Nomination for FY 2004
Secretary of Defense Environmental Award

Arnold Air Force Base, Tennessee

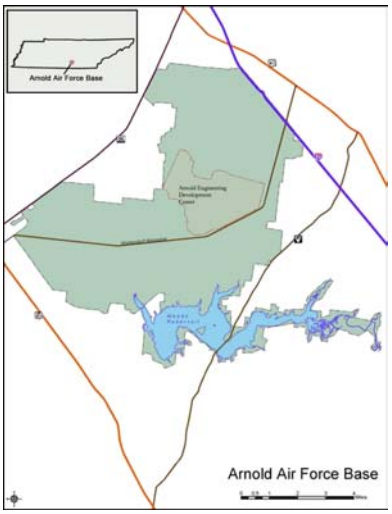
Natural Resources Conservation—Large Installation

INTRODUCTION

Located just west of the Cumberland Plateau in Middle Tennessee, Arnold Air Force Base (AAFB) is home to the Arnold Engineering Development Center (AEDC). As host unit at AAFB, AEDC is the world's most diverse complex of aerospace flight simulation test facilities. The center operates 58 test facilities including jet and rocket engine propulsion test cells, aerodynamic and propulsion wind tunnels, space chambers, arc heaters, and ballistic ranges that can simulate virtually every aspect of flight from ground level to deep space. Of these test units, 13 have capabilities unmatched anywhere in the world. Both the base and the center are named after World War II Commander of the U.S. Army Air Forces and 5-Star General of the Air Force, Henry "Hap" Arnold.

As the only active-duty Air Force base in Tennessee, AAFB employs some 2,500 Air Force, Navy, Army, civilian, and contractor personnel. AAFB also supports the Tennessee Army and Air National Guard through the administration of a license for the 6,685 acre Tullahoma Training Site where an annual average of 35,000 man-days of troop, tank, and artillery training take place.

Natural resources are managed on 33,223 acres of unimproved grounds, 4,365 acres of semi-improved grounds, and 1,493 acres of improved grounds. Component acreage includes 29,386 acres of forest, 1,479 acres of grassland, 1,835 acres of wildlife foodplots, 32,000 acres as a Tennessee Wildlife Management Area, 299 acres for two National Natural Landmarks (Sinking Pond and Goose Pond), 3,632 acres for Woods Reservoir, 1,894 acres of karst wetlands, and 171 miles of streams. About 90% of the installation is available for hunting, fishing, and other outdoor recreation activities. As such, more than 23,300 hunter-use days occurred during the award period.



AAFB occupies 39,081 acres, including Woods Reservoir.

AEDC Test Complex

AAFB is a biologically significant site, with 20 animal and 61 plant species listed as state or federally endangered, threatened, or species of concern. Of the 33 plant associations found on-base, 17 are imperiled vegetative communities (Natural Heritage Classification).

BACKGROUND

AAFB's Integrated Natural Resources Management Plan (INRMP) was approved on 15 November 2001, and was revised in September 2002, 2003, and 2004. Three Cooperative Agreements are important to the plan's implementation:

Partner	Agreement Purpose & Year
TN Wildlife Resources Agency (TWRA)	Fish and Game Management (1991)
U.S. Fish & Wildlife Service (USFWS)	Cooperative Management of Eggert's sunflower (2004)
US Department of Agriculture Wildlife Services Division	Nuisance Wildlife Control (2003, 2004)

The Natural Resources Management Program within the AEDC Support Directorate, Environmental Management Division, provides management direction, resource allocation, oversight, and contract administration to Aerospace Testing Alliance (ATA), the support contractor for AAFB. An Air Force professional Natural Resources Manager and ATA conservation staff of 11 biologists, foresters, technicians, and administrative personnel make up the highly successful team that provides exceptional stewardship of natural resources on the base. Program coordination and integration are accomplished through the Environmental Protection Committee (EPC) and annual work plans. Quality assurance is accomplished through the use of performance metrics and is evaluated at Quality Management Reviews and EPC meetings. Installation activities are evaluated for impacts to natural resources through computer automated Environmental Impact Analysis Process (EIAP) using MATRIX software.

Program Summary

Outstanding implementation of INRMP goals and objectives was accomplished through the development of 84 conservation projects. Project descriptions were used to develop budget submittals. These rigorous, high-quality submittals resulted in 100% funding allocations. Funds were obligated on time and expended without waste to accomplish 80 of the 84 projects, a 95% implementation rate for INRMP goals and objectives.

AAFB offers a unique opportunity to conserve species and natural communities of global and national importance while accomplishing a highly complex military mission. This dual challenge is achieved in an outstanding manner through the use of efficient business processes, sound scientific methods, and effective communication. The premier accomplishments include:

- Successful support of all military missions with no delays in mission timetables and no added cost;
- Significant increase in knowledge of ecosystem function, composition, and structure through scientific studies;
- Control of invasive species;
- Restoration of 2,000 acres of Barrens habitat;
- Recovery of the Eggert's sunflower; and
- Significant contributions in conservation education and community involvement.

Sinking Pond is characterized by rapid transitions between wet and dry conditions

Significant Accomplishments

Overall Conservation Management

Natural resources plans and projects were successfully coordinated with the military mission, civil works projects, and other environmental compliance and restoration initiatives through formal committees, informal meetings, and contract administration. External coordination with partners in conservation management was highly successful. Major partners include the USFWS, Tennessee Army National Guard (TNARNG) (a major military tenant on AAFB), and TWRA.

AAFB maintains a cutting-edge natural resources program, uses the best available science, and enhances native biodiversity in cooperation with a Conservation Integrated Process Team (IPT). The 15-member IPT consists of state and federal agencies, regional universities, and conservation organizations.

Innovative use of modern technology resulted in cost reduction and improved monitoring of key ecosystem components. For example, a Geographic Information System (GIS) team created an application and database framework to provide natural resources personnel with tools for adaptive management decision-making. The team developed a repeatable vegetation/land cover classification using satellite imagery to detect vegetation changes. GIS data were also used for a landscape-scale bird community-habitat relationship project, resulting in identification of birds as indicator species for grassland and shrub habitats. In addition, the use of new bat locating technology enhanced the TNARNG mission. AnaBat II bat detectors were used to survey 10 sites for gray and Indiana bats in the TNARNG firing range. Since the AnaBat II system can be left recording unmanned for up to 8 days, sites were surveyed with no interruption of training.

Ecosystem Management

AAFB uses the Site Conservation Planning (SCP) process developed by The Nature Conservancy (TNC) as a tool for implementing a science-based, adaptive framework of ecosystem management to produce a clear set of goals and strategies for the base's conservation program. Successful management resulted in the enhancement of biodiversity on AAFB.

Focal Targets	Accomplishments
Barrens mosaic	2,000 acres of Barrens habitat created
Karst wetlands	1,894 acres maintained
Streams and springs	171 miles of streams protected
Gray bat	Assisted with regional efforts resulting in population increase

Eggert's sunflower is proposed for delisting in 2005

Recovery of a federally listed species, the Eggert's sunflower, was a **FIRST FOR THE AIR FORCE**. Genetic research, initiated in 1999, led to the establishment of criteria in 2004 which defined a functioning population. This research, combined with successful habitat restoration, resulted in a 33% increase in population, supported USFWS recovery objectives, and led to the USFWS proposed delisting of the Eggert's sunflower in 2005. A Cooperative Management Agreement (CMA) between AAFB and the USFWS ensured the recovery of this species. Such species recovery efforts provide several advantages for the Air Force:

- Section 7 Endangered Species Act (ESA) consultations are not required;
- Species management becomes simplified by reducing the number of Barrens habitat units (3,544 acres managed on 9 large restoration areas vs. 358 census sites scattered throughout AAFB);
- Species monitoring is simplified and incorporated into Barrens Ecological Monitoring Program;
- Land use is not restricted since disturbance of Eggert's sunflowers outside of Barrens restoration areas is permitted; and
- Annual cost of Eggert's sunflower management can be reduced by 40% through reduced monitoring and consolidation of prescribed burn units.

This clearly demonstrates careful, well planned, and successful stewardship of natural resources while improving mission flexibility on AAFB.

Several significant ecological studies were initiated during this award period:

- **Historic Barrens Forest Structure and Fire Regimes Assessment**: Evaluating the fire return interval for Barrens mosaic conservation target.
- **Landscape Geomorphology and Historic Vegetation Modeling Study**: Evaluating the extent and scope of the historic vegetation within the Barrens mosaic.
- **Vegetation, Climate, and Soil Effects on Water Recharge and Soil-Water Balance in Barrens Mosaic**: Facilitating evaluation of restoration results on the extent and duration of flooding and impacts to wetlands.
- **Hydrogeomorphic Model (HGM)**: Developing a regional guidebook using the HGM to characterize depressional and flat wetlands, partnering with the U.S. Army Corps of Engineers (USACE), U.S. Environmental Protection Agency (EPA), Tennessee Tech University, and Tennessee Department of Transportation.

Land Use Management

All ground-disturbing activities are evaluated during the EIAP, and erosion control recommendations are made. Best Management Practices (BMPs) have been developed and are used during all maintenance and construction projects. All revegetation activities for erosion control are integrated with the Invasive Pest Plant Management program to prevent introduction of noxious weeds.

Forest Management

Using prescribed burning as a silvicultural tool in the pine forests. Prescribed fire was used in forestry burns totaling 876 acres and 1100 acres in FY03 and FY04, respectively.

Intensive forest management activities aid in restoring the Barrens mosaic. These activities generated receipts of $150,000 from the sale of 12,000 tons of pulpwood and 800,000 board feet of sawtimber in FY03, and $200,000 from the sale of 11,000 tons of pulpwood and 825,000 board feet of sawtimber in FY04. Additionally, 90 acres and 183 acres were reforested in FY03 and FY04, respectively. Prescribed burning was used to reduce high wildfire fuel loads totaling 876 acres in FY03 and 1,100 acres in FY04. BMP guidelines were met or exceeded for forest management activities including forest road construction and maintenance, fire line construction, timber harvesting, site preparation, and reforestation.

Fish and Wildlife

AAFB has an incredible diversity of fish and wildlife. To date, 412 species of vertebrates have been identified on the base including: 226 species of birds (includes summer residents, migrants, and wintering species); 61 species of reptiles and amphibians; 42 species of mammals; and 83 species of fish. Among these are 15 state and 2 federally listed species. Additionally, 1,734 species of invertebrates have been catalogued.

AAFB's Gray Bat Management Plan supports the base mission while protecting the sustainability of a priority two maternity colony. Within the award period, 275 gray bats were captured and banded on- and off-base.

Gray bat distribution data used in mission and conservation planning and management activities leading to a proposed down-listing of this species.

AAFB took the initiative to organize the formation of the Tennessee Bat Working Group (TNBWG) by contacting participants, writing the charter, supervising nominations and elections, and chairing the group. Participants include 15 state and federal agencies, non-governmental organizations (NGOs), and universities. This initiative led to the first meeting of the group (40 participants with 9 formal presentations and group discussions), a directory of active groups, and a website for information exchange at http://groups.yahoo.com/group/TBWG.

AAFB also established a management and banding program for the Henslow's sparrow. Banding efforts indicate an increase of over 400% in the species' population at fire-managed grasslands. Base staff discovered a new breeding population of Henslow's sparrow while assisting TWRA on property located just north of the base. Prior to this discovery, the base habitat supported one of only four known breeding populations in Tennessee. The discovery of this new population increases mission flexibility and enhances eco-regional biodiversity conservation. AAFB staff provided technical guidance to TWRA regarding the management of this Barrens site.

Barking tree frog is listed by the TWRA as "Wildlife in Need of Management."

AAFB participates in the Monitoring Avian Productivity and Survivorship (MAPS) program, a continent-wide, and constant-effort bird-banding program. All pertinent data gathered at the base are submitted annually to the MAPS program to be used in analysis of population demographics for the Southeast.

AAFB monitors the Sinking Pond great blue heron rookery using a complete census every 2 years. This rookery is located on airfield approach and departure routes, so data are important for safe flight operations.

A pilot study was conducted in 2003 to evaluate the application of an anurans habitat utilization monitoring methodology. Eleven of the 14 species of anurans known to occur at AAFB (including the barking tree frog) have been identified using call counts.

An ecological investigation of the Northern pine snake was conducted using radio telemetry techniques. Results indicated excellent potential for long-term conservation management and were integrated into an environmental assessment (EA) for development of a TNARNG laser-firing tank range.

The base actively cooperates with the Barrens Topminnow Recovery Group (chaired by USFWS) on the recovery of this globally imperiled species.

Other Natural Resources

Henslow's sparrow is listed as a "Bird of Conservation Concern" by the USFWS.

The AAFB Wildlife Management Area (WMA), managed by TWRA, is ranked number 1 in the state based on strength of diversity and abundance of game species (turkey, deer, waterfowl, numerous small game species, and a sport fishery on Woods Reservoir). AAFB is popular for deer hunting based on high hunter success rates (556 harvested in 2003 and 499 harvested in 2004) and is fast becoming a favored turkey hunting spot with a record 89 birds harvested in 2004 and 80 birds harvested in 2003. AAFB is a designated Tennessee Watchable Wildlife Area offering opportunities to view many game and non-game species. The base has numerous trails available for hiking and biking. A primitive campground is utilized by deer and turkey hunters on the WMA during scheduled hunts (4,000 visitor days) and a complete campground offering tent and recreational vehicle camping is also available (2,600 visitor days).

Pest Management

AAFB developed a plan that led to a 93% reduction in herbicides used for the treatment of *Lespedeza spp.* in the Airfield Barrens (440 acres). Over 2,300 acres were surveyed and 25 invasive plant species identified. The base developed and implemented an innovative herbicide screening study to identify the best herbicides for controlling invasive plant species without injuring native plants at Goose Pond. Through an aggressive and effective pest plant management program, 24 natural communities were protected on 6,400 acres.

The Northern pine snake is a State threatened species.

Conservation Education

AAFB is very active in conservation education. Activities and accomplishments include:

- Participated annually in Career Day at a local high school.
- Made scientific presentations at the Cullowhee Native Plant Conference (500 people in attendance), the National Military Fish and Wildlife Association (NMFWA) Bat Working Group meeting at the 2003 NMFWA meeting, the Highland Rim Chapter of the Tennessee Ornithological Society, and the Tenth Symposium on the Natural History of the Lower Tennessee and Cumberland River Valleys.
- Published 2 abstracts and 2 technical papers and a non-technical article on the pine snake in *The Tennessee Conservationist.*
- Created 6 large conservation storyboards and displayed throughout AAFB.
- Provided 15 college students (9,500 hours) with internship opportunities in field monitoring and ecosystem management techniques.

Community Relations

AAFB has strengthened public awareness of natural resources on- and off-base through Earth Day activities, wildflower hikes, and education tours for various universities, scout troops, and other groups. Further, AAFB personnel are affiliated with over 16 regional and national professional and non-profit organizations. Other contributions include:

Interns receiving training

- Conducted training session for TWRA personnel in bat identification, banding, and capture techniques; and
- Assisted Western NC University with their research in Comparative Phylogeography of Gulf Coast Plant Groups.

Environmental Enhancement

During the past two years, AAFB's natural resource program has achieved significant accomplishments in environmental enhancement. For example, the base developed a thorough understanding of habitat requirements for several protected species and as a result developed management techniques that support the base's mission while fostering continued expansion of key population groups. Technology transfer was enhanced through external partnership exchanges concerning AAFB's use of advanced scientific methodologies, prescribed burn strategies, targeted university research, and use of appropriate BMPs. The success is well documented by the proposed delisting of Eggert's sunflower and the potential down-listing of the gray bat.

Mission Enhancement

AAFB identified and implemented land management strategies to meet 100% of TNARNG's training requirements in support of Operation Iraqi Freedom. AEDC also benefited the base mission by developing and implementing Bird-Aircraft Strike Hazard (BASH) strategies to facilitate re-opening of the airfield, saving $25,000 annually in maintenance costs.

Natural Resources Compliance Program

AAFB enjoys rewarding professional relationships with all pertinent federal and state natural resources agencies. All regulatory consultations were successful. Compliance with laws and regulations was outstanding with 100% of requested budgets obtained and executed.

Earth Day hike led by AAFB personnel.