. Home range size varies with habitat type, season, and sex of the tortoise; moreover, considerable individual variation has been found. Reported annual average home ranges for males have varied from 0.5 to 1.9 hectares. Females generally have

smaller home ranges, with reported averages ranging from 0.1 to 0.6 hectares. Multiple burrows are typically used, which complicates estimates of population density.

8.3. HABITAT

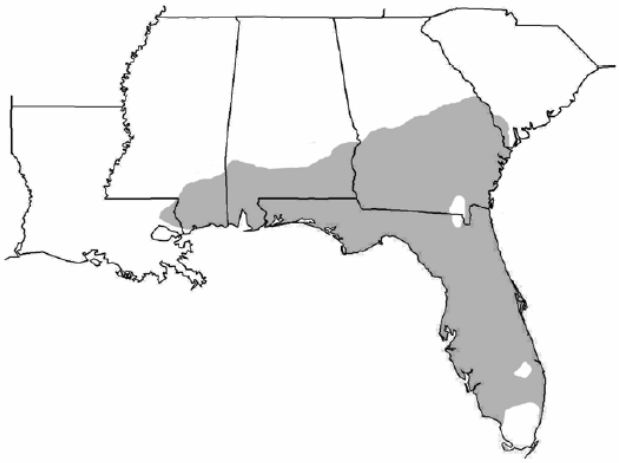
The gopher tortoise typically inhabits relatively well-drained, sandy soils. The gopher tortoise is generally associated with longleaf pine, xeric oak sandhills but also occurs in scrub, xeric hammock, pine flatwoods, dry prairie, coastal grasslands and dunes, mixed hardwood-pine communities, and a variety of disturbed habitats. Gopher tortoises excavate burrows that average 4.5 m in length and 2 m in depth. These burrows, which provide protection from temperature extremes, desiccation, and predators, serve as refuges for approximately 360 other species, including federally listed species such as the Mississippi gopher frog (*Rana capito*) and Eastern indigo snake (*Drymarchon couperi*).

8.4. DISTRIBUTION

The gopher tortoise occurs in the southeastern Coastal Plain from southeastern South Carolina to extreme southeastern Louisiana. The gopher tortoise is endemic to the United States, and Florida represents the largest portion of the total range of the species.

Figure 8.4: Gopher Tortoise Distribution

(Source: Gopher Tortoise Management Plan, Florida, September 2007)



9. PROBLEMS FACING THE GOPHER TORTOISE

The success of any conservation or recovery effort depends on reducing or eliminating threats to the continued existence of the species. The following summarizes the five listing factors identified in section 4(a)(1) of the ESA which must be considered by the USFWS in evaluating current threats to the gopher tortoise.

9.1. THE PRESENT OR THREATENED DESTRUCTION, MODIFICATION, OR CURTAILMENT OF THE SPECIES' HABITAT OR RANGE

The primary threats to gopher tortoises in the Southeastern U.S. are habitat destruction, fragmentation, and degradation. Causes of these threats include, but are not limited to; urbanization and development, intensive forestry practices, agriculture, dam construction, invasive exotic plant establishment, sand extraction, mining, land-use requiring vegetation clearance, fire suppression, agriculture, and human predation. Most gopher tortoise habitat exists on privately owned lands, rendering threats to habitat quality an important issue for private landowners. Additionally, federal and state lands are comprised of gopher tortoise habitat, and this Agreement focuses on these areas.

9.2. OVERUTILIZATION FOR COMMERCIAL, RECREATIONAL, SCIENTIFIC, OR EDUCATIONAL PURPOSES

Human collection and consumption is the primary way in which gopher tortoise populations are overutilized. Human predation on gopher tortoises has occurred throughout the Southeastern U.S. Harvesting of gopher tortoises is now prohibited by all states throughout its range; however, illegal commercial hunters continue to collect gopher tortoise for their meat. For example, the effects of human predation on tortoise populations in longleaf pine-turkey oak habitat in the Florida Panhandle has resulted in a low density of tortoise populations, as compared to higher densities of tortoises found in similar habitat in Peninsular Florida. Although tortoise protection and decreased tortoise populations have reduced human consumption rates, some tortoise populations may still be depleted by sustained human predation.

9.3. PREDATION AND DISEASE

In the wild, gopher tortoise eggs and hatchlings are preyed upon by mammals, birds, and snakes. Approximately 80–90% of nests are typically depredated, primarily by mammalian predators. It is believed that more than 90% of hatchlings may not survive their first year. Adults are not usually subject to predation, but there is evidence that they can succumb to dogs and coyotes. Gopher tortoise populations can typically withstand natural predation pressure, with only one to three of every 100 eggs probably producing a breeding adult. However, predator populations, such as raccoons and crows, can be artificially high in some habitats because of anthropogenic factors. Also, potential new tortoise predators have invaded the Southeast (nine-banded armadillo, coyote, monitor lizards, feral hogs, and red imported fire ant) via human transport or habitat alteration.

Beginning in the 1990s, upper respiratory tract disease (URTD) was identified as a potential threat to the gopher tortoise, and relatively large die-offs (100–300+ shells) that might be linked to URTD were documented on several public lands in Florida. In addition to at least two Mycoplasma species responsible for URTD, gopher tortoises also may have herpesvirus and iridovirus. Pathogens may be partially responsible for recent declines in some gopher tortoise populations, but URTD may have a long evolutionary history as a gopher tortoise disease. It is possible that *Mycoplasma agassizii* may be detected in virtually every population, if enough tortoises are sampled. There are several possibilities why URTD has only been discovered

recently: 1) increased research on the species, 2) increased stress on gopher tortoise populations from habitat fragmentation and degradation has lowered their resistance to pathogens, 3) a more virulent form of the pathogen has evolved, or (4) URTD was introduced by humans via exposure to infected captive tortoises. On Sanibel Island, 87% of tortoises tested were seropositive for exposure to the pathogen, and at least one population there appears to have experienced a 25–50% reduction in breeding age adults. However, it has been found that observed declines in the demographic well-being of gopher tortoise populations did not appear to be related to the presence of *Mycoplasma agassizii*.

9.4. EXISTING REGULATORY MECHANISMS

The species is federally listed west of the Tombigbee/Mobile Rivers with no federal and some state protection east of these rivers. While the gopher tortoise is currently state protected in Alabama, Florida, Georgia, and South Carolina, state protection varies greatly, and there is no coordinated or comprehensive framework for conservation or protection currently in place. For more state-specific regulatory information, see Section 6.2.

9.5. OTHER MANMADE OR NATURAL FACTORS AFFECTING THE SPECIES' CONTINUED EXISTENCE.

There are no other known manmade or natural factors affecting the species continued existence. However, increased conversion to agricultural lands could cause increased use of and tortoise exposure to agricultural chemicals.

10. CONSERVATION STRATEGY AND COMMITMENTS

The strategy for organizing a cooperative, range-wide approach to gopher tortoise management and conservation is focused on establishing a baseline of conservation commitments that all Parties agree to, and then collectively accounting for specific agency conservation actions across the region. It also establishes a starting-point for private landowner involvement in gopher tortoise conservation and management activities. Key components of this strategy are based on the premise that this Agreement, in the near term, is focused on reducing the deteriorating status of the species by improving, organizing, and implementing specific management actions, and in the long term, will facilitate the development of a network of managed gopher tortoise populations across its range.

The commitment and actions outlined in this Section focus on conservation, improvement, and ongoing management of gopher tortoise habitat. The landscape and local level conservation actions are designed to be adaptable and implementable by all Parties in a collaborative environment, and the agency-specific actions describe the specific actions that each Party will conduct to effectively manage the species and reduce habitat and population loss. The results of these actions will be observed through monitoring the response of tortoise populations. Information obtained from surveys and monitoring will increase the understanding of the gopher tortoise and its management needs. This knowledge will be applied using the concepts of Adaptive Management that periodically assess and modify conservation actions.

10.1. HABITAT CONSERVATION COMMITMENTS

Each of the Parties is bound by certain guiding agency requirements which establish their mission, goals, and responsibilities while also managing and conserving the habitat of various species (e.g., the gopher tortoise) in the Southeastern U.S. This section addresses general measures that will be taken by the Parties to conserve gopher tortoise and its habitat at the landscape and local level. Best practices for habitat management, monitoring, and translocation of tortoises are contained in Appendix B.

10.1.1. Landscape Level Conservation

This section describes general conservation efforts that all Parties agree to implement at the regional or landscape level, in accordance with their respective authorities and their individual missions. These common and comprehensive efforts and actions include:

- Identifying suitable or potentially suitable gopher tortoise habitat/sites/areas, and documenting those that are exceptional ecosystems known to support high biodiversity and/or numerous federal-and-state listed threatened and endangered plant and animal species.
- Identifying areas occupied by gopher tortoises.
- Identifying areas of potential agency mission – gopher tortoise habitat conflict.
- Identifying and reducing dispersal barriers between gopher tortoise populations.
- Developing and implementing best management practices for avoiding/minimizing/mitigating impacts to suitable and occupied habitats.
- Identifying and collaborating with landowners (private and public) on conservation/management efforts needed to minimize impacts to or sustain gopher tortoise habitat.
- Making gopher tortoise information available to promote appropriate data sharing, conservation, and partnering.
- Assessing and evaluating gopher tortoise habitat or population trends related to actions associated with development/agriculture/etc or conservation/restoration.
- Avoiding/minimizing impacts to suitable, unoccupied gopher tortoise habitat to allow for occupation of gopher tortoises in such areas, and managing these areas appropriately (e.g., prescribed fire).

10.1.2. Local Level Conservation

This section describes general conservation efforts that all Parties agree to implement at the local, installation or property level, consistent with their respective authorities and in accordance with their individual missions. These common and site-specific efforts and actions include:

- Considering the effects of actions on gopher tortoise during the planning process, and avoiding or minimizing impacts on habitat where practical.
- Identifying presence/absence of gopher tortoises in proposed action areas where the action will disturb soils in suitable habitat.
- Avoiding when practical or otherwise minimizing adverse effects on gopher tortoise habitat during land management activities.

- Considering translocation of gopher tortoises for projects that will adversely and permanently degrade/fragment/destroy occupied habitat and where all other management options have been exhausted. If translocation is selected as an action, developing a translocation plan.
- Avoiding where practical or otherwise minimizing adverse effects of actions that isolate existing gopher tortoise populations.

10.2. AGENCY-SPECIFIC HABITAT CONSERVATION ACTIONS

The following section details specific gopher tortoise conservation and management actions that have been implemented, are being implemented or are being considered for implementation by:

- United States Army
- United States Navy
- United States Air Force (USAF)
- United States Marine Corps (USMC)
- United States Forest Service (USFS)
- United States Fish & Wildlife Service (USFWS)
- State of Alabama
- State of Florida
- State of Georgia
- State of South Carolina
- Poarch Band of Creek Indians
- American Forest Foundation (AFF)

10.2.1. Army

The gopher tortoise occurs on Camp Blanding, FL; Fort Benning, GA; Fort Gordon, GA; Fort Rucker, AL; and Fort Stewart, GA. Specific management objectives and activities for gopher tortoise management are included in the INRMP for each installation. Conservation of the gopher tortoise and other species is part of a broader goal to conserve biological diversity on Army lands consistent with the Army's mission. Biological diversity and the long-term survival of species such as the gopher tortoise ultimately depend upon the health and sustainability of the ecosystem in which they reside. Therefore, installation-specific gopher tortoise management strategies will promote ecosystem integrity. Maintenance of ecosystem integrity and health also benefit the Army by preserving and restoring training lands for long-term use.

In accordance with Army Regulation 200-1, *Environmental Protection and Enhancement*, INRMPs support the Army mission through stewardship of Army lands and are the primary tool for managing species and their habitats at Army installations. Garrison commanders utilize INRMPs for the conservation, rehabilitation, and enhancement of natural resources to ensure readiness. The Army Species At Risk Policy and Implementing Guidance Memorandum, dated 15 September 2006, identifies the gopher tortoise as a high priority species at risk. The Army has programmed funds for the management of key species at risk. Camp Blanding, FL has additional state-mandated requirements to conserve gopher tortoise and is currently participating in the development of a CCAA for that location.

The following is a list of some of the gopher tortoise habitat conservation and management activities included within the installation INRMPs which have been utilized by some installations in the southeastern U.S. to conserve and enhance species such as the gopher tortoise.

1. Installations conduct monitoring programs to scientifically determine demographic trends and to measure success. Monitoring activities include:

    - Surveying for burrows to assess and minimize impacts to GT population and habitat prior to significant ground disturbing activities.
    - Monitoring gopher tortoise population demography.
    - Monitoring gopher tortoise activity and movement patterns.
    - Maintaining site specific distribution and demographic information on tortoises within the installation GIS system.

2. Upon establishment of installation gopher tortoise goals, the Army may apply the Army Compatible Use Buffer (ACUB) program to protect gopher tortoise habitat on private lands. The ACUB Program authorizes installations with approved ACUB plans to work with partners to protect and restore habitat outside installation boundaries. The principal design of these plans and partnerships is to prevent incompatible development and pursue conservation activities that sustain the installation's military mission.

3. Soldiers and other personnel (including contractors) involved in field activities at the installation will receive training or literature on how to minimize impacts whenever practical while still accomplishing mission goals. Outreach and education materials will include gopher tortoise and gopher tortoise burrow identification, the relevance of gopher tortoise conservation to the Army mission, and information on how certain activities (e.g., heavy wheeled and tracked vehicle operation and mechanical digging) may directly harm individuals, damage burrows and nests, affect foraging and have potential for significant habitat damage.

4. Current silvicultural standards far Red-cockaded Woodpecker (RCW) management on installations is consistent with requirements for gopher tortoise habitat. Where RCW management is not an issue, forest management and timber harvest will be evaluated for compatibility with gopher tortoise habitat needs. Installations will use pine and hardwood timber harvest and various forms of mechanical and chemical vegetation control, as necessary, to achieve specific habitat and vegetation objectives or to enhance degraded habitat.

5. The five Army installations in the southeast with gopher tortoise populations have aggressive prescribed burning programs. Current prescribed burning standards for wildfire hazard reduction and RCW management on installations is consistent with gopher tortoise habitat management. Frequent burning reduces shrub and hardwood encroachment, and stimulates growth of gopher tortoise forage plants such as grasses, forbs, and legumes. The physical result of fire on tree and shrub species is to reduce canopy cover. Heat stress caused by prescribed burning will eradicate undesirable hardwood mid-story and induce mortality among young, stressed, and diseased trees.

This allows greater sunlight penetration to reach ground level which promotes establishment of understory species used by the gopher tortoise as forage and is also important for proper egg incubation.

6. Headquarters, Department of the Army will designate a representative to the GTT.

7. Identify gopher tortoise management research and development projects currently conducted under the DoD's Strategic Environmental Research and Development Program to the GTT. Continue to conduct gopher tortoise research as appropriate through the W.S. Army Corp of Engineers Engineer Research and Development Center.

10.2.2. Navy

Naval Air Station (NAS) Jacksonville, FL:

Gopher tortoises are located in mission sensitive areas on Naval Air Station (NAS) Jacksonville, and gopher tortoise habitat is abundant at Outlying Landing Field (OLF) Whitehouse. The installation has prepared and is implementing a Gopher Tortoise Management and Relocation Plan covering all three NAS Jacksonville properties, revised in fiscal year (FY) 2005 along with updated surveys. NAS Jacksonville has a population at the weapons compound, where fencing has been modified to extend two feet below ground in some areas to discourage movement into the compound. Gopher tortoises also occur in habitat located on OLF Whitehouse along the mowed apron and in the dry sandy areas of Rodman Range. The goal of the gopher tortoise management plan project is to enable NAS Jacksonville to continue to relocate gopher tortoises from unsuitable, highly developed areas at NAS Jacksonville to improved habitat at OLF Whitehouse. Relocation efforts are coordinated with the Florida Fish and Wildlife Conservation Commission (FFWCC) and USFWS as appropriate. In addition to Navy owned lands, gopher tortoise populations occur at the Navy's Pinecastle Range on land owned by the U.S. Forest Service. At Pinecastle, the Navy and the U.S. Forest Service jointly monitor the rare, threatened, and endangered species onsite, including the gopher tortoise.

Management efforts also include two habitat restoration projects at OLF Whitehouse. The projects, which involve the conversion of unsuitable habitat to a longleaf pine/wiregrass ecosystem, are funded with Navy forestry funds. One 55-acre site has been planted with longleaf pine and the other is to be completed in FY07. Improving gopher tortoise habitat is also one of the goals of the prescribed burn plan for the Rodman Range.

Naval Submarine Base (SUBASE) Kings Bay, GA:

Gopher tortoise surveys have been conducted for all suitable habitat on the base (a resurvey of previously-identified habitats was conducted in October of 2003 involving 315 burrows at 21 locations). Intense surveys were also conducted for the area involving the security fence enclave. While a formal management plan for the gopher tortoise has not been developed, the primary management practice on SUBASE Kings Bay involves the use of prescribed fire in pine stands, which opens tree canopies and allows suitable understory development.

Gopher tortoises affected by infrastructure improvements or mission activities have been relocated to suitable habitat on site in coordination with the Georgia DNR and USFWS as appropriate. Land disturbance activities within a known gopher tortoise habitat continue to prescribe mitigation or relocation in accordance with the recommendations outlined in the 1997 gopher tortoise survey conducted for the Base.

NAS Pensacola and NAS Whiting Field, FL:

NAS Pensacola and NAS Whiting Field have significant gopher tortoise populations. A gopher tortoise survey is currently being conducted by The Nature Conservancy, Gulf Coastal Plain Ecosystem Partnership for NAS Whiting Field as an update to prior efforts. Surveys at NAS Pensacola have been part of other biological survey efforts over the years with two specific surveys conducted in FY04 and FY08. It is estimated that approximately 400 burrows exist on Navy lands under the control of both NAS Pensacola and NAS Whiting Field. Based on preliminary current results and on prior survey efforts, it is estimated that approximately 200 burrows are currently active on Navy lands under the control of both NAS Pensacola and NAS Whiting Field.

Both NAS Pensacola and NAS Whiting Field have performed tortoise relocations in years past on a case by case basis due to mission and facility requirements, but no relocation has been required since 1999. Relocation, when conducted, is coordinated as an INRMP effort involving both the FWC and the USFWS as appropriate. As part of management, gopher tortoise signs are being installed adjacent to active burrows at both Pensacola and Whiting Field as a means of protecting the burrows from mowing equipment and other heavy machinery. In flight clear zones at NAS Whiting Field and its OLF's, a mission-approved orange cone marking system is used. The orange cones have been stenciled with "gopher tortoise" and are placed adjacent to the burrows. Outside of clear zones on NAS Whiting Field lands and on all lands at NAS Pensacola, flexible markers with "gopher tortoise" decals are driven into the ground adjacent to the burrows. In addition to surveys and protection practices, management for gopher tortoise populations include the use of prescribed fire to maintain gopher tortoise habitat, forest timber thinning to increase available sunlight to the forest floor in tortoise habitat areas, invasive species control, and coyote predator control to the extent achievable within staffing and budget availability.

10.2.3. Air Force

Initial GIS estimates that the Air Force currently owns roughly 19% of the DoD-owned lands in the four states that are Parties to this Agreement. Unofficial estimates indicate that the Air Force has roughly 5-7% of the gopher tortoises on DoD-owned lands, but this does not account for potential habitat. In conjunction with DoD, the Air Force will obtain more accurate data to include actual and potential habitat acreage.

In accordance with USAF Instruction 32-7064, *Integrated Natural Resources Management*, the Integrated Natural Resources Management Plan (INRMP) supports the military mission by combining a series of component plans into an ecosystem management approach and is the primary tool for managing species and their habitat at USAF installations. An approved installation INRMP assists the installation commander with the conservation and rehabilitation of natural resources consistent with the use of the installation to ensure the readiness of the

Armed Forces. The following is a list of habitat conservation and management activities included within the installation INRMPs which have been utilized by some installations in the southeastern U.S. to conserve and enhance species such as the gopher tortoise. This listing is not meant to be all-inclusive, but merely examples of the various actions that have been historically taken by USAF installations as detailed in their individually approved installation INRMPs:

- Conserving known burrows and surveying for new ones in areas of potential habitat if any construction or significant ground disturbing activities are planned.
- Managing the natural communities to improve habitat.
- Providing predator control programs capable of removing specific individual predators predating burrows, nests, or young hatchlings.
- Limiting public access to selected areas of the installation, which helps protect against poaching.
- Minimizing habitat conversion to incompatible land uses such as residential or commercial property on the installation.
- Monitoring gopher tortoise population demography.
- Monitoring incidence of upper respiratory tract disease (URTD).
- Monitoring gopher tortoise activity and movement patterns to determine home range for individual tortoises.
- Thinning forests and removal of hardwood midstory encroachment within known gopher tortoise/indigo snake habitat.
- Conducting prescribed burning of forests and fields within known gopher tortoise/indigo snake habitat.
- Maintaining locational and demographic information on tortoises within the installation GIS system, known as GeoBase (if applicable).
- Implementing inter- or intra-installation "on-site" permit relocation plans (with prior approval by the applicable states).

10.2.4. Marine Corps

Marine Corps Logistics Base (MCLB) - Albany, GA:

In accordance with MCLB Albany's INRMP, the following summarizes gopher tortoise conservation actions being conducted at the base:

- Timber management – use random spacing when planting longleaf pine seedlings to more closely mimic naturally occurring stands. This may encourage gopher tortoises to re-colonize the area or provide habitat for the species.
- Gopher tortoises have been identified on MCLB Albany; however, their burrows were not found after an intensive search by the MCLB Environmental Division during March 2007. Potential gopher tortoise habitats will continue to be monitored.
- If there are planned disturbances in potential gopher tortoise habitats, then a survey will be conducted prior to construction to determine their presence. Should tortoises be present, GDNR would be notified of the occurrence of tortoises.

- Prescribed burning and thinning encourages the growth of grasses and other herbaceous cover needed by the tortoise. These practices should be continued at MCLB Albany.
- In areas considered to be high habitat potential for the tortoise, disturbances should be scheduled to avoid potential tortoise nesting periods.
- Establishment of sand pine, slash pine, or loblolly pine plantations with closed canopies limit tortoise habitat. Establishment of longleaf pine stands are better for tortoise habitat due to the more open canopy associated with this pine species and will therefore be encouraged.

Blount Island Command (MCSF-BI) - Jacksonville, FL:

Several active gopher tortoise burrows have been identified in the southeastern corner of the site, near the former test track area. The approximate area of suitable habitat for gopher tortoise is 15 acres at MCSF-BI. Gopher tortoises are found in an undeveloped area with deep sandy soils, which appears to be one of the small islands adjacent to the original channel of the St. Johns River before Blount Island was created. The area was part of a vehicle test track route before the tortoises were documented in that location. Since then, the area has been posted to prohibit vehicle traffic and the test track has been relocated. In addition, MCSF-BI environmental staff have restricted military operations in the areas where gopher tortoise burrows are known to exist.

In accordance with Blount Island Command's INRMP, the following is a summary of planned conservation actions:

- Develop and maintain a GIS-based tracking system for protected species occurrences and their habitat areas.
- Identify and clearly indicate with signage a 25-foot buffer around gopher tortoise burrows.
- Restrict gopher tortoise buffer areas from vehicle traffic and ground-disturbing activities.
- Conduct yearly gopher tortoise burrow counts.
- Conduct yearly survey of forage quality and quantity around gopher tortoise burrows.
- Implement vegetation management measures, as warranted, to maintain gopher tortoise foraging habitat proximate to burrows.

10.2.5. Forest Service

Land and Resource Management Plans (LRMP) have been developed and approved for the National Forests in Alabama and the National Forests in Florida, the two U.S. Forest Service administrative units covered by this Agreement. These LRMPs were developed and are being implemented using an ecosystem management approach and adaptive management. The LRMPs can be accessed at www.fs.fed.us/r8/planning/sap/final_alabama_plan/welcome.htm and www.fs.fed.us/r8/florida/projects/documents/forest_plan/forest_plan.shtml. The following is a list of habitat management activities and objectives included within the LRMPs. While this list is not all-inclusive, it provides examples of actions that will conserve the gopher tortoise, associated species, and the ecosystems upon which they depend:

- Protect from harm or move out of harm's way gopher tortoises encountered by personnel, cooperators, or contractors engaged in activities that may endanger individual specimens (note that the Forest Service or contractors are not going to search project areas for presence of gopher tortoises, but if, for example, a tortoise is encountered on a timber haul road, the logger will either move it out of harm's way or wait for it to cross the road).
- Protect known burrows and survey for new ones in areas of potential habitat if any significant ground disturbing activities are planned. Significant ground disturbing activities include road construction (temporary, permanent, haul roads, and skid trails), land clearing for rights-of-way, mining operations, oil and gas development, building construction, and intensive site preparation including sheering, root raking, drum chopping, and disking unless low PSI tracked equipment is used.
- Maintain information on known burrow locations in a database with GPS coordinates so these locations can be incorporated into habitat management plans and contracts.
- Maintain a 15-foot radius buffer zone around all known burrows, active or inactive, where heavy equipment use will be minimized (note that not all known burrows will be marked; GPS locations of known burrows will be provided to contractors and it will be their responsibility to maintain the buffer).
- When developing maintenance management plans for new or renewed special-use permits involving rights-of-way, the permittee must conduct gopher tortoise burrow surveys in suitable habitat of the right-of-way prior to performing vegetation maintenance with heavy equipment. Surveys shall be performed by personnel familiar with gopher tortoise ecology.
- Restore and maintain between 27,000 acres and 32,000 acres of longleaf pine per decade of this Agreement until all offsite pine species have been restored to the appropriate native pine species.
- Thin between 69,000 and 79,000 acres of overstocked pine stands per decade of this Agreement with a target basal area of between 30 and 60 square feet per acre.
- Prescribe burn on average every 3 years with varied intervals on any given site to restore natural processes in all sites where the natural-fire-return interval was less than 10 years. Strive to burn 50 percent of those acres between March 15 and September 30 with 20 percent of the acreage between May 1 and July 31.
- Maintain ground cover that generally consists of more than 40% herbaceous, pyrophytic plants, with no mid-story hardwoods over 7 feet tall.
- Hardwood mid-story may be controlled with chemical or mechanical means or prescribed fire.
- Invasive non-native species are controlled, with priority given to areas where they are causing adverse effects to federally listed species or Regional Forester's sensitive species, such as the gopher tortoise.
- Seek opportunities to use authority under the Wyden amendment to manage habitat on adjacent private lands where landowners are willing to enter into a conservation agreement
- The national forests involved in this Agreement will serve as recipient sites for gopher tortoises being displaced by development, contingent upon funds being

provided by the developer to manage habitat for the tortoises being relocated and to monitor their recruitment into the population.

10.2.6. United States Fish and Wildlife Service

National Wildlife Refuges in Florida, southern Georgia, and southeastern Alabama (east of the Mobile delta) support or have the potential to support gopher tortoises within the range covered under this CCA. The following National Wildlife Refuges are among those placing priority emphasis on applying management practices resulting in restoration and maintenance of habitats that support gopher tortoises:

- Bon Secour NWR, AL
- Okefenokee NWR, GA
- St. Marks NWR, FL
- Lower Suwannee NWR, FL
- Egmont Key NWR, FL
- Lake Woodruff NWR, FL
- Merritt Island NWR, FL
- Lake Wales Ridge NWR, FL

Management practices on National Wildlife Refuges are usually targeting objectives for a number of associated species. Within the distribution of the gopher tortoise, habitat is managed to support and increase red-cockaded woodpecker, Florida scrub-jay, indigo snake, Florida sand skink, and a large number of xeric scrub plants, among federally listed species. In addition, a larger number of non-listed species otherwise of conservation concern in these same habitats include migratory birds (e.g., Bachman's and Henslow's sparrows), reptiles and amphibians (e.g., eastern diamondback snake, gopher frog), and small mammals (e.g., Florida mouse). All of these species are associated with grassy-herbaceous dominated ground cover and many are specifically associated with gopher tortoise burrows.

The USFWS has concerns with leaving gopher tortoises in harm's way, on refuges or anywhere else. Historically, concerns have been raised on the translocation of gopher tortoises both on and off refuges. The extent of the impacts from translocation on this species, both positive and negative, are currently unknown. The USFWS will continue to follow the long-term monitoring of gopher tortoise translocation to determine its success.

Examples of ongoing and planned management actions focused on gopher tortoises follows.

Bon Secour National Wildlife Refuge

Gopher tortoises are locally occurring at Bon Secour and present habitat management for the species is through prescribed burning. Strategies in the Bon Secour NWR CCP include:

- Once habitat is established through use of growing season burns, perform ground searches for gopher tortoise burrows twice yearly (summer and winter).
- By 2014, scope gopher tortoise burrows twice yearly (summer and winter) to estimate gopher tortoise and eastern indigo snake populations.

- Reduce basal area on 400 acres of ridge top forest to regionally acceptable levels which will provide optimum habitat for gopher tortoises and eastern indigo snakes.

Okefenokee National Wildlife Refuge

Gopher tortoises are present within Upland Management Compartment 3 of Okefenokee National Wildlife Refuge. About half of this compartment has suitable habitat (550 acres) for gopher tortoises. The refuge recently acquired 6,800 acres along the eastern edge of Okefenokee Swamp. This land rises onto Trail Ridge, a sand ridge that defines the eastern boundary of the swamp, and it is estimated that approximately 2,500 acres would be suitable for gopher tortoises once restored to native vegetation. This land has been in slash pine production with soil disturbances. Although the refuge owns the land, management of the timber remains with a private landholder, Forest Investment Associates, until 2081. However, the refuge aims to acquire the timber rights as soon as possible so restoration can begin.

Management within the refuge's upland compartments relies on prescribed fire and periodic selective thinning of the timber. Prescribed fires are used every 2-3 years during the growing season in areas where gopher tortoises exist. Management prescriptions are evaluated every ten years. Conservation objectives and strategies outlined in the refuge's CCP that relate to the gopher tortoise are as follows:

- Protect and maintain the threatened and endangered species populations, expanding their populations where possible, and enhancing the habitat on the refuge by working with adjacent landowners. Encourage other land managers in the area to promote appropriate habitat for threatened and endangered species to create a larger gene pool, increase opportunities for survival within the ecosystem, and restore a piece of the area's natural heritage.
    - Develop and implement surveys for "focal" species of mammals, birds, fish, amphibians and reptiles, particularly those species that are threatened, endangered, or species of special concern (e.g., Rafinesque's big-eared bat, round-tailed muskrat, pocket gopher, Sherman's fox squirrel, gopher tortoise, etc).
- Determine the status, specific habitat requirements, and limiting factors of reptile species, including those associated with the upland pine community. Evaluate feasibility of restoration.
    - Develop and employ survey methods to determine status and distribution of reptiles within the upland pine community. Identify specific habitat requirements for reptile species and use GIS analysis to locate additional suitable sampling sites.
    - Monitor the status of gopher tortoises on the refuge and compare with other populations. Map the location of gopher tortoise burrows; establish the level of activity and use by commensal species.

St. Marks National Wildlife Refuge

At St. Marks NWR, 5,973 acres have been identified as priority suitable habitats, with about 95% of the known gopher tortoise burrows found within this habitat grouping. Continual management activities include prescribed fire in 2-4 year intervals, hand-cutting of hardwood species to increase herbaceous vegetation, removing exotic species, and planting native grasses. The St. Marks NWR CCP outlines several specific goals, objectives, and strategies that address the needs of gopher tortoises, including the following:

- Continue to restore and maintain open multi-aged, historic pine communities with low, diverse understories. Annually conduct habitat inventories on 7 percent of the forested compartments and prescribe treatments to maintain average pine basal areas of 50 to 80 square feet per acre and retain greater than or equal to 65 pines (>5 inches DBH) per acre. Evaluate revising the target pine basal areas upward for stands with larger diameter pines. Manage pine understories to average less than 4 feet in height.
- The gopher tortoise is a keystone species that provides habitat for a host of other rare species including the federally listed eastern indigo snake. Maintain healthy grassy/herbaceous groundcover in longleaf pine sandhills and conduct a survey of the population.
- By 2010, determine population size and distribution of eastern indigo snakes on the refuge. Assess the impacts of habitat management. Initiate the monitoring of refuge eastern indigo snakes by examining gopher tortoise burrows, area searches, or some other technique.
- Continue habitat restoration of the old agricultural fields (e.g., Panacea, Abe Trull, Wakulla, Mounds, and Stoney Bayou).
- By 2009, as part of the Habitat Management Plan, develop a restoration plan for the fields identifying (to the extent possible) the historic habitat(s), the current plant communities, the restoration needs, the methods to achieve the restoration, and the projected restoration schedule.
- Continue to use commercial harvest to conduct thinning as identified in forest or habitat management prescriptions, while maintaining strict oversight to minimize rutting or other habitat damage. Thinning operations will also be managed to limit possible disturbance to critical wildlife habitat. Regulations to avoid take of flatwoods salamanders would be followed in accordance with 50 CFR 6(a)-(e) during timber harvests within the 1,476-foot radius buffer zone surrounding salamander breeding ponds.
- By 2012, inventory refuge lands for rare and listed plants and animals through contracts, partnerships, or use of existing or additional staff.
- Since research has indicated that RCW populations are more productive where growing season prescribed fires are conducted in their foraging habitat, shift prescribed fires in current and future foraging habitat to the growing season as much as feasible.
- In 2008, determine if human and domestic or feral animal predation is impacting the gopher tortoise population. Take appropriate actions.
- By 2011, evaluate the potential to translocate tortoises to areas of unoccupied (or underutilized) suitable habitat. Any tortoises introduced from off-refuge sites

must be disease free. The State of Florida requires permits to relocate or translocate tortoises.

Lower Suwannee National Wildlife Refuge

Lower Suwannee NWR has approximately 7,500-8,000 acres of suitable gopher tortoise habitat. This includes high pine, pine flatwoods, and areas such as roadsides and clearings. Much of this habitat is marginal, but is improving with ongoing management actions, predominantly prescribed burning and forest thinning. Approximately 5% of available habitat on the Refuge has been surveyed thoroughly, and from that survey the Refuge may have had 2,000 - 4,000 active burrows in 2004. Significant population changes probably have not occurred since that time, although significant strides have been made since then in habitat improvement on several areas of the Refuge.

The Lower Suwannee NWR plans to conduct the following habitat management actions:

- Expand scientifically based monitoring and research to support management decisions regarding wildlife habitat and populations.
- Conduct gopher tortoise surveys every 5 years and investigate for presence of Upper Respiratory Tract Disease.
- Conduct prescribed burns using a combination of dormant and growing season burns. Prepare pine plantations for a shift to controlled burning during the growing season by opening the forest canopy through wider tree-to-tree spacing. This widely spaced canopy will allow the damaging heat from controlled fires to quickly dissipate and reduce the heat and fire damage to the trees.
- Continue forestry practices including thinning and restoring pine uplands through planting of longleaf and wiregrass on sites that have historically supported the longleaf pine/wiregrass complex on between 30 to 50 acres per year.
- Create a mosaic of forest structure through the use of appropriate silvicultural methods of thinning, shelterwood, and/or group selection harvesting. Create small openings, ½ - 1 acre in size, within plantations and plant seedlings or rely upon natural regeneration to fill these gaps. This will promote the development of a landscape with trees of multiple species, ages, structure and edge effect.

Egmont Key National Wildlife Refuge

Egmont Key National Wildlife Refuge is an island in Tampa Bay. Although it is relatively small and isolated compared to mainland National Wildlife Refuges, Egmont Key may support the highest density of gopher tortoises found within the NWR system in the existing habitat present on the refuge. Ongoing and future management work involves preparing the island for prescribed burning and to eradicate exotic species (Brazilian pepper and Australian pine), removing thick ground vegetation existing on the island, and facilitating the movement of tortoises throughout the island by developing movement corridors along fire breaks. The total treatment area covered by the fire breaks is approximately 20 acres, and the total area treated to eradicate exotic species to date is approximately 100 acres.

Merritt Island National Wildlife Refuge

Presently, the most important management undertaken at Merritt Island is through prescribed burning of existing short scrub conditions and restoring additional habitat by transforming, through mechanical means, tall scrub largely unoccupied by gopher tortoises into short scrub that can serve as future gopher tortoise habitat. Approximately 12,000 to 20,000 acres of gopher tortoise habitat are burned annually, supporting on average of 5 tortoises per every 10 acres.

In addition to actively managing existing habitat and restoring additional habitat, other work on Merritt Island involves removing berms to restore wetland functions, as well as occasional land clearing projects conducted by NASA, which owns the land on which Merritt Island National Wildlife Refuge exists. With anywhere from 7 to 14 burrows per acre, the Refuge staff places a high priority on surveying and evaluating activities for impact on tortoises. When gopher tortoises are located, they are removed (excavated) and locally relocated when operations require burrow impact.

10.2.7. Alabama

Until recently, the Alabama Department of Conservation and Natural Resources (ADCNR) has not taken specific measures for the protection and enhancement of gopher tortoises on state-owned lands other than the nongame regulation described below.

Current efforts:

- Gopher tortoises were reintroduced to the Wehle Nature Preserve in Bullock County in 2006. Efforts will continue to expand the population on this property and the adjoining Barbour Wildlife Management Area, in association with reestablishment of longleaf pine.
- Forest management practices on the Stimpson and Upper State Sanctuaries are designed in part to aid gopher tortoise restoration.
- Longleaf pine restoration is underway at the Gulf State Park, which will set the stage for expansion of the tortoise population.

In addition to these measures on state lands, ADCNR has funded projects to benefit gopher tortoises on properties of other agencies and organizations:

- Gopher tortoise research on Conecuh National Forest, site of Alabama's largest tortoise population. This will be expanded to include reintroduction beginning in 2008.
- Longleaf pine restoration at Splinter Hill Bog, a gopher tortoise-occupied property in Baldwin County owned by The Nature Conservancy.

Future efforts:

- Over the next four years, ADCNR will work to identify burrows and institute gopher tortoise management plans on all ADCNR properties in the gopher tortoise's historic range. As of 2007, these properties consist of about 50,000 acres.

- Over the next year, ADCNR will develop a cooperative agreement with Florida and Georgia for the introduction of excess Florida tortoises to appropriate Alabama sites, including ADCNR lands and properties owned by other agencies and organizations.

10.2.8. Florida

The state of Florida completed and is implementing its Gopher Tortoise Management Plan (the Plan) of September 2007. This comprehensive plan has several important goals and objectives that are summarized below:

- Improve gopher tortoise carrying capacity of all protected, potential habitat on both public and private lands supporting gopher tortoises by 2022.
- Increase protected, potential gopher tortoise habitat to 1,955,000 acres by 2022.
- Restock 60,000 gopher tortoises by 2022 to protected, managed, and suitable habitats.
- Decrease tortoise mortality on lands proposed for development through a redesigned permitting system.

The Plan contains several proposed associated conservation actions to achieve these goals and objectives. The following is a summary of the conservation actions that are highlighted:

- Develop and implement a redesigned gopher tortoise permitting system that emphasizes tortoise relocation and improves mitigation requirements.
- Coordinate more effectively with local governments.
- Strengthen law enforcement by training law enforcement personnel and developing gopher tortoise law enforcement guidance.
- Acquire and restore upland habitats and increase connectivity between habitats.
- Maintain upland forested pine and hardwood canopy cover below 60% in order to stimulate production of forbs, grasses, and other tortoise forage plants.
- Maintain herbaceous groundcover, including grasses, legumes, and forbs, at 50% or greater.
- Apply prescribed fire every 5 years or less to stimulate growth and diversity of tortoise forage items.
- Develop databases to track prescribed fire, management treatment actions (such as chemical or mechanical applications), vegetation monitoring, and management needs.
- Control infestations of invasive species.
- Avoid or minimize heavy equipment use in areas with high burrow concentrations.
- Manage tortoise populations by restocking tortoises in suitable habitat and working with other states, local governments, and NGOs to identify other sites where tortoises could be relocated to.
- Manage tortoise diseases such as URTD through the development of health screening protocols and disease outbreak contingency plans.
- Create incentives for landowners through the Safe Harbor Program and other landowner assistance programs.

- Create a public awareness campaign.

Conduct long-term monitoring on tortoise populations in five-year intervals on selected lands and develop a database for monitoring data.

10.2.9. Georgia

Current efforts:

- Using Landsat imagery and soil maps, identified locations of adequate gopher tortoise habitat throughout the Georgia range.
- Assessing the quality of sandhill habitats identified above by vegetation sampling and coarse-scale tortoise surveys.
- Using distance sampling to estimate gopher tortoise populations on a sub-sample of publicly-owned lands identified as having suitable tortoise habitat.
- Evaluate same sub-sample of sites based on their value as potential recipient sites for tortoises translocated from Florida due to development conflicts.
- Developing a CCAA with Plant Vogtle to establish a tortoise population on suitable sites using tortoises translocated from Florida.
- Participation in the Interagency Burn Team to prescribe burn tortoise habitats on state, federal, and The Nature Conservancy lands at intervals consistent with frequency of natural fires.
- Have acquired and will continue to acquire lands supporting gopher tortoise habitat.
- Pursue the use of conservation easements and other landowner incentive programs to protect tortoise habitat on private lands.

Future efforts:

- Use distance sampling to estimate gopher tortoise populations on all of publicly-owned lands identified as having suitable tortoise habitat.
- Estimate gopher tortoise populations on private lands where permission has been granted to conduct inventories.
- Evaluate all publicly-owned sites (and privately-owned sites we're given access to) based on their value as potential recipient sites for tortoises translocated from Florida due to development conflicts.
- Pursue the development of a standard CCAA for private landowners willing to establish or enhance tortoise populations on suitable sites using tortoises translocated from Florida or displaced from construction sites in Georgia.
- Continue and expand participation in the Interagency Burn Team to prescribe burn tortoise habitats on state, federal, and The Nature Conservancy lands at intervals consistent with frequency of natural fires.
- Continue acquisition of lands supporting gopher tortoise habitat.
- Continue pursuit of conservation easements and other landowner incentive programs to protect tortoise habitat on private lands.

10.2.10. South Carolina

South Carolina has designated the gopher tortoise as an endangered species within the state. Few tortoises remain in South Carolina, but the state continues to conduct habitat protection efforts in wildlife management areas, focusing particularly on areas that are believed to be part of the tortoise's historic range, and is currently conducting mark-recapture studies. Specific conservation actions include:

- Inventory known gopher tortoise populations and relict individual localities to determine the extent of the population.
- Facilitate appropriate habitat conservation initiatives to protect gopher tortoise sites identified in the inventory. Monitor these sites to determine stability of known populations.
- Conduct landowner workshops to educate landowners about the importance of gopher tortoises and methods for protecting this species.
- Conduct fire management operations at known gopher tortoise locations on SCDNR properties.
- Encourage other property owners, especially owners/operators of public lands such as the Savannah River Site (SRS), Public Service Authority (PSA) and others to conduct fire management operations to further enhance gopher tortoise populations.
- Continue gopher tortoise life history research.
- Continue gopher tortoise repatriation/relocation technology research.
- Monitor impacts to gopher tortoise burrows from armadillos.

10.2.11. Poarch Band of Creek Indians

As stated previously, the gopher tortoise is a culturally significant species for the Tribe. This relationship has existed for thousands of years and the Tribe hopes to continue this relationship for the generations to come. The Tribe has several ongoing efforts in place to protect and enhance the population of gopher tortoises living on Tribal lands:

- Continue planting of Longleaf Pine habitat on the Magnolia Branch Wildlife Reserve, which is owned by the Tribe. Several hundred acres have been planted to date.
- Continue controlled burning, which has been conducted for the last two years on targeted sites on the Wildlife Reserve.
- Conduct gopher tortoise burrow surveys periodically. Surveys were conducted in May 2007 and January 2008.
- Maintain funding for gopher tortoise and habitat related projects on Tribal lands through the USFWS and the Natural Resources Conservation Service (NRCS).
- Continue participation in partnerships that have been developed with the Alabama Natural Heritage Program at Auburn University, the USFWS, NRCS, and the Conecuh National Forest.

10.2.12. American Forest Foundation

As part of AFF's "Pine Ecosystem Management for the Gopher Tortoise" initiative, the organization developed a landowner-friendly management handbook for landowners in the listed portion of the gopher tortoises' range, organized several demonstration field days, conducted workshops on landowner assurance agreements, and developed educational trails. These efforts highlight the benefits of active forest management for the gopher tortoise and other wildlife to family forest owners, who own a majority of the non-federally listed gopher tortoise range lands.

Building on this experience, AFF commits to the following conservation actions:

- Update the *Pine Ecosystem Management for the Gopher Tortoise* Handbook
- Distribute the handbook to landowners in Florida and Georgia
- Work with USFWS, state agencies, and other cooperators to develop Candidate Conservation Agreements with Assurances (CCAAs)
- Educated targeted private landowner about how their actions can play a significant role in gopher tortoise conservation, and he management flexibility provided through CCAAs and the associated regulatory assurances.

10.3. FUNDING COMMITMENTS

Each of the Parties commits to seek funding for implementation of the conservation measures set forth in this Agreement. As appropriate, Parties will support the GTT and all management activities undertaken in accordance with the responsibilities of the GTT. No provision herein shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, 31 U.S.C. § 1341, or any applicable state law.

11. DURATION AND AMENDMENT OF THE AGREEMENT

Long-term protection and management, as outlined in this Agreement, are necessary for the continued conservation of the gopher tortoise. The initial term of this Agreement shall be ten (10) years. This Agreement shall be extended for additional five (5) year increments until long-term habitat management and conservation of the gopher tortoise is assured. Any Party may withdraw from this Agreement upon sixty (60) days written notice to the other Parties.

Any Party may propose modifications to this Agreement by providing written notice to the other Parties. Such notice shall include a statement of the proposed modification and the reason for the modification. The Parties will use their best efforts to respond to proposed modifications within 60 days of receipt of such notice. Proposed modifications will become effective upon the other Parties' written approval and completion of any necessary environmental analysis.

12. EFFECT OF THE AGREEMENT IN EVENT OF LISTING DECISION

It is the intent and expectation of the Parties that the execution and implementation of this Agreement will lead to the conservation of the gopher tortoise in its natural eastern range. If, subsequent to the effective date of this Agreement, the Secretary of the Interior should determine pursuant to section 4(a) of the ESA (16 U.S.C. §1533(a)), that the gopher tortoise is threatened or endangered, the Parties will participate in recovery planning for the gopher tortoise. It is also the

expectation of the Parties that the conservation and management commitments made in this document will be considered in the event of a listing under the ESA.

13. ADDITIONAL PROVISIONS

13.1. REMEDIES

No Party shall be liable in damages for any relief under this Agreement (including, but not limited to, damages, injunctive relief, personal injury, and attorney fees) for any performance or failure to perform under this Agreement. Furthermore, no Party has any right of action under this Agreement.

13.2. DISPUTE RESOLUTION

The Parties agree to work together in good faith. The GTT should coordinate and help resolve any disputes.

13.3. NO THIRD-PARTY BENEFICIARIES

This Agreement does not create any new right or interest in any member of the public as a third-party beneficiary, nor shall it authorize anyone not a Party to this Agreement to maintain a suit for personal injuries or damages pursuant to the provisions of this Agreement. The duties, obligations, and responsibilities of the Parties to this Agreement with respect to third parties shall remain as imposed under existing law.

APPENDIX A: SIGNATURE PAGES

GOPHER TORTOISE CANDIDATE CONSERVATION AGREEMENT

The following page will be reproduced as necessary to facilitate the signature of the Agreement by the appropriate Party representatives. It is anticipated there will be one Signature per page.

GOPHER TORTOISE CANDIDATE CONSERVATION AGREEMENT SIGNING PARTY

By signing this Agreement, the organization listed below agrees to uphold the ideals and values of the CCA and hereby commits to carry out specific conservation measures as detailed in Section 10, or Appendix E for additional Parties.

Alex A. Beehler

Signature

Alex A. Beehler

Typed or Printed Name

Department of Defense

Agency/Organization

October 10, 2008

Date

Roel Lopez

Designated Point of Contact (POC)

703-604-1820 roel.lopez@osd.mil

Designated POC Phone and Email

GOPHER TORTOISE CANDIDATE CONSERVATION AGREEMENT SIGNING PARTY

By signing this Agreement, the organization listed below agrees to uphold the ideals and values of the CCA and hereby commits to carry out specific conservation measures as detailed in Section 10, or Appendix E for additional Parties.

Signature

ADDISON D. DAVIS, IV
Typed or Printed Name

HEADQUARTERS, DEPARTMENT OF THE ARMY
Agency/Organization

1 OCT 08
Date

Leslie Gillespie-Marthaler
Designated Point of Contact (POC)

703 697-5433 leslie.gillespiemarthaler@hqda.army.mil
Designated POC Phone and Email

GOPHER TORTOISE CANDIDATE CONSERVATION AGREEMENT SIGNING PARTY

By signing this Agreement, the organization listed below agrees to uphold the ideals and values of the CCA and hereby commits to carry out specific conservation measures as detailed in Section 10, or Appendix E for additional Parties.

Signature

Donald R. Schregardus

Typed or Printed Name

Department of the Navy

Agency/Organization

9/4/03

Date

Mr. Tom Egeland

Designated Point of Contact (POC)

(703) 614-1173 tom.egeland@navy.mil

Designated POC Phone and Email

GOPHER TORTOISE CANDIDATE CONSERVATION AGREEMENT SIGNING PARTY

By signing this Agreement, the organization listed below agrees to uphold the ideals and values of the CCA and hereby commits to carry out specific conservation measures as detailed in Section 10, or Appendix E for additional Parties.

Emmett R Titshaw Jr

Signature

EMMETT R. TITSHAW, Jr., Maj Gen, USAF

Typed or Printed Name

Air Force

Agency/Organization

29 Oct 08

Date

Lt Col Scott T. Taylor, AF/A3O-AYR

Designated Point of Contact (POC)

703.588.2017 scott.taylor@pentagon.af.mil

Designated POC Phone and Email

GOPHER TORTOISE CANDIDATE CONSERVATION AGREEMENT SIGNING PARTY

By signing this Agreement, the organization listed below agrees to uphold the ideals and values of the CCA and hereby commits to carry out specific conservation measures as detailed in Section 10, or Appendix E for additional Parties.

Thomas A. Peterson

Signature

THOMAS A. PETERSON, Acting Regional Forester

Typed or Printed Name

U. S. Forest Service, Southern Region

Agency/Organization

June 13, 2008

Date

JIM FENWOOD, Director of Biological & Physical Resources

Designated Point of Contact (POC)

Phone: 404.347.7397 Email: jfenwood@fs.fed.us

Designated POC Phone and Email

GOPHER TORTOISE CANDIDATE CONSERVATION AGREEMENT SIGNING PARTY

By signing this Agreement, the organization listed below agrees to uphold the ideals and values of the CCA and hereby commits to carry out specific conservation measures as detailed in Section 10, or Appendix E for additional Parties.

Cynthia K. Dohner
Signature

Cynthia K. Dohner
Typed or Printed Name

U.S. Fish and Wildlife Service
Agency/Organization

November 7, 2008
Date

Rick Gooch
Designated Point of Contact (POC)

404-679-7124 Richard_gooch@fws.gov
Designated POC Phone and Email

GOPHER TORTOISE CANDIDATE CONSERVATION AGREEMENT SIGNING PARTY

By signing this Agreement, the organization listed below agrees to uphold the ideals and values of the CCA and hereby commits to carry out specific conservation measures as detailed in Section 10, or Appendix E for additional Parties.

Signature

M. N. Pugh, Director

Typed or Printed Name

Alabama Division of Wildlife & Freshwater Fisheries

Agency/Organization

July 16, 2008

Date

James J. McHugh

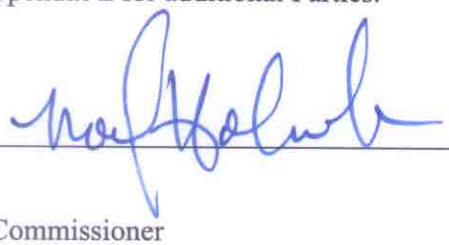
Designated Point of Contact (POC)

334-242-3874 Jim.McHugh@dcnr.alabama.gov

Designated POC Phone and Email

GOPHER TORTOISE CANDIDATE CONSERVATION AGREEMENT SIGNING PARTY

By signing this Agreement, the organization listed below agrees to uphold the ideals and values of the CCA and hereby commits to carry out specific conservation measures as detailed in Section 10, or Appendix E for additional Parties.



Signature

Noel Holcomb, Commissioner

Typed or Printed Name

Georgia Department of Natural Resources

Agency/Organization

June 18, 2008

Date

Michael J. Harris

Designated Point of Contact (POC)

770-761-3035 mike_harris@dnr.state.ga.us

Designated POC Phone and Email

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Signature

Drue DeBerry

Typed or Printed Name

American Forest Foundation

Agency/Organization

10/15/08

Date

Todd Gartner

Designated Point of Contact (POC)

202/ 463-5181 tgartner@forestfoundation.org

Designated POC Phone and Email

GOPHER TORTOISE CANDIDATE CONSERVATION AGREEMENT SIGNING PARTY

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Buford L. Rolin

Signature

Buford L. Rolin

Poarch Band of Creek Indian
Agency/Organization

10.21.08

Date

Laura L. Cook, Environmental Director
Designated Point of Contact (POC)

(251) 368-9136, Ext. 2680
Designated POC Phone and Email

GOPHER TORTOISE CANDIDATE CONSERVATION AGREEMENT SIGNING PARTY

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Kenneth D. Haddad

Signature

Kenneth D. Haddad

Typed or Printed Name

Florida Fish and Wildlife Conservation Commission

Agency/Organization

12/23/08

Date

Thomas E. Ostertag

Designated Point of Contact (POC)

850 410-0656 x17340

Designated POC Phone and Email

APPROVED AS TO FORM
AND LEGAL SUFFICIENCY

Commission Attorney

GOPHER TORTOISE CANDIDATE CONSERVATION AGREEMENT SIGNING PARTY

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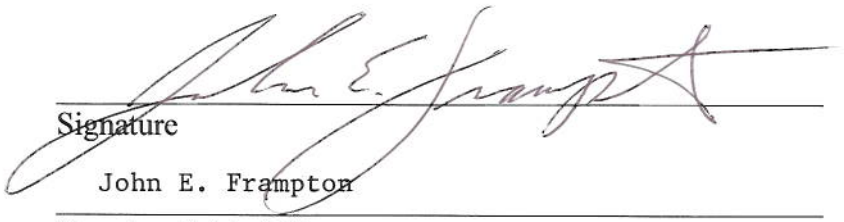

Signature

John E. Frampton

Typed or Printed Name

Director, SC Department of Natural Resources

Agency/Organization

Feb. 19, 2009

Date

Barry R Beasley

Designated Point of Contact (POC)

803-734-9095, beasleyb@dnr.sc.gov

Designated POC Phone and Email

APPENDIX B: RECOMMENDED CONSERVATION ACTIVITIES – HABITAT MANAGEMENT, MONITORING, AND TRANSLOCATION

HABITAT MANAGEMENT

The long-term survival of the gopher tortoise requires effective natural resources programs to meet and enhance stewardship requirements set forth in federal laws and agency policy. This should include habitat management to maintain an open park-like canopy with a diverse herbaceous groundcover and minimal shrub encroachment. Proactive habitat management requires the application of aggressive land management activities to optimize conditions for tortoise foraging (diverse herbaceous groundcover) and reproduction (open, sunlit sites for nesting). Prescribed fire, mechanical and chemical treatments, and timber management are an example of tools available to land managers.

The successful application of prescribed fire to enhance and maintain optimal gopher tortoise habitat is dependent on burn frequency and season of the burn. Fire frequency will vary depending on the habitat type and associated fuel loads, but most gopher tortoise habitats will benefit from a fire-frequency of 1-5 years (see Table 1). Frequent fires will reduce shrub encroachment and competition and stimulate a rich, herbaceous groundcover.

Table 1: Recommended structural characteristics and fire frequency for plant communities commonly used by the gopher tortoise (Modified from FWC, 2007).

Plant Community	**Fire Regime**	**Max. % Canopy Cover**	**Max. % Shrub Cover**	**Min.% Ground Cover**
Dry Prairie	1-3 yrs	<10	<10	50
Sandhill/ Upland Pine Forest/Oldfield Pinelands	2-5 yrs	50	30	40
Flatwoods	2-5 yrs	60	50	50
Scrubby Flatwoods	3-7 yrs	40	60	30
Scrub	7-12 yrs	40	60	15

Season of burn can have an effect on top-kill and establishment of shrubs. Shrubs are more vulnerable to growing season burns (spring and summer) than to dormant season burns (winter). When feasible, prescribed fire should mimic the natural fire cycle of occurrence. Summer burns produce optimal forage for gopher tortoises and reduce encroachment of shrubs. In old-field areas that have lost their one hour fine fuels (grasses/forbs), summer burns may not be an option. These areas respond well to winter burns, where the dormant biomass provides adequate fuels.

One consequence of fire suppression of forested lands in the Southeast has been severe habitat degradation of formerly fire maintained communities. Active land management practices can often restore these sub-optimal habitats. Removal of off-site hardwoods, thinning of pine trees,

and the introduction of prescribed fire can foster a return to an open, grassy forest structure preferred by gopher tortoises. The following management actions will promote optimal conditions for gopher tortoise habitat:

- Maintenance of upland forested pine and hardwood canopy cover below 60% in order to stimulate production of forbs, grasses, and other tortoise forage plants.
- Maintenance of herbaceous groundcover, including grasses, legumes, and forbs, at 50% or greater.
- Application of prescribed fire at least every 5 years or less to stimulate growth and diversity of tortoise forage.

Proactive management practices, in addition to prescribed fire, are effective for improving gopher tortoise habitat. Timber harvest and/or mechanical and chemical vegetation control can be used to achieve the desired forest structure and to restore degraded sites. During timber and restoration efforts, where possible, avoid the use of heavy equipment when constructing logging decks, roads, or other site-converting activities in areas with high burrow concentrations, unless there is no other alternative to reduce shrub cover. Harvesting of off-site timber species followed by reforestation with appropriate site-suited species and the reintroduction of fire can stimulate recovery of suppressed ground cover species. Locate logging decks in areas that will minimize skid traffic near gopher tortoise burrows. On heavily disturbed sites, natural recovery of native ground cover may not be possible. These sites may require intensive restoration efforts such as sowing of a suitable native seed mix to facilitate restoration. Site preparation should employ fire and/or herbicides where possible rather than mechanical methods such as chopping. Apply the latter if necessary for inhibiting vigorous sprouting of woody vegetation. Chemical and mechanical methods of hardwood control should employ best management practices to avoid soil disturbance, destruction of ground-layer vegetation, and non-target effects of herbicides. There should be no bedding for establishment of new forest stands on gopher tortoise habitat. To the greatest extent possible, damage to gopher tortoise burrows should be avoided.

Remedial Actions for Habitat Loss or Destruction

- Where construction will occur within 25 feet of the mouth of a gopher tortoise burrow, and permanently destroy suitable habitat, the tortoise should be removed and translocated to another location onsite, offsite or penned and released after the construction activity is completed. If the construction activity will take more than 12 months to complete, offsite relocations should be pursued.
- Where construction and/or excavation activities occur beyond 25 feet from an active gopher tortoise burrow, the area around the construction site should be enclosed by a fence or other barrier to exclude tortoises.
- Corridor(s) should be maintained to allow for movement of the tortoises outside of the construction/project area. An “island” (burrows encircled by development) population of gopher tortoises will not be biologically sustainable. Translocation will be necessary for “island” populations.
- For construction of roads that will have heavy use, some type of wildlife passage designed to allow for safe movement of gopher tortoises and other wildlife is encouraged.

- To ensure the amount of available habitat is not significantly diminished, consider mitigating loss of habitat by restoring/enhancing existing habitat or establishing easements on private land for management of gopher tortoise habitat (can benefit other species, especially commensals, as well).

Invasive Species And Predation

The spread of invasive, exotic species can have detrimental effects on gopher tortoise habitat. Invasive exotic plant species can greatly reduce the quality of gopher tortoise habitat. These invasive species can be spread via contaminated equipment. It is important to clean all machinery to prevent the spread of these invasive species.

Predator populations, such as raccoons and crows, can be artificially high in some habitats because of anthropogenic factors. Additionally, several other non-native predators, coyote, nine banded armadillo, dogs (feral and domestic), fire ants, and several exotic reptile species have been shown to eat gopher tortoises and/or their eggs. When gopher tortoise survival and recruitment are adversely affected by anthropogenic induced predation pressure and/or invasive species, it may be necessary to consider a hatchling head start program, predator control measures to minimize predator populations, and chemical/mechanical controls for invasive plant species.

MONITORING

Monitoring is an essential component of any conservation strategy and plan. Monitoring allows habitat quantity and quality to be assessed and ensures that gopher tortoise populations are adequately supported. Monitoring plans should include both habitat parameters and a general idea of the number of tortoises and, as appropriate, be part of the agency's management plan and/or regular planning process.

When an agency decides to pursue a gopher tortoise monitoring plan, it should be incorporated into the agency's existing management plan within the prescribed cycle of revision. If a monitoring plan is developed and implemented, periodic monitoring reports should be submitted to the GTT and incorporated into agency management plans. The results should be made available to the Parties as appropriate. As information is developed, census/monitoring techniques should be modified in order to stay effective and relevant.

Goals of Monitoring

- Establish baseline habitat or population data
- Assess effectiveness of management for adaptive management purposes
- Assess effectiveness of translocations
- Track changes in habitat acreage and suitability
- Track changes in population as applicable

Steps To Successful Monitoring

The following four stages comprise an effective approach to monitoring gopher tortoise populations and habitat:

Identification

- Develop an understanding of where gopher tortoise populations are, or could be, located.
- Utilizing base maps or GIS data sets, determine if land is suitable for the gopher tortoise and, if suitable habitat is occupied, whether there are actual tortoises on the property. Categorize parcels as:
  - No potential to become gopher tortoise habitat
  - Potential gopher tortoise habitat
  - Occupied gopher tortoise habitat

Quantification

Once one determines that there are gopher tortoise populations at the site, the following steps should be taken to quantify observations:

- First, the simple observation that tortoises are present is valuable. This is the first and most basic form of quantification. The goal here is to provide presence or absence for every potential tortoise site. This information, combined with an estimate of the size (acreage) of the site is the first stage and is the basis for Conservation Planning (see Conservation section below).
- Second, initiate the simplest forms of enumeration. Begin sampling using broad general estimates: e.g., how far does one have to walk to find 40 gopher tortoise burrows? *This standard is in the process of being developed through research funded by the Army Threatened and Endangered Species (TES) program, along with other, more statistically-sound protocols. That effort will be discussed later in this section.*
- Third, only after the Prioritization described below has been achieved is detailed enumeration logical. In the case of the tortoise, it is believed that an initial accurate sampling using this method should be the basis for determination of progress, and should require re-sampling only at intervals of 5 to 10 years. However, in many cases a total survey will not be necessary – the primary goal is to track general population levels.

Prioritization

- Develop a schema identifying which populations will be looked at more intensively and followed more rigorously.
- Determine the responsible party for actual monitoring of each population.
- Make decisions about which tortoise populations within each agency are most important and require funding. *There are several tools being developed in order to help organizations determine where to place their funds. These include different maps of gopher tortoise regions/populations in Georgia and the beginnings of a region wide network for all who gather information on specific populations, similar to the RCW networking site.* With information from all parties, agencies can make decisions on where to place their funding based on knowing where their help could have the biggest impact.

Conservation

- Set up a follow-up scheme at which a re-examination of the extent and numbers of animals is conducted every five to ten years.
- Determine whether management plans are reversing the decline of the species.
- Conduct repeated sampling to discover trends:
  - Situation 1: Many animals in quality habitat (viable)
  - Situation 2: Very few animals in quality habitat (not viable)
  - Situation 3: Many animals in poor quality environment (viable, if animals are moved or habitat is improved)

Tools For Monitoring

A region-wide GIS database and a web-based interactive tool for management of site information are being developed to support the partners in this agreement.

TRANSLOCATION

Translocation is conducted for a number of reasons. It is a suitable option when efforts to maintain tortoises at their original sites are not possible or where leaving them in place will put them in imminent danger. Additionally, it can be used to maintain and restore other populations and habitat.

Off-Site Translocations

Recipient sites

Sites where tortoises in need of translocation are to be placed must be identified early so that biologists do not have to search for appropriate sites as impending needs to move animals arise. Therefore, signatory agencies should identify sites throughout their property, or in the case of state agencies, their jurisdiction's tortoise range, that meet the criteria essential for the acceptance of translocated tortoises. These essentials are:

- Site must have suitable habitat requirements (i.e. relatively open canopy, well-drained sandy soil, and abundant herbaceous vegetation)
- Site must be within the historic range of the species
- Site preferably devoid of a natural tortoise population, or the population is assumed or known to be below carrying capacity
- Dedicated, long-term and proper management of the site is secured, which includes the development of a site-specific management plan.

Signatory agencies should maintain a database of available recipient sites and their important characteristics (e.g. location, acreage, native tortoise population demographics) within their jurisdiction. Signatory agencies will pursue and promote established state and federal private land incentive programs that can be tapped by landowners interested in receiving and managing translocated tortoise populations. Where possible, incentive programs unique to this effort will be developed and employed.

Donor sites

Two main scenarios exist as to when a tortoise population may be deemed a donor:

- The population is either not viable at it's current population size or makeup or the habitat quality and/or management is not sufficient (if the first part of this scenario is the issue, such a site may also be considered a recipient site to enhance a low or sexually skewed population, provided dedicated management exists).
- Impending harm to the site (and therefore the tortoises) renders a need to rescue the tortoises.

Other Considerations

- When feasible, donor tortoises should be moved to the closest recipient site.
- Tortoises that display clinical signs of disease should be segregated from the others and relocated to a site that has been established specifically for diseased tortoises, for the purpose of avoiding potential disease transmission. Efforts should be made to test tortoises for URTD prior to arrival if requested by the managers of the recipient site.
- Translocations should only be conducted when the forecasted overnight low temperatures for the day of translocation and the two following days are 50°F or greater.
- Although a recipient site may consist of tortoises from more than one donor site, every effort should be made to avoid splitting up tortoises from a particular donor site into multiple recipient sites.
- Ideally, capture and removal of tortoises from donor sites should be accomplished by live-trapping (i.e., bucket trapping, box trapping, and hand capture). Mechanical excavation, although acceptable, is less preferred because of the increased stress on the tortoises and the greater potential for injury or mortality.
- Efforts should be made to remove and translocate commensals to the recipient site or an appropriate alternative. If commensal species of special concern are found, consult with state or federal agencies for guidance. If translocations are conducted during the nesting season, burrow aprons should be searched for eggs. Eggs should be relocated, or eggs should be incubated and hatchlings released at the recipient site.
- Temporary enclosures have proven to be highly effective at increasing the site fidelity of relocated tortoises. Tortoises should be enclosed for a minimum of six months prior to release, but ideally nine months to ensure that tortoises habituate to their new environment. Sub-adults should be provided with starter holes to reduce chances of predation. The size of the enclosure shall depend on the number of tortoises within and the amount of native forage. A general guideline is to allow one half acre of high quality habitat per tortoise, and tortoises should not be enclosed alone. Supplemental feeding may be required in some instances. Enclosed areas must afford the tortoises some areas of shade.
- Translocated populations should be monitored one active season after removal of fences to document if site-fidelity has been achieved. Long-term monitoring for population viability is discussed in the Monitoring section above.

- All translocations should be under the guidance of a biologist (or biologists) or other qualified federal or state government wildlife professional and be coordinated with the appropriate federal, state, and resource agencies. All necessary state and federal permits must be secured prior to operations if applicable.

On-Site Translocation

This section only applies to on-site translocations, which occur when recipient and donor sites are near enough to potentially allow free movement between them.

Temporary

Temporary on-site translocations occur when tortoises are in harm's way of a particular, temporary activity or disturbance, but can be allowed to safely return to the site following such an activity or disturbance. Temporary captivity preferably lasts no more than a few weeks but can be longer. Two primary methods are:

- Capture and temporary captivity of tortoises, followed by hard releasing (no temporary enclosing necessary) at site of capture following cessation of the activity or disturbance that required their rescue. Proper care of captive tortoises depends on the duration of their captivity and the number of tortoises housed together. Any tortoises that display clinical signs of disease should be segregated from others during captivity.
- Capture and immediate release of tortoises outside of an impassable fence surrounding the impacted area. This should not be done if the immediately adjacent habitat is unsuitable for tortoises. Once the activity or disturbance has ceased, the fences should be removed to allow tortoises to return to the original site if suitable habitat remains at least partially intact.

Permanent

Permanent on-site translocations occur when tortoises are in harm's way of a particular activity or disturbance that will permanently prevent re-establishment of the tortoises at that site, and a suitable site devoid of a natural tortoise population, or containing a population assumed or known to be below carrying capacity, is available nearby. Guidelines for permanent on-site translocations are similar to those for off-site relocations and tortoises should be penned rather than hard-released. Care should be taken to ensure tortoises are not attempting to return to original areas.

APPENDIX C: DEFINITIONS

Adaptive Management: The integration of design, management, and monitoring through a scientific approach to systematically test assumptions in order to adapt and learn.

Bedding: A site preparation method which mounds the topsoil to raise the roots of seedlings above any temporary standing water.

Burrow apron: Fanned-out sandy area immediately in front of a tortoise burrow.

Carrying capacity: The maximum number of individuals that a site and its resources can support during the most unfavorable time of year.

Chemical Treatment: The use of herbicides to control undesired plant species.

Chopping: A site preparation method and land management tool to reduce the height and density of understory vegetation using a weighted drum with cutting blades to cut and chop vegetation.

Commensals: A biological relationship in which one species derives food, refuge, or other benefits from another animal species hurting or helping it; in the gopher tortoise's case, it is a species that shares the burrow with the tortoise.

Donor site: A site which tortoises are moved from during translocations.

Fuel loads: The amount of flammable materials (fuels) present in a habitat (e.g., trees, shrubs, grasses, etc.).

Hard release: A release without the benefit of penning, creating starter burrows, or any other technique designed to improve site-fidelity.

Hatchling Head Start Program: Protects hatchlings until they are of sufficient size to be beyond normal hatchling mortality to increase their chances of survival upon release into the wild.

Logging Deck: Site where logs are prepared and loaded for transport.

Mechanical Treatment: The use of mechanical means such as chainsaws, roller chopping, or mowing to reduce competition from undesired vegetation when regenerating forest stands.

Off-Site Timber Species: A species growing in a habitat it normally would not occur in due to disruption of natural processes, such as fire suppression.

Off-site translocation: Translocation in which the recipient and donor sites do not allow free movement between them.

On-site translocation: Translocation in which the recipient and donor sites are near enough to potentially allow free movement between them.

One Hour Fine Fuels: Fuels consisting of dead herbaceous plants, stems and branches less than ¼ -inch in diameter and the upper most layer of litter.

Predator Control: Removing predators, usually through trapping, to maintain their population well below natural levels for the benefit of some target species.

Recipient site: Site which tortoises are moved to during translocations.

Seropositive: A positive blood test indicating an immune response (exposure) to the bacteria that cause upper respiratory tract disease in gopher tortoises.

Site Preparation: Measures employed on a site to dispose of debris, reduce competitive vegetation, and prepare the soil for artificial or natural regeneration.

Take: Taking, attempting to take, pursuing, hunting, molesting, capturing, injuring, or killing any wildlife or freshwater fish, or their nests or eggs by any means, whether or not such actions result in obtaining possession of such wildlife or freshwater fish or their nests or eggs.

Top-kill: To kill the above-ground portion of a tree or shrub.

Skid: Moving of logs by means of heavy equipment from the point of harvest to a loading area.

Starter hole: A shallow hole dug with a shovel or auger that approximates the angle of a gopher tortoise burrow entrance.

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APPENDIX E: ADDITIONAL PARTIES TO THE GOPHER TORTOISE CANDIDATE CONSERVATION AGREEMENT

Additional federal agencies, state and tribal agencies, NGOs, and private parties that share a desire to conserve gopher tortoise populations and habitat in order to prevent regulatory constraints and carry out their missions to the best of their ability are welcome to sign onto this Agreement at any time. In order to do so, the agency or organization interested in becoming a Party to the CCA must provide the GTT with the following information:

- A detailed description of the agency's or organization's authority to enter into such agreement (see Section 6 for examples), and
- Specific conservation commitments the agency or organization will implement and execute (see Section 10.2 for examples).

Upon receipt of this information and review and agreement among GTT members, the organization will be asked to submit a signed signature page, after which the GTT will amend this Appendix as appropriate.