

Editor's Note: The following article highlights efforts by the Air Force and Marine Corps to protect endangered and threatened species on their lands. This article is the second of two focusing on the Department of Defense's contribution to species protection and conservation. The first article appeared in the July/August 1996 issue of the Endangered Species UPDATE.

ENDANGERED SPECIES MANAGEMENT ON U.S. AIR FORCE LANDS

By: L. Peter Boice

The Air Force manages more than 100 installations and training ranges on over 9 million acres of land. Many of these lands are in pristine condition because of the need for safety buffers around Air Force training operations. With more than 70 listed species known to occur on at least 45 installations, the Air Force invests more than \$5 million for the protection of these species each year.

Ecosystem Management

The Air Force has led the way in implementing ecosystem management within the Department of Defense (DoD). Eglin Air Force Base (AFB), located in Florida's panhandle, has more than 460,000 acres and contains some of the most biologically significant public land in the entire United States. More than 90 rare or imperiled species, including at least nine federally listed species, are found on the base. Although approximately 57,000 acres have been cleared for military activities, the majority, close to 385,000 acres, remain forested.

A 320,000 acre longleaf pine (*Pinus palustris*) and wiregrass (*Aristida stricta*) sandhills ecosystem, representing the largest acreage of this imperiled natural community known to occur under single ownership, is the main focus of ecosystem management at Eglin. The integrated natural resources management plan centers on critical fire-maintained natural communities and is based upon tiers of ecological condition. The four-tiered land classification system is based on the quality and restorability of both natural and disturbed communities and the level of management required to achieve restoration. All management decisions are made under the "umbrella" of ecological integrity.

Successful implementation of ecosystem management at Eglin relies on ongoing cooperative partnerships with the Florida Natural Areas Inventory (FNAI) and the University of Florida. Three related surveys, conducted by FNAI, identified occurrences of rare plants, high quality natural communities, and selected rare amphibians. These inventories have been fundamental to the development of Eglin's management plan. Research by the University in Eglin's sandhill community is measuring the responses of insects, birds, vegetation, and soils to different restoration techniques. A long-term research project is determining the status and habitat requirements of red-cockaded woodpeckers (*Picoides borealis*) on Eglin, which contains the fourth largest population of this endangered bird.

Arnold AFB, Tennessee, is also using ecosystem management to enhance its natural resources program. The quality and abundance of rare plants on Arnold is unparalleled in Tennessee; forty-nine rare plant species have been identified, including ten previously listed candidate species. The base also contains the only intact, large-scale barrens habitat in the state.

Arnold has drafted a new integrated natural resources management plan using a collaborative approach to decision-making, which ensures the views of all potentially affected stakeholders are incorporated into long-term planning. This process, which was a key factor in developing the plan, had not previously been used in natural resources planning within DoD. Participants represented a broad cross-section of interested parties and disciplines, including the U.S. Fish and Wildlife Service (FWS), U.S. Geological Service, state agencies and universities, The Nature Conservancy (TNC), and DoD resource managers from several military installations in the Southeast. The approach encourages all stakeholders to voice their concerns early in the planning process, promotes effective planning, and greatly reduces the potential for delays in military activities. This collaborative approach, having proven to be successful on a relatively small scale, has significant potential for application in much larger regions.

Noise Studies

Noise studies to evaluate the effects of military overflights on protected species are important to all Military Services, but are perhaps of most interest to the Air Force. At Goldwater Air Force Range (AFR), Arizona, the Air Force is conducting a study of the effects of overflight noise on the

nocturnal desert. Using an ecosystem approach, researchers are studying the effects of overflights on several interrelated species in hopes of providing important information for all DoD managers in desert areas. The study is also focusing on species that have small home ranges that fall completely within a particular flight path, which allows DoD to determine the effects of overflights on species that are consistently exposed to noise from aircraft.

Partnership with The Nature Conservancy

All of the Military Services have benefited from a nearly decade-long partnership with TNC. The Air Force was the first Service to formally work with TNC, and the organizations continue to enjoy a mutually beneficial relationship. The two organizations are currently developing a Natural Heritage Management System to consolidate information regarding threatened and endangered species throughout the Air Force. (The Navy is working on a similar system.) The system will include information about the occurrence of endangered and threatened species, management recommendations to contribute to species recovery, and a geographic information system to map the location of existing and available habitat on Air Force installations.

The Air Force has also drawn on TNC's technical expertise to address many installation-specific issues. For example, a desert plant thought to be rare, the Merriam's bearpaw poppy (*Arctomecon merriamii*), was known to occur at Nellis Air Force Range, Nevada. During a biological inventory of the base, TNC discovered previously unknown populations of the plant. The existence of the additional populations led the FWS to remove the poppy from the former list of candidate species.

Red Wolf Reintroduction

Buffer zones around Air Force military training areas, such as air-to-ground ranges, runways, and missile launch areas, can have multiple uses including protected species management. Dare County AFR, North Carolina, played a major role in the success of efforts to reintroduce red wolves in the Alligator River National Wildlife Refuge. An agreement between the Air Force and the FWS authorized release of red wolves (*Canis rufus*) onto the 46,600 acre air-to-ground range at the AFR. The availability of a large land area with limited public access was considered vital to the success experienced during the early part of the reintroduction program. The most consistent production of offspring of released

wolf pairs has been on the Dare County Range. The Air Force also provides assistance by participating in field surveys, monitoring activities of the wolves, and periodically closing roads to protect active den sites.

Sea Turtle Protection

Tyndall AFB is one of several coastal Air Force installations in Florida which have aggressive programs to protect endangered sea turtles. Tyndall has the longest ongoing loggerhead sea turtle (*Caretta caretta*) monitoring program in the northern Gulf of Mexico - 18 miles of beach are monitored daily during the nesting season. Wire cages protect nests from predators, and those in danger of being destroyed by high tides are moved to safer locations. Natural resources personnel conduct controlled nighttime releases of hatchlings designed to mimic natural conditions, reduce mortality from predators, and correct for possible disorientation from artificial lights. Tyndall's management efforts have maintained hatching rates above 70%, significantly enhancing the population of this endangered species.

U.S. MARINE CORPS LANDS

The Marine Corps manages thirteen major installations on its 1.7 million acres of land. Many installations are located in sensitive coastal areas due to the need to provide amphibious training. At least nine bases are known to have listed species, and each year the Marine Corps invests about \$2 million into species protection.

Installation Programs

Marine Corps Base Pendleton

Marine Corps Base (MCB) Camp Pendleton, California, demonstrates how a heavily used military base can successfully coordinate plans for military activities and management of ecological zones for multiple threatened and endangered species. By careful management of endangered species, Pendleton was able to increase its flexibility to train. Camp Pendleton signed an agreement with the FWS in FY 1995 to formalize consultations on the effects of military activities on 14 threatened and

endangered species. Camp Pendleton conducted this programmatic consultation to address all species of concern in riparian, estuarine, and beach areas of the base where military construction and training activities were being planned for a five-year period. Consultation goals include promoting partnerships with the FWS as a way to improve conservation practices, defining Pendleton as a provider of habitat within the larger regional context, and reducing the need for lengthy consultations on future actions by providing consistency for future consultations. The goals also aim to define conservation plans and establish a precedent for follow-up uplands programmatic consultation.

The Marine Corps has developed several innovative techniques in order to meet these goals. A set of comprehensive programmatic instructions has been written to guide future base actions in order to avoid or minimize adverse impacts on habitat and species. Incentives, in the form of a mitigation bank that offers mitigation ratios, is designed to promote good management. A sliding scale, based on species population growth, has been developed for incidental take. Lastly, Camp Pendleton has now defined its role with respect to regional ecosystem and biodiversity management initiatives. As a result of the consultation and Camp Pendleton's proposed management practices, military training can now occur in riparian areas previously off-limits due to the presence of endangered species.

This multi-species agreement was a logical extension of earlier efforts at Pendleton to manage the least Bell's vireo (*Vireo belii pusillus*). Resource managers at the base have been protecting and managing vireo habitat for a decade. In that time, the songbird's population has increased from approximately 90 nesting pairs in 1986 to more than 220 pairs in 1993. At one point, the FWS was considering formally establishing 10,000 acres at Camp Pendleton as critical habitat for the vireo. However, FWS determined that the Marine Corps was providing a level of protection that was equal to or greater than that which would have been established with the formal designation. This landmark decision was very positive for the military mission, as the critical habitat designation could have severely restricted Marine Corps flight activities in the 10,000 acre area.

Marine Corps Base Lejeune

MCB Lejeune, North Carolina, has successfully integrated protection of the red-cockaded woodpecker (*Picoides borealis*)

with mission activities. Camp Lejeune's aggressive prescribed burning program is designed to mimic the natural fire cycles typical of the fire-maintained sub-climax communities in which the woodpecker evolved. This controlled burning does much more for the base than simply improve endangered species habitat-it also suppresses dense understory growth, providing open areas for field training exercises. The reduced forest fire hazard facilitates realistic live ammunition training. As a result of the Marine Corps' management efforts, the Population of woodpeckers has remained stable, despite intense military use, and the FWS has reduced restrictions on training activities in nesting areas.

Under Lejeune's newly adopted Long-Range Habitat Management Plan for the woodpecker, military activities are closely managed in areas where the birds live and breed. Each cluster site containing woodpecker colony trees is suffounded by a 200-foot buffer. Within the zones, vehicular and foot traffic are restricted to designated roads and trails, and only blank small arms firing is allowed. Activities prohibited from these areas include firing artillery within 600 feet of the colonies, digging foxholes or burying cable, climbing, cutting, or damaging any size pine tree, and using trees to install antennas. The plan includes a base-wide woodpecker population objective which incorporates current and future military land use requirements and existing and potential woodpecker foraging habitat.

Marine Corps Base Hawaii

At the 482 acre Nu'upia Wildlife Management Area of MCB Hawaii, the Marine Corps is enhancing habitat for the endangered Hawaiian stilt (*Himantopus mexicanus knudseni*). Base managers are clearing introduced mangrove trees that are causing water quality problems and invading mudflats where the stilt lives. An integrated natural and cultural resources inventory is also being conducted to include longterm data on stilt distribution and behavior, types and abundance of marine life, and water and sediment quality.

The Marine Corps has also found an innovative way to manage stilt habitat. Troops periodically operate amphibious assault vehicles in mudflats used by the stilt. The vehicles break up invasive vegetation that is filling in open mudflats and providing artificial bridges for the mongoose, an introduced mammal that preys on the stilt.

Marine Corps Base Quantico

DoD must often monitor and manage species and their habitats to avoid negative effects on them or to demonstrate that mission activities have no adverse impacts. For example, the Marine Corps monitors the habitat of the endangered dwarf wedge mussel (*Alasmidonta heterodon*) at MCB Quantico, Virginia, to determine whether tank training activities in the watershed affect the specific habitat and the survival of the species. Water quality is continuously monitored for changes in siltation and other indicators of quality, such as pH and biochemical oxygen demand. Identification of changes in water quality allows the Marine Corps to modify training activities, if necessary.

Endangered Species Awareness

The Marine Corps and the FWS have jointly produced two endangered species awareness posters. The first depicts Marines "hitting the beach" at Camp Pendleton with a Western snowy plover (*Charadrius alexandrinus nivosus*) in the foreground and reads "These Guys Hit the Beach Every Day." The second, showing a red-cockaded woodpecker at Camp Lejeune with camouflaged Marines in the background, states "Operation RCW: The New Air Ground Team." A third poster featuring the desert tortoise (*Gopherus agassizii*) is planned.

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