



2023 Secretary of Defense

# Environmental Awards

Natural Resources Conservation, Large Installation  
Patrick Space Force Base

## Introduction

Patrick Space Force Base (PSFB) encompasses 2,002-acres and is one of four main installations that constitute the Space Launch Delta 45 (SLD 45). This includes the 16,198-acre Cape Canaveral Space Force Station (CCSFS), 640-acre Malabar Transmitter Annex located in Palm Bay, and 11-acre Jonathan Dickinson Missile Tracking Annex located in Jupiter. Additionally, SLD 45 operates the Eastern Range which encompasses 15 million square miles extending from Florida across the southern Atlantic Ocean and into the Indian Ocean.

SLD 45 is responsible for overseeing the preparation and launch of U.S. government and commercial satellites from CCSFS; there are more than 74 mission partners and tenants at SLD 45, consisting of 3,807 military, 2,418

civilian, and 4,553 contractor personnel. The space launch mission brings new launch customers, increased workforce/contractors, and tourists that generates an economic impact estimated of \$1.3B per year. In addition to serving as the world's busiest spaceport, SLD 45 provides assured access to space while protecting 47 state and federally listed threatened and endangered species located in more than 15 natural communities including beach dune, coastal strand, maritime hammock, scrub, upland hardwood forests, pine flatwoods, mesic flatwoods, and several wetland communities.

## Background

The primary tool for managing SLD 45 natural resources is the Integrated Natural Resources Management Plan (INRMP). The INRMP assists PSFB with the conservation and

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rehabilitation of natural resources while ensuring mission readiness. The plan is reviewed and updated annually in collaboration with U.S. Fish and Wildlife Service (FWS), Florida Fish and Wildlife Conservation Commission (FWC), and National Marine Fisheries Service (NMFS), and is certified by the SLD 45 Civil Engineer Squadron Commander. The last annual review was completed in August 2022, and the INRMP is reviewed every five years with both external and internal stakeholders to ensure information and agency signatures are kept current. The last five-year revision was completed in September 2020. This was a monumental task considering the significant communication challenges associated with the COVID-19 pandemic.

The SLD 45 natural resources team (NRT) is comprised of seven Department of Defense (DoD) employees, separated into Habitat and Wildlife elements within the Civil Engineer Squadron. Integrated within the NRT are two embedded FWS biologists through the National FWS-Air Force Partnership. Nuisance wildlife control and Bird Aircraft Strike Hazard support is provided through contracts with the U.S. Department of Agriculture (USDA). Conservation Law Enforcement support is provided through a contract with FWC, and prescribed fire support is provided by the Avon Park Wildland Fire Support Module (APWSM) who report to the Air Force Wildland Fire Branch. To integrate mission operations and natural resource protection, the NRT sits on the Work Order Review Boards for CCSFS and PSFB, the Airfield Operations Board, and the Prescribed Burn Working Group; has partnerships with FWS and FWC for Southeastern beach mice; and is a cooperating party with the NMFS and Bureau of Ocean Energy Management for offshore sand dredging/placement for post-hurricane beach restoration.

## Accomplishments

### Leading DoD in Federally Listed Sea Turtle Management

The NRT played a significant role in the protection of federally listed sea turtle species, leading a 37-year productive sea turtle program, the longest in DoD. Both PSFB and CCSFS beaches provided nesting habitat for more than 9,000 nests, with CCSFS breaking its loggerhead turtle nesting record in 2022, documenting 3,804 nests. Both installations continued their 34th year as part of the Florida Index Nesting Beach Survey and State Nesting Beach Survey programs, which allows for the management of coastal development and promotes the recovery of sea turtles. To ensure maximum hatching success, USDA removed 110 feral hogs, 30 coyotes and 170 raccoons, which resulted in the production of 480,000 hatchlings.

In addition to predators, artificial lighting can cause both hatchling and adult sea turtles to lose or take incorrect bearings and become disoriented thereby interfering with the beach nest site selection of nesting females. These hatchlings and adults have been known to perish from the extended amount of time trying to find the ocean. Due to the SLD 45 mission, lighting is essential for safe launch operations. To ensure needs of both the mission and protection of sea turtles are met, the NRT implemented more than 15 Light Management Plans and reviewed and/or approved 23 lighting designs, which enabled SLD 45 to maintain compliance with the Biological Opinion issued by FWS that is required under Section 7 of the Endangered Species Act.

In 2021, the NRT volunteered to assist FWC with testing of a new nesting data collection application and hosted a site visit in 2022. The visit provided FWC the opportunity to improve the application capabilities, thus getting closer to releasing the application for other high density nesting beaches to use.



**Release of Rehabilitated Green Sea Turtle in the Trident Basin**

A juvenile green sea turtle is released back into the Trident submarine basin after being rehabilitated.

CCSFS is also home to a unique population of resident, federally threatened juvenile green sea turtles, which inhabit the Trident submarine basin and forage for algae from the rock revetments along the basin shoreline. The NRT completed its 30th year of monitoring the health of this population through studies with the University of Central Florida. Approximately \$75K in end of year DoD funds were successfully procured to understand why this population appears to be less healthy than turtles at other long-term study sites and to ensure current and future activities are not contributing to the decline in health. During the monitoring process, any unhealthy turtles captured during the biannual study are rehabilitated and brought back once healthy.

**Conserving Florida Scrub-Jays While Sustaining the Space Launch Mission**

SLD 45 is home to Florida’s only endemic bird, the Florida scrub-jay (scrub-jay), a federally listed threatened species. The CCSFS scrub-jay population is considered part of the larger meta-population that includes birds on the adjacent Kennedy Space

Center and Canaveral National Seashore and is the third largest population of scrub-jays left in Florida. The NRT partnered with personnel from Archbold Biological Station and FWS to complete the 26th annual census in record time. Results showed a 40% increase in the population over the past 20 years. Since the census is conducted during the nesting season, the NRT was able to determine there were 184 juveniles produced in 2021-2022 based on their plumage. Color-banding of individuals assists in identifying which birds belong to which groups, allowing biologists to track birds as they leave their natal group and join or establish new groups.



**Banding Threatened Florida Scrub-Jay**

A Florida scrub-jay is banded to assist in future identification of the bird after it leaves its natal group.

Scrub-jay habitat is restricted to low, dense oak thickets with numerous sandy openings that are used for foraging and caching acorns. Due to their narrow range of habitat requirements, managers continually restore and enhance habitat to allow for sustained utilization by scrub-jays. To achieve habitat suitability, the NRT use a combination of mechanical cutting and prescribed fire. The NRT worked around extensive mission constraints within a constantly changing space launch environment and increasing launch



tempo demands. Even with these challenges, SLD 45 natural resource managers have established an exceptional prescribed burn program, successfully enhancing quality of existing CCSFS scrub habitat while minimizing smoke impacts to personnel, vital mission payloads, and launch facilities.

In coordination with the APWSM, the NRT successfully burned 1,856 acres of scrub habitat across CCSFS, including the mechanical cutting and burning of 30 acres of tall dense hammock to create new scrub-jay corridors. These totals marked the best two-year burn acreage total and best one year total (1,250 acres) since the beginning of the prescribed burn program in 1992. In addition, these totals exceeded annual SLD 45 INRMP goals by 250%. These record totals were accomplished through successful coordinated efforts between the SLD 45 NRT, FWS, APWSM, mission support partners, launch community partners, public utilities, Florida Forest Service, and many others.



**Prescribed Burn Near Space Launch Complex 37**  
The Air Force Wildland Fire Burn Team conducts a prescribed burn to support habitat management on CCSFS.

### **Studying/Applying Innovative Management Techniques**

In partnership with the USDA and University of Florida, SLD 45 became the first in the world to utilize thrips, an almost microscopic, winged insect that is a biocontrol for the invasive Brazilian pepper tree. Over 260,000 thrips have been released at CCSFS and have

exhibited successful reproduction as well as damage to new growth tips, seedlings, and flowers. Continued monitoring with monthly releases of 4,000-10,000 thrips are anticipated to show biocontrol resilience and the need for less herbicide as damage becomes more widespread.



**Thrips-Brazilian Pepper Eating Insects**  
In partnership with the USDA and University of Florida, CCSFS became the first in the world to utilize thrips, the biocontrol for the invasive Brazilian pepper plant.

High ghost crab populations at CCSFS were assumed based on ancillary observations during nighttime light surveys, and after two years of ghost crab research, it was confirmed that a high population of ghost crabs at CCSFS prey on more than 8% of sea turtle hatchlings crawling to the water. Due to this research and the ability of the NRT to procure a third year of funding, regulatory agencies have approved limited removal of ghost crabs to control the ghost crab population. Follow up monitoring of sea turtle emergences will determine if control methods increase the number of hatchlings reaching the water.

Planning for future increases in launch tempo and added mission constraints on the Eastern Range, SLD 45 NRT and FWS funded a study on the efficacy of clean rooms during smoke events to reassure mission partners that prescribed burning can safely coincide with launch operations. The study involves researching and assessing past performances of existing clean rooms on the Eastern Range

during burn events, as well as researching best management industry standards for operations, maintenance, and sustainment of clean rooms. The goal is to make recommendations for clean room operations and establish a clean room standard that would improve user confidence regarding the facility's ability to protect personnel against smoke events from prescribed fire and wildfires.

The use of camera buckets to determine Southeastern beach mouse presence has assisted the NRT at streamlining Endangered Species Act Section 7 consultations as well as determining mitigation options when adverse impacts cannot be avoided to meet mission requirements. These cameras are passive and since animals are not required to be handled, a permit is not required. The camera buckets have enabled biologists to not only track beach mouse presence and distribution across CCSFS but have also assisted with detection of other non-target species.



#### Threatened Beach Mouse Detected

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#### Protecting Native Species Diversity

SLD 45 is home to a multitude of native fauna, some of which are protected by state or federal law. This includes more than 3,000 gopher tortoises which are considered a keystone

species because their burrows provide habitat for many other native species, some of which are also protected. The NRT reviewed more than 900 projects and performed over 400 field surveys to determine if impacts to tortoises could be avoided, and 16 tortoises were relocated from project sites to prevent impacts. All tortoises were measured, uniquely marked, and added to the SLD 45 Geographic Information System (GIS) for tracking ability.



#### Gopher Tortoises Being Relocated to Re-use Launch Complex 20

State-listed gopher tortoises are captured, marked, and relocated to allow re-use of Space Launch Complex 20 that has been abandoned for decades.

Although not a listed species, Osprey are federally protected by the Migratory Bird Treaty Act. They are common nesters within SLD 45 properties and tend to prefer man-made structures such as weather towers, light poles, and antennas. Since most of these structures support critical launch support activities, SLD 45 has installed 44 nesting platforms that have successfully encouraged Osprey to stay off these mission critical structures. The NRT performs an annual census to determine how successful the platforms are at keeping birds off structures. The census is a valuable tool during project reviews and helps determine when protection measures should be incorporated and if additional nesting platforms are required.

The NRT is regularly called upon to respond to various nuisance and/or injured wildlife and have developed a procedure to allow

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installation personnel to report injured wildlife to a central office, who can quickly reach the appropriate personnel to respond. More than 190 calls were received ranging from birds wrapped in fishing gear to live whales stranded on the beach. SLD 45 partnered with local wildlife rehabilitators such as Florida Wildlife Hospital, Brevard Zoo, and Sea World to ensure all injured wildlife are safely transported for proper care and treatment.

### **Promoting DoD Natural Resources through Outreach**

Base community relations and conservation education are important aspects of the mission of SLD 45. The NRT rallied 130 base personnel to remove 14 tons of trash from the CCSFS beach in 2022. Removal of this trash cleared the way for more than 9,000 nesting sea turtles and numerous nesting shorebirds.

The NRT showcased the SLD 45 natural resources program at the CCSFS Family Day, which hosted more than 15,000 base personnel and their families. Additionally, NRT educated base personnel and military dependents by conducting a sea turtle walk to watch a live sea turtle nest on CCSFS. This education also improved awareness of sea turtles through presentations at local schools, book reading, displays and beach walks.

The NRT also performed outreach to installation Explosive Ordnance Disposal, Security and Navy personnel through annual beach awareness and off-road driving training. This training outlined safe driving techniques to ensure the mission of others did not conflict with the protection of natural resources.

### **Preserving Biodiversity by Controlling Invasive Species**

Biodiversity is a critical factor for ecosystem resilience and invasive species are detrimental to native species and their habitat. The NRT has identified over 20 non-native faunal species and 43 invasive floral species, with 60% of the plant species listed as a Category 1 invasive by the Florida Invasive Species

Council. This classification indicates that most of the invasive plants on SLD 45 lands can change community structure and ecological functions.

More than 1,168 acres of invasive vegetation were removed from SLD 45 properties, with an emphasis on the Brazilian pepper tree, the most dominant invasive plant found on SLD 45. Observations after removal of invasives from the scrub community have shown recovery of native herbaceous and woody species, successfully meeting greater than 40% coverage of oak for this community type. Annual follow-up herbicide treatment of more than 800 acres ensured long-term control. Furthermore, vectors for new infestation were monitored through inspections of equipment being brought onto SLD 45 to ensure invasives were not spread.

### **Enhancing Sensitive Coastal Ecosystems on the Space Coast**

More than 50% of Florida's barrier coast is developed, making the SLD 45's minimally altered coastal ecosystem rare. Comprised of coastal grasslands, strand, scrub, wetlands, and beach dunes, this community is heavily used by the federally threatened Southeastern beach mouse. Over time invasive vegetation has severely degraded usable habitat for the beach mouse. Recognizing the opportunity to utilize mitigation funds from commercial launch companies, the NRT in collaboration with FWC and FWS developed a beach mouse habitat restoration project within 78 acres of coastal habitat. Over 23 acres of Brazilian pepper trees were removed and the area was re-planted using over 2,210 native coastal species. Successful re-establishment of a coastal grassland has transpired, with less than 8% coverage of Brazilian pepper tree re-growth, and preliminary beach mouse monitoring has shown an increased presence. Partnering with FWC and FWS resulted in additional funding totaling approximately \$50K for critical beach mouse monitoring and baseline vegetation and community assessments.



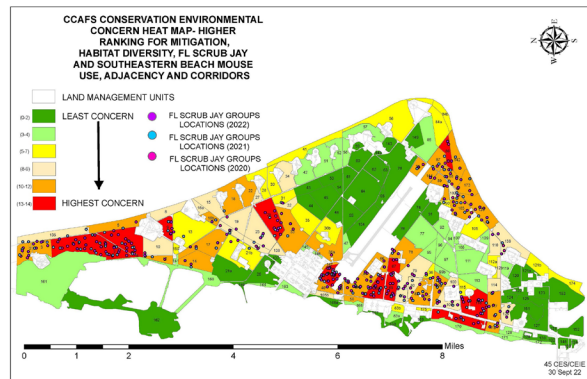
Coastal wetland shoreline restoration resulted in over one linear mile of more diverse wetland plant communities with roughly 3,800 native plantings that improve natural hydrology and bank stabilization. With installation of riprap for shoreline stabilization and loss of wetland area, compensatory mitigation resulted in wetland plantings, invasive removal, and three years of monitoring that documented survival of 80% of plantings and less than 5% of invasive plant cover. This success improved wetland function, diversity, and adjacent water quality for aquatic fish and wildlife.

Atlantic Ocean beaches are a vulnerable coastal ecosystem, especially since beachfront development across Florida has reduced viable habitat for native flora and fauna species. Both CCSFS and PSFB have limited beachfront infrastructure, although the PSFB beaches run parallel to the only barrier island transportation route. SLD 45 completed a 4.2-mile beach restoration project at PSFB that included more than 189,000 native dune plantings and protected adjacent infrastructure, widened beaches, and improved dune stability and diversity. Re-establishment of beach stability, dune profiles, and sand quality resulted in an average exceedance of 57% sea turtle hatchling emergence success rate, one of the highest values within the past decade.

### **Integrating Threatened and Endangered Habitat Protection with the Range of the Future Infrastructure Roadmap**

A natural resource mitigation plan was developed to support a \$2.3M CCSFS Range of the Future Infrastructure Roadmap. This mitigation plan determined the natural resource capacity with future development expansion, and minimized impacts to the most sensitive, more densely occupied threatened and endangered species habitat. The

mitigation plan began with the CCSFS Conservation Heat Map that utilized GIS to display ranked importance of specific habitat units overlaid with proposed development footprints that were strategically placed outside of highly diverse areas to prevent fragmentation and population decline. Original impacts in a five-year timeframe were estimated at 700 acres; the SLD 45 Heat Map use reduced more sensitive habitat impacts to less than 70 acres.



### **Conservation Heat Map Provides Snapshot of Environmentally Sensitive Areas of CCSFS**

This conservation heat map was created to assist with planning for the CCSFS Space Launch Range of the Future. It has been essential to future planning and has been instrumental in reducing environmental impacts while allowing improvements to increase mission capacity.

SLD 45 leadership asserted the Conservation Heat Map was a great decision-making tool for the Infrastructure Roadmap that has increased early transparency of environmental considerations and reduced complications caused by "after the fact" environmental review. Other critical planning meetings have been supported by the NRT with on-the-fly mapping for new commercial space launch analyses that assisted SLD 45 legal, leadership, and launch customers' understanding of potential space craft impacts. These streamlined communications resulted in comprehension of launch impacts more quickly and effectively.