Appendix C

Threatened and Endangered Species

Attachments to Appendix C

Attachment C-1 **Sea Turtle Management Plan**

Attachment C-2 **Florida Scrub-jay Management Plan**

Attachment C-3 **Scrub Habitat Restoration Plan**

Attachment C-4 **Gopher Tortoise Relocation Plan**

Appendix C: Threatened and Endangered Species

Air Force Instruction (AFI) 32-7064, Chapter 7, Threatened and Endangered Species Management, instructs military installations to develop and implement programs to protect and conserve federally listed threatened and endangered plants and wildlife in accordance with Public Law 93-205. Paragraph "c." of this law further acknowledges separate state-recognized lists and advises installations to also consider impacts of actions that could jeopardize the quality of the state listed species' habitat. An ecosystem management strategy should be provided in the Integrated Natural Resources Management Plan (INRMP) for the protection and recovery of Threatened and Endangered (T&E) species and Candidate species when practical. Protection measures for state listed species are also included in the INRMP. With the exception of the West Indian manatee, there is no formally designated critical habitat (under Section 4 of the Endangered Species Act) within 45th Space Wing (45 SW) properties. **Section C.2.6** (West Indian manatee) discusses the critical habitat within 45 SW property for this federally listed threatened species. Additionally, critical habitat has been designated in waters adjacent to and used by the 45 SW (Banana River and Atlantic Ocean). Additionally, the 45 SW is home to numerous state and federally listed species. Species management plans have been developed for listed species located within 45 SW properties in which specialized and/or significant management is required due to Biological Opinion and/or other regulatory requirements. The responsibilities associated with the SAIA is the major factor contributing to 45 SW future planning, funding and implementation of management actions to protect, conserve, and contribute to the recovery of federally-listed species under the INRMP.

C.1 Identified Species

This appendix focuses on those species requiring specialized and/or significant management. Species management plans include the following species and these plans are incorporated as Attachment to this appendix (Appendix C):

- Sea turtles (Attachment C-1)
- Florida scrub-jay (Attachment C-2)
- Scrub-jay habitat (Attachment C-3)
- Gopher tortoise (Attachment C-4)

Protected species were identified as high, medium, or low priority species. The definition of each category is provided below.

- **High** priority species include federally listed species with management plans (attached to this Appendix), Biological Opinions (BO) and incidental take permits (see **Appendix B**), and/or which are directly managed by 45 SW with projects undertaken specific for them, or have critical habitat within the boundary of the 45 SW installations.
- **Medium** priority species include federally listed species known to occur on at least one of the 45 SW installations; however, these species are not typically directly managed by 45 SW nor are projects undertaken directly by 45 SW to support these species, although protection measures are often used to reduce potential impacts.

- **Low** priority species include all federal species of special concern as well as all state listed species known to occur on at least one of the 45 SW installations.

High Priority Species

- Federally threatened eastern indigo snake
- Federal candidate and state threatened gopher tortoise
- Federally threatened Florida scrub jay
- Federally threatened southeastern beach mouse
- Federally threatened loggerhead sea turtle
- Federally endangered green sea turtle
- Federally endangered leatherback sea turtle
- Federally endangered hawksbill sea turtle
- Federally endangered Kemp's Ridley sea turtle
- Federally endangered West Indian manatee
- Federally endangered Florida perforate lichen

Medium Priority Species

- Federally threatened red knot
- Federally threatened piping plover
- Federally protected bald eagle
- Federally threatened wood stork
- Federally threatened roseate tern
- Federally endangered Atlantic sturgeon
- Federally endangered smalltooth sawfish
- American alligator (treated as federally threatened)
- Federally endangered North Atlantic right whale

C.2 High Priority Species

C.2.1 Sea Turtles

Years of nesting data has been collected for these listed species, which is provided in the associated Attachments to Appendix C. Sea turtle nesting must be monitored in order to meet USFWS Biological Opinion requirements to limit incidental take due to disorientation/ misorientation caused by 45SW mission artificial lighting The Sea Turtle Management Plan can be found in Attachment C-1. Sea turtles nest on the Atlantic beaches of CCAFS and PAFB. The National Marine Fisheries Service has designated critical habitat areas in the Atlantic Ocean adjacent to CCAFS and PAFB for the loggerhead sea turtle (Figures 1 and 2). However, CCAFS

and PAFB beach (terrestrial) areas are exempt from designated terrestrial critical habitat for the loggerhead sea turtle, per the USFWS.

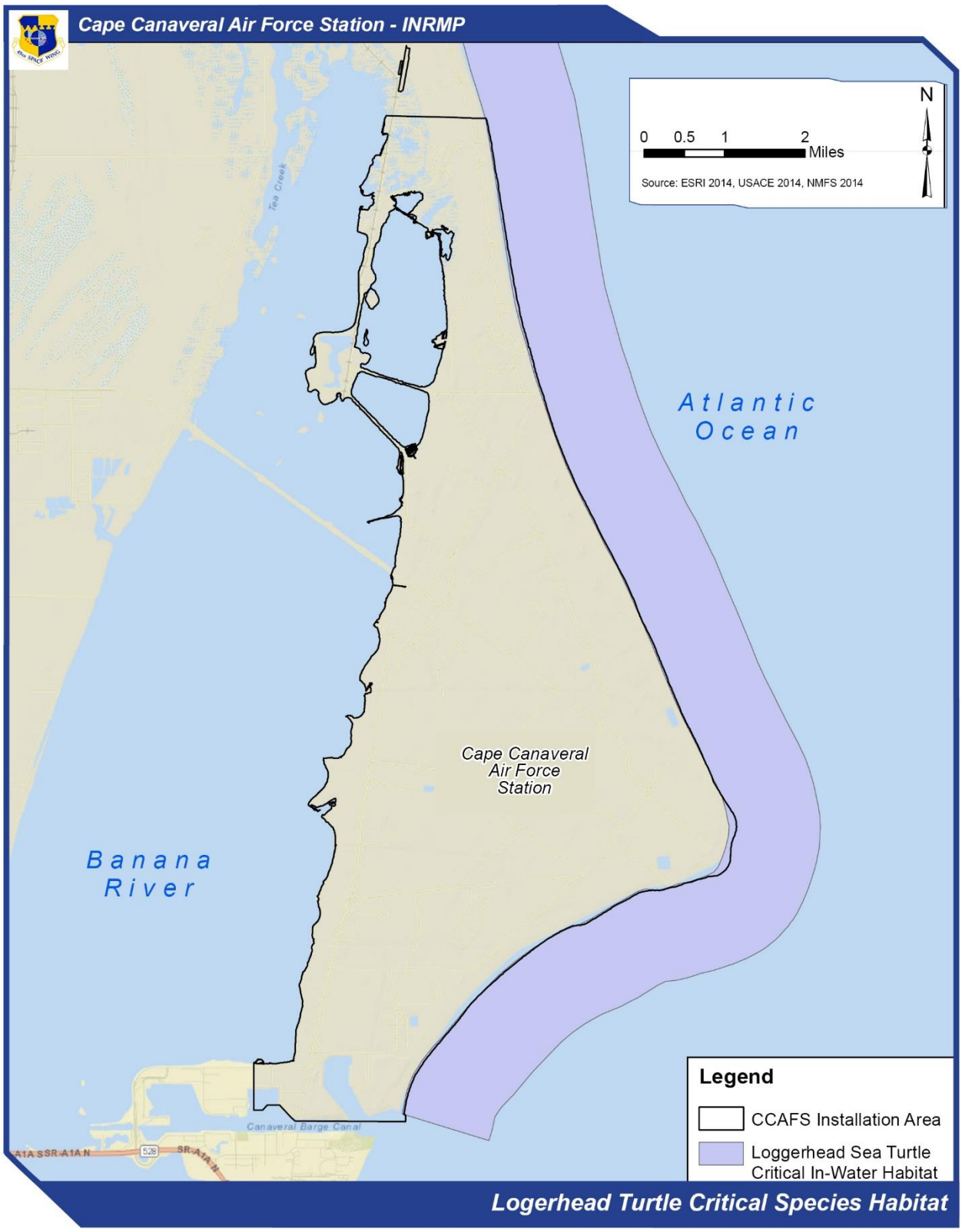

Figure 1. Loggerhead sea turtle in-water critical habitat (per NMFS), adjacent to CCAFS

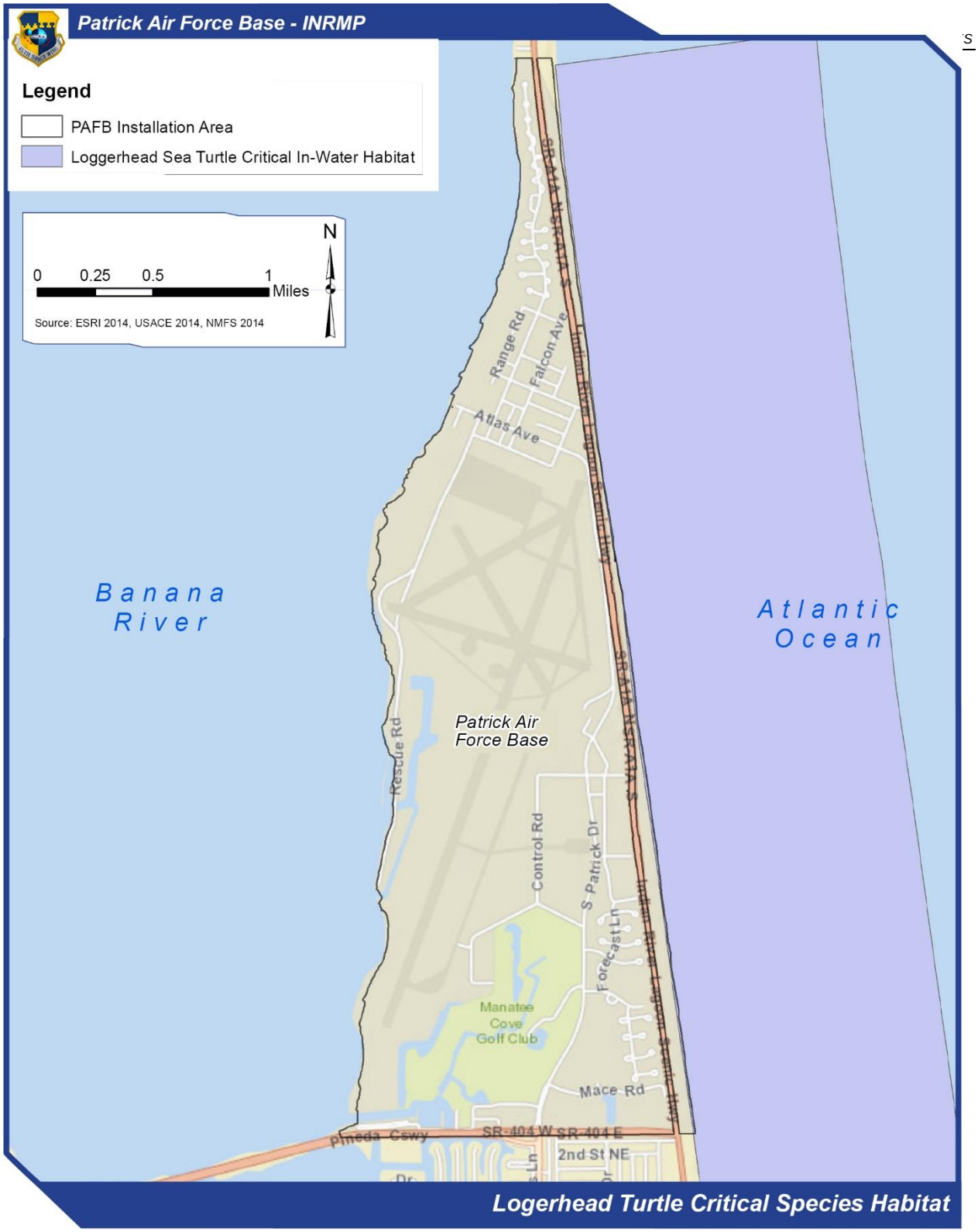

Figure 2. Loggerhead sea turtle in-water critical habitat (per NMFS), adjacent to PAFB

C.2.1.1 Juvenile Green Sea Turtle

The Trident Basin (Basin) at CCAFS is home to a significant population of juvenile green sea turtles which are listed as federally endangered. These resident juvenile turtles inhabit the Basin and forage for algae from the rock revetments along the shoreline of the Basin. In addition to the management objectives of the Sea Turtle Management Plan (Attachment C-1), a study of the juvenile green sea turtles that inhabit the Basin at CCAFS is conducted annually, under a contract with the University of Central Florida (UCF). Study objectives include the distribution, biology, morphology, and size class determinations of this population and may include any potential and/or observed impacts to the species from activities occurring in the Basin. Useful information is gathered and documented about this particular population and its associated size class for the species. Since little is known about the complete life cycle of sea turtles, particularly of this size class, the study provides information to the scientific community regarding the foraging needs and range of this size class, and may contribute to the recovery of the species. The data results indicate the Navy submarine activity in the Basin has not adversely affected the juvenile green turtle population, and the construction of the rock lined Basin has provided a foraging area that is supplementing the juvenile green sea turtles' diet.

C.2.2 Florida Scrub-Jay

Years of nesting data has been collected for this listed species, which is provided in the associated Attachments to Appendix C. The Florida Scrub-Jay Management Plan can be found in Attachment C-2. The Florida scrub-jay is found within CCAFS, and utilizes habitat within JDMTA.

C.2.3 Southeastern Beach Mouse

The Southeastern beach mouse (beach mouse) is a federally listed threatened species. It is a sub-species of the numerous, widely distributed old field mouse. The beach mouse is found within CCAFS. Beach mice populations have historically been restricted to the coastal dune and coastal strand communities along Florida's East Coast. The historical distribution of this species was from Ponce Inlet (Volusia County), south to Hollywood Beach (Broward County). Human alteration of the coastal barrier islands has resulted in extirpation of the beach mouse from the majority of its range. The most viable populations are now located on federal lands, including the Canaveral National Seashore, Merritt Island National Wildlife Refuge/Kennedy Space Center and CCAFS. Studies conducted in the vicinity of LC-40 indicate a large and healthy population of beach mice residing in coastal dune/strand and disturbed oak scrub communities in this area. Further research has shown that beach mice are located in interior oak scrub sites, as well as buildings. The coastal dune habitat is afforded considerable protection, and the species is protected by Section 7 of the ESA. Currently no critical habitat for the beach mouse has been designated.

Impacts to this species are addressed on a project specific basis and through Section 7 Consultation with USFWS. Mitigation measures to reduce potential impacts to this species, if appropriate, are determined by USFWS. The beach mouse may be relocated out of the project area and/or USFWS may issue a "take permit" to the proponent of the project.

Smaller projects that involve digging in areas where beach mice may be found will be reviewed by the personnel of the 45 SW Civil Engineer Squadron Environmental Conservation Element (CES/CEIE-C) and consultation normally will not occur if it is determined that impacts to the beach mouse can be avoided.

Currently, the 45 SW has two Programmatic BO that address impacts to the beach mouse. The first BO (USFWS Log No. 41910-2009-F-0110) issued December 23, 2008 (Appendix B, Attachment B-1) involves disturbance to areas where beach mice are present, but will not result in a permanent removal of the habitat. Examples of such projects include scrub restoration, burning, and installation of utility lines. The BO allows a take for all beach mice located in these areas.

The second Programmatic BO (USFWS Log No. 02-617) issued August 22, 2002 addresses pest control operations on CCAFS. Several years ago, beach mice were being captured inside facilities on CCAFS. As a result, pest control operations were changed to ensure no beach mice were killed. The BO allowed a take of 50 beach mice within CCAFS associated with pest control operations for a period of one year from 22 Aug 2002. The BO was extended via emails following that first year. For areas located east of Pier Road, Lighthouse Road, ICBM Road and North Phillips Parkway, which are considered typical beach mouse habitat, the USAF is required to live trap. Any beach mice captured in these areas are relocated outside the facility. The USAF is currently working on updating this BO.

C.2.4 Eastern Indigo Snake

Federally listed as a threatened species, the Eastern indigo snake (indigo snake) has been identified throughout CCAFS from road kills, field collections, and observations. The indigo snake is also present, or presumed present, within MTA, and JDMTA. The major threats within CCAFS to this protected species are habitat loss and vehicle strikes. Relatively stable habitat exists on CCAFS due to controlled access and minimal development which makes this installation capable of maintaining a population of indigo snakes close to that which would occur in an undisturbed habitat.

Management of the indigo snake occurs on a project specific basis and all potential impacts are addressed through the use of the Environmental Impact Analysis Process (EIAP). Impacts to the indigo snake are addressed through Section 7 consultation with USFWS if the USAF believes that the proposed action "may affect" the species. Construction activities in the preferred habitat of the indigo snake will require adherence to the USFWS *Standard Eastern Indigo Snake Protection Measures,* and should be a component in the project specifications and contract language/drawings. Indigo snakes typically leave construction areas once activities begin and mitigation actions are not required. If any indigo snakes are encountered during construction, work will stop until the indigo snake moves out of the area on its own, and the 45 CES/CEIE-C is contacted immediately. Resumption of construction/clearing can begin after the indigo snake is out of the area. Other components of the *Standard Eastern Indigo Snake Protection Measures* include informational posters about the indigo snake that are provided to construction contractors for display in a prominent location at construction sites and access roads to the site. The 45 CES/CEIE-C developed an Indigo Snake Education Plan (Plan)

(approved by USFWS) that is provided to contract managers prior to initiation of projects. [1]The contract manager is required to read and be familiar with the Plan, as well as ensure all construction personnel are familiar with the Plan. If required per BO, an indigo snake monitoring report is submitted to the USFWS after construction/clearing activities.

Normally, the only time indigo snakes may be relocated is during relocation of gopher tortoises. The personnel of the 45 CES/CEIE-C should be contacted in the event it is determined an indigo snake should be relocated since this action would require a permit.

C.2.5 Gopher Tortoise

The gopher tortoise is listed as threatened in the State of Florida, and a candidate for federal listing in Florida. The gopher tortoise is present on all four 45 SW properties: CCAFS, PAFB, MTA, and JDMTA. Although the gopher tortoise is not federally protected in Florida, it is afforded protection by the USAF due to its state ranking and use of its burrow by commensal species, some of which are federally protected species. The gopher tortoise is considered a keystone species because its burrow provides important habitat for many other native species; some commensal species observed utilizing gopher tortoise burrows within CCAFS include the eastern diamondback rattlesnake, eastern coach whip, ghost crabs, box turtle, cotton mouse, cotton rat, Florida gopher frog, and armadillo.

Gopher tortoises inhabit upland habitats common in central Florida, including scrub, pine flatwoods, and the dune area along beaches. Their diet consists mainly of grasses, grass-like plants, and legumes. The primary reason for the decline of this species throughout the southeast United States (U.S.) is habitat destruction. The dry upland habitat favored by this species is also desired for construction development for business and residential areas.

The current population of gopher tortoises on CCAFS is not known; although, based on the observations of 45 CES/CEIE-C personnel, a considerable number of individuals inhabit CCAFS, probably in the thousands. The current number of gopher tortoises present on PAFB, MTA, and JDMTA are not known. According to 45 CES/CEIE-C personnel, the population at PAFB is estimated at less than 20 gopher tortoises based on the limited number of gopher tortoise burrows found on the airfield and the closed landfill south of the FamCamp. The population is estimated as 63 tortoises at MTA, based on a recent survey (VZ Technologies 2014b) with observations of tortoise inside and outside of burrows. Personnel of the 45 CES/CEIE-C report the tortoise population on JDMTA is estimated at less than 10, as there are only a few burrows found in open areas within stormwater swale banks and other elevated locations near the fence line.

In 1999, the 45 CES/CEIE-C received the first blanket tortoise relocation permit for CCAFS, allowing captures and relocations for a three year period rather than requiring procurement of

[1] The USFWS standard *Indigo Snake Education Plan* can be found at: https://www.fws.gov/northflorida/IndigoSnakes/20130812_Eastern_indigo_snake_Standard_Protection_Measures.htm).

individual permits for projects. A 45 SW Gopher Tortoise Conservation Plan (Attachment C-3), approved by FWC, was developed that outlined procedures for relocating gopher tortoises within CCAFS, and other 45 SW properties. This enabled the 45 SW to a receive blanket gopher tortoise relocation permit. In 2009, the FWC implemented a new gopher tortoise permitting process and informed the 45 SW it was no longer issuing blanket permits. This initiated discussions within DoD regarding the legality of a state agency assessing fees on a federal agency on a species that is not federally listed. As a result and as reflected in the FWC *Gopher Tortoise Management Plan*[2], military activities are exempt from permitting and fees therefore a permit is no longer required for the 45 SW. The 45 CES/CEIE-C reviews all projects and flags those actions which may impact the gopher tortoise. Surveys occur prior to land disturbance activities to assess potential impacts to the gopher tortoise. If avoidance of impacts to the gopher tortoise and/or its habitat is not possible, the 45 CES/CEIE-C personnel will relocate the gopher tortoise outside of the project area, but within a 45 SW property.

In 2008, a Candidate Conservation Agreement (CCA) was developed for the gopher tortoise as a cooperative effort among state, federal, non-governmental, and private organizations. The purpose of the CCA was to collectively implement proactive gopher tortoise conservation measures across its eastern range. In accordance with this CCA, annual reports are submitted by the 45 SW that detail gopher tortoise habitat management and relocation efforts that have taken place throughout the year.

C.2.6 West Indian Manatee

The West Indian manatee (manatee) is federally listed as endangered, but is now under consideration by USFWS for reclassification to threatened (USFWS, 2014).

In Brevard County, the USFWS has designated all inland waters of the Banana River and all waterways between the Indian and Banana Rivers as critical manatee habitat, including contiguous waterbody features such as tributaries, bays, covers, and inlets (Figures 3 and 4). Since 1990, the northern Banana River, north of the National Aeronautics and Space Administration (NASA) Causeway has had restricted boat access due to the manatee. An increasing number of manatees using the region (Provancha and Provancha 1988) pre-empted the USFWS to deny public power boats access to nearly all of the Banana River waters adjacent to CCAFS.

Manatees are one of the few marine mammals known to inhabit the local salt-water lagoon system within and near CCAFS and PAFB. The turning basin, west of CCAFS facility Hangar AF, typically has an area of exceptionally high concentration, and is considered critical habitat for the manatee. Manatees may also be found in the Port Canaveral area, including the Trident Basin (also designated by USFWS as critical habitat).

[2] FWC *Gopher Tortoise Management Plan* can be found at website: *http://myfwc.com/wildlifehabitats/managed/gopher-tortoise/management-plan/*.

Due to the nature of the activities conducted at 45 SW properties and the presence within CCAFS of designated manatee critical habitat, the USAF will carefully consider the siting of projects which could adversely affect manatee habitat located within the USAF turning basin, Trident Wharf, Poseidon Warf, Air Force Warf, waterways and adjacent shorelines of the Banana River, and contact USFWS for Section 7 consultation early in the process for projects proposed in these waters within CCAFS and PAFB boundaries.. Manatees also utilize the waters of the PAFB marina and the Banana River waters adjacent to PAFB western boundary. Construction activities in the manatee critical habitat within CCAFS and PAFB, including dredging, docks/pilings repair and replacement, will require a Section 7 consultation with USFWS, and adherence to the FWC *Standard Manatee Conditions for In-Water Work*[3], which will be a component in the project specifications and contract language/drawings.

Any projects that have the potential to impact manatees will require Section 7 consultation under the ESA, consultation under the Marine Mammal Protection Act and/or consultation under the Fish and Wildlife Coordination Act with USFWS. The USFWS will determine the necessary mitigation to be taken to reduce potential impacts to this species. Normal safeguarding actions consist of installation of signs warning construction personnel of the presence of manatees, the protected status of the manatee, no wake requirements, and work stoppage requirement if a manatee enters the project area from as far as 50 feet. Any natural resource enhancement projects or installation construction actions that may affect manatee habitat or the species will also be compared to the guidelines established in the *Brevard County Manatee Protection Plan*[4] developed under the Florida Manatee Sanctuary Act.

In water habitat for the North Atlantic right whale can be found in the Atlantic Ocean adjacent to CCAFS and PAFB (Figures 3 and 4). Although the USAF does not own these water body areas, there are some activities that do/will take place within designated critical habitat, or have the potential to impact the North Atlantic right whale critical habitat; these activities will be conducted in accordance with the appropriate in-water construction guidelines. Projects that have the potential to impact North Atlantic right whales will require Section 7 consultation under the ESA and consultation with NMFS under the Marine Mammal Protection Act.

[3] FWC *Standard Manatee Conditions for In-Water Work* can be found at website: http://myfwc.com/media/415448/Manatee_StdCondIn_waterWork.pdf.
[4] *Brevard County Manatee Protection Plan* can be found at website: http://www.brevardcounty.us/docs/default-source/natural-resources-documents/brevard-county-manatee-protecton-plan.pdf?sfvrsn=0.

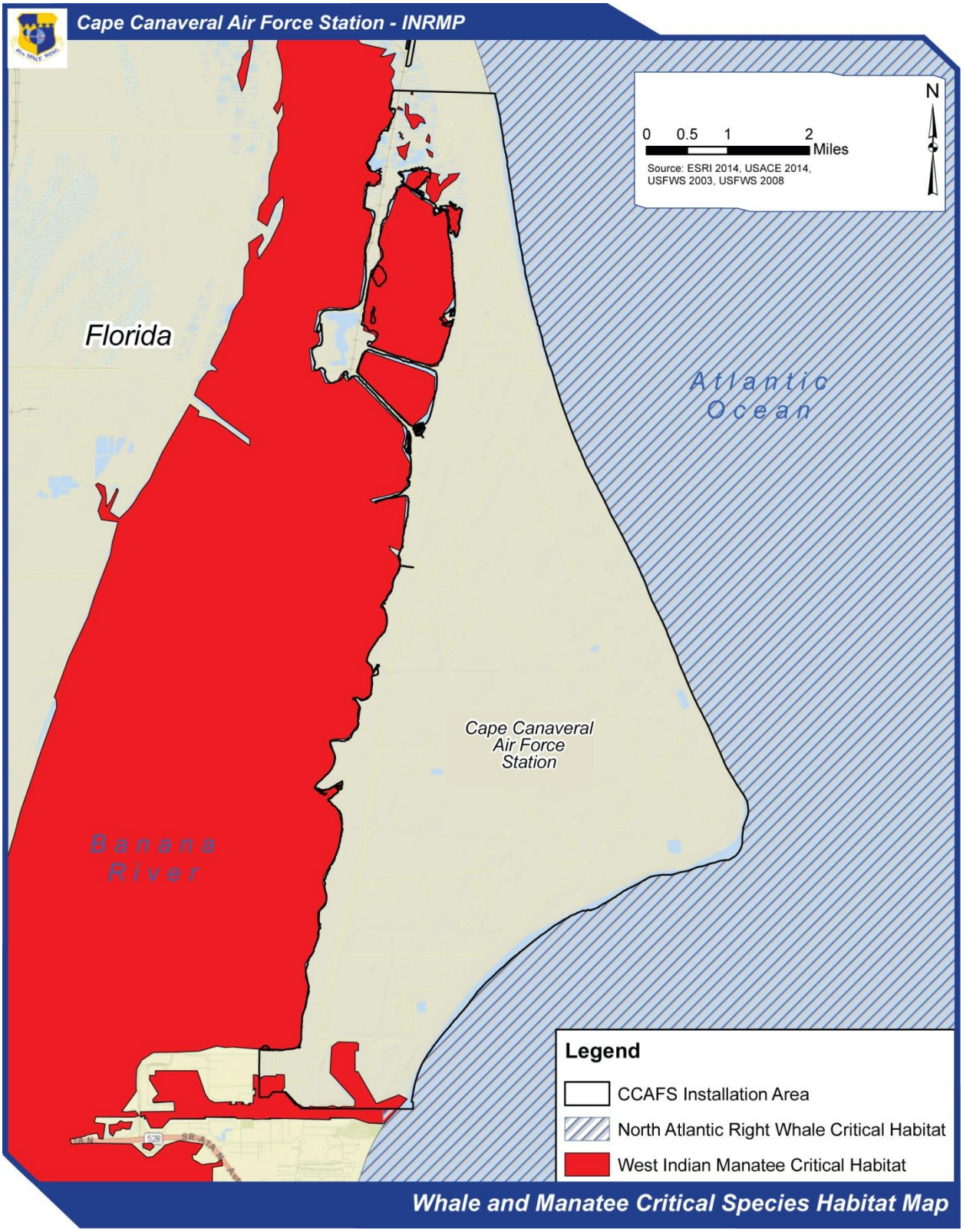

Figure 3. In-Water Critical Habitat for W. Indian manatee and N. Atlantic right whale, CCAFS

Figure 4. In-Water Critical Habitat for W. Indian manatee and N. Atlantic right whale, PAFB

C.2.7 Florida Perforate Lichen

The Florida perforate lichen (lichen) is a federal and state listed endangered plant species. The lichen is present only at the JDMTA property of the 45 SW. The population found within JDMTA is part of a larger population at Jonathan Dickinson State Park (JDSP), located adjacent to JDMTA. The lichen is found in well-drained sands of scrub in only a few locations in Florida. Currently, no critical habitat for the lichen has been designated.

Impacts to this species are addressed on a project specific basis and through Section 7 ESA consultation with USFWS. In 2005, under USFWS Section 7 consultation (7 Feb 2005) for a JDMTA fence and tower replacement project the lichen at JDMTA was relocated to an offsite location within JDSP through coordination with the JDSP biological staff. A 30-foot wide clear zone was established as a part of the fence replacement. In accordance with USFWS guidance, this clear zone will be maintained for security purposes and vegetation will be cleared and mowed regularly. The lichen at JDMTA was almost entirely limited to a relatively open area at the edge of pine and oak tree line near the boresight tower with some areas of the lichen being closer to the fence line. Global Positioning System (GPS) coordinates of the recipient sites were recorded and provided to JDSP for locations to prevent fire impacts from their controlled burns. The personnel of 45 CES/CEIE-C monitor the recipient sites. Only fragments of the lichen that were too difficult to retrieve/remove still remain on JDMTA.

Smaller projects that involve impacts to areas where any remaining lichen may be found at JDMTA will be reviewed by 45 CES/CEIE-C; consultation will occur if it is determined that impacts to the lichen cannot be avoided. Generally, impacts will be avoided by prohibiting mowing and foot and vehicular traffic in the areas where lichen is located. It is possible that the lichen may disperse back into JDMTA with wind and rain; JDMTA will be surveyed annually to determine if new populations of the lichen have established on this 45 SW property.

A 70-foot clear zone was established adjacent to the fence clear zone for Florida scrub-jay (scrub-jay) habitat enhancement. This 70-foot area will be maintained on approximately five-year cycles with a mosaic restoration by prescribed burning by JDSP to maintain natural vegetation to heights that the scrub-jay prefers in accordance with the burn plan for JDSP. Refer to the JDMTA and Other Managed Species sections (sections 1.4 and 1.5.2.4) for scrub-jay and indigo snake conservation measures, respectively.

C.3 Medium Priority Species

There are several other listed species that are managed on the 45 SW properties without a specific management plan as there are no requirements outlined in a Biological Opinion (BO). If specific plans were developed, additional information of each species' population would be required including detailed demographics and site specific species utilization of habitat found within 45 SW properties. USFWS has indicated a desire for more monitoring of protected species. Monitoring will be funded by the Air Force (USAF) for species that may be subjected to recurring impacts due to 45 SW actions and for those that are easily disturbed. However, unless a BO outlines the specific monitoring requirements, most protected species monitoring to provide population trends and demographics will occur every three to five years, or as funding

allows. If these studies indicate impacts then the USAF will request a BO from the USFWS to devise an adaptive management strategy.

Attachment C-1

Sea Turtle Management Plan

Attachment C-1: Sea Turtle Management Plan

C.1 Introduction

Each year, between 1,400 to 3,600 sea turtle nests are deposited on the 13 miles of beach at Cape Canaveral Air Force Station (CCAFS); and 600 to 2,000 nests are deposited on the 4 miles of beach at Patrick Air Force Base (PAFB) (Figure 1).

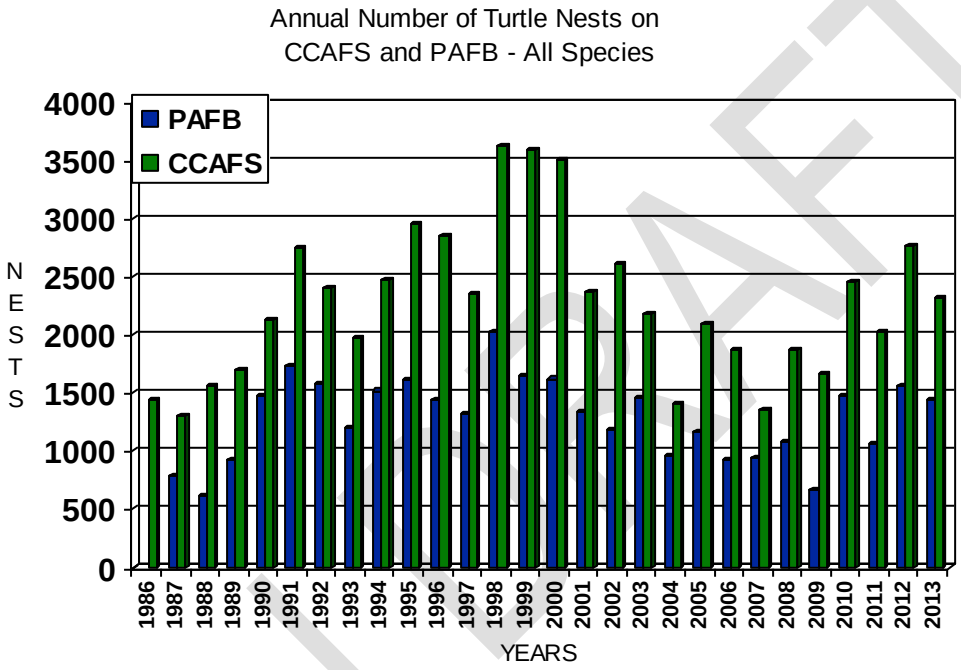

Figure 1. 45 SW Historic Sea Turtle Nesting Activity (1986 through 2013)

The loggerhead *(Caretta caretta*), Atlantic green (*Chelonia mydas*), and leatherback (*Dermochelys coriacea*) sea turtles nest on the beaches of CCAFS and PAFB. The beach of CCAFS has a high-energy surf zone, a gently sloping sandy beach, and a substantial dune system. The beach within PAFB also has a high-energy surf zone, and an offshore worm rock reef (beyond the breakers), parallel to the southern quarter of PAFB.

In 1986, the 45th Space Wing (45 SW) began sea turtle monitoring at CCAFS and PAFB. Since the sea turtle program began, the 45 SW preservation techniques have been modified and improved. The overall program has been expanded to include: predator control, exterior light management, sea turtle walks and education, rescue and release of hatchlings, daily nest surveys, stranding and salvage activities, nest relocation, and participation in the State of Florida (FDEP) Index Nesting Beach Survey. In 1988, CCAFS and PAFB were included in the FDEP Index Nesting Beach Survey. This survey program was designed to provide an index of sea turtle population trends through standardized sampling of selected nesting beaches. This long-term, systematic program provides high quality data from nesting beaches around the

state. Continued participation in this program is crucial in the determination of the recovery of threatened and endangered sea turtles. All activities are permitted by the Florida Fish and Wildlife Conservation Commission (FWC) and fulfill all the requirements of the U.S. Fish and Wildlife Service (USFWS) which oversees the implementation of the ESA. This Sea Turtle Management Plan briefly discusses the characteristics of each of these federally listed sea turtle species and identifies the management techniques employed by the 45 SW.

After discussion with USFWS, an exemption was granted to the 45 SW allowing 45 SW properties be exempt from the critical land habitat designation for the loggerhead sea turtle. This exemption was granted by USFWS because the 45 SW sea turtle management practices include measures that provide a benefit to the conservation of loggerhead sea turtles, and all sea turtles (nests, eggs, and hatchlings) and the 45 SW maintains an INRMP that provides for those measures. The 45 SW is committed to continued participation in the INBS/SNBS and hatchling productivity programs; and 45 SW leadership continues to support these programs. Additional information regarding this exemption can be found in **Section C.2.1** of this Appendix C-1, and also a copy of the USFWS letter regarding this topic can be found in **Appendix C-1A** of this appendix (USFWS letter dated 10 October 2012).

The following management measures are implemented to manage sea turtle populations at CCAFS and PAFB and contribute to their recovery:

- Conduct annual sea turtle surveys (Index and State Nesting Beach Surveys) along the CCAFS and PAFB beaches and in Trident Basin (study by University of Central Florida) to monitor the effect of 45 SW and other tenant operations and to provide long-term sea turtle population trends.
- Continue annual productivity data collection
- Perform disorientation surveys daily for adults and hatchlings and report all incidents using the FWC Marine Turtle Disorientation Report form.
- Carry out night surveys when disorientation incidents become a recurring problem at a particular location or when a light source cannot be identified;
- Deploy portable light shields, when necessary, to reduce hatchling disorientation;
- Protect sea turtle nests from predation, as needed, with welded fence wire;
- Relocate nests deposited in poor locations (below high tide, behind the dune);
- Participate in stranding and salvage activities;
- Conduct trapping when predation is noted;
- Conduct biannual beach cleanups;
- Stabilize dunes by planting native vegetation and installing sand fences;
- Conduct beach renourishment and rubble removal projects;
- Continue educational efforts and signage for 45 SW leadership, personnel, users and the public;
- Maintain appropriate trash receptacles at CCAFS and PAFB;

- Conduct periodic light surveys IAW the BO (see **Appendix C**);
- Comply with 45 SWI 32-7001 (*Exterior Lighting Management*);
- Stage equipment on the PAFB beach as required to minimize impacts;
- Relocate sea turtle nests only as the last resort and IAW the FWC Marine Turtle Conservation Guidelines (FWC 2007); and
- Avoid sea turtle nesting/hatching season when implementing dune and beach restoration and enhancement projects.

C.2 Species of Sea Turtles Found on the 45 SW

There are three species of sea turtles that nest on the shores of the 45 SW:

- Loggerhead (*Caretta caretta*)
- Atlantic green turtle (*Chelonia mydas*)
- Leatherback (*Dermochelys coriacea*)

C.2.1 Loggerhead (*Caretta caretta*)

The loggerhead turtle is the most common nesting sea turtle on CCAFS and PAFB. Adult and subadult loggerheads have reddish-brown carapaces and dull brown to yellowish plastrons. Adult loggerheads in the southeastern US have a mean straight carapace length of approximately 3 feet and a mean body weight of about 249 pounds. The brown hatchlings weigh approximately 0.70 ounces and are 1.7 inches long. (USFWS 2014a)

Nests are deposited on CCAFS and PAFB each year between April and September. During the 1999 nesting season, a record number (3,581) of loggerhead nests were documented on CCAFS and in 1998, a record number (1,993) of loggerhead nests were documented on PAFB. Figures 4 and 5 reflect the annual number of loggerhead nests deposited on CCAFS and PAFB, respectively. Based on nest surveys at CCAFS from 1986 through 2013, the average annual number of loggerhead turtle nests is 2,200. Based on re-nesting frequency estimates, this represents approximately 880 nesting females. For PAFB the average number of loggerhead nests deposited from 1987 through 2013 is 1,266. This represents approximately 506 nesting females. Both CCAFS and PAFB have followed the same patterns of high and low nesting years for loggerheads as the rest of Brevard County (FWC 2014).

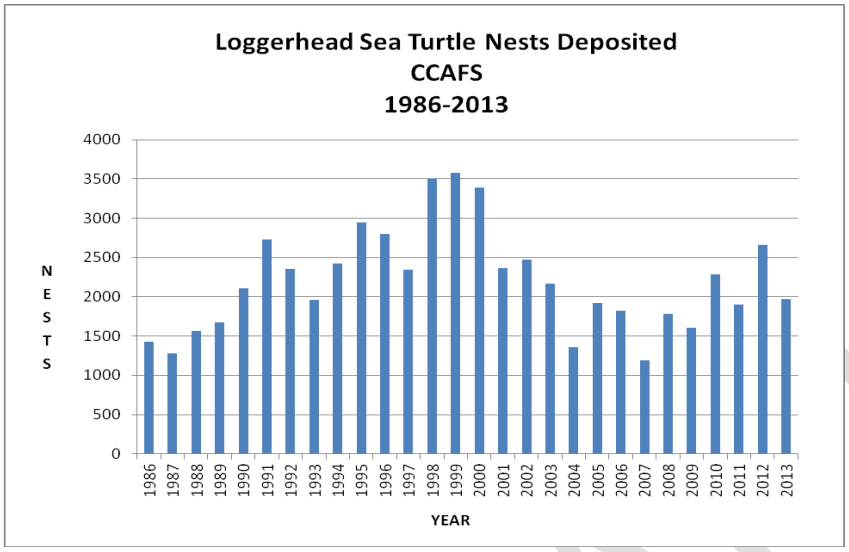

Figure 2. Annual Number of Loggerhead Sea Turtle Nests, CCAFS

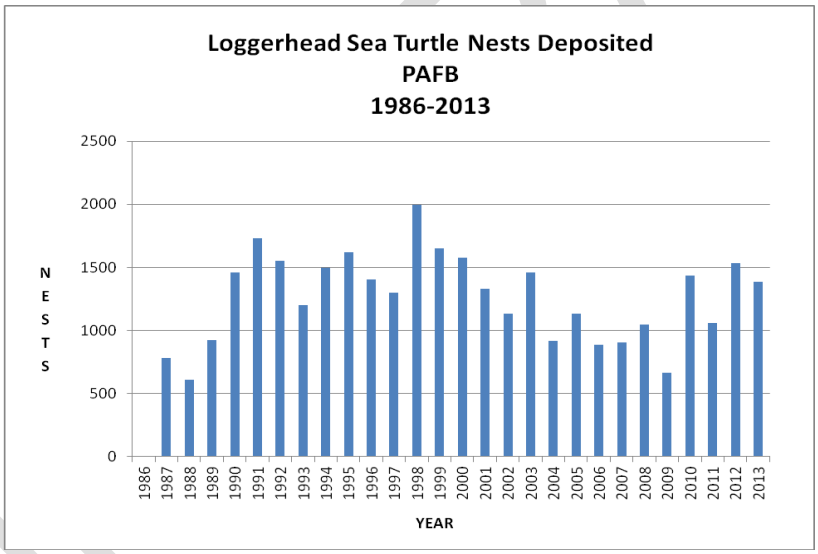

Figure 3. Annual Number of Loggerhead Sea Turtle Nests, PAFB

In-water critical habitat established by NMFS for the loggerhead sea turtle in the Atlantic Ocean adjacent to CCAFS and PAFB installations is reflected in Figures 1 and 2.

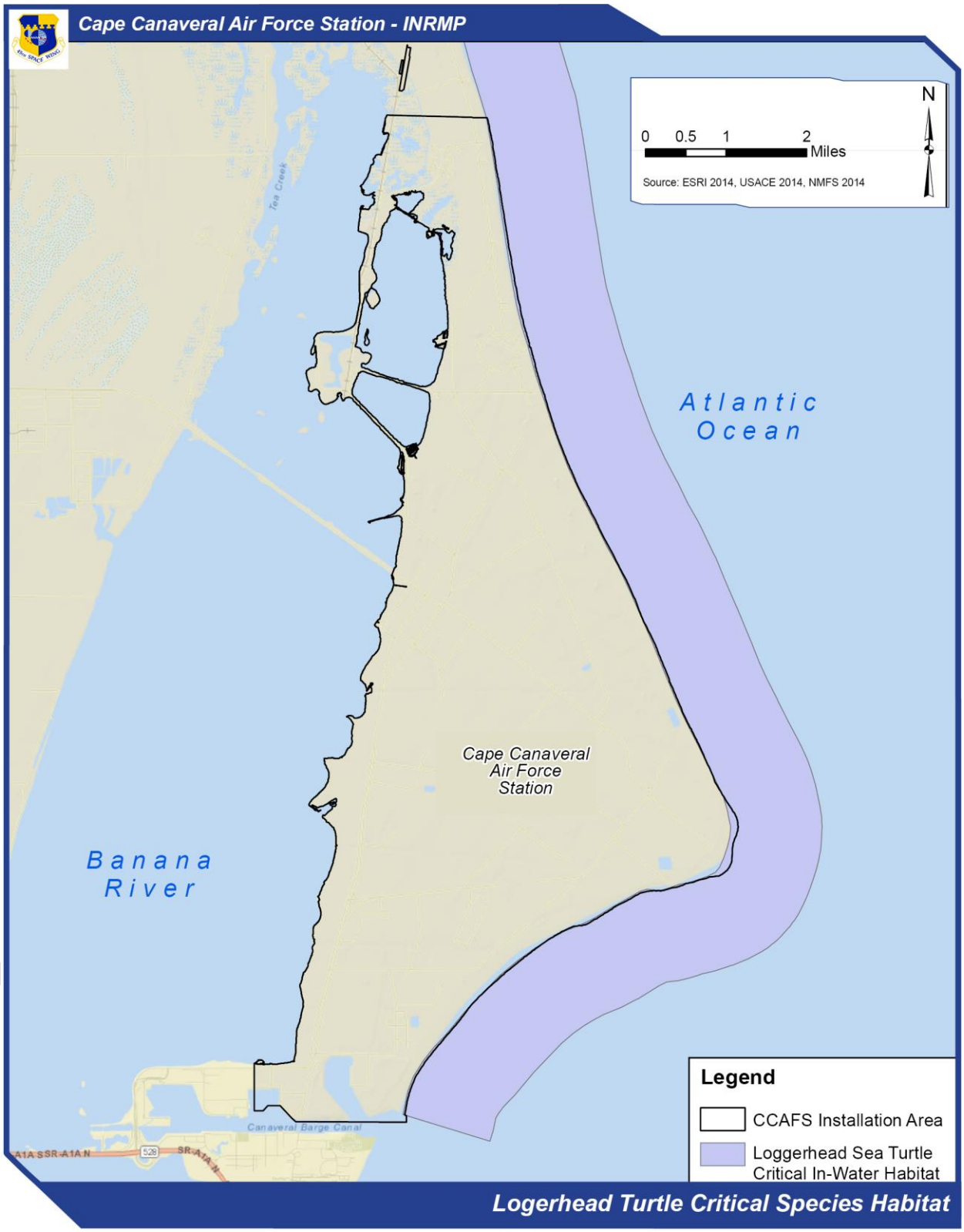

Figure 4. In-Water Critical Habitat for Loggerhead sea turtle (per NMFS), CCAFS

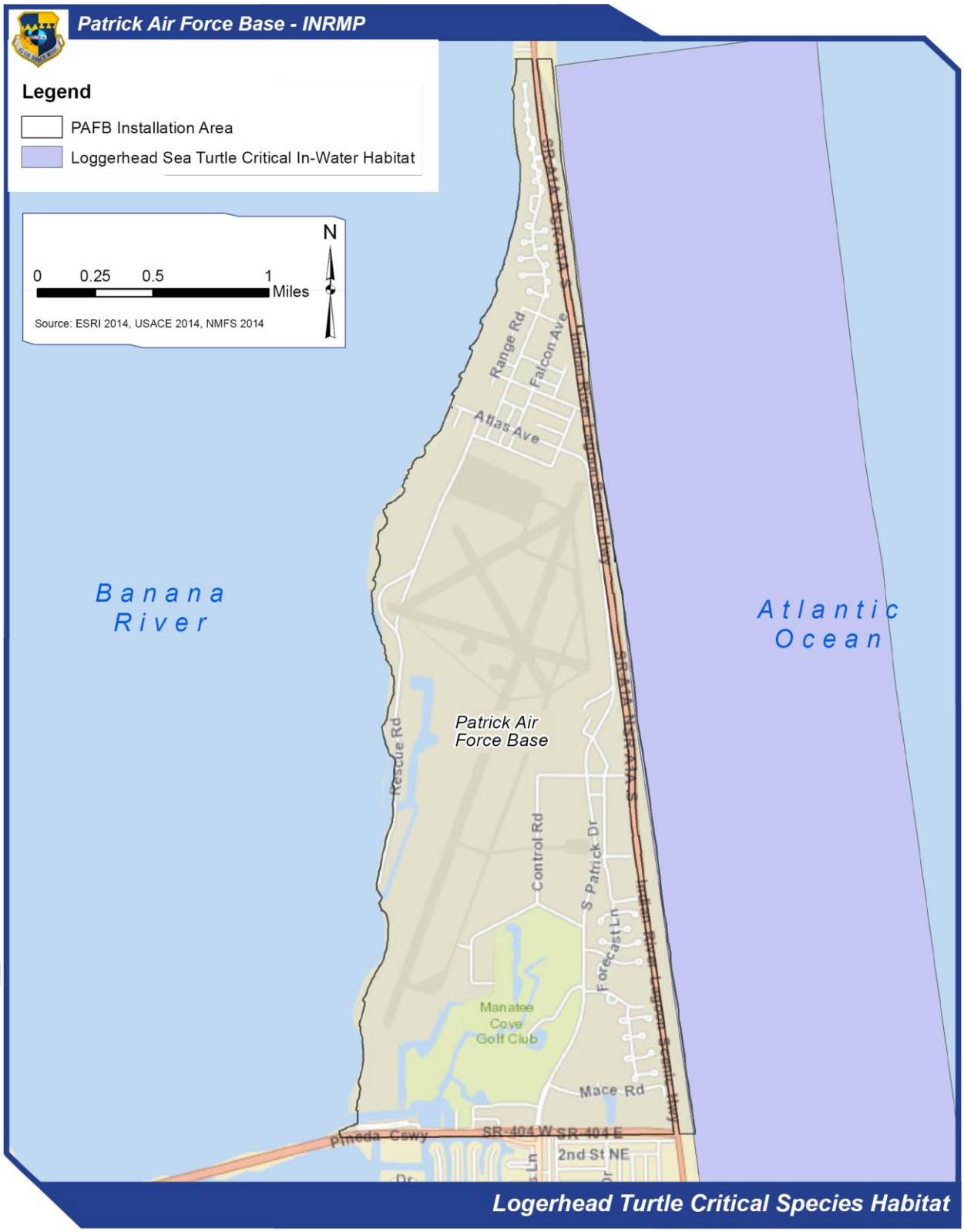

Figure 5. In-Water Critical Habitat for Loggerhead sea turtle (per NMFS), PAFB

C.3 Atlantic Green Turtle (*Chelonia mydas*)

The Atlantic green sea turtle (green turtle) is the largest hard-shelled sea turtle. Adults have a carapace varying in color from black to gray to greenish or brown, often with bold streaks or spots, and a yellowish white plastron. The physical attributes of the Florida population of green turtles average 3.3 feet straight carapace length and 300 pounds body weight. Characteristics that distinguish them from other sea turtles are their small, rounded head and smooth carapace. Hatchlings weigh approximately 0.88 ounces, their black carapace is about 2 inches long, and the ventral surface is white. (USFWS 2014b)

From 1986 through 2013, the number of green turtle nests deposited on CCAFS beaches has ranged from 4 to 335. From 1987 through 2013, the number of green turtle nests deposited on PAFB beaches has ranged from 0 to 64. Based on surveys from 1986 through 2013, the average annual number of green turtle nests deposited was 69 on CCAFS and was 20 on PAFB (from 1987-2007). The 2013 nesting season was a record year for green turtle nests deposited on the beaches of CCAFS and PAFB: 335 and 69, respectively. CCAFS and PAFB also followed the same state-wide trend of abnormal low and high years for green nesting (FWC 2014). Figures 6 and 7 reflect annual number of nests deposited on CCAFS and PAFB, respectively.

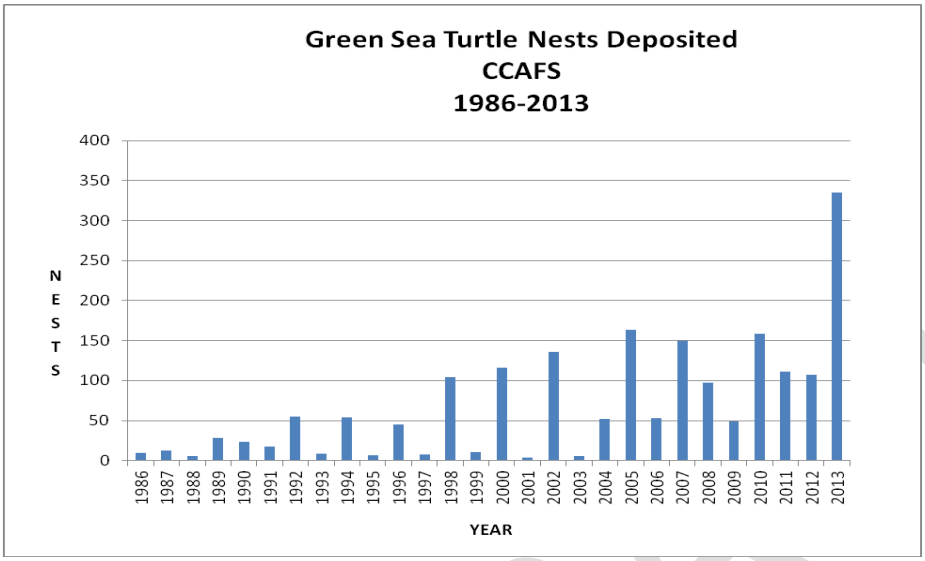

Figure 6. Annual Number of Atlantic Green Sea Turtle Nests, CCAFS

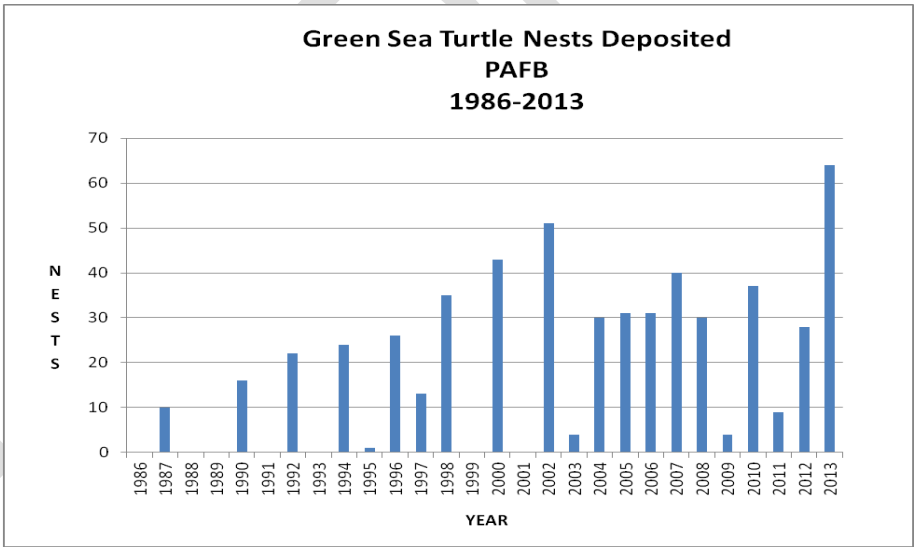

Figure 7. Annual Number of Atlantic Green Sea Turtle Nests, PAFB

C.4 Leatherback (*Dermochelys coriacea*)

The leatherback sea turtle is the largest of all sea turtles, attaining a length of 5 to 5.5 feet straight carapace length and a weight that occasionally reaches 1,100 pounds. Its shell is unique in being covered with a continuous layer of thin, black, and often white-spotted skin, instead of keratinized scutes. The carapace is raised into a series of seven longitudinal ridges. Other distinctive features are the absence of claws, the absence of scales, the long forelimbs, the reduced skeleton, and notable pink spot on the dorsal surface of the head in adults. (USFWS 2014c)

From 1986 through 2013, the highest number of leatherneck sea turtle nests was observed in 2012 on CCAFS and PAFB beaches, 12 and 6 leatherneck turtles, respectively. There are many years during this survey period that no leatherback sea turtle nests have been observed at CCAFS and PAFB. A total of 81 leatherback nests have been documented on CCAFS since surveys began. At PAFB, 23 leatherback nests have been documented since 1987 through 2013. Figures 8 and 9 reflect the annual number of leatherback sea turtle nests deposited on CCAFS and PAFB since nest surveying started in 1986.

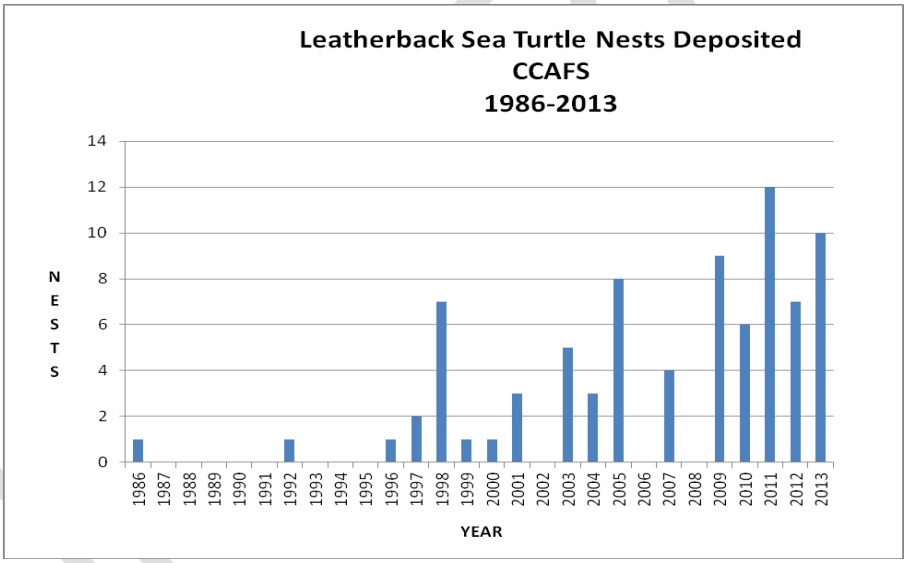

Figure 8. Annual Number of Leatherback Sea Turtle Nests, CCAFS

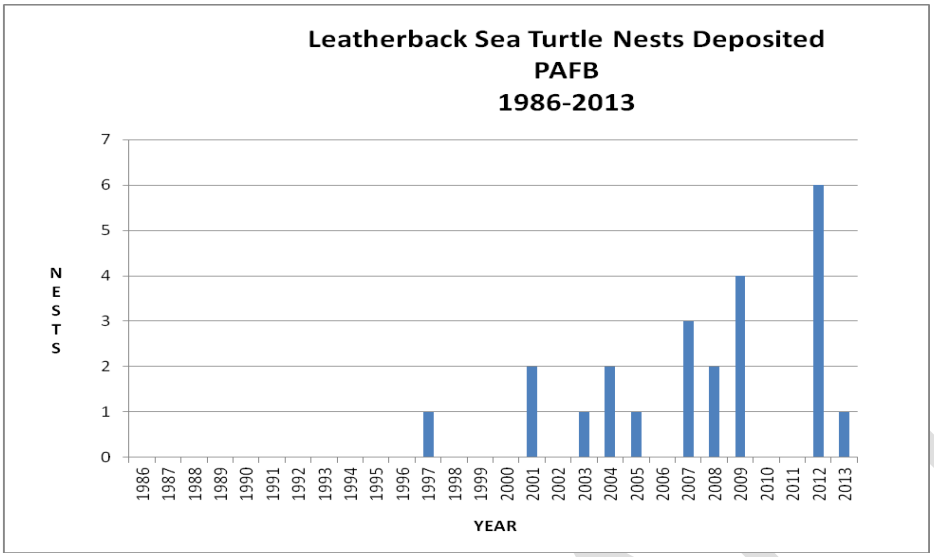

Figure 9. Annual Number of Leatherback Sea Turtle Nests, PAFB

C.5 Sea Turtle Permit

The FWC issues permits for activities involving marine turtles in Florida under authority granted to the State through a Cooperative Agreement with the FWS under Section 6 of the ESA and Chapter 370.12 of the Florida Statutes (Appendix B, Attachment B-4.2). Each permit designates a principal permit holder, up to 25 authorized personnel, and a list of authorized activities. Principal permit holders are responsible for ensuring that all authorized personnel listed on their permit are thoroughly trained by an experienced turtle biologist. Permit holders are authorized to conduct specific activities depending upon experience, area of investigation, and demonstrated sea turtle conservation needs. The permit must be in the possession of all authorized personnel while conducting sea-turtle related activities.

In addition, the FWC provides written guidelines about acceptable research and conservation techniques. Personnel are only authorized to conduct those activities specifically listed on their marine turtle permit. The guidelines specify the conditions and responsibilities that permitted personnel are expected to know for the activities that they conduct. This permit is renewed annually. Occasionally, the USAF approves studies on the CCAFS beach that are conducted by other people that hold their own sea turtle permits.

C.6 Nest Protection

C.6.1 CCAFS

For the purpose of sea turtle surveys, the nesting beach at CCAFS is divided into 21 kilometers (13 miles) marked with white polyvinyl chloride (PVC) pipe or wood posts (Figure 10). These markers provide reference points for all marine turtle monitoring activity recorded on CCAFS. Impacts to the beaches of CCAFS by the public is limited since CCAFS is a secured area and no public access is permitted. Beach access and fishing is permitted at two dune crossovers;

however, access is limited to 0.25 miles north and south of each dune crossover and is only open to badged personnel and their guests. Trash receptacles are maintained at CCAFS beach access points and trash is picked up during sea turtle monitoring season.

C.6.2 PAFB

PAFB is located roughly 15 miles south of CCAFS. The PAFB beach is located just east of US A1A, a road that is heavily used by tourists, locals and military personnel; the nesting beach at PAFB stretches from the Pineda Causeway (SR 404) for 4.4 miles to the north (Figure 11). Similar to CCAFS, the PAFB beach is divided into kilometer markers (7 kilometers), as depicted on Figure 11. The PAFB beach is open to the public until dark each day, but can close under high security conditions or if the 45 SW Commander requires closure for safety or security. Sea turtle nest locations are marked with triangulate stakes in the dune a measured distance from the clutch. Nests can be surrounded with stakes and flagging for avoidance during beach restoration actions as required under specific BOs and FDEP permits. Public education signage is placed at public beach entrances regarding sea turtles and sea turtle nesting, avoidance of artificial lighting on the beach, and prevention of destruction of dune vegetation. Trash receptacles are maintained at PAFB beach access points and trash is picked up during sea turtle monitoring season. Recreational beach equipment is staged away from the potential sea turtle nests (and marked nests), and is removed from the beach at the end of each day.

C.6.3 Nest Relocation

Nest relocation is considered a management technique of last resort. The most desirable alternative is to eliminate the problems that prompt relocation of the nest. Normally a nest is relocated only if it is deposited below the high tide line or if it is deposited in thick vegetation out of sight of the ocean. A small number of nests are relocated on CCAFS (<20) every year. An occasional nest at PAFB has been relocated due to storm erosion. If a nest requires relocation, the eggs are moved no later than 0900 the day following its deposition. Eggs are moved no later than 12 hours after deposition to prevent the potential for movement-induced egg mortality. Nest relocations are performed in accordance with the FWC Marine Turtle Conservation Guidelines (MTCG) (FWC 2007).

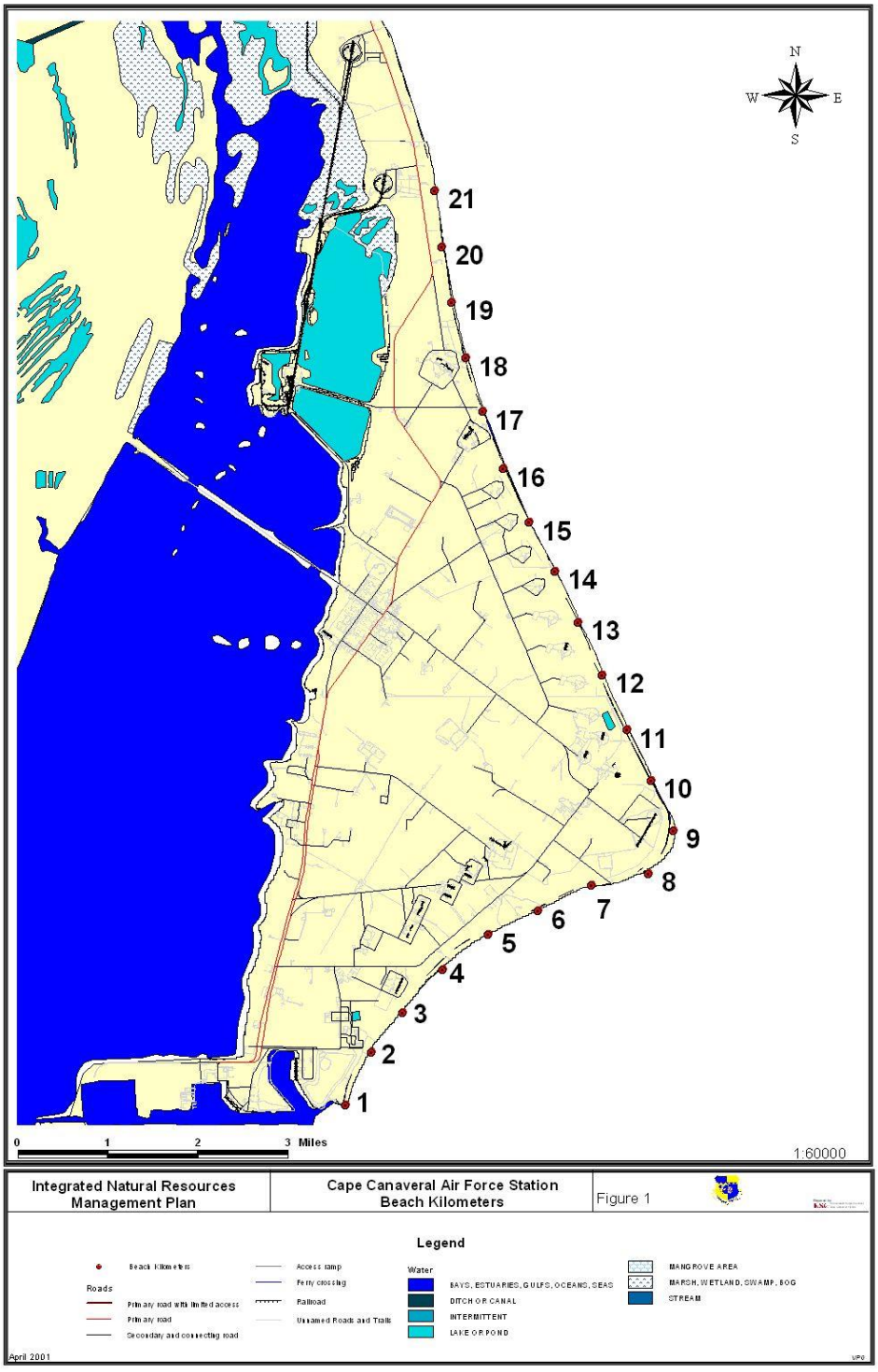

Figure 10. CCAFS Nesting Beach

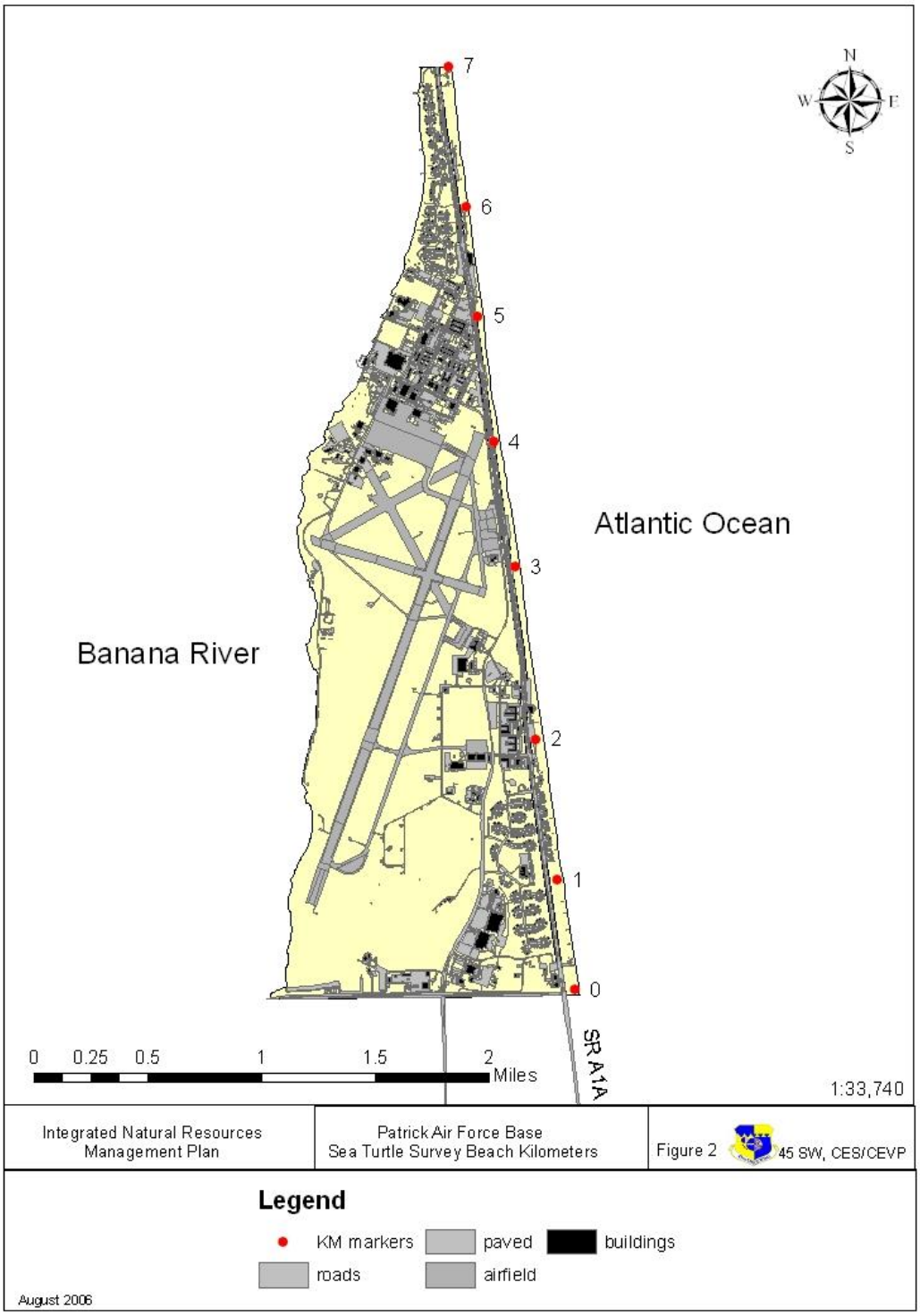

Figure 11. PAFB Nesting Beach

C.7 Nesting Surveys

Sea turtle nesting surveys are conducted on the CCAFS and PAFB beaches starting in March. The beach is surveyed 2-3 times per week March-April and seven days a week (dependent on weather), beginning in early May and ending in September. Daily surveys are conducted beginning at 0700 hours, using all-terrain vehicles (ATV). At CCAFS, surveyors are occasionally delayed or prevented from conducting a survey due to safety and/or security constraints related to launch support activities. Weather is the common factor impacting sea turtle surveys. These surveys are conducted in conjunction with the FWC beach indexing protocol that requires daily surveys 15 May through 31 August. After 30 September, the CCAFS and PAFB beaches are patrolled 2-3 days/week until the conclusion of nest fate determinations (usually October or November). These surveys are part of the Index and State Nesting Beach Survey programs and have been ongoing since 1988. In addition to surveys conducted to support sea turtle monitoring, 45 SW biologists perform beach surveys a minimum of one day/week Nov-Feb to support other activities; therefore, the beaches are surveyed weekly regardless of sea turtle season.

The 45 SW acknowledges recent trends in sea turtle nesting in Florida which has resulted in the season beginning earlier and ending later, and future sea turtle monitoring recommendations are expected to be expanded to include 1 April through possibly 30 November. Based on the history of nesting on 45 SW beaches, the current monitoring effort already includes the expanded time frame since personnel are on the beach March-November. Personnel are not aware of any nests that have been missed due to early or late nesters. The current protocol for monitoring for the state nesting beach survey does not require a set number of days/week, only that monitoring typically begins on 1 Mar, which the 45 SW follows. The protocol for the index nesting beach survey requires seven days/week 15 May-31 August, which the 45 SW follows. In the event these monitoring dates change in the future, the 45 SW will discuss these changes with leadership and make the appropriate changes, as required. The weekly monitoring conducted outside the season, Nov-Feb, would also pick up any early or late nesters and assist in determining if surveys need to be performed more regularly during this time of the year.All sea turtle crawls are recorded and a sample of nests are numerically marked using wooden survey stakes sprayed with high-visibility orange paint. At CCAFS stakes are numbered sequentially and each is placed approximately one half meter landward of the nest cavity. At PAFB two small stakes are placed in line with the nest (at set distances) at the seaward base of the dune and within the dune to avoid obstructing the beach and to prevent beachgoer vandalism of nest demarcation. The marking scheme for CCAFS is currently every 17th nest for loggerhead turtles and every nest for green and leatherback sea turtles. The marking scheme for PAFB is more complex for loggerheads, but results in a sample of around 100 nests. Every green and leatherback nest located on PAFB is marked. Nests and false crawl determinations are made visually and by hand digging where confirmation was necessary. Nests are observed daily to determine nest fates, and all disturbed nests are noted by marking on the stake and survey sheets.

Nest success evaluations are conducted either 70 days after the eggs are deposited (80 days in the case of a leatherback nest) or 72 hours after the first emergence, whichever occurs first. A

nest that has been subjected to inundation, excessive rainfall, shading, or cold fronts is not excavated until 80 days after egg deposition or 96 hours after the first emergence. Nests deposited in October are not evaluated until 80 days. Nest success evaluation is determined by excavating marked nests. Success rate is calculated using the data obtained by 45 CES/CEIE-C from the evaluated nests (calculation includes marked sample of nests, average clutch size, average emergence, etc.). For example, on CCAFS in 2013, nest success for the loggerhead, Atlantic green, and leatherback sea turtles was 43, 46, and 30 percent, respectively. On PAFB in 2013, nest success for the loggerhead, Atlantic green, and leatherback sea turtle was 69, 58, and 100 percent, respectively.

Nest success evaluations are performed in accordance with the FWC MTCG (FWC 2007).

C.8 Disorientation and Light Surveys

Disorientation surveys are performed daily for both adults and hatchlings and all incidents are reported to FWC using the standardized Marine Turtle Disorientation Report form, which is available in the appendix of FWC MTCG (FWC 2007). When possible, a description of any light(s) that appears to be responsible for the disorientation is included in these reports. When disorientation incidents become a recurring problem at a particular location or a light source cannot be identified, a night survey is done to determine the source and extent of the problem. Coordinates of light sources are added to the form when the source is fairly certain and can be obtained. For additional information on lighting, see Section 6.3 below.

In accordance with the Biological Opinion (BO) associated with hatchling incidental take (see Appendix B, Attachment B-4.1), periodic light surveys are required to identify and resolve problem light sources to ensure 3% or less hatchling incidental take as stipulated in the BO. In addition, compliance with the 45 SW Instruction 32-7001 *Exterior Lighting Management* is mandatory (45 SWI 32-7001, is available at http://static.e-publishing.af.mil/production/1/45sw/publication/45swi32-7001/45swi32_7001.pdf) is mandatory. More discussion on light management is included below in Section 6.3.

Portable light shields are occasionally used as a temporary method of reducing hatchling disorientation. The shields are set up landward and along the sides of the nest cavity and block illumination of known disorienting light sources.

Figures 12 and 13 depict historic sea turtle disorientation rates on CCAFS and PAFB beginning in 1990 through 2013.

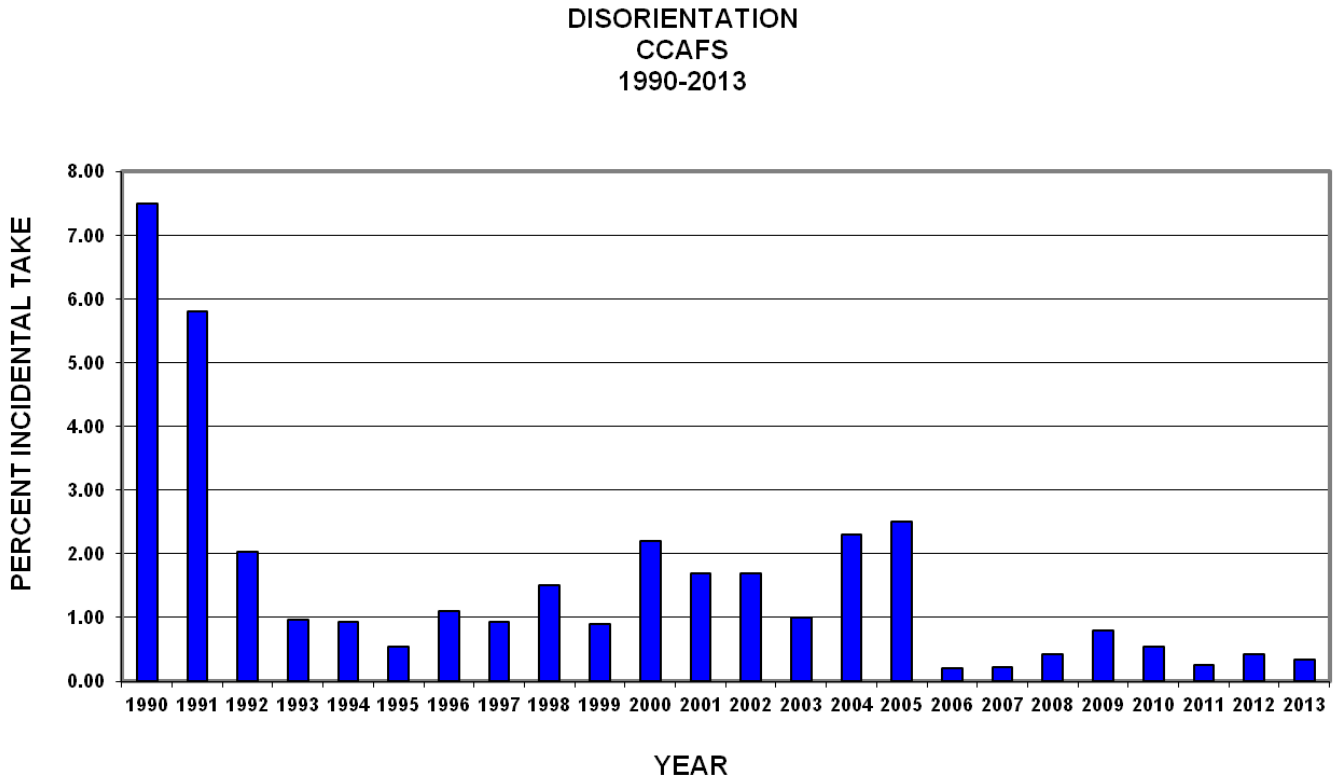

Figure 12. Historic Sea Turtle Disorientation on CCAFS

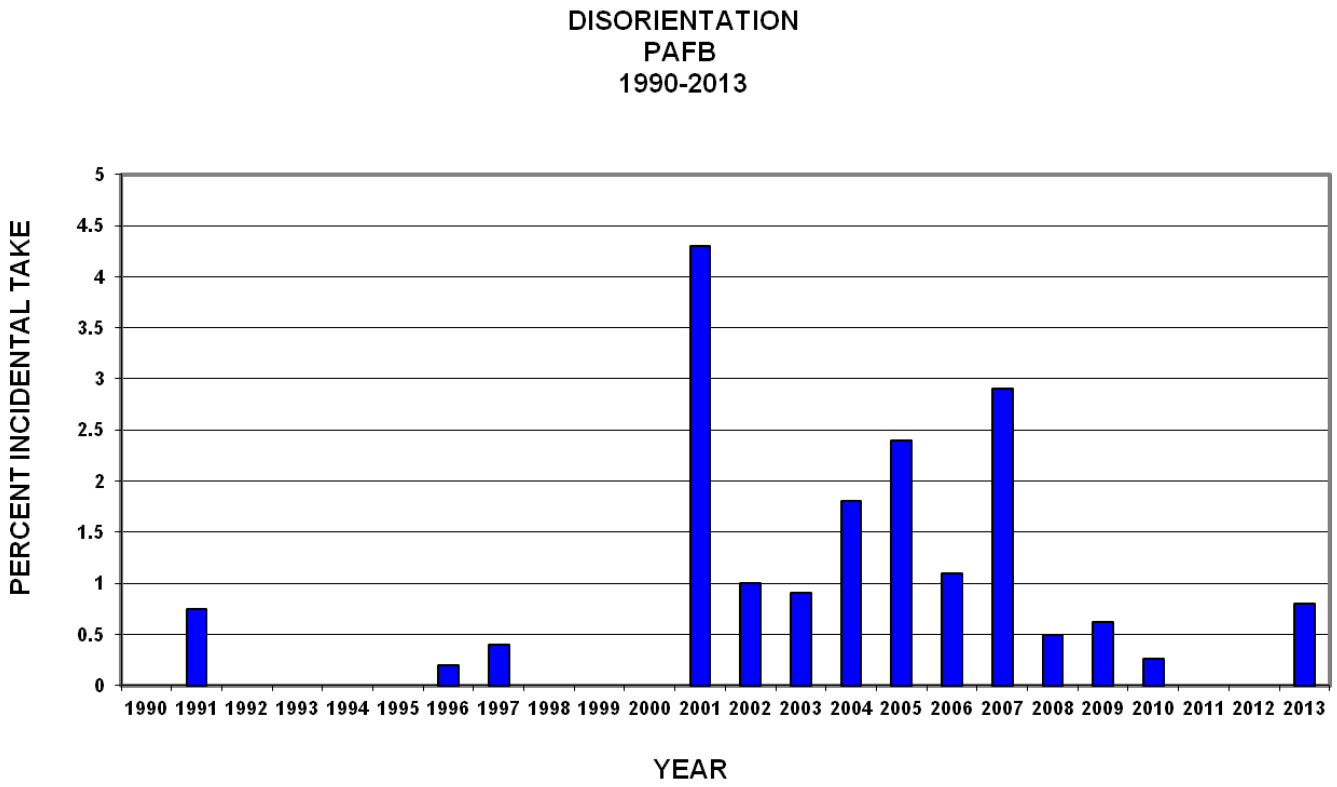

Figure 13. Historic Sea Turtle Disorientation on PAFB

C.9 Nest Predation

Between 1977 and 1983, observations of sea turtle nests on CCAFS indicated a high level of predation by raccoons (*Procyon lotor).* In 1984, a program was initiated to preserve sea turtle nests by trapping and relocating raccoons and placing wire screens over turtle nests to deter excavation by raccoons. Predation at PAFB has been minimal; trapping has only occurred when necessary and no nests have been screened. Reduction of sea turtle nest predators on CCAFS and PAFB is accomplished by live-trapping and removal of animals from the beach and coastal strand areas. The raccoon and feral hog have historically been the dominant predators on CCAFS, while other predators include bobcats, armadillos, coyotes, and ghost crabs. In recent years, coyotes have become a primary predator on CCAFS. PAFB has experienced minor predation by raccoons, feral cats, and ghost crabs. Tomahawk live traps baited with sardines are used for raccoon trapping. Beach trapping by 45 SW personnel is conducted by setting multiple traps in areas of intense raccoon activity. On CCAFS, predator control on the beach is conducted throughout the season, as needed, using single or multiple traps at various locations. Additionally, coyote and feral hog control is performed year-round by personnel under contract with the 45 SW. Use of padded steel leg traps is allowed by FWC to trap coyotes under permit number LSSP-12-00005B that was issued to USAF on 10 March 2014 (see Appendix B, Attachment B-4.4). This permit expires 31 December 2014 and renewal was pending during writing of this updated plan.

Figures 14 and 15 illustrate the historic predation activity on CCAFS and PAFB beginning in 1990 through 2013.

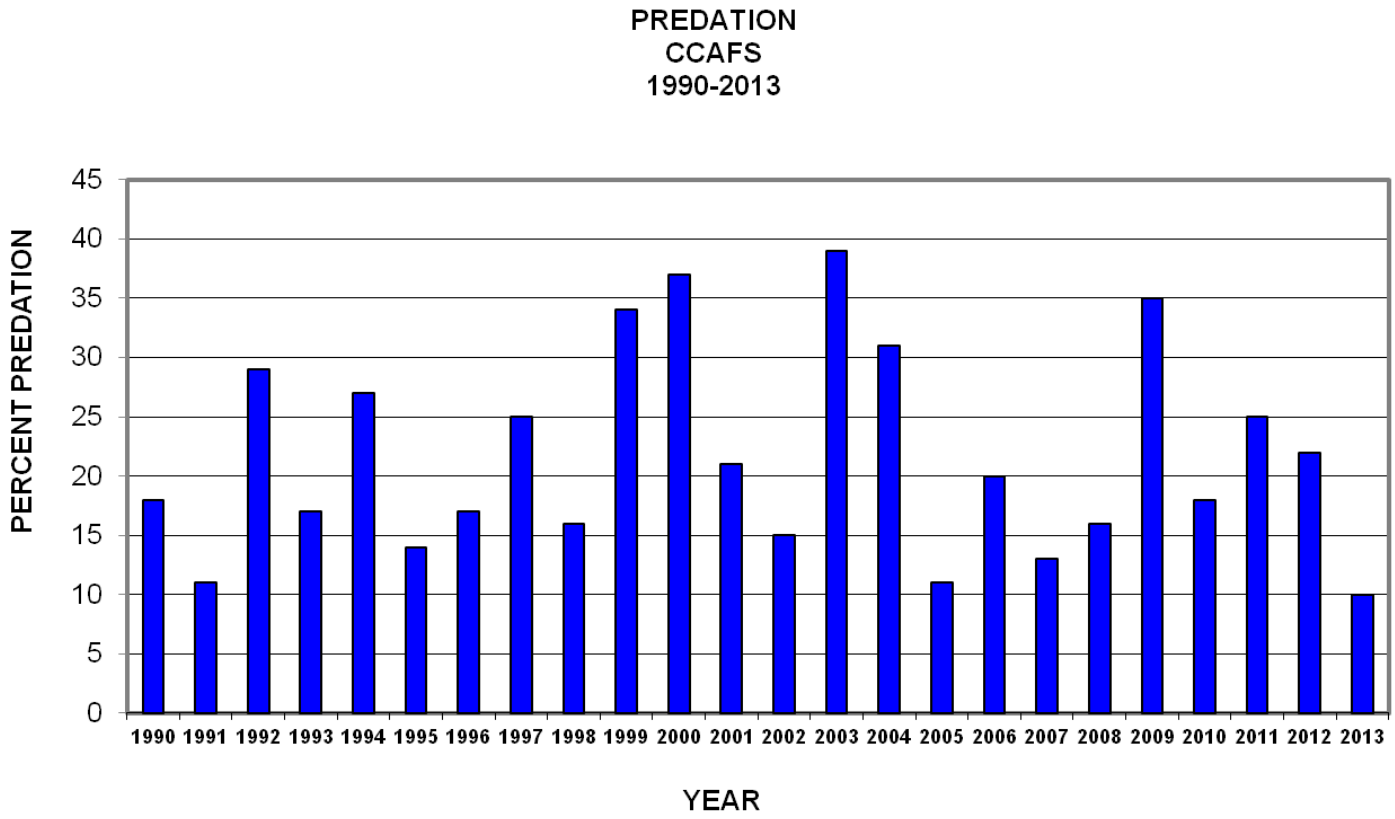

Figure 14. Historic Sea Turtle Nest Predation on CCAFS

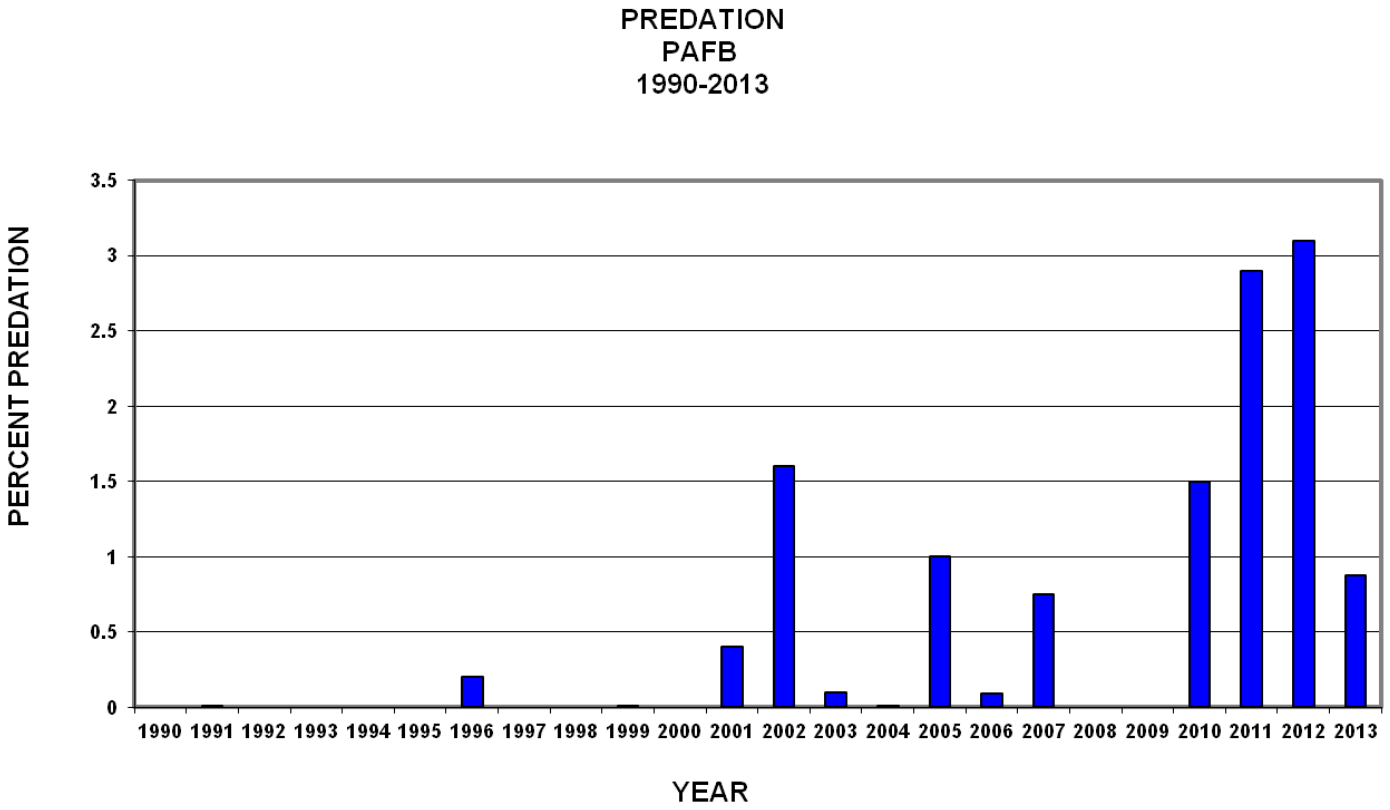

Figure 15. Historic Sea Turtle Nest Predation on PAFB

To protect sea turtle nests from predation, a limited number of nests at CCAFS are protected using 4 foot square sections of welded wire fence. These screens are placed over the nest and secured in place with rebar anchors at each corner. This allows hatchlings to escape from the nest upon emergence, yet reduces potential nest disturbance by predators, such as raccoons and feral hogs. The screen is centered over the egg chamber to make it less likely for predators to burrow to the eggs from the side. The location of the egg chamber is found by hand-digging. Due to the extended time required to locate a nest and screen it, loggerhead sea turtle nests are currently not screened. However, most green and leatherback turtle nests at CCAFS are protected with predator screens, due to smaller number of annual nests for these two species when compared to the loggerhead sea turtle.

As illustrated in Figure 15, predation events at PAFB are minimal to non-existent. Generally, less than 1% of nests deposited experience predation. Trapping for predators is conducted by the PAFB pest shop when predation is reported by the University of Central Florida (UCF) to 45 CES/CEIE-C. Traps are set beachside of the areas in which sea turtle nests or emerging hatchlings were impacted by predators.

Trapping for feral cats has been aggressive throughout the years due to feeding by some residents in the beachside PAFB Temporary Lodging Facilities. Signs are posted and residents have been notified that feeding of wildlife is considered illegal on 45 SW property. Feral cat populations within PAFB have decreased since 2007.

C.10 Stranding and Salvage of Sea Turtles

The 45 SW collects information from stranded turtles on land or found floating in the water, whether dead or alive. Approximately 30 to 40 turtles are found stranded on CCAFS each year and on average six sea turtles are found stranded on PAFB annually. All permit holders participating in this activity are required to complete a Sea Turtle Stranding and Salvage Network-Stranding Report form for each turtle encountered. This form is available in the appendix of FWC MTCG (FWC 2007). Any live stranded turtles are transported to a holding facility for further evaluation and care (e.g., Sea World, Volusia County Marine Science Center, Brevard Zoo), as directed by FWC sea turtle staff. Personnel conducting stranding salvage activities are required to attend training every two years.

C.11 Educational and Outreach Activities

C.11.1 Turtle Watches

Approximately two turtle watches are conducted each summer on the CCAFS beach during nesting season; reserved for groups selected by the CCAFS Commander and/or the 45 SW Commander. Since there are numerous organizations off base which provide this activity, and because CCAFS is a secured area, CCAFS has chosen to reserve its public watches for special circumstances. Turtle watches are conducted in accordance with the guidelines in the FWC MTCG (FWC 2007). All participants in turtle watches are informed of the federal and state of Florida laws protecting sea turtles (adult and hatchling) and their nests. Participants are

reminded that conducting turtle watches, touching sea turtles, and handling sea turtle eggs without a permit is unlawful.

C.11.2 Maintaining Preserved Specimens

Maintaining preserved specimens allows for the display of sea turtles or sea turtle body parts for educational or scientific research purposes. A small number of sea turtle specimens are maintained at CCAFS and PAFB for educational purposes. Specimens are labeled and accompanied by appropriate interpretive displays. A written inventory is kept of all preserved specimens. The FWC sea turtle permit provides approval for this activity (see Appendix B, Attachment B-4.2).

C.11.3 Additional Training

There are a number of additional activities undertaken by the 45 SW that involve education about sea turtles on 45 SW property. This includes:

- Turtle walks with 45 SW leadership and other personnel
- Educational signs at beach crossovers
- Education information for people staying at beachside facilities, including table top brochures and rental packet letters
- Newcomer briefings
- Annual briefings to base housing residents
- Annual participation in Space Coast Wildlife and Birding Festival
- Presentations at the Child Development Center on PAFB

C.12 Related Management

C.12.1 Off-Road Vehicles

In general, the use of ATVs is generally not permitted on 45 SW installations. The only approved use for off-road vehicles, like the ATV, is for 45 CES/CEIE-C environmental personnel and for security personnel performing safety and security operations.

The 45 CES/CEIE-C personnel utilize ATVs during the sea turtle monitoring season, wildlife surveys, prescribed burns for scrub restoration, and beach clean-up activities. When conducting sea turtle surveys/monitoring on the beach, ATV operators of the 45 CES/CEIE-C, or their contractors, check for and avoid ground nesting birds, loafing/foraging shorebirds, dune vegetation, and sea turtle adults and hatchlings. ATVs are driven over the sea turtle tracks to ensure that the nest (new or freshly hatched) is not counted more than once. ATVs are operated in a manner to reduce any potential impacts to natural resources and 45 CES/CEIE provide training to security in the proper use of ATVs on the beach. Use of ATVs has allowed environmental personnel the ability to track thousands of sea turtle nests and disorientation events a year over tens of miles efficiently and quickly. Additional information regarding ATV training and operation can be found in 7.1.4 of INRMP document.

In addition, the 45 SW restricts night driving on the beach unless absolutely necessary for security issues or 45 CES/CEIE-C natural resources monitoring requirements.

C.12.2 Dune Restoration/ Beach Enhancement

The 45 SW Civil Engineering programs projects involving dune and beach restoration and enhancement when necessary to protect beachside facilities from severe erosion and by re-establishing appropriate beach/dune profiles to benefit sea turtles. This has included installation of dune crossovers, planting of dune vegetation, beach tilling, beach escarpment removal and installation of dune berms. The majority of these projects block exterior lighting from reaching the beach, thus reducing the likelihood of disorienting sea turtles. Tilling and escarpment removal have been conducted in accordance with beach restoration permits and BOs to improve sea turtle nesting on nourished beaches by preventing sand compaction and steep slopes. Native dune plants have been planted in areas where storm surge has scoured away existing vegetation. The 45 SW Civil Engineering installed sand fencing along with a recent beach nourishment project at PAFB to encourage dune rebuilding and re-vegetating. Sand fencing has also been installed at CCAFS on sections of the beach where dune vegetation is scarce or nonexistent, or in areas where the profile of the beach is extremely flat. When conducted appropriately with Best Management Practices (BMPs) implemented, these dune restoration and beach enhancement projects are beneficial to the sea turtle. The 45 SW Civil Engineering will continue to program for such projects, and environmental funding for dune/beachfront plantings will occur when the budget allows and if problematic areas are identified.

To reduce the potential impacts to sea turtles, these projects are generally completed in the winter months, avoiding the sea turtle nesting/hatching season in accordance with permit and BO requirements.

Examples of projects undertaken that benefit sea turtles:

- Biannual beach cleanups
- Sand fencing
- Beach renourishment and rubble removal

C.12.3 Light Management

Extensive research has demonstrated that the principal component of the emergent sea turtle hatchlings' orientation behavior is visual (Carr and Ogren 1960, Dickerson and Nelson 1989, and Witherington and Bjorndal 1991). Artificial beachfront lighting has been documented to cause disorientation (loss of bearings) and misorientation (incorrect bearing) of hatchling turtles. As hatchlings head towards artificial lights, their exposure to predators and the likelihood of dehydration is greatly increased. Misoriented hatchlings can become entrapped in vegetation or debris, and some hatchlings have been found dead on nearby roadways and in parking lots after being struck by vehicles. Intense artificial lighting can even draw hatchlings back out of the

surf. Additionally, preliminary research indicates that lights adjacent to sea turtle nesting beaches may hinder the beach nest site selection of nesting females.

During 1988 the 45 SW and USFWS met and agreed upon the development of light management plans (LMPs) for CCAFS and PAFB to maintain compliance with section 7 of the ESA. The purpose of the plans was to provide guidelines for identification, retrofitting/replacing, and operation of particular lamps and fixtures known to adversely affect threatened and endangered sea turtle nesting activities on CCAFS and PAFB beaches. After development of these LMPs, USFWS issued a BO in 1991 authorizing an incidental take of hatchlings from 75 loggerhead and two green sea turtle nests at CCAFS and hatchlings from two loggerhead nests at PAFB. In subsequent years, the authorized level of take was to be reduced by 50% each following year. The BO was modified during 1991 after the 45 SW reported the incidental take had been exceeded for that season. The BO was modified to include all hatchlings that had been disoriented for that year and authorized a 4% take for the 1992 season and 2% for all years following. The BO was again modified during 2000 and authorized an incidental take of 2% of hatchlings and 2% of adults for PAFB and CCAFS.

In 2004, the 2% incidental take was exceeded at both PAFB and CCAFS. Subsequent meetings resulted in a new BO in 2006 that resulted in an interim authorized take of 3% of hatchlings for the 2006 and 2007 seasons. Historically, LMPs were required for any new construction that required exterior lighting. The 2006 BO modified this requirement to require LMPs for all new facilities that are in close proximity to the beach, are not constructed in accordance with 45 SWI 32-7001 (see next paragraph), have lighting directly visible from the beach, and/or may cause significant sky glow. The BO was modified again in 2008 and authorized a 3% take of nesting females, and up to a total of 3% of all hatchlings disoriented/misoriented from a representative sample of all surveyed marked nests. The BO also requires at least five nighttime light surveys at CCAFS and PAFB during the peak of nesting season (May 1 through October 31). For additional information regarding reasonable and prudent measures and terms of the BO, see Appendix B, Attachment B-1.1.

The 45 SWI 32-7001 was developed in 2000 to implement an internal policy to limit incidental take under the ESA and to support the light management BO. In 2003, the 45 SWI 32-7001 was revised to provide a more thorough discussion of responsibilities of 45 SW organizations, tenants and residents. The 45 SWI 32-7001 was also revised to incorporate the up-to-date BO guidance and was published in January 2008, and was revised and published again in 2012 (available at website: http://static.e-publishing.af.mil/production/1/45sw/publication/45swi32-7001/45swi32_7001.pdf). The primary change in the 2012 revision of SWI 32-7001 is the identification of acceptable compliant light sources, as well as programmable timers and motion sensors that are encouraged for area lighting if essential to personnel safety, and a change to annual notification requirements.

The 45 SW will issue annual notices, prior to the sea turtle nesting season, reminding all tenants and residents of their lighting responsibilities under 45 SW SWI 32-7001 (http://static.e-publishing.af.mil/production/1/45sw/publication/45swi32-7001/45swi32_7001.pdf). Organizations, tenants and residents are responsible for minimizing exterior lighting during the sea turtle season. To comply with 45 SWI 32-7001 and existing LMPs, personnel of the 45 CES/CEIE-C

will inspect and record noncompliance and will notify facility managers of lighting violations. Five to ten nighttime lighting surveys will be conducted at CCAFS and five to six at PAFB during the sea turtle nesting and hatching season to enforce compliance with existing light management policies. Surveys for disorientation will continue in order to evaluate the effectiveness of LMPs and light management policies.

Exterior lighting that is not mission-, safety-, or security-essential will be extinguished from 2100 to 0600 from 1 May to 31 October. Mission-essential lighting supporting launch activities includes launch preparation, processing of boosters, payloads, etc., and any searchlights or banks of lights (portable light-alls) used to light the pad during night launches. This would also include, as an example, lighting within the Vertical Integration Facility (VIF) that is required when the vehicle is being moved in and out (VIF doors are open). Safety-essential lighting is any lighting required for night operations training such as conducted by the 920th Search and Rescue Wing and transient aircraft operations as well as lighting for the airfield, parking lots and/or facility entrances for personnel who work during hours of darkness. Security-essential lighting includes lighting at the base entrance gates, pad specific entrances, perimeter security lighting around critical facilities, national security threats/elevated terrorist levels, and aircraft parking aprons/pads.

Exterior lighting requiring replacement will be done so in accordance with the 45 SW 32-7001. All operations with artificial lighting will be accomplished using downward-directed, well-shielded LPS light fixtures, full cutoff amber/yellow compact fluorescent fixtures, full cutoff amber (bug light) incandescent fixtures, or shielded amber or red Light Emitting Diode (LED) lights. Where color rendition or explosion-proof fixtures are required for mission-essential operations, well-shielded, high-pressure sodium (HPS) lights may be used; however, a letter of justification must be submitted to the 45 CES/CEIE-C with the request for this variance. Further, any lighting other than HPS that is required for color-rendition purposes will require a letter of justification. Mission operations that require unshielded lighting or "uplighting" will require a letter of justification and approval through 45 CES/CEIE-C and the USFWS. Lighting directly visible from anywhere on the beach must be shielded and/or recessed so that the point source of light or any reflective surface is not directly visible from the beach.

The 45 SW acknowledges recent trends in sea turtle nesting in Florida which has resulted in the season beginning earlier and ending later, and future sea turtle monitoring recommendations are expected to be expanded to include 1 April through possibly 30 November. Based on the history of nesting on 45 SW beaches, lighting restrictions will continue to be enforced 1 May-31 October. Both CCAFS and PAFB have only had a handful of nests present in April and November and neither site has documented a disorientation event during either of these months in the history of monitoring (since the late 1980s). If nesting on 45 SW beaches begins to increase in the future, expansion of lighting restrictions will be reconsidered at that time.

For a more general discussion of how the 45 SW exterior lighting affects natural resources, particularly sea turtles, see Section 6.2.6 of the INRMP.

C.13 References

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ACRONYMS for SEA TURTLE MANAGEMENT PLAN

45th Space Wing	45 SW
ATV	All Terrain Vehicle
BMP	Best Management Practice
BO	Biological Opinion
CCAFS	Cape Canaveral Air Force Station
CES/CEIE-C	Civil Engineer Squadron, Environmental Conservation Element
ESA	Endangered Species Act
FDEP	Florida Department of Environmental Protection
FWC	Florida Fish and Wildlife Conservation Commission
HPS	high-pressure sodium
INRMP	Integrated Natural Resources Management Plan
LED	Light Emitting Diode
LMP	Light Management Plan
MTCG	Marine Turtle Conservation Guidelines (FWC)
PAFB	Patrick Air Force Base
PVC	polyvinyl chloride
UCF	University of Central Florida
USFWS	US Fish and Wildlife Service

Appendix C-1A

USFWS Justification Letter Dated 10 October 2012 to 45 CES/CEIE-C Regarding Exemption from Loggerhead Sea Turtle Critical Habitat Designation

DEPARTMENT OF THE AIR FORCE
45TH SPACE WING (AFSPC)

OCT 10 2012

MEMORANDUM FOR UNITED STATES DEPARTMENT OF THE INTERIOR
U. S. FISH AND WILDLIFE SERVICE
7915 BAYMEADOWS WAY, SUITE 200
JACKSONVILLE FL 32256-7517

FROM: 45 CES/CEAN-C
1224 Jupiter Street, MS 9125
Patrick AFB FL 32925-3343

SUBJECT: Letter of Justification To Be Exempt From Loggerhead Sea Turtle Critical Habitat Designation, Cape Canaveral Air Force Station (CCAFS) and Patrick Air Force Base (PAFB), Florida

1. Per recent emails and conversations with your office regarding the proposed listing of critical habitat for the loggerhead sea turtle, this letter serves as justification for 45 Space Wing (45 SW) properties to be exempt from such listing. The Air Force (AF) is confident that the current and proposed revision of the 45 SW Integrated Natural Resources Management Plan (INRMP) includes provisions that benefit not only loggerheads, but all species of sea turtles, their nests, eggs, and hatchlings. In addition, this letter addresses specific comments/recommendations provided by Ms. Ann Marie Lauritsen/U. S. Fish and Wildlife Service (USFWS) within an email dated 10 July 2012 after her review of the 45 SW Sea Turtle Operational Component Plan, a tab in the current INRMP.

2. Both CCAFS and PAFB provide prime nesting habitat for loggerhead sea turtles. Both sites voluntarily joined both the Index and State Nesting Beach Survey programs in 1988, and have continued to be participants ever since. Further, both sites have participated in annual hatchling productivity data collection. Staff biologists have successfully demonstrated to its leadership the importance of continued participation in these programs. In addition to participation in these programs, the following bullets describe other activities the 45 SW currently employs that benefit all species of sea turtles.

- Planting native dune vegetation and installing sand fence in areas to help both build up and stabilize dunes, as well as assist in shielding artificial exterior and incidental interior light from reaching the beach.
- Biannual beach cleanups, which minimizes marine debris entanglement and improves the quality of sea turtle nesting habitat.

- Beach renourishment and rubble removal projects, which provide additional nesting habitat.
- Educational turtle walks to both 45 SW leadership and installation personnel, which leads to more support for the sea turtle program.
- Training for 45 Security Forces personnel that patrol the beach to minimize adverse impacts to nests/eggs/hatchlings to include restricting night driving unless absolutely required for security purposes.
- Educational signs at beach crossovers that explain the importance of the beaches to sea turtles (see Attachment 1).
- Educational information to personnel staying in beachside facilities including sea turtle table top brochures and a rental packet letter that contains sea turtle information and "do's/don'ts" for reducing impacts to sea turtles.
- Newcomer's briefing to all new personnel that includes information about sea turtles that nest on 45 SW beaches.
- Annual briefings to base housing residents providing sea turtle biology information, and an explanation of light management requirements.
- Annual participation in the Space Coast Wildlife and Birding Festival, which includes tours of CCAFS, with stops at the beach explaining the AF's role in the protection of sea turtles.
- Presentations at the Child Development Center at PAFB when requested for Earth Day that involve a mini-lesson about sea turtles.
- Beach access and fishing rules at CCAFS that include specific items to protect sea turtles (see Attachment 2). Each access point also includes the presence of dumpsters and monofilament recycling bins.
- Relocation of nests deposited below high tide or behind the dune to increase hatchling productivity.
- Participation in stranding and salvage activities, as well as cold stun events.
- Requirements at PAFB for beach equipment staging (see Attachment 3).
- Nuisance wildlife management program to increase hatchling productivity.
- Intense light management program, including night surveys and facility manager follow-up, to reduce disorientation of adult and hatchling sea turtles.
- Screening of nests for depredation control and construction of shielding around nests prone to disorientation due to proximity to known artificial lighting or sky glow.
- Review of project designs, site plans, work orders, fixture/lamp selections and cutsheets, etc., to ensure any potential adverse impacts to sea turtles are appropriately prevented or mitigated.

3. As previously mentioned, the 45 SW received specific comments and recommendations from the USFWS after reviewing the current 45 SW INRMP and sea turtle component plan. Each topic will be addressed in the following individual points.

4. Comment 1 explained the USFWS's support of the continued daily sea turtle surveys at CCAFS and PAFB, and confirmed the 45 SW INRMP provides a detailed description of the methodology of these surveys.

As explained earlier, the 45 SW is committed to continued participation in the INBS/SNBS and hatchling productivity programs. Recent conversations with 45 SW leadership have resulted in increased support of these programs.

5. Comment 2 addressed continuation of programs that control predators that depredate sea turtle nests, and confirmed the 45 SW INRMP provides a detailed description of this process. The Service recommended providing additional information regarding predator removal, describing what triggers predator control to minimize depredation, and reducing mammalian predation to at or below 10%. This information will be added during the next revision of the 45 SW INRMP; however, the following information is provided to address the immediate concern.

Depredation at PAFB has never exceeded 10% and normally is low to nonexistent. Raccoon trapping at PAFB is initiated at the first sign of tracks on the beach during sea turtle nesting season. Trapping is continued in the area of nest/hatchling depredation until the depredation stops or the offending animal is captured. Depredation at CCAFS has varied over the years with recent depredation averaging around 20%. Raccoon trapping at CCAFS is initiated on the beach in April and continues throughout the nesting season. Traps are placed in areas where tracks are observed as well as at nests that were depredated the previous night. In addition, the 45 SW has procured a nuisance wildlife contract that provides nuisance wildlife removal services at CCAFS. These services include year round trapping/removal of feral hogs, year round leg trapping and removal of coyotes, and year around "shoot on sight " for all coyotes and raccoons observed within ½ mile of the beach. In addition, when offending animals on the beach cannot be trapped, the contractor performs nighttime beach shooting in specific areas of concern.

Depredation at CCAFS has never been below 10%; however, the 45 SW is doing everything possible to keep the predation as low as possible. Recent immigration of coyotes has become a major concern, which is the reason why leg trapping has been implemented. The current CCAFS policy is eradication of all feral hogs and coyotes, and eradication of raccoons within ½ mile of the beach. Other predators such as armadillos and bobcats, which account for less than 1% of the predation, are addressed on an individual basis. The 45 SW will strive to keep depredation rates as low as possible.

6. Comment 3 addressed educational outreach and the Service's recommendation to place educational signs at all public beach access points explaining the importance of

the area to sea turtles. The USFWS also recommended including provisions of the 45 SW's pet policy regulation on the sign.

Signs already currently exist at all beach access points. Attachment 1 provides one photo each of the signs at CCAFS and PAFB. The 45 SW proposes to institute periodic patrols of the PAFB beach once a new Conservation Law Enforcement Officer is hired. Hiring freezes throughout the AF have delayed this position from being filled. This individual, once hired, will ensure pet laws are enforced thus reducing the potential for pets to dig up sea turtle nests, as well as ensuring that the public is not having a negative impact on nesting sea turtles or emerging hatchlings at night. This patrol and compliance verbiage will be added during the next 45 SW INRMP revision.

7. Comment 4 addressed trash receptacles at the public beach access points with the USFWS recommendation of installation of predator-proof receptacles at all access points to minimize the potential for attracting predators of sea turtles.

Both CCAFS and PAFB already have trash receptacles at all beach access points. At CCAFS, 2-ton dumpsters with heavy lids are utilized. To further decrease attracting predators to the CCAFS beach, fishermen are not authorized to clean or discard fish remains on the beach itself. At PAFB, regular trash receptacles are utilized, however they are not predator-proof. Beachside facilities at PAFB remove garbage from trash receptacles daily. Trash receptacles and dumpsters at PAFB at general beach access areas are under a specialized refuse removal contract. With budget cuts across the AF, the refuse contract is already at its bare minimum. Based on the low presence of predators, as well as the low depredation rate observed on PAFB, the AF does not believe predator-proof receptacles are economically justified at the present time. If depredation rates increase and the present trash bins appear to be related to the increase in predator activity, the 45 SW will research the possibility of utilizing predator-proof receptacles.

8. Comment 5 addressed light management and the USFWS's recommendation to include more details in the 45 SW INRMP regarding procedures for ensuring fixtures/lamps follow 45th Space Wing Instruction (SWI) 32-7001, *Exterior Lighting Management*, prior to installation or replacement of lights on CCAFS and PAFB. Additional details will be added during the next 45 SW INRMP revision; however, the following information is provided to address the immediate concern.

To ensure compliance with Biological Opinion (BO) FWS 41910-2009-F-0087 regarding light management and disorientation, the 45 SW proactively created the SWI (Attachment 4) to implement the Terms and Conditions of the BO. The Instruction also made it possible for violators to be subject to punitive action and/or disciplinary action, although this has never been required. The USFWS was given the opportunity to review this SWI during the last revision in 2008.

In addition to the requirements of the BO and SWI, 45 SW biologists are a reviewing entity on all National Environmental Policy Act documents, project designs, site plans, work orders, etc. Further, verbiage concerning lighting provided as comments during the review process includes the provision that 45 SW Environmental/biologists must approve the types of fixtures and lamps being installed prior to purchase. All lighting that is non-compliant requires a Light Management Plan (LMP) in accordance with the BO, which the USFWS reviews/approves. Additionally, LMPs are required for lighting that is in close proximity to the beach or potentially visible from the beach.

There have been a few occasions where lights were purchased prior to the proper approvals. Installation personnel/biologists are working with project engineers to ensure this doesn't happen in the future. Most problems stem from funding from different sources within the Department of Defense, and the project proponent's desire to prevent loss of the funding.

9. Comment 6 addressed staging of beach recreational equipment at PAFB during sea turtle nesting season specifically where equipment is rented through 45 SW recreational services at Blockhouse Beach. In consultation with the Service, requirements have been implemented regarding staging of such equipment (Attachment 3). These requirements will be added to the 45 SW INRMP during the next revision.

10. Based on current language in the 45 SW INRMP, current management practices, and future incorporation of the information in the above points in the next 45 SW INRMP revision, the AF believes it has demonstrated that the 45 SW INRMP provides benefits to nesting loggerhead sea turtles, nests, eggs and hatchlings.

11. Please review this letter and provide a response to this office at your earliest convenience. POC for this action is Ms Angy Chambers, 45 CES/CEAN, 321-853-6822 or E-mail, angy.chambers@us.af.mil.

Michael Blaylock

MICHAEL A. BLAYLOCK
Chief, Natural Assets

Attachments:
1. Beach Access Signs
2. CCAFS Fishing Rules
3. Beach Equipment Staging Policy
4. Exterior Lighting SWI

cc: Ann Marie Lauritsen, USFWS, St. Petersburg

ATTACHMENT 1
BEACH ACCESS SIGNS

Beach Crossover Sign at Patrick AFB

Beach Crossover Sign at Cape Canaveral AFS

ATTACHMENT 2
CCAFS FISHING AND BEACH ACCESS RULES

Fishing and Beach Access for Cape Canaveral Air Force Station (CCAFS)

1. Three locations on the CCAFS beach are open to fishing and walking. Beach access is allowed only during daylight hours, within one quarter mile of the authorized access points, and individuals must remain within sight of the access point. Personnel must possess (on their person) an operational cell phone. All fishing locations are closed three days prior to shuttle launches and one day prior for all rocket launches. Call **(321) 853-0911** for all emergencies. Personnel are required to adhere to the rules listed below.
2. Beach Access and Fishing Rules:
   a) Adhere to all federal and state fishing regulations, including those pertaining to size, season, limits, licensing, and fishing equipment.
   b) Protect endangered species. Do not disturb sea turtles, turtle nests (nesting season is May through October), nest markers (numbered wooden stakes), predator screens, light shields, traps, driftwood raceways, or any skeletal remains. These animals are state and federally protected and violators are subject to prosecution.
   c) Fishermen and walkers must protect the delicate ecological environment. Do not pick up or remove plants, animals, or historical artifacts. A small number of shells may be removed for personal use only. No collection for commercial use will be allowed. Any violators will be prosecuted.
   d) Use of umbrellas above high tide line is prohibited.
   e) Digging or metal detector use will not be allowed without written approval from the 45 SW Conservation Law Enforcement Officer.
   f) Keep off dunes and beach vegetation.
   g) Stay out of posted bird nesting areas.
   h) Beach and River access is authorized between 1/2 hour after sunrise and 1 hour prior to sunset.
   i) Littering is prohibited, you must remove your own trash.
   j) Do not clean fish on CCAFS property.
   k) Fishing poles are limited to two poles per fisherman.
   l) Fishermen and walkers may fish and walk on the beach at their own risk but assume responsibility for the actions and safety of any guests. Alligators, snakes, sharks, feral hogs and other wild animals inhabit CCAFS so be cautious.
   m) Swimming and wading is not allowed.
   n) Firearms, explosives, and alcoholic beverages are strictly prohibited.
3. Authorized Beach Fishing Locations:
   a) Camera Road A: Located 1/2 mile south of Cape Canaveral Lighthouse (Directions: Travel north on Phillips Parkway from the South Gate (Gate 1) to Pier Road. Turn right (east) onto Pier Road. Follow Pier Road and merge northeast onto Lighthouse Road. Turn right (east) on Camera Road A to the beach).
   b) Camera Road B: Located 1/10 mile north of Cape Canaveral Lighthouse (Directions: Same as for Camera Road A - 3/4 Mile further north).
   c) Complex 34 – Located approximately 9 miles north of the South Gate just off Phillips Parkway. The beach access is located northeast of the blockhouse and the pad.
4. Authorized Port Fishing Locations:
   a) Navy Port Area: Fishing is authorized at the Trident and Poseidon Wharfs only. Fishing hours are from 1/2 hour after sunrise to 2200 hrs. Fishing is controlled by the Commanding Officer, Naval Ordnance Test Unit and may be closed at anytime without notice. Call (321) 853-1169 for the fishing hotline.
5. Authorized Banana River Access:
   a) South side of Hangar AF. This is for canoe/boat ramp access only. No fishing from shore.

6. Violation of any of the above stated rules and requirements may result in suspension of all fishing and beach access privileges for the violator or as directed by Det 1 MSG/CC.

Effective 1 November 2010

ATTACHMENT 3
BEACH EQUIPMENT STAGING POLICY

Requirements for Beach Equipment Staging at PAFB, FL
United States Fish and Wildlife Service (USFWS) Log #41910-2011-I-0270
(applicable 1 May to 31 Oct annually and if early or late nests are marked within the area of the Beach house beach)

In accordance with Section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.), the USFWS concurred that, if the following measures described below are implemented, the requested Air Force activity of beach equipment staging is not likely to adversely affect nesting and hatching loggerhead (Caretta caretta), green (Chelonia mydas), leatherback (Dermochelys coriacea), hawksbill (Eretmochelys imbricata), and Kemp's ridley (Lepidochelys kempii) sea turtles.

1. No recreation equipment shall remain on the beach or dune overnight. All recreation equipment shall be removed from the beach no later than sundown each day during sea turtle nesting and hatching season;

2. Recreation equipment shall not be brought out onto the beach until after the daily early morning sea turtle surveys are completed (no equipment earlier than 0900);

3. Umbrellas will only be set up below the average high tide line (waterward) to prevent impacts to potential sea turtle nests/eggs as almost no nests are laid in this swash zone. The measured distance to this mean high tide line is approximately 107 feet from the seawall that parallels the Beach house and large parking lot. This line must be marked/maintained with a flag/stake/cone to prevent erroneous use of other high tide lines that are created due to lunar phases or storm activity;

4. Only umbrellas that are clamped to beach chairs (lounger legs-no straight legs) may be used above the high tide line during sea turtle nesting/hatching season. Signs or flags (for advertisement, etc.) must either be weighted such that they sit on the sand and don't penetrate it or must be installed close to the seawall (without damaging/trampling dune vegetation);

5. All recreation equipment shall be brought on to the beach by hand (manually) without the assistance of heavy equipment or motorized vehicles;

6. Trash receptacles shall be maintained within the Beach house area and near beach access points to minimize the potential for attracting predators of sea turtles (raccoons, etc.). Trash receptacles must be either predator-proof or all trash must be removed every day most especially before dusk as predators are more active in the evening;

7. All lighting used for the Beach house must be in compliance with established light management guidelines found in Biological Opinion 41910-2009-F-0087 and 45 SWI 32-7001;

8. Nest surveys/marking will only be conducted by persons on a valid FWC permit pursuant to FAC 68E-1;

9. All nests found below the high tide line must be marked;

10. A report describing the actions taken to implement these measures shall be submitted to USFWS by 31 December (by 45 CES/CEA).

ATTACHMENT 4
EXTERIOR LIGHTING SPACE WING INSTRUCTION

BY ORDER OF THE COMMANDER,
45TH SPACE WING

45TH SPACE WING INSTRUCTION 32-7001

25 JANUARY 2008

Civil Engineering

EXTERIOR LIGHTING MANAGEMENT

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

ACCESSIBILITY: Publications and forms are available on the e-Publishing website at www.e-publishing.af.mil for downloading or ordering.

RELEASABILITY: There are no releasability restrictions on this publication.

OPR: 45 CES/CEVP
Supersedes 45SWI32-7001, 1 April 2003

Certified by: 45 CES/CD (William J. Gibson)
Pages: 3

This instruction implements the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 et seq), Air Force Policy Directive (AFPD) 32-70, ***Environmental Quality***, Air Force Instruction (AFI) 32-7064, ***Integrated Natural Resources Management***, and the United States Fish and Wildlife Service (USFWS) Biological Opinion issued 9 April 1991, updated 2 May 2000 and 23 August 2006. The instruction also explains management responsibilities, exterior lighting restrictions and reporting requirements necessary for the 45th Space Wing (45 SW) to remain in compliance with Federal, State, and local standards. Military personnel who violate this instruction are subject to punitive action under Article 92, Uniform Code of Military Justice. Violations by civilian employees may result in administrative or other disciplinary action under AFI 36-704, ***Discipline and Adverse Action***.

SUMMARY OF CHANGES

This document has been revised to include the identification of additional lamps that may be used in lieu of low pressure sodium (LPS) for non-beachfront facility exterior lighting, the inclusion of a requirement for shielding of fixtures that aren't full cut-off (downward directed), and a change to the official first month of sea turtle nesting season based on the peak season. A margin bar indicates newly revised material.

1. Background. In 1998, the 45 SW and USFWS agreed to develop Light Management Plans (LMPs) in an effort to reduce the amount of exterior lighting visible from the beach. This action was required to reduce sea turtle hatchling mortality caused by disorientation. Disorientation occurs when sea turtles crawl toward inland light sources rather than the ocean. The LMPs identified exterior lights that could be replaced with LPS lamps, unnecessary lights that could be eliminated, and operational constraints for all exterior lights. The USFWS has recently approved additional types of fixtures that may be used instead of LPS when shielded.

2. Concept. This instruction establishes responsibilities and provides guidance for the protection of threatened and endangered sea turtles in accordance with the Endangered Species Act and the Biological Opinion issued by the USFWS. This instruction applies to all exterior lighting systems/fixtures located within Air Force property boundaries of the 45 SW that may affect sea turtles.

3. Responsibilities.

3.1. Organizations, tenants, and residents are responsible for minimizing exterior lighting during the sea turtle nesting season, 1 May through 31 October, between the hours of 2100 and 0600. Exterior lighting that is not mission-, safety-, or security-essential will be extinguished during this time frame. All exterior lights will be controlled by either individual or cluster light-specific switches, or an Energy Management Control System (EMCS).

3.1.1. Mission-essential operations that require artificial lighting will be accomplished with fixtures using downward-directed and well-shielded LPS, full cutoff amber/yellow compact fluorescent, full cutoff amber (bug light) incandescent, or full cutoff amber Light Emitting Diode (LED). Where color rendition or explosion-proof fixtures are required, well-shielded, high-pressure sodium (HPS) lights may be used; however, a letter of justification must be submitted to the 45 SW Civil Engineering Environmental Flight (45 CES/CEV) with the request for this variance. Further, any lighting other than HPS that is required for color-rendition purposes will require a letter of justification. Lighting directly visible on the beach must be shielded to prevent incidental illumination of the beach.

3.1.2. Interior lighting that creates an incidental glow visible outside the facility must be extinguished or shielded to prevent the light from being visible external to the facility. Mission operations that require unshielded lighting or "uplighting" will require a letter of justification and approval through 45 CES/CEV and the USFWS. If interior lighting is required for safety or security reasons and is visible outside the facility, the facility manager must work with the 45 CES/CEV to identify alternative light types and shielding options.

3.1.3. Use of photo cells is not permitted unless lighting is a security requirement. Programmable timers may be used for area lighting, if essential for personnel safety. Requests to 45 CES/CEV for the installation of photocells must be accompanied by written justification.

3.2. The 45 CES/CEV office will be responsible for monitoring and enforcement of light use restrictions for sea turtle protection on 45 SW installations.

4. Notification and Reporting.

4.1. The 45 CES/CEV office will issue annual notices to all personnel prior to the sea turtle nesting season to remind organizations, tenants and residents of light use constraints and responsibilities.

4.2. Detachment 1, 45th Mission Support Group Commander (Det 1, 45 MSG/CC) will issue the annual notices to organizations and tenants on Cape Canaveral Air Force Station.

4.3. Incidents of inappropriate light operation will be reported to the accountable facility managers and appropriate Commanders.

4.4. Questions regarding the requirements of this Space Wing Instruction or concerns related to sea turtles and lighting should be directed to 45 CES/CEVP at 494-7288.

SUSAN J. HELMS, Brigadier General, USAF
Commander

Attachment C-2

Florida Scrub-Jay Management Plan

Attachment C-2: Florida Scrub-Jay Management Plan

C.1 State-Wide Population of Florida Scrub-Jays

The Florida scrub-jay was federally listed as a threatened species on 3 June 1987 under the Endangered Species Act (ESA) of 1973. A statewide Florida scrub-jay (*Aphelocoma coerulescens*) survey was conducted in 1992-1993, and there were an estimated 4,000 pairs of scrub-jays in Florida (Fitzpatrick et al. 1994 qtd. in USFWS 2014d). Of 39 counties within the historic range of scrub-jays, 32 remained occupied (82 percent). However, 19 of those 32 counties had fewer than 30 pairs of scrub-jays remaining, and nine of these counties had 10 or fewer pairs. Thirteen counties within the historic range (33 percent) had 30 or more pairs of scrub-jays. Rangewide, the species may have declined by as much as 25 to 50 percent during the mid 1980s to mid 1990s (Stith et al. 1996 qtd in USFWS 2014d). Following the 1992-1993 census, there has been no periodic, systematic surveys or censuses for scrub-jays throughout their range.

The Florida scrub-jay (scrub-jay) is habitat-specific, depending on the availability of Florida scrub for its survival. Because of the loss of optimal scrub habitat due to disruption of natural fire cycles and clearing for homes and agriculture, the populations that remain in Florida are small, demographically isolated, and likely to decline. Three core populations have been identified because they contain well over half of the state's remaining scrub-jays (USFWS 2007). Those three core populations occur at:

- Kennedy Space Center (KSC)/Merritt Island National Wildlife Refuge (MINWR)/Cape Canaveral Air Force Station (CCAFS) ;
- Southern Lake Wales Ridge
- Ocala National Forest in central Florida (the Forest includes parts of Marion, Lake, Putnam, and Seminole counties).

The state wide breeding population was approximately 4,000 pairs in 1993, but has continued to decline by >25% since then and is now estimated at approximately 3,100-3,750 groups with an estimated 7,750-9,375 birds (USFWS personal comment). Although there is some uncertainty concerning specific numbers, it is believed that the KSC/MINWR contains approximately 550 family groups, the second largest in the state (Ocala National Forest has the largest population) (USFWS 2008).Considering the importance of the CCAFS scrub-jay population for maintaining stable statewide population, special consideration and management of this species and its habitat is required.

The scrub-jay does not inhabit the other three 45 SW installations: Patrick Air Force Base, Malabar Transmitter Annex, and Jonathan Dickinson Missile Tracking Annex (JDMTA). JDMTA is surrounded by the Jonathan Dickinson State Park on three sides. The scrub-jay does inhabit the state park, but no nests have been observed within JDMTA; the scrub-jay does use JDMTA for caching acorns. This plan only applies to CCAFS.

C.2 Biology of the Florida Scrub-Jay

C.2.1 Physical Description

The Florida scrub-jay is endemic to Florida. It is a 30-centimeter (12-inch), bluish-colored, crestless jay. Plumage of adult males and females are alike, but males are slightly larger than females. The head, nape, wings, and tail are pale blue; back and belly are pale gray. The throat and chest are white and bordered by a blue gray bib. Juveniles differ in appearance from adults in that they have dull or dark brown upperparts (USFWS 2014d).

C.2.2 Reproduction

Florida scrub-jays are non-migratory, extremely sedentary, and have very specific habitat requirements. Scrub-jays exhibit a short, highly synchronized, cooperative breeding and nesting season (Woolfenden 1973). Cooperative breeding is when non-breeding adults, referred to as helpers, participate in territory and nest defense, mobbing predators and participating in other breeding activities (excluding nest construction, egg-laying, and incubation) within their natal territories. Except in the case of habitat loss and fragmentation, juvenile scrub-jays stay in their natal territory for up to five years; upon reaching breeding age the scrub-jay will disperse short distances from their natal territory (one to three territory widths) and will occupy a territory for life.

On CCAFS, scrub-jay nesting activities begin in late February-early March and continue through late June-early July. Clutch size varies from 2 to 5 eggs per nest with a mean of 3.4 eggs. As the breeding experience of the female scrub-jay increases, clutch size generally increases. Incubation of eggs requires approximately 17 days. Predation of nests in CCAFS scrub-jay populations has historically been extremely heavy (Stevens and Young 2000). Virtually all nest losses at CCAFS are attributed to nest predation. The complete loss of eggs and young from nests that appear undamaged (nest remains intact) implicates snakes as the prime predator (Stevens and Hardesty 1998).

C.2.3 Diet

Florida scrub-jays are omnivorous, consuming about 60 percent animal matter. Insects comprise the bulk of the diet for most of the year and are particularly important in the spring, fulfilling the high energetic demands associated with nesting. Various small vertebrates may also be consumed when available. Acorns are the primary and essential plant food and are consumed by the scrub-jay throughout the year; providing a staple food source during periods of low insect availability. Surplus acorns are often cached in the ground (USFWS 2014d). Other plant items eaten when available include palmetto seed, tread softly, briars, blueberry, gallberry, rosemary seed, and there is evidence that scrub-jays consume hickory nuts at CCAFS.

C.2.4 Habitat Requirements

The scrub-jay is restricted to a xeric scrub and scrubby flatwoods communities consisting of low, dense oak thickets including live oak (*Quercus virginiana*), sand live oak (*Q. geminata*), myrtle oak (*Q. myrtifolia*), Chapman oak (*Q. chapmanii*), and runner oak (*Q. minima*) with numerous interspersed open sandy areas (Woolfenden 1978). Bare sand patches are essential for

foraging and acorn-caching. Ground cover is sparse, dominated by saw palmetto (*Serenoa repens*) and sand palmetto (*Sabal etonia*). Slash pines (*Pinus elliottii*) and sand pines (*P. clausa*) are widely scattered (USFWS 2014d). Scrub-jays show an obligatory reliance on oaks. A minimum scrub height of 3 feet is required for scrub-jay habitat use (Westcott 1970), and scrub heights of 4 to 5.5 feet are optimal (Breininger et. al 1995). Optimally, the scrub-jay prefers habitat with low growing oaks, 3 to 10 feet tall, a sand pine canopy of 20% percent or less, and interspersed in this habitat, 10 to 50% of the ground cover is open, sandy areas (USFWS 2014e), Florida scrub-jays defend relatively large territories (12 to 37 acres) that often include habitat patches with different fire histories (Woolfenden and Fitzpatrick 1984, Breininger et al. 1995).

Natural wildfires are believed to have maintained scrub communities as a low, open habitat suitable for scrub-jays. Exclusion of fire in these communities eliminates open sandy areas and can lead to succession from low scrub to xeric hammock (Veno 1976). The period of time for this succession to occur is not well documented, and varies based on site characteristics. Cox (1984) suggested that fires need to occur at least every 20 to 30 years if scrub community is to remain suitable for Florida scrub-jays. The US Fish and Wildlife (USFWS) service recommends a fire cycle of every six to 12 years (USFWS 2014e) and recent conversations with USFWS, FWC and USAF personnel suggest that more frequent fires may be required in order to establish desired open areas. Fire suppression poses a significant threat to scrub-jay populations. The habitat areas managed on public lands is increasing, but management is not always aggressive enough to maintain optimal habitat for the scrub-jay (USFWS 2013).

C.2.5 Florida Scrub-jay Habitat on CCAFS

There is approximately 8,400 acres of scrub habitat potentially suitable for scrub-jays present within CCAFS based on estimated acreages for oak scrub (including all inland scrub and oak woodlands), disturbed oak scrub, coastal strand, and disturbed coastal strand habitats. Recent conversations with representatives from the 45 SW Civil Engineer Squadron, Environmental Conservation Element (45 CES/CEIE-C) and USFWS regarding recovery actions for the Florida scrub-jay resulted in 45 CES/CEIE-E personnel delineating the scrub acreage into three categories; good, fair and poor (see **Appendix C-3**). These categories will assist the management and focus of future scrub habitat restoration. The goal is to keep the good habitat in good-optimal condition, while restoring fair and poor scrub adjacent to where scrub-jays are currently being observed. This will allow expansion of birds into adjacent habitat within CCAFS.

Additionally USFWS and the Florida Fish and Wildlife Conservation Commission (FWC) indicated to 45 CES/CEIE-C personnel that the MINWR/KSC/CCAFS population of scrub-jays must be maintained at 600 breeder pairs for conservation of the species. At the time, the 45 SW was asked to determine how many breeder pairs could be supported based on funding and mission constraints knowing that the 300 breeder pairs was probably not possible to achieve. The 45 CES/CEIE-C determined the amount of scrub/potential scrub available, and using the percentage that could be in optimal condition at any given time (50%-70%) and the average territory size of 25 acres/group, calculated that CCAFS could support 170-237 breeder pairs, For the purpose of providing USFWS and FWC a feasible breeding pair number for recovery, 45 CES/CEIE-C personnel use 200 breeder pairs as the new goal.

Lack of habitat management in years prior to 1995 and the removal of scrub habitat associated with construction activities within CCAFS were the primary historic threats to the CCAFS scrub-jay population. The 45 CES/CEIE-C is the organization within 45 SW with primary responsibility for overseeing Florida scrub-jay management and consulting with the USFWS.

C.3 Protective Measures

See Section 6.2.2 for a discussion of the Environmental Impact Analysis Process (EIAP) for the 45 SW, which includes evaluating potential impacts to Florida scrub-jays. As required by the ESA, the 45 SW avoids and minimizes potential impacts prior to engaging in activities that have the potential to affect. Project proponents are notified during the environmental review process of any habitat compensation requirements (see Section 5.0 below).

C.3.1 Current Reasonable and Prudent Measures (2011)

Based on a recent Biological Opinions (BO) and Incidental Take Permit from the USFWS (see Appendix B) on clearing around the airfield, the 45 SW implements the following reasonable and prudent measures to minimize impacts to, and the incidental take of the Florida scrub-jay:

- Avoid construction during the Florida scrub-jay nesting season from March 1 through June 30 to the maximum extent practicable.
- Notify USFWS of any unauthorized take of the scrub-jays during construction activities.
- Ensure prior to clearing of occupied scrub-jay habitat that there is suitable habitat within 1200 feet.
- Restore habitat appropriately as described under Scrub-jay Habitat Compensation (Section 5.0) below.
- Conduct scrub-jay monitoring, as required.
- Submit annual reports to the USFWS.

Additionally, for work that does not require a permanent removal of habitat or work that is occurring adjacent to occupied habitat, the following measures are implemented to reduce potential impacts to jays:

- Review all actions to ensure there will be no adverse impacts to scrub-jays or their habitats (NEPA).
- Work with planners to avoid siting new buildings in occupied or potential scrub-jay habitat.
- Avoid construction and/or clearing activities during scrub-jay nesting season in areas where scrub-jays are known to occur to the maximum extent possible.
- If clearing of occupied scrub-jay habitat is to occur within the species nesting season, the areas will be surveyed prior to clearing to determine if there are any active scrub-jays nests; if an active nest is located, to the maximum extent possible, 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.

C.4 Other Measures

Other protective measures undertaken by the 45 SW to reduce impacts to Florida scrub-jays include (see Section C.7 for a completed list):

- Maintain the 35 mph speed limit in the high density area where scrub-jays are known to cross back and forth across Phillips Parkway
- Increase public awareness of scrub-jays and other wildlife through road signs.

C.4.1 Population Studies

Based on the USFWS Recovery Plan (1990), which indicated that little information on scrub-jay basic biology is available (outside of Archbold Biological Station and Merritt Island NWR), the USAF contributes to the following research tasks:

- Determining minimum habitat size,
- Obtaining information on basic biology,
- Determining current distribution of populations, and
- Conducting periodic censuses.

Currently, the 45 SW is not contributing to the determining the introduction capabilities of Florida scrub-jay; there are historical and ongoing studies contributing to the other four items. The 45 SW undertakes these population studies, partially to fulfill requirements of the BOs and Incidental Take Permits and partially to better understand the species and its habitat needs. The results then inform management decisions and future consultations with the USFWS.

C.5 Historical Studies

Census studies of the Florida scrub-jay on CCAFS began in 1990 by base natural resources contractor personnel. In 1994, this work was contracted out to Florida Natural Areas Inventory (FNAI), who conducted scrub-jay activities through 2008, at which time all work was brought in-house to be conducted by 45 CES/CEIE-C biologists. In 1994, three primary study sites were established by FNAI for the purpose of conducting scrub-jay research on CCAFS. These sites were the Beach (BCH), Enhancement (ENH) and Rosemary (ROS). A fourth site, the North Rosemary (NRO) site, was added in 1995 and a fifth site, Parkway (PKWY), was added late in the summer of 1998. The PKWY, along with the BCH and combined NRO and ROS sites have the largest clusters of scrub-jay groups on CCAFS (Stevens et al.1998). Figure 1 reflects the locations of scrub-jay groups in 2013.

These studies have included studies of banded populations of scrub-jays in different scrub habitats and have provided a wealth of information that can be used to document the status of populations.

During the 2013 census, 45 SW CES/CEIE-C documented 476 birds in 138 groups on CCAFS (Figure 2). This is the largest recorded population within CCAFS since the annual census began. Of the 476 birds observed in 2013, 54 were identified as juvenile birds. Figures 2 and 3 show the numbers and locations of groups from 2009-2013.

Figure 1 – CCAFS 2013 Scrub Jay Groups

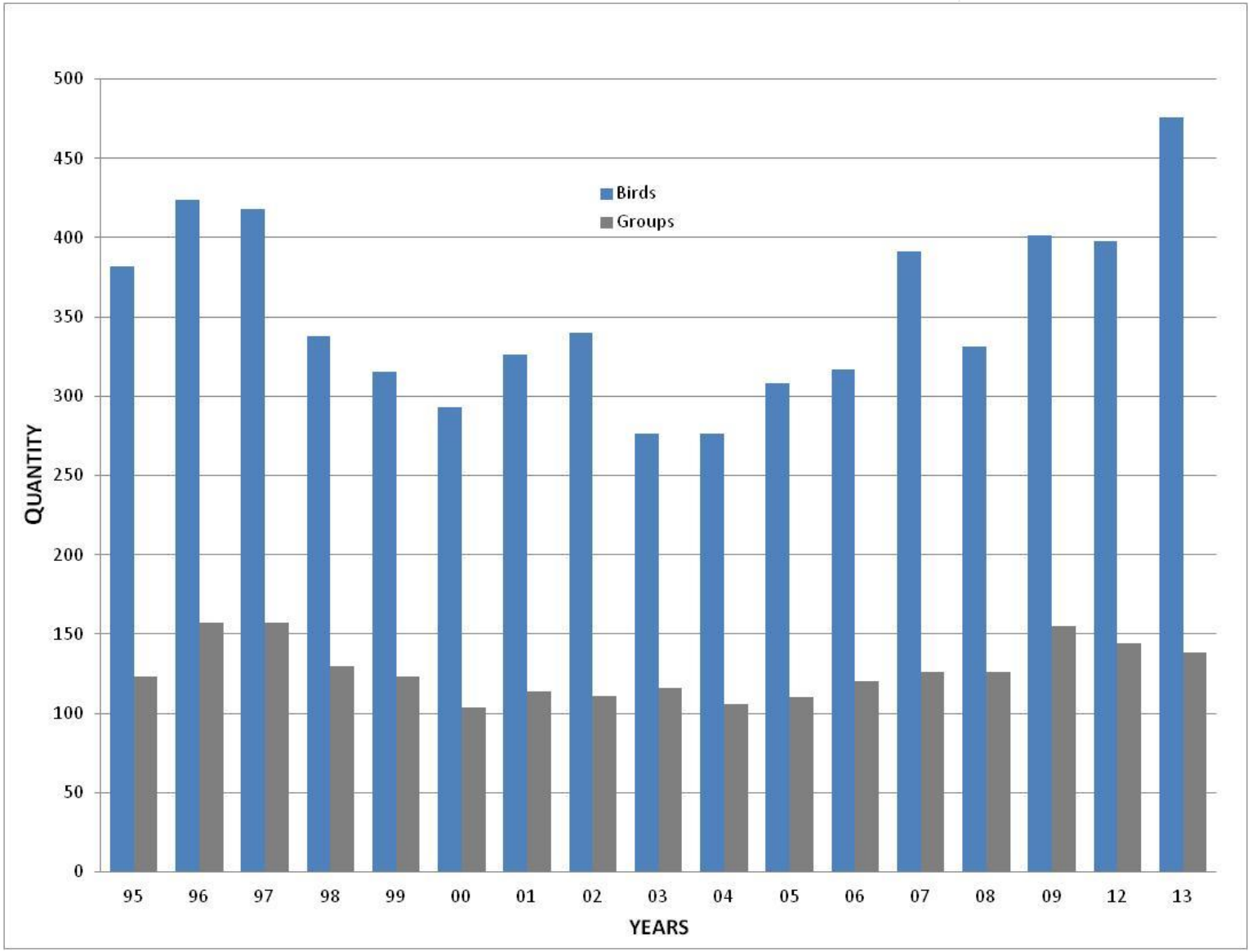

Figure 2 – CCAFS Scrub-jay Population and Number of Groups, 1995-2013

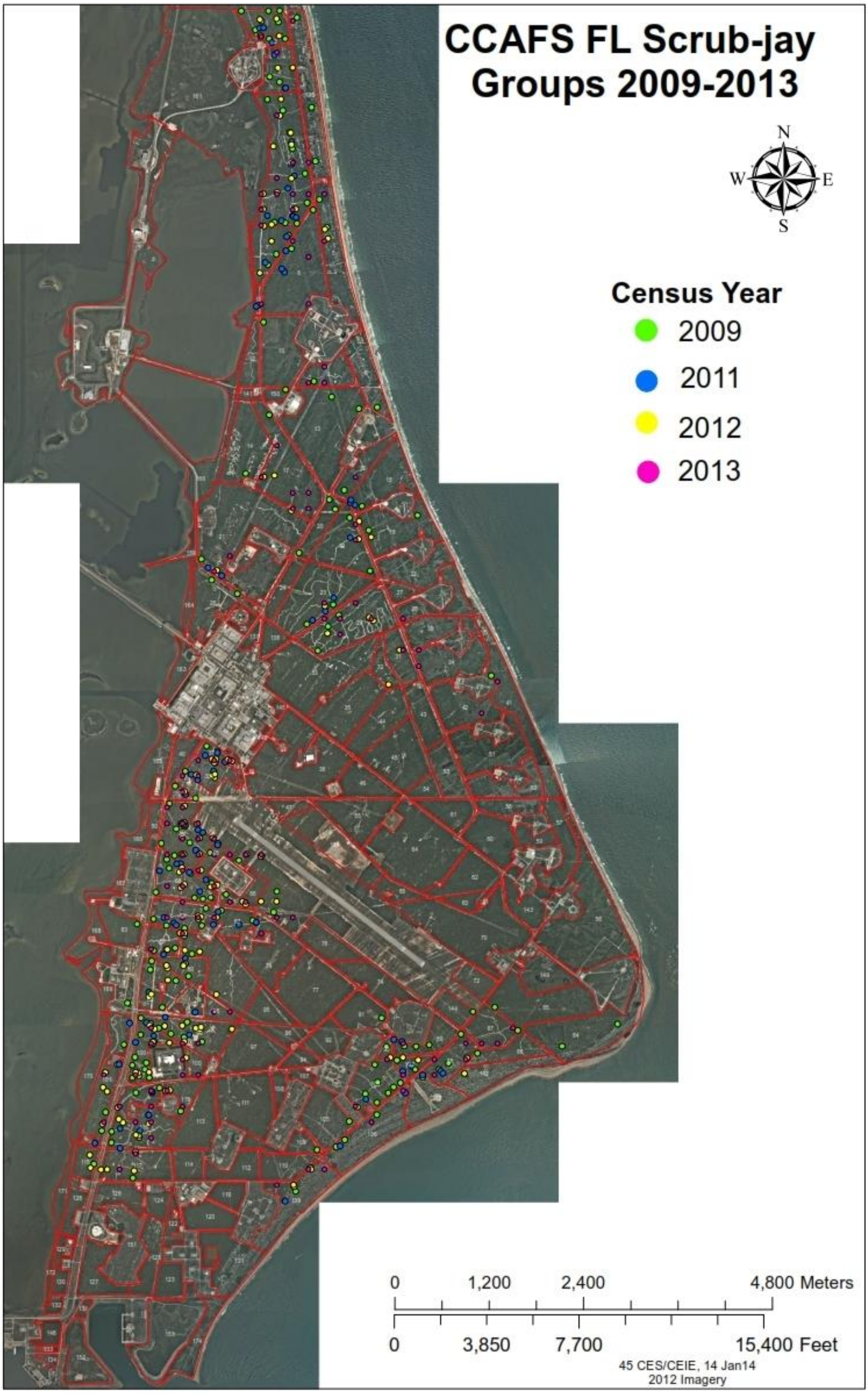

Figure 3 – CCAFS Scrub Jay Group Locations 2009-2013

C.5.1 Current Activities

In accordance with the September 11, 2011 amendment to USFWS Biological Opinion (BO) #4190-2010-F-0019, census studies are continuing at CCAFS. Due to budget and personnel constraints, detailed monitoring of groups has ceased with the exception of any monitoring required under BOs. Currently, an annual census is being conducted to determine the number of groups and individuals. Additionally, 45 CES/CEIE-C biologists are attempting to band at least one individual per group. Biologists regularly perform surveys in support of construction and other projects to ensure no nests and/or habitat is being adversely impacted.

A census of all suitable, accessible scrub-jay habitat is completed starting in mid June each year. Censuses are performed in virtually all potential scrub-jay habitat. Census protocols were adapted from Woolfenden and Fitzpatrick (1991). Where possible, census points are spaced at 100-yard intervals to minimize the potential for over- or under-counting groups and individual birds.

Banding is conducted by placing a uniquely identifying open ended metal ring around the leg of the bird. The bands are very light-weight and do not appear to impede the birds in any way. All steps are taken to minimize disturbance to the scrub-jays.

C.5.2

The 45 SW is currently working on a setting up a monitoring program to assess scrub-jay response to the different restoration techniques. Reliable estimates of nest survival are essential for assessing strategies for Florida scrub-jay conservation. Suppression of natural fires and the uncertainty of conducting regularly planned prescribed fire has changed the composition of scrub habitat over a large proportion of CCAFS. There are relatively few naturally open, sandy areas, which are essential to jays. During the past few years, squiggles and crop circles were constructed in several management units to mimic the open areas that jays need for their survival. These artificial openings may play an important role in understanding their effect on scrub-jay productivity. Scrub-jay nests will be monitored to determine nest survival in areas with natural and artificial openings. Nest searching shall begin in early March by visiting known territories. Behavioral cues by nesting females will help facilitate finding a nest. Once nests are found, they will be monitored at least weekly until fledging or failure. Habitat characteristics (scrub height, percent oak cover, etc.) near the nest will also be collected. Data will be evaluated using the nest-survival analysis implemented in program MARK (White and Burnham 1999; Dinsmore et al. 2002) or similar robust models.

C.6 CCAFS Scrub Habitat Compensation

Any loss or development of potential scrub habitat on CCAFS must be compensated. Based on a recent modification (2011) to an existing BO and Incidental Take Permit (2008, amended 2009, Appendix B), the 45 SW and the USFWS have updated the process for compensating for loss of scrub habitat on CCAFS, which was originally established in 1999. The 45 SW currently implements a 2 to 1 compensation rate for scrub habitat lost to development (2011 BO). The

project proponent will be responsible for mitigation and mitigation costs. Additional details on how and where to undertake compensatory restoration is described in the Scrub Habitat Restoration Plan (**Attachment C-3, Appendix C**).

C.6.1 Site Selection

In accordance with the September 11, 2011 amendment to USFWS BO #4190-2010-F-0019, the ratio for scrub habitat compensation has been reduced to 2:1. New construction in scrub habitat will be handled on a case-by-case basis consistent with the Scrub Habitat Restoration Plan (**Attachment C-3 of Appendix C**).

C.6.2 Identification of Requirement

Personnel of the 45 CES/CEIE-C will notify all proponents requesting land clearing of the need for compensation through the work order review or other EIAP process. When a project involving land clearing is proposed, all potential scrub habitat (good, fair and poor) loss, regardless of size, will be considered for compensation.

Whether the proposed area is currently inhabited by scrub jays or not does not factor into the compensation calculation. All scrub and potential scrub habitat loss must be mitigated according to existing BOs and Incidental Take Permits with USFWS. Unless otherwise negotiated, and in lieu of typical mitigation on a site-by-site basis, all scrub habitat on CCAFS that is lost to development will be compensated at a 2:1 ratio. As sites are earmarked for development, the proponent will be required to compensate for acreage lost to development.

C.7 45 SW Recovery Actions

This section provides a compiled summary of the ways that the 45 SW is contributing to the recovery of the Florida scrub-jay. Overall, management actions for Florida scrub-jays on CCAFS are primarily oriented toward habitat improvement, coupled with ongoing surveys, with the purpose of protecting and enhancing scrub-jay numbers and habitats. These actions have been developed through consultation with the USFWS. Some of these actions are included as reasonable and prudent measures and/or terms and conditions on various BOs and Incidental Take Permits and are, therefore, non-discretionary; other items are discretionary. All actions requiring funds to implement are subject to availability of funding

1. Habitat protection

- Review all actions to ensure there will be no adverse impacts to scrub-jays or their habitats (NEPA).
- Work with planners to avoid siting new buildings in occupied or potential scrub-jay habitat.
- Avoid construction and/or clearing activities during scrub-jay nesting season in areas where scrub-jays are known to occur to the maximum extent possible.
- If clearing of occupied scrub-jay habitat is to occur within the species nesting season, the areas will be surveyed prior to clearing to determine if there are any active scrub-jays

nests; if an active nest is located, to the maximum extent possible, 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. Habitat restoration

- Expand existing populations by restoring Land Management Units (LMUs) immediately adjacent to the major population centers.
- Create corridors between major population centers and ensure the corridors are wide enough to provide suitable potential territories rather than travel corridors.
- Create sandy and/or sandy/herbaceous openings in areas where fire is not creating the desired percentage of sandy openings. The specific technique and size will be determined through monitoring of openings previously created.
- Remove and/or treat invasive species in LMUs occupied by scrub-jays.

3. Habitat management

- Continue restoration and maintenance of LMUs currently occupied by scrub-jays, particularly in areas with many contiguous territories.
- Perform prescribed burning of an average of 300 acres per year over a rolling 10-year time frame.
- Maintain mowed road shoulders in areas with high concentrations of scrub-jays to provide adequate caching areas.
- Monitor and control invasive species in LMUs occupied by scrub-jays.

4. Population management (e.g., translocation, supplemental feeding, genetic management, etc.)

- Increase and maintain current breeder groups to 200.
- Review the base pest management contract to ensure pest management actions are not having adverse impacts to scrub-jays.

5. Monitoring

- Perform annual Cape-wide population census to determine number of groups and birds.
- Monitor response of scrub-jays to the varying techniques being used for scrub restoration such as artificial creation of sandy openings.
- Color band at least one member per family group, preferably a breeder.

6. Research

7. Regulatory and law enforcement

- Conduct Section 7 consultations for any action that has the potential to affect scrub-jays and/or their habitat.

- Maintain 35mph speed zone adjacent to west end of airfield; large numbers of birds cross over the road in this area.

8. Incentives and influencing

- Partner with the Brevard County Environmentally Endangered Lands (EEL) program to maintain existing and future 45th Space Wing scrub conservation easements on EEL properties purchased with DoD REPI funding.

9. Outreach

- Educate base and general public on 45SW scrub-jay program by attending local festivals, submitting articles to base newspaper and face book page, and conducting presentations at various venues.
- Educate wing leadership and launch program managers on 45 SW scrub-jay program and ESA requirements through briefings and the controlled burn working group.

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Acronyms for Florida Scrub-jay Management Plan

ABS	Archbold Biological Station
BCH	Beach (site)
BO	Biological Opinion
CCAFS	Cape Canaveral Air Force Station
CES/CEIE-C	Civil Engineer Squadron, Environmental Conservation Element
DoD	Department of Defense
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
ENH	Enhancement (site)
ESA	Endangered Species Act
ESC	Environmental Support Contract(or)
FNAI	Florida Natural Areas Inventory
FWC	Florida Fish and Wildlife Conservation Commission
INRMP	Integrated Natural Resources Management Plan
KSC	Kennedy Space Center
NFWF	National Fish and Wildlife Foundation
NRO	North Rosemary (site)
NWR	National Wildlife Refuge
PKWY	Parkway (site)
ROS	Rosemary (site)
SW	Space Wing
TNC	The Nature Conservancy
USAF	US Air Force, Department of the Air Force
USFWS	US Fish and Wildlife Service

Attachment C-3

Scrub Habitat Restoration Plan

Attachment C-3: Scrub Habitat Restoration Plan

C.1 Introduction

After the U.S. Air Force (USAF) acquisition of Cape Canaveral Air Force Station (CCAFS) in the 1950s, a fire suppression policy for CCAFS became effective. Total wildfire suppression was instituted to protect resources vital to the United States (US). In the late 1980s, the lack of wildfires or the implementation of a prescribed burning program on CCAFS was deemed to be a threat to the continued survival of the federally-listed (Threatened) Florida scrub-jay, (*Aphelocoma coerulescens*). Under the Endangered Species Act (ESA), all federal lands where the Florida scrub-jay (scrub-jay) is present must be managed in effort to improve the survivability of the species. A USFWS Biological Opinion (BO) prepared in January 1991 led to the development of a strategy for restoring the scrub habitat required by this federally threatened species. The CCAFS scrub habitat restoration program was initiated in 1991 for the purpose of restoring over-mature scrub communities to a condition suitable to support the scrub-jay. Initially, this program was accomplished solely through the application of prescribed fire. After the initial program, it was realized that over-mature oak scrub had to be managed with mechanical treatment prior to burning. Additional BOs since 1991 have further refined the strategy for scrub habitat restoration. See Appendix B for BOs relating to the Florida scrub-jay. Scrub habitat restoration also benefits other listed species, in addition to the Florida scrub-jay.

The Scrub Habitat Restoration Plan is for CCAFS and is primarily in support of scrub habitat compensation as required by BOs and Incidental Take Permits with the USFWS. The 45 SW may undertake additional scrub habitat restoration outside of permit requirements. The scrub restoration program reflects modern conservation practices aimed at promoting operational safety, efficiency and enhancing habitat utilization by various wildlife species. These actions are compatible with the CCAFS mission, but methods will be modified, as required, so that there is no conflict with the mission. This Scrub Habitat Restoration Plan will be revised, as needed, to incorporate operational changes in procedures and land use, and to incorporate information obtained from monitoring of the scrub restoration program. See Appendix J of the INRMP, Wildland Fire Management Plan for more on the overall wildland fire program for the 45 SW.

The purpose of the original burn program was to introduce prescribed fire in place of naturally occurring wildfires initiated by lightning strikes in the oak scrub. These burns maintain the oak scrub as a low, open habitat that many floral and faunal species have evolved to utilize. In addition, a fire regime reduces vegetative biomass to nutrients used to promote future plant growth; the newly sprouting vegetation supports numerous wildlife species by providing a preferred food source.

Mechanical treatment prior to burning is now used in some areas. The USAF employs a variety of techniques to maintain scrub habitat including use of a roller chopper, bull dozers equipped with Vee blades, Brown tree cutters, Brontasaurus, a Gyro Track, and other equipment that is useful for habitat restoration. Once the slashed material has dried sufficiently, the cut and dried material is then burned using the incinerator burn process. Trench burning is used more often than the burn box on CCAFS, especially in areas with a large amount of overgrown vegetation. The Air Curtain Incinerator approach efficiently disposes of large quantities of forest waste

products at very high temperatures with very little air emission (USDA 2002). Burning of mechanically treated sites is required to prevent an accumulation of debris/litter (fuel), and to maintain open patches of sand essential to scrub-jays. To the extent possible, subsequent treatment will include less mechanical site preparation and more reliance on prescribed burns.

Over the past several years it has become apparent with the lack of opportunities to burn due to constraints of the 45 SW mission, sandy openings within the scrub habitat that scrub-jays require could not be created and/or maintained long term. Therefore, in 2009 45 CES/CEIE-C began artificially creating openings using bull dozers. These openings, called "squiggles" or "crop circles," were the result of observations of firebreak areas noted after a prescribed fire (firebreaks were created in 2009 around active scrub-jay nests to avoid loss of nests from fire). 45 CES/CEIE-C personnel noticed that up to three years later these firebreaks were still present. Additionally, scrub-jays were responding favorably to the openings created by the firebreaks, using these areas almost immediately. Further monitoring is needed to determine nest success; however, juvenile birds have been observed within these land management units (LMU) where these artificial openings have been created and maintained.

In addition to improving the habitat, prescribed burns reduce the amount of fuel, thus reducing the possibility of catastrophic wildfires. The current fuel load on CCAFS is at dangerous levels due to the previous fire suppression program. This situation increases the dangers related to wildfires as the intense heat, produced by excessive amounts of fuel, inhibits efforts to control or suppress the blaze. An intense and uncontrolled wildfire would be counterproductive to the overall scrub habitat restoration and the overall mission on CCAFS.

The current scrub restoration program reflects modern conservation practices aimed at promoting operational safety, efficiency and enhancing habitat for wildlife. These actions are compatible with the CCAFS mission, but methods will be modified, as required, so that there is no conflict with the mission. This plan will be revised, as needed, to incorporate operational changes in procedures and land use, and to incorporate information from monitoring of the scrub restoration program.

The major wildlife species within CCAFS which benefit from the use of prescribed burning include white-tailed deer, squirrels, rabbits, gopher tortoise, Eastern indigo snake, quail, doves, Florida scrub-jay and a variety of nesting migratory birds. Benefits from burning include an increase in yield and quality of forage, browse from hardwood sprouts, and the creation of openings for feeding, caching and travel.

A total of 12,127 acres of land has been divided into 164 LMUs or compartments (Figure 1) to facilitate the scrub restoration program on CCAFS. Compartments were delineated by existing roads, firebreaks, lines-of-sight, canals and natural interdunal swales. These units have further been classified into good, fair, and poor scrub, and vegetation that will not be managed as scrub (Figure 2). This has resulted in approximately 8,485 acres that will be managed as scrub and subject to restoration activities. The type of techniques used will depend on the height of the vegetation, the condition of the scrub and the location within CCAFS.

C.1.1 Limitation to Prescribed Burns

Due to CCAFS mission-related operational constraints and weather restrictions, acceptable burn days are limited. Therefore, when suitable days occur, top priority is given to accomplishing the burn. A Prescribed Burn Working Group was established with participation from all key players that could potentially affect the scrub restoration/prescribed fire management program. This group has allowed for a better understanding amongst CCAFS organizations of the need for prescribed fire. Notification and a quick approval/rejection process have been developed as part of the Prescribed Burn Working Group which has allowed for more effective planning and conflict resolution.

Figure1. CCAFS Land Management Units/Compartments for Prescribed Burn Planning, as of 2013

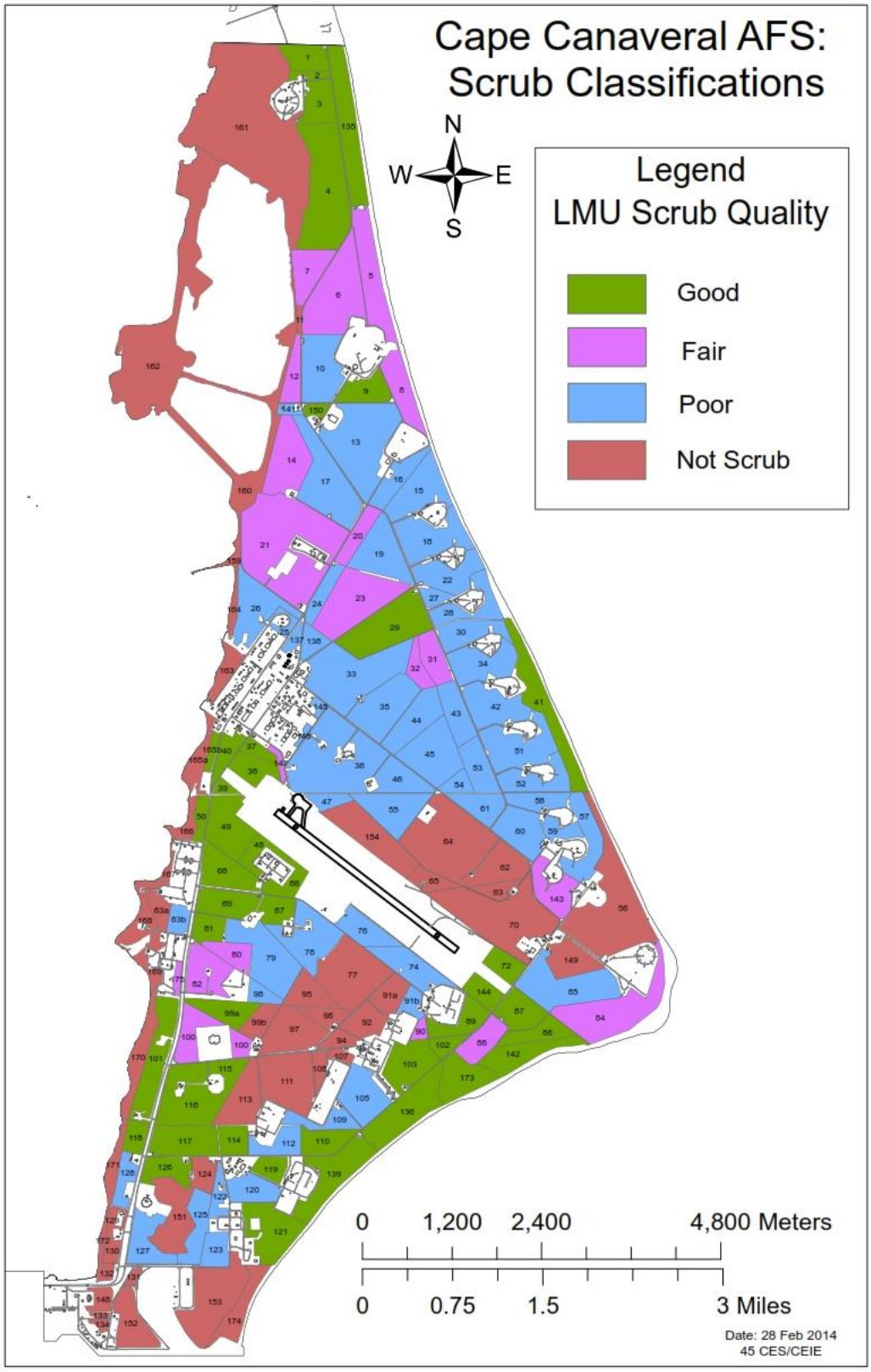

Figure 2. CCAFS Land Management Units; Scrub Community Quality

C.2 Scrub Habitat Restoration Protocol

As part of developing this Scrub Habitat Restoration Plan, the following information was considered:

- Scrub-jay populations have been shown to be demographically stable (reproduction > mortality) only where habitat conditions are optimal.
- Scrub communities within CCAFS are highly degraded due to > 40 years of fire suppression. In some areas, exotic plants, particularly Brazilian pepper, further degrade scrub habitat.
- Scrub restoration sites treated since 1998 show generally good recovery and improving habitat conditions; however, optimal conditions will not be produced by a single management action.
- Growth rates of long-unburned scrub often exceed that of scrub that has burned periodically. The coastal scrub that occupies much of CCAFS is often dominated by live oak (*Quercus virginiana*) which exhibits relatively rapid height growth.
- Scrub restoration is considered a process leading to a maintenance phase of management by prescribed burning rather than a single management action. Based on current knowledge, the following protocol seems most appropriate.
    1. Initial Restoration – mechanically cut to the extent required and conduct prescribed burns in scrub habitat.
    2. Conduct exotic plant treatment to the extent required one year following a restoration burn.
    3. Conduct a second burn approximately 3-7 years following initial burn (monitor to determine appropriate frequency).
    4. Conduct a third restoration burn approximately seven years after second burn.
    5. The second and third restoration burns and the long-term management burns are intended to be mosaic burns that produce and maintain a mix of optimal height and short scrub.
    6. Transition to long-term management through prescribed burning at approximately 5 to 10 year fire return intervals (mean = every 7.5 years).
    7. Monitor habitat, post-burn, to adjust frequency as necessary.

C.3 Activities Conducted Pre- and Post- Prescribed Burn

Prior to mechanical treatment, the proposed burn sites are visited to determine general presence of fauna, potential cultural resources, potential constraints, and monitoring transects. Heavy equipment operators conducting mechanical treatment activities are observant to the presence of wildlife including, but not limited to, gopher tortoises, indigo snakes, and nesting birds. All invasive species in the treatment compartments will be identified and delineated with GPS equipment prior to mechanical or prescribed fire treatment. Some LMUs programmed for treatment will be cut prior to burning. Mechanical treatment, as well as installation of firebreaks, of the units will be performed by the base environmental contractor. Prescribed burning of the units will be conducted by base environmental contractor personnel from the Air Force Fire Center. USAF land managers will identify sites to be burned, safety and security considerations, and dates when burns can be conducted without impacting the mission.

Sites will be prioritized based on their potential for improvement as habitat for scrub-jays. Due to the presence of the scrub-jay within the CCAFS scrub community, special consideration will be given to populated sites prior to cutting and burning. Based on the findings and recommendations of the most recent scrub-jay census, compartments will be treated and burned so as to reduce impact on scrub-jays. Once the site(s) are determined, sites will be mechanically cut at a height not less than 18 inches to lessen soil disturbance, and reduce the probability of creating areas for exotic species growth.

The USAF and Burn Boss will work closely together to determine primary and alternate dates for the prescribed burning of selected compartments once the sites are prepared. At least 30 days prior to the scheduled burn, an electronic message (email) is distributed to points of contact (POC) associated with the proposed prescribed burn. This list of contacts includes facility managers, launch squadron commanders, spacecraft managers, as well as civilians and contractors who provide spacecraft support and/or maintenance. This email message will include a map showing the location of the proposed burn and a brief description of the proposed prescription (acceptable wind direction, location of smoke sensitive areas, etc.). It is the POC's responsibility to disseminate the information to their personnel so that concerns may be addressed early. Follow up email messages are sent at 15, 7 and 3 days prior to the prescribed burn, as well as the day of the burn. Concerns raised by USAF personnel, civilians or contractors are handled on a case by case basis. If concerns cannot be resolved, the burn is rescheduled for one of the alternate dates. The process is then repeated until all are in agreement. See Appendix J, Wildland Fire Management Plan for more on the processes and requirements of the 45 SW wildland fire program.

Firebreak construction and maintenance must be completed prior to initiation of a burn. A number of firebreaks have been constructed on CCAFS to protect hazardous operation areas from the threat of wildfires. In addition, five vegetative firebreaks were constructed in 1988 as part of a multiple use project designed to reduce sightline and canal bank maintenance, improve wildlife habitat, provide additional security access and initiate a CCAFS firebreak system. Further, the road and drainage canal system on CCAFS provides an extensive network of disturbed land that facilitates bare ground firebreak construction. Therefore, firebreak construction has been identified and planned in accordance with the priorities established for the compartments' burning schedule.

C.3.1 Regulatory Requirements

Florida law requires a permit to conduct open burning in the state. This authorization must be obtained from the Florida Forest Service. The person responsible for conducting the burn must be in attendance for the entire period of the burn. The burn cannot be allowed to produce smoke, soot, odors, visible emissions, heat, flame, radiation or other conditions to such a degree as to create a nuisance. The Florida Forest Service can revoke burn permits for improper management techniques.

C.3.2 Activities on the Day of the Prescribed Burn

The burn should be initiated as soon as possible after the approved 9:00 A.M. start time. On the day of the burn, prior to setting the fire, coordinating agencies (Fire, Security and Safety Departments) and adjacent property owners will be notified. The Burn Manager will make a final check with the U.S. Weather Service and defer burning if predictions are unfavorable for the next 12 hours.

When planning and conducting prescribed fires, the Prescribed Fire Manager and Prescribed Burn Boss must exercise their responsibilities in a way that meets Clean Air Act standards (Public Law 95-95) and best serves the public interest. Prescribed fire stewardship emphasizes the immediate safety aspects of personnel conducting the burn; the health, safety, and property of others that may be directly affected by the fire; and the potential for off-site effects of smoke on public health and visibility. Prescribed fires produce varying quantities of smoke, an elusive by-product that can be a major concern; therefore, smoke management must be considered in every prescribed fire plan. See Appendix J, Wildland Fire Management Plan for more on the processes and requirements of the 45 SW wildland fire program.

All flames will be extinguished one hour prior to sunset on the same day as ignited.

C.3.3 Post Burn Activities and Observations

The application of herbicides to invasive vegetation will be conducted six to nine months post-burn in the recently burned area (and any part of the unit that did not burn). Monitoring for vegetative recovery (plant community structure and composition), burn success across the compartment (mechanically treated and untreated), and faunal recovery will be conducted post-burn. See Appendix G, Invasive Plant Species Management Plan for more on managing invasive vegetation.

Rehabilitation of any area on CCAFS following a prescribed burn will be by natural ecological recovery. Seldom will a fire destroy the root system of plants, therefore water and wind erosion potential is minimal. Observations of scrub areas burned on CCAFS indicate that most plant species re-sprout within six months after fire and demonstrate significant re-growth within the first year. The natural recovery mechanism built into the fire-dependent ecosystems of the area will be sufficient to rehabilitate the area following normal fire conditions.

If wildland resource loss due to fires does occur, rehabilitation will be through re-establishment of the target community as identified in the INRMP, this plan or other natural resources and land use plans. The method used will depend on the type and extent of resource loss incurred and the target community. Artificial site conversion from the pre-existing natural community type will not be undertaken.

C.4 Measuring Success

Since 1995, line-intercept transects have been used to assess vegetative recovery and burn success. Most land management units that were treated in the past had an average of two to three transects (50-foot length). Plant species, height and percent coverage along the line were recorded pre-burn and then in approximately six month intervals post-burn for up to three years. Based on this analysis, the general conclusions are that even with successful burns (greater than 50% of the compartment is burned adequately) vegetation response has been fair with a decent recovery of dominant species and low to moderate growth of vines and exotic species.

Around 2003, it was decided that vegetation monitoring was not providing the most worthwhile data for scrub restoration success analyses. The Florida scrub-jay population has been increasing at CCAFS, indicating that even though vegetative response post-burn is fair, the scrub-jays have increased reproductive success (FNAI 2005).

Consequently, the approach was shifted to the study of multiple treatment methods (such as "checker boarding", adaptive edge clearing, meandering clearing with planned openings, etc.) in an attempt to ascertain effective scrub treatment combining innovative mechanical methods with prescribed fire. Scrub vegetation was rebounding and growing in more densely after treatment than the pre-existing scrub thereby reducing the optimal scrub for the scrub-jays with shorter heights and greater numbers of open areas. Locally, CES-CEIE-E scientists and/or contractors have observed that coastal scrub responds differently than standard oak-saw palmetto scrub. Higher humidity and moisture levels in the coastal vegetation may be a challenging factor for treatment and re-growth post-treatment. The 45 CES/CEIE-C is using adaptive management to develop towards new treatment strategies. Compartments across CCAFS are being mechanically treated to provide strategic locations for prescribed fire if mission constraints prevent fire in one particular area for a period of time. The results of scrub-jay monitoring have revealed that the birds continue to colonize and use scrub restoration plots; however more optimal scrub habitat acreage is necessary for greater productivity of the scrub-jays (unknown source). Frequent follow-up treatment in the compartments is needed to reduce scrub vegetation density, maintain openings, and promote landscape level heterogeneity in scrub vegetation height. The 45 CES/CEIE-C is re-evaluating and devising an updated scrub restoration monitoring regime in combination with scrub-jay monitoring in order to utilize the most effective indicators for vegetative and species recovery and scrub restoration success. Meetings with USFWS will occur to discuss metrics and develop agreeable scrub restoration monitoring procedures.

Each year the scrub habitat restoration plan is reassessed and targeted compartments are evaluated based on the latest scrub-jay information (through site visits and meetings with the scrub-jay monitoring team), restoration techniques and resources. Work plans are developed for the annual targeted areas with a general prescription for each. The CCAFS scrub restoration program goal is to connect the main populations of scrub-jays on CCAFS by expanding the habitat where scrub-jays are currently located; linking these main population areas using corridors. As explained earlier and in the scrub-jay plan (**Appendix C, Attachment C-2**), CCAFS LMUs have been classified into four categories: good, fair, and poor scrub and units that are not considered scrub (Figure 2). The plan is to maintain good scrub in good/optimal and restore fair and poor scrub, starting in those units adjacent to where scrub-jays are currently residing. In addition, two main corridors will be created: one linking the population of scrub-jays on Pier Road to those on Phillips Parkway and one linking the scrub-jays on the north end to scrub-jays located further south (Pier Road and Phillips Parkway). A large amount of the Pier Road corridor has been completed using mitigation funds from the Skid Strip clear zone expansion, although it will be a few years until the habitat is considered suitable for scrub-jay occupancy.

Attachment C-4

Gopher Tortoise Relocation Plan

Attachment C-4: Gopher Tortoise Relocation Plan

C.1 Introduction

Per the Florida Fish and Wildlife Conservation Commission (FWC) 2012 *Gopher Tortoise Management Plan* (FWC 2012) (http://myfwc.com/media/2286685/GT-Management-Plan.pdf), military activities are exempt from obtaining permits and paying permit fees; therefore the 45th Space Wing (45 SW) is no longer required to obtain a permit from FWC for gopher tortoise relocations. The gopher tortoise (*Gopherus polyphemus*) is present within four 45 SW properties: Cape Canaveral Air Force Station (CCAFS), Patrick Air Force Base (PAFB), Malabar Transmitter Annex (MTA), and Jonathan Dickinson Missile Tracking Annex (JDMTA), and this Plan applies to these locations.

Protection of the gopher tortoise by the 45 SW is due to the anticipated federal listing (currently Candidate species), state listing (Threatened species), and the commensal relationship with other federally protected species.

C.2 Background

Requests for gopher tortoise relocation come up frequently on CCAFS due to what appears to be a substantial gopher tortoise population; a gopher tortoise census has not been conducted for gopher tortoises within CCAFS. Prior to the 2012 *Gopher Tortoise Management Plan* (FWC 2012), 45 SW obtained permits as required.

C.3 Management Methods

Tortoises that have the potential to be impacted are avoided and/or relocated to offset adverse effects to the species. Avoidance of impacts to the tortoise will be investigated first, before relocating a tortoise. For example, working with the project proponent and re-configuring the site plan to allow a greater distance (at least 25 feet) between gopher tortoise burrows and the construction footprint is a form of avoidance. In the event avoidance is not possible, relocation of the gopher tortoise will be initiated. The following are the current procedures utilized on 45 SW properties for gopher tortoise relocation issues.

C.4 Site Determination

Although the 45 SW is no longer required to have a FWC-issued permit for gopher tortoise relocation, the methods regarding relocation have not changed from when relocations were conducted under a permit. No single or centralized site will be used for all tortoise relocations; however, the 45 SW only relocates gopher tortoises within the boundaries of 45 SW properties. Donor sites (areas in which habitat suitability could be affected) will be surveyed to determine the number of tortoises occupying the site and the number of individuals that would require relocation. The proposed recipient site will be surveyed to determine the presence/absence of tortoises occupying that site, and the density of tortoises. If the proposed recipient site already contains a dense population of tortoises, an alternate site will be selected. Whenever possible, tortoises

removed from a single site will be treated as a "group or neighborhood" and will be relocated to a common recipient site.

Based on gross estimates from Geographical Information System (GIS) data and using 2005 imagery, approximately 11,000 acres of potentially suitable gopher tortoise habitat exists within CCAFS. Based on past relocation efforts, density of tortoises has varied greatly depending on the habitat. Density in poor habitat has been observed at less than 1 tortoise/acre while density in good habitat has been observed to be 2 to 3 tortoises/acre.

C.5 Animal Capture and Handling

If the observer cannot confirm whether a burrow is active or is not confident in a determination, the burrow will be assumed active. The presence of tortoises may be confirmed using a gopher tortoise burrow camera; however, confirmation employing this method is not always possible due to turns within the burrow. Typically, a backhoe is used to excavate gopher tortoise burrows. Bucket traps are used when backhoe excavation is not possible, such as when the burrow is underneath a road or slab of concrete that cannot be penetrated by the backhoe. Only "gopher tortoise excavation" experienced backhoe operators are used for this activity, with trained tortoise observers providing oversight and direction throughout the entire operation (FWC 2012). Since gopher tortoises are susceptible to cold stress, temperatures will be considered during all non-summer relocations. Tortoises are captured and/or relocated only on days when the overnight low temperature is forecast to be above 50 degrees Fahrenheit (F) for three consecutive nights.

Once captured, tortoises are measured and permanently marked using the scute drilling method (FWC 2012). Since a unique numbering system already exists on CCAFS and the adjacent Kennedy Space Center (KSC), the 45 SW will continue to utilize the existing gopher tortoise numbering system. During holding and processing periods individual tortoises are separated to minimize risk for cross contamination and the spread of disease, including Upper Respiratory Tract Disease (URTD), . All processing equipment is cleaned with a 10% bleach solution between use and tortoises are held in clean, separate containers.

C.6 Data Dissemination

All information relating to the tortoise relocation will be entered into a GIS database, and a short summary will be completed describing the relocation activity (donor and recipient site description, date, turtle identification, morphometrics, sex, general health, etc.). These reports will be kept on file in the 45th SW Civil Engineer Squadron, Environmental Conservation Element (45 CES/CEIE-C) office and this data is also provided to FWC during annual reporting in accordance with the Gopher Tortoise Candidate Conservation Agreement (GTCCA).

In addition, the 45 SW has initiated a program to compile and maintain historical tortoise relocation data, which includes GIS to analyze and display this data for future planning. A public awareness program has been initiated on CCAFS to encourage individuals to report sightings of marked

tortoises on CCAFS. These opportunistic sightings, along with project related relocation tracking, continue to be documented in the GIS database.

A GTCCA report is prepared annually (October through September) by the 45 CES/CEIE-C; the annual assessment report is required from each party to the GTCCA to document conservation activities occurring within the gopher tortoise's non-federally listed range (see **Appendix B, Attachment B-5.1** for a copy of the GTCCA). The annual assessment report is submitted to the Gopher Tortoise Team Chair by December 1 of each calendar year. Table 1 provides 2009 through 2013 data for select parameters that are included in the annual reports.

Table 1. 45 SW Results of Select Parameters from GTCCA Annual Reports, 2009-2013

Parameter	2009	2010	2011	2012	2013 (d)
Number of Tortoises Relocated to protected lands within 45 SW lands (a)	0	0	0	0	97
Number of Tortoises Relocated to unprotected lands within 45 SW lands (b)	22	47	4	15	0
Number of Surveys Conducted (c)	5 on CCAFS	8 on CCAFS	6 at CCAFS	28 at CCAFS, 1 at PAFB	17 at CCAFS, 1 at MTA

Source: GTCCA Annual Reports (2009 – 2013)

(a) Protected lands applies to any land that is protected from any future development (i.e. take of habitat).

(b) Unprotected lands do not have any enforceable protection commitments or use restrictions that would prevent them from being modified and made unsuitable for tortoises.

(c) Surveys conducted in response to gopher tortoise relocation requests (see sub-section C.2 above).

(d) According to 45 CES/CEIE-C personnel, prior to 2013, 45 SW lands were considered unprotected as the land was not a designated gopher tortoise recipient site. Therefore the 45 SW lands could be developed at some point in the future. Beginning in 2013, it was decided that 45 SW lands should be considered protected lands.