



# 45TH SPACE WING

PATRICK AIR FORCE BASE  
CAPE CANAVERAL AIR FORCE STATION



SECRETARY OF DEFENSE  
2002 ENVIRONMENTAL AWARD  
NATURAL RESOURCES CONSERVATION  
LARGE INSTALLATION

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45TH SPACE WING, PATRICK AIR FORCE BASE, FLORIDA**

**INTRODUCTION AND BACKGROUND**

Along Florida’s Space Coast from which the vast Atlantic stretches east, the journey to space began years ago and continues today. The work of the 45th Space Wing (45SW) comes together amid the sensitive habitat of sea turtles and scrub jays. Headquartered at Patrick Air Force Base (PAFB) and nearby Cape Canaveral Air Force Station (CCAFS), the wing has been the backbone of the nation’s space program for more than 50 years.



As an integral part of the nation’s military, the 45SW ensures the Air Force’s vision of space power is a critical component of a lean, yet effective national defense force. The 45SW supports air and space superiority, global attack capability, rapid global mobility, precision engagement ability, information superiority, agile combat support and rescue, and oversees launch operations for Department of Defense (DoD) and commercial space programs.

The most outstanding feature of the 45SW conservation program is the ability to protect, preserve, restore, and remain outstanding stewards of the environment given the space mission and unique environmental considerations at six separate operating locations.

Responsibilities of the 45SW are far reaching. The wing’s Eastern Range includes 15,800 acres at CCAFS, 2,108 acres at PAFB, and extends more than 10,000 miles downrange from the Florida mainland through the South Atlantic and north to Argentina, Newfoundland. Facilities also include 652 acres of tracking sites at the Malabar and Jonathon Dickinson Missile Tracking Annexes in Florida and 4,087 acres of downrange sites at Antigua Air Station and Ascension Auxiliary Airfield.

Recognized as the world’s busiest launch base, the 45SW assures access to space, while personnel protect 46 species, or 58 percent of all federal- and state-protected animals and plants in the DoD.

Overseeing nearly 22,000 acres of sandy beaches, coastal sand dunes, fresh and salt-water wetlands, woodlands, and fragile sensitive coastal dune ecosystems is a monumental task.

The 45SW conquers this enormous responsibility through proactive management of a highly intense and uniquely intricate set of natural resource programs, including critical wildlife habitat restoration, protecting resources, and improving biodiversity.

**Natural Resources Conservation Team**

<b>Name</b>	<b>Position</b>
Alexander Stokes	Flight Chief
Clay Gordin	Planning/Conservation Chief
Mike Camardese	Natural Resources Planner
Angy Chambers	Environmental Planner
Dale Hawkins	Environmental Planner
Don George	Environmental Planner
Allen Reed	General Engineer
Terri Bracher	Public Affairs/ECAMP
Greg Liscombe	PALACE Acquire Intern
Dan Phillips	Environmental Support Contract (ESC) Program Mgr.
Jane Provancha	ESC Group Leader
Paul Schmalzer, PhD	ESC
Kris Herpich	ESC Wildlife Biologist
Alexis Alicea	ESC Environmental Scientist
Keitha Dattilo-Bain	ESC Environmental Scientist
Vince Greenwade	ESC MIS Manager

A strong commitment to environmental excellence keeps the 45SW in compliance with the National Environmental Policy Act (NEPA) and other federal, state, and local laws and regulations. Compliance is maintained through the Environmental Impact Analysis Process (EIAP), with personnel reviewing thousands of proposed actions, ensuring compliance with all environmental requirements.

**AWARDS AND RECOGNITION**

Year	Title	Level
2002	General Thomas D. White Natural Resources Conservation, Large Base	Air Force
2002	Air Force Outstanding Civil Engineer Environmental Flight	Air Force Space Command
2002	General Thomas D. White Environmental Quality, Overseas	Air Force Space Command
2002	General Thomas D. White Natural Resources Conservation, Large Base	Air Force Space Command
2002	General Thomas D. White NEPA Award for Team Excellence	Air Force Space Command
2001	The Secretary of Defense Natural Resource Conservation Team	Department of Defense
2001	General Thomas D. White Natural Resources Conservation, Team	Air Force
2001	General Thomas D. White Natural Resources Conservation, Small Base	Air Force Space Command
2001	General Thomas D. White Natural Resources Conservation, Individual/Team	Air Force Space Command
2001	General Thomas D. White Environmental Quality, CONUS, Non-Industrial	Air Force Space Command
2001	Audubon International Cooperation Sanctuary, Water Conservation Certification	National
2000	General Thomas D. White National Environmental Policy Act Award	Air Force
2000	General Thomas D. White Natural Resources Management, Large Base	AF-Honorable Mention
2000	Audubon International Cooperation Sanctuary, Env. Planning Certification	National
1999	General Thomas D. White Environmental Quality, Industrial	Department of Defense
1999	General Thomas D. White Environmental Quality, Industrial	Air Force
1999	General Thomas D. White Environmental Quality, Industrial	Air Force Space Command
1999	General Thomas D. White Natural Resources Management, Large Base	Air Force Space Command
1999	Public Affairs Achievement; Director's Excellence Award for Community Involvement in Environmental Planning	Air Force Space Command
1999	General Edwin W. Rawlings Award for Env., Officer/Civilian	Air Force Space Command
1998	General Thomas D. White Natural Resources Management, Large Base	AF-Honorable Mention
1998	General Thomas D. White National Environmental Policy Act Award	AF-Honorable Mention
1998	General Thomas D. White Natural Resources Management Award	Air Force Space Command
1998	General Thomas D. White National Environmental Policy Act Award	Air Force Space Command
1996	Outstanding Environmental Flight Award	Air Force Space Command
1993–2003	Tree City USA, National Arbor Foundation	National

In addition to operational considerations, the climate and extent of natural resources provides unique challenges in maintaining the fragile balance between hazardous rocket operations and the rare ecosystem. Due to barrier island influences and the effect of two climate zones, an ecosystem has evolved that is unlike any other in the Northern Hemisphere.

Repeatedly recognized for outstanding achievement, the 45SW’s mission of environmental stewardship, along with legal requirements, shapes its natural resources goals. The program goes beyond just meeting statutory and regulatory requirements by always “going the extra mile.” Personnel continually seek better, more efficient ways to accomplish tasks and meet challenges through innovative technologies and partnering.

**PROGRAM SUMMARY**

**Overall Conservation Management**

The 45SW’s mission is space and its responsibility is the earth. The overall objective of the 45SW’s environmental program is to support the Air Force mission of assured access to space while protecting and preserving the environment.

Referred to as “the model to follow” by the United States Fish and Wildlife Service (USFWS) and the Florida Fish and Wildlife Conservation Commission (FWCC), the 45SW is tops in protecting threatened and endangered species. Initiatives continually exceed expectations and requirements.

A comprehensive revision of the Integrated Natural Resource Management Plan (INRMP) was completed that vastly improves natural resource management. Usability and access were enhanced through the monumental task of incorporating

numerous natural resource programs spread out over six installations, 10,000 miles apart.

Going “above and beyond,” the team completed the revision in May 2001, six months ahead of the Sikes Act Improvement Amendment statutory deadline. The revision was the first completed in Air Force Space Command (AFSPC) and the Air Force that was fully coordinated with wing organizations and regulatory agencies. The 45SW INRMP is noted to be an exemplary guide for protecting the natural resources under its jurisdiction.

**Ecosystem Management**

As the world’s premier “Gateway to Space,” the 45SW’s space mission requires a constant state of checks and balances with the environment. With 74 space launches during the last three years and 3,302 launches to date, the 45SW maintains an incredibly intense launch schedule coupled with the



responsibility to minimize impacts and restore the sensitive barrier island ecosystem.

A detailed program is in place to monitor the environment surrounding each launch site before and after every mission to document and minimize damage. Space launch missions involve massive quantities of exotic fuels and toxic substances. Monitoring and identifying potential launch-related effects to wildlife, air, water and soil is now a routine part of every space mission. Data collected is entered into a Geographical Information System (GIS) database to track cumulative impacts. Results are incorporated into NEPA documents and provide valuable information to support existing and future launch operations.



Controlled burns are conducted to improve and enhance habitat of the threatened Florida Scrub Jay and other indigenous scrub habitat species. The scrub jay is a federally listed species primarily due

to the loss of natural habitat. Forty years of fire suppression caused the natural cycle of the coastal scrub community to become adversely interrupted and the scrub became overgrown. The 45SW developed a scrub habitat restoration plan to address and mitigate the loss of habitat due to mission-related development. Controlled burns help convert over mature scrub to a condition suitable for scrub-dependent species. During the last three years, mechanical clearing and 11 controlled burns were conducted that encompassed approximately 800 acres.

Personnel took immediate, protective action when the only known population of endangered juvenile green sea turtles in the world was discovered inhabiting the Navy Trident Submarine Basin at CCAFS. The basin provides a unique ecosystem with its algae-covered rock revetment providing a perfect foraging area for this unique size class of juvenile green turtles. Monitoring is done to ensure there are no adverse impacts on the species from space operations.

**Land Use Management**

A Herculean effort was completed by the 45SW to protect one of the world’s greatest natural resources—Florida beaches. Continually eroding from seasonal and tropical storms and hurricanes, a massive \$8.3 million beach renourishment program began in 1999 at PAFB.

In 2001, 75 percent of the beach was completely restored at a cost of \$6 million. This three-mile restoration marked the first time the



wing joined hands with local authorities to complete a joint beach restoration project. Brevard County had received funding to nourish the 9.5 miles north of PAFB. 45SW environmentalists seized the opportunity, partnered with the county, and saved approximately \$1 million by piggybacking on their already approved permits, environmental assessment, consultations, and contracts.

More than 827,000 cubic yards of high-quality, “turtle friendly” beach sand was pumped from an offshore site to replenish beach areas and restore the natural ocean floor contours.

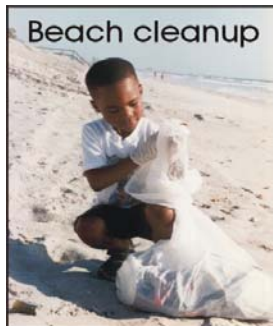


However, efforts did not stop there, and a final component of the nourishment project was stabilizing the dunes by installing 167,000 native coastal plants. Plant root

systems help stabilize dunes, while leaves and branches trap sand blown from the beach during high winds, thus, raising dune heights. More than 2,750 sea grape trees were planted, creating a visual barrier that reduces sea turtle hatchling disorientation. To protect the dunes and plants, wooden crossovers were designed and constructed to allow beach access without harming the fragile dune ecosystem.

The new sand protects costly, mission-essential equipment and provides ideal nesting habitat for thousands of threatened and endangered sea turtles. The team’s biologists aggressively monitored all nourishment activity to guard against adverse impacts to these majestic creatures’ nesting grounds.

Conservation personnel partnered with the grounds contractor to identify areas where maintenance could be reduced to promote revegetation of sensitive riparian areas and fragile sand dunes and reduce pollution. This initiative reduced mowing of four acres and saves about \$4,500 annually while improving riverine wetlands and coastal dune habitat.



The 45SW’s dedicated commitment to protecting and restoring natural resources is demonstrated by massive beach and shoreline cleanup efforts. Storms cause huge amounts of trash

to wash ashore and accumulate on beaches. During the past three years, 660 volunteers collected more

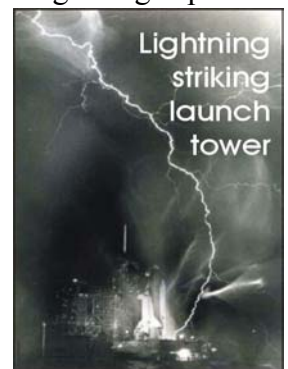
than 150 tons of trash from over 21 miles of beach. An incredible four tons of the trash was recycled.

Personnel aggressively created partnerships with community organizations—Keep Brevard Beautiful and the Center for Marine Conservation, Florida Coastal Cleanup—in countywide and international cleanups. In November 2001, the conservation team volunteered to accomplish a badly needed out-of-cycle beach cleanup. Since the beaches were closed to the public following the “Attack on America” on September 11, the team recruited 50 base volunteers to tackle the war on trash. Three tons of garbage was collected in less than three hours along a three-mile stretch of beach.

Permanent removal and treatment of exotic vegetation is incorporated into land clearing and cutting projects through the EIAP process, thus, ensuring native ecosystems continue to thrive. Without treatment, clearing and cutting promotes exotic species growth and it subsequently overtakes desirable native vegetation. Project designs are reviewed and use native species in landscaping. Integrating exotic vegetation control resulted in 750 acres of land being protected from further spread of invasive species. An updated digitized vegetation map is now in the GIS program for NEPA/EIAP analysis, scrub habitat restoration planning, high-fuel load identification, and master planning for use in citing new construction.

**Forest Management**

Central Florida is known as the “lightning capital of the world.” Lightning-induced wildfires are a constant threat to 45SW facilities. However, this natural fire regime serves two purposes—it reduces the fuel load and maintains scrub habitat at a desirable height and mosaic for native wildlife.



For most of the last 40 years, the 45SW practiced fire suppression at CCAFS to protect the nation’s valuable space assets. Consequently, the endemic

scrub oak habitat succeeded into large oak hammocks significantly reducing the natural habitat for the threatened Florida Scrub Jays and other indigenous species. In addition, a dangerously high-fuel load accumulated as the natural process was interrupted and represented a potential for catastrophic wildfires that could affect the nations assured access to space.

The 45SW conducted a fuel-load survey (amount of biomass capable of burning) of CCAFS using the GIS. Areas with a high-fuel load are integrated into the habitat restoration program and scheduled for mechanical treatment and controlled burning.

In partnership with the USFWS, an ongoing ecologically balanced fuel-load reduction plan was established. These efforts protect critical space launch assets, restore species habitat, improve forest quality, and promote biodiversity.

A working group was established to develop controlled burn notification procedures for CCAFS and nearby Kennedy Space Center (KSC) that includes forecasted wind direction and duration. The team coordinates with space launch vehicle contractors and payload customers to ensure there are no impacts to critical space flight hardware from smoke generated by the burns.

An integral part of habitat restoration efforts is



keeping exotic plant species from invading newly restored areas. An aggressive program to monitor and eliminate invading exotics was initiated with approximately \$262 thousand invested over

the last three years. This improves foraging habitat for numerous species, including white-tailed deer, eastern indigo snakes, and gopher tortoises.

***Fish and Wildlife***

Each year the ancient procession of threatened and endangered female sea turtles come to nest on 45SW shores. Installation beaches, part of the second largest Loggerhead nesting region in the

world, provide habitat for more than 5,000 protected sea turtle nests annually.

Diligent monitoring and protection efforts, including resolving lighting issues, removing predators, and relocating nests has resulted in more than 15,000 nests yielding approximately 1.5 million hatchings during the last three years. This 70 percent Loggerhead hatching success ratio



exceeds the USFWS Recovery Plan goal of 50 percent. Additionally, two extremely rare leatherback nests were monitored in 2001 with an 87 percent hatch success.

In addition to protecting sea turtles, the 45SW is committed to meticulously monitoring, preserving, and protecting the federally listed Florida Scrub Jay. CCAFS enjoys the third largest remaining population of scrub jays in Florida with 340 individuals in 114 family groups. The 45SW has partnered with The Nature Conservancy for the last nine years to study the demography of scrub jays on wing facilities. An annual CCAFS-wide census determines number of birds, health, territories, and survival from previous seasons. It also depicts whether current measures are successful and provides guidance for future initiatives. The 2002 census indicated a 13 percent increase in the population—a positive step toward recovery.

Lauded by regulators as a model for other landowners to follow, the 45SW partners with the USFWS in scrub jay habitat restoration at CCAFS. Natural resource managers conceived and implemented a scrub



Florida Scrub Jays in nest

habitat compensation plan that requires proponents, such as new commercial space launch developers, to fund future scrub habitat restoration when construction activities destroy these areas.

A Biological Opinion issued by the USFWS requires that four acres of habitat be restored for every one acre lost. Restoration funds are paid by non-45SW organizations and held in a special USFWS account until ready for execution. These actions were ingeniously incorporated into the wing’s INRMP. The process aides the 45SW in meeting the requirements of the Endangered Species Act without compromising the wing’s space mission.

Visionary actions, coupled with effective partnering with regulatory agencies, significantly reduced time to relocate threatened and endangered species for critical space launches, restoration, and construction activities. This state-approved, innovative comprehensive relocation plan and procurement of a blanket permit were used to relocate 100 gopher tortoises. Relocation time was reduced by 76 percent—from 21 to 5 days.



Taking protection a step further, personnel tested tortoises for a highly contagious upper respiratory tract disease that decimated some populations in other areas. The Air Force also funded a radio telemetry study to determine the impact relocation has on tortoises.

Once again at the forefront of partnering initiatives, the 45SW aggressively teams with regulatory agencies to develop procedures that rescue Great Horned Owl eggs and chicks from space launch towers yet preserve mission schedules.



Historically, it could take up to a month for biologists discovering eggs on launch facilities to

receive the required permit for each individual incident resulting in lost productivity and delays to launch schedules. As proven champions, personnel can now remove the eggs under a blanket permit and take them to the Audubon Center for Birds of Prey when they are first discovered. All events are recorded and submitted in an annual report. The birds are later released back on 45SW property ensuring future generations thrive.

The conservation team again rose to the challenge when ospreys were nesting on mission-critical antennas and communication and launch towers. The team erected 38 alternate platforms that encouraged nesting away from equipment; in turn reducing potential impacts to scheduled maintenance and space launch missions. Osprey pairs now nest annually on these platforms. Personnel conduct a yearly census to ensure any new nests found on critical structures are quickly relocated.

Personnel responded to more than 100 incidents involving sick and injured wildlife. Injured wildlife are transported to licensed wildlife rehabilitators then returned to their point of capture upon successful rehabilitation.

To protect threatened and endangered sea turtles and their nests and eggs, an intense predator removal program was implemented. Raccoons and feral hogs can destroy 100 percent of all nests deposited on a beach. Over the past three years, personnel removed more than 400 raccoons and 275 feral hogs from sea turtle nesting areas.



Not satisfied with meeting only minimum requirements, 45SW conservationists protect all wildlife—not just threatened and endangered species. When concern was raised about “deer strikes” by vehicles on CCAFS, 45SW personnel partnered with FWCC deer biologists to develop a white-tailed deer census program. This initiative defined the population and outlines potential species management actions.

**Other Natural Resources**

The 45SW leads by example as the first AFSPC base to achieve the National Arbor Foundation Tree City status and has maintained this distinction for ten years.



The conservation team took the initiative in 1993 to apply for this certification well in advance of the Air Force mandating it in 1994.

Diligent efforts resulted in PAFB becoming one of the first military installations to have its golf course earn the Audubon International Cooperative Sanctuary Program certification. This program recognizes outstanding efforts in developing and managing the golf course in an environmentally safe and friendly manner by implementing programs that provide better wildlife habitat, reduce pesticide use, and conserve water.

Constantly vigilant during project reviews, biologists ensure the use of native plants in landscaping projects to reduce supplemental watering. A quality-of-life project to plant 220 trees was successfully completed.

Natural resource personnel successfully restored 150 acres of wetlands at CCAFS that became isolated during construction of Titan launch facilities decades ago. The area degraded into an unhealthy ecosystem and the wetland previously subject to normal river fluctuations lost its natural biodiversity and the water chemistry was altered. As the area was no longer a nursery for vertebrates and invertebrates, it changed the entire wetlands.



By diligently working with regulators for permits, two 42” culverts were installed to reconnect the area

to the river. The adverse environmental impacts of decades of isolation quickly began reversing. To

ensure the safety of the federally endangered West Indian Manatee, the design included gating that prevents manatees from becoming trapped in the culverts.

A Gabion stabilization system was constructed during a campground expansion project to stop shoreline erosion and prevent runoff from entering adjacent wetlands. More than 20 tons of wetland invasive and exotic plant species along the Banana River were removed and replaced with native mangroves and spartina.

**Pest Management**

Always looking for better, cheaper, more efficient and environmentally friendly solutions to problems, the 45SW is using an innovative mosquito control method. More than 100 bat houses were installed. Each bat house can hold up to 200 bats, and one bat can consume up to 1,000 mosquitoes each night. Bat houses were placed on 20-foot poles and sited in areas where mosquitoes breed. Controlling insects by attracting bats is a safe and environmentally sound alternative to using pesticides while also saving money.

Protecting threatened and endangered species while protecting human life go hand-in-hand at the 45SW. Southeastern Beach Mice are typically found in coastal dune habitat and the



Cape is one of the last known areas where this species is thought to thrive. These threatened creatures have exceeded their known habitat range and were found miles from the beach. Facilities were invaded causing common rodent problems.

The 45SW initiated a Section 7 Consultation under the Endangered Species Act. By partnering with the USFWS, a programmatic agreement was reached to keep facilities rodent-free while still protecting this species. All beach mice captured are subsequently released elsewhere.

**Education and Community Relations**

*Education is the key to success!* Community relations and conservation education at, and by, the



45SW is extensive. Personnel “spread the word” through 30 news articles, conducted 36 speaking engagements, participated in and set up displays at more than 25 on- and off-base events, and conducted numerous news media interviews.

Information pamphlets developed by in-house personnel educate the base populous and the local community on threatened and endangered species, controlled burns, scrub restoration, general conservation efforts, and biodiversity at wing installations. Information posters, including narratives and color pictures of animals, were erected at construction sites indicating the presence of the species and what to do in case one is encountered. The comprehensive web page provides information on 45SW environmental programs worldwide.



During the last three years, personnel eagerly conducted 35 news interviews, including a “Media Day” where 20 news reporters had an opportunity to learn and

report about five major natural resource protection initiatives. The resulting coverage was a phenomenal success with four television stations airing in-depth stories on the wing’s programs.

Environmental flight personnel provided presentations and participated in environmental programs at local schools, the base open house and air show, and command and multi-command environmental symposiums. Taking advantage of every available opportunity, these dedicated experts actively incorporated natural resource conservation information in the weeklong Environmental and Energy Awareness Week celebration co-sponsored with the National Aeronautics and Space Administration (NASA).

Community outreach efforts included judging science fairs at local schools and presentations at two international sea turtle meetings. The 45SW Natural Resources Program was presented at the National Conference of Registered Environmental Professionals and the 8th Annual Public Interest

Environmental Conference at the University of Florida Law Center by special request.

Base and community volunteers are encouraged to participate in beach cleanups with educational information on display at check-in sites. “Turtle walks” are sponsored for base personnel and the general public to promote the balance between wildlife protection and 45SW’s mission. Crossing all environmental sectors, conservation team members provided natural resources briefings to the 45SW’s community-based Restoration Advisory Board under the Installation Restoration Program.

The 45SW was handpicked by Brevard County to join a steering committee participating in “Brevard Tomorrow.” Comprised of members of local businesses, natural resource interest groups, local and county governments, and university academicians, the committee developed a plan that allows the county to preserve and enhance its remaining natural resources while continuing its economic growth.

Arbor Day celebrations and tree plantings at numerous locations, including the Child Care Center, Base Exchange, campgrounds, and base chapel inject a spirit of cooperation and awareness.

### ***Environmental Enhancement***

The first step toward protecting natural resources is incorporating it into daily decision-making processes. The 45SW is unique in the Air Force due to its complex mission and mix of military, DoD, civilian, tenant, commercial and contractor personnel. Because of the diverse nature of the 45SW and its operations, the EIAP was streamlined through development of a working group consisting of Air Force and other governmental agencies and contractors to aid in open discussion and resolution of EIAP issues.

Over the past three years, more than 2,600 work orders were reviewed and over 200 project-specific NEPA documents were processed, each within 5–10 days of receipt. There were no adverse impacts to natural resources or construction/maintenance projects, new programs, or mission schedules. Checklists were made

user-friendly, while boilerplate language expedites routine projects. Responsibilities were identified to reduce potential delays.

Natural resources issues are incorporated into all wing-planning efforts through a comprehensive siting and coordination process. More than 50 site plans and over 400 dig permits were reviewed ensuring all natural resource issues were identified and resolved.

The EIAP working group worked hand-in-hand with Boeing and Lockheed Martin during the construction of the nation’s newest fleet of space rockets—the Evolved Expendable Launch Vehicle—to ensure there were no

adverse impacts to the environment. Sea turtle lighting issues, reimbursement for scrub jay habitat mitigation, and the relocation of 56 gopher tortoises were addressed.

Protection of migratory birds is now included in engineering technical specifications for tower maintenance and construction. Nesting platforms are erected nearby newly constructed towers or adjacent to existing towers to encourage birds to nest away from critical, mission support equipment. When nests have to be relocated, physical deterrents are added to existing towers to prevent future nesting. USFWS guidelines are incorporated into new tower construction, including warning lights designed to deter birds from the area. Additionally, guy wires are reduced as much as possible and proponents are encouraged to use space on existing towers instead of building new ones.

***Mission Enhancement***

In order to comply with the Endangered Species Act and Biological Opinions issued by the USFWS, controlled burns are carried out as an integral part of habitat restoration work on CCAFS and KSC. Smoke and particulates dissipated by wind direction, could be potentially harmful to sensitive spacecraft, payloads or other operations. As a result

of an Air Force/NASA working group, all organizations are now notified of burns so that each facility can advise if a delay is necessary. In the event the area scheduled for burn poses concern, the team built in flexibility so that an alternate compartment could be burned instead.

A comprehensive matrix of natural resource information was developed for every active, inactive, or planned launch complex and other base areas to facilitate sound use/reuse decisions. The 45SW developed ranking factors for wetlands, threatened and endangered species, and other considerations. This information provides a complete picture of environmental effects of modern space launch operations that are incorporated by strategists and planners when making decisions on new projects or launch programs.

***Natural Resources Compliance Program***

As a result of tireless efforts and countless measures to protect endangered sea turtles and hatchlings from being disoriented by artificial lighting, state regulators and the USFWS cite the 45SW as having the only successfully implemented large-scale light management program in the world.

Light reflecting off breaking waves act as a queue for orienting hatchling sea turtles toward the ocean. Lights from beachfront or inland sources can mean the difference between life and death to these creatures.

Disoriented hatchlings move away from the surf toward these lights and can be lost to predation, desiccation, and starvation.

Space launch complex and other facility lights were disorienting turtles. Three federally listed species consultations were required and a Biological Opinion was issued to the 45SW limiting nest disorientation from lighting to two percent of the total nests deposited. 45SW biologists researched the disorientation phenomenon and developed the first ever Light Management Plan written specifically for sea turtle preservation.



Numerous projects were programmed, funded, and implemented for exterior light removal, replacement, shielding, individual switching, and addition of timers and/or operational constraints. Existing light fixtures were changed to Low-Pressure Sodium units that help minimize disorientation.

Disorientation was reduced from 50 percent in 1993 to .3 percent at CCAFS and 1.09 percent at PAFB. A 45SW Instruction provides detailed guidance



and direction on the proper use of lighting. While everything possible is done to protect turtles, continual development of land adjacent to the facilities still disorients hatchlings on base property. Therefore, a formal consultation under Section 7 of the Endangered Species Act with the USFWS was reinitiated.

Periodic night inspections are conducted to detect unauthorized and harmful lighting. Notification and education awareness programs are then done. Newly deposited nests are identified during daily inspections throughout nesting season—May 1 through October 31—and appropriate protection measures are taken.

Natural resources are involved in all aspects of environmental compliance. When ammonia was detected in a canal on CCAFS, personnel researched and implemented an environmentally friendly solution. Water migrating through a CCAFS landfill carried high levels of ammonia into the canal and a pilot project was introduced to help reduce the contaminant level to an acceptable amount. Phytoremediation, or the use of vegetation for cleanup, is typically used to reduce heavy metals from groundwater, but was previously untested for ammonia. 45SW biologists and the Florida Department of Environmental Protection identified indigenous plants they believed would conquer the problem. Sampling and analysis to date indicate successful results and future plans call for treatment of a larger area.



When critical training was in danger of being stopped because of suspected impacts to endangered manatees in the Banana River, the 45SW expeditiously consulted with the USFWS for approval of the pararescue training in a manatee habitat region. In a cooperative spirit, the 45SW and the 920th Rescue Squadron made the necessary changes to training schedules to prevent any danger to this lumbering sea cow.



**COMMITMENT**

The 45SW is committed to environmental excellence in natural resource conservation. The team continues to seek out new ways to protect, preserve, and restore the environment. These exceptional stewardship programs continue to grow and expand, along with new opportunities, ensuring natural resources are here for generations to come.

Commitment to the environment extends both on- and off-base boundaries through an extremely interactive education and awareness program. Partnering relationships with the community, universities, and regulators substantially enhance this success.

The 45SW’s commitment to supporting the Air Force space mission and providing outstanding natural resource stewardship can be summed up with one phrase:

***“Our mission is space.  
Our responsibility...the earth.”***