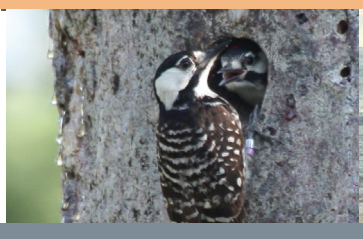
NATURAL RESOURCE CONSERVATION PROGRAM

United States Marine Corps | 2010



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Our Marine Corps installations reside in a variety of ecosystems, providing the full range of environments needed to train Marines in realistic, diverse settings required to ensure they are ready to deploy anywhere, anytime for any mission. As such, our installations are also located in some of the most biologically rich and diverse areas of the world; ranging from the Atlantic and Pacific Coasts, to the Mojave and Sonoran Desert and the Pacific Islands.

These environments host a broad range of species and habitats, some of which are critically threatened or endangered, that are entrusted to the stewardship of the Marine Corps. We take great pride in our record of balancing natural resource conservation with training and operational requirements of the lands we use, and will continue to strike this balance through our Natural Resource Conservation Program.

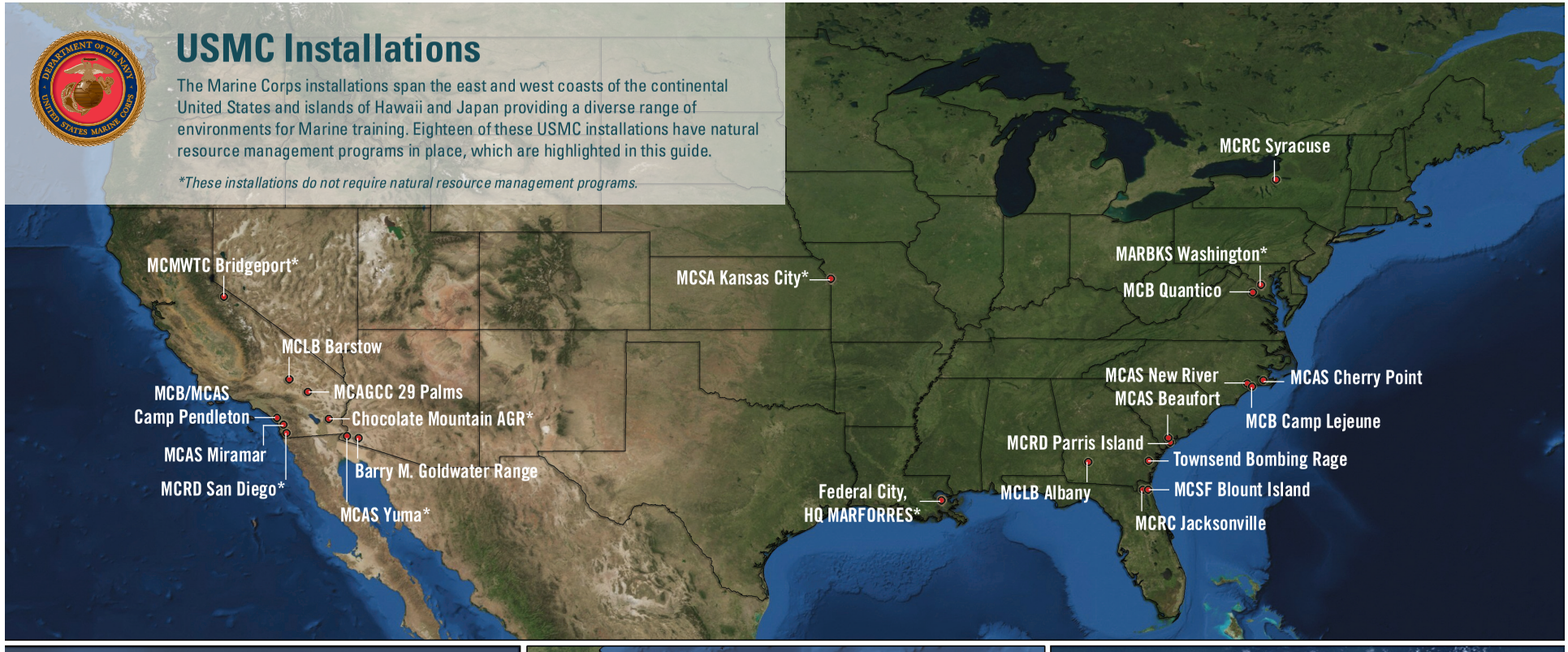
I am proud to present this second edition guide to our Natural Resources Conservation Program. It provides a glimpse of the breadth and diversity of the resources managed by our installations, and illustrates the commitment of the Marine Corps for ensuring the sustainability of the lands with which we have been entrusted.

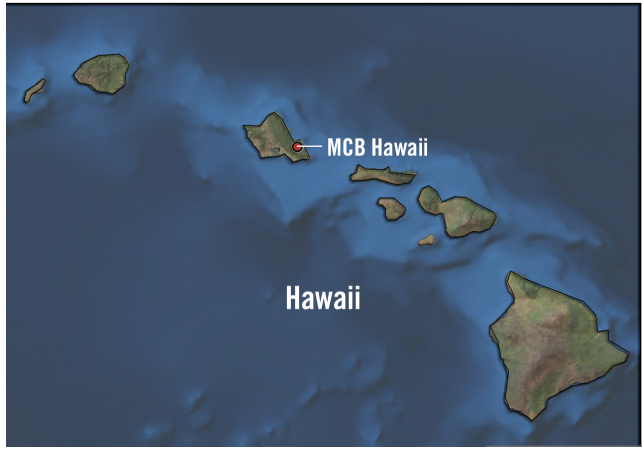
E.G. Payne, Jr.
Major General, U.S. Marine Corps
Assistant Deputy Commandant
Installations and Logistics (Facilities)

USMC Installations

The Marine Corps installations span the east and west coasts of the continental United States and islands of Hawaii and Japan providing a diverse range of environments for Marine training. Eighteen of these USMC installations have natural resource management programs in place, which are highlighted in this guide.

**These installations do not require natural resource management programs.*





“A country worth defending is worth preserving.”

–Brigadier General Mike Lehnert,
former Commanding General of Marine Corps Installations West

USMC photo by Lance Cpl. Tammy K. Hineline

UNITED STATES MARINE CORPS NATURAL RESOURCES

The United States Marine Corps (USMC) defends the people, interests, and resources of the United States of America and her allies. Marines successfully complete duties directed by the President, rapidly deploying to any location around the world. Marines have shown their prowess time and time again, from breaking the Taliban’s momentum in Afghanistan to providing humanitarian aid after the earthquake in Haiti.

Ensuring readiness for such a diversity of demands requires Marines to train in a similarly diverse range of environments, from ocean shores, to windswept deserts, to temperate and tropical forests, to high mountain terrain. The Marine Corps recognizes the importance of effective natural resource management, not only to meet our stewardship responsibilities, but also to sustain our training capability. The Marine Corps actively manages more than 3 million acres of land in some of the most biologically diverse and unique areas of the world.

In addition to its ecological and defense value, much of the land under USMC control is open to the public for recreational purposes, including hunting and fishing. USMC land also serves the public through agriculture and sustainable forestry programs. This guide is intended to provide a general overview of the breadth and scope of the natural resources programs and initiatives within the Marine Corps at installation and national scale. This introduction provides an overview of the entire Natural Resource Conservation program. Subsequent sections provide installation level detail and program highlights.

USMC Photo

Blooming Ocotillo plant (*Fouquieria splendens*) on Barry M. Goldwater Range. The Octoillo is indigenous to the Sonoran Desert and is specifically adapted to the harsh desert climate.

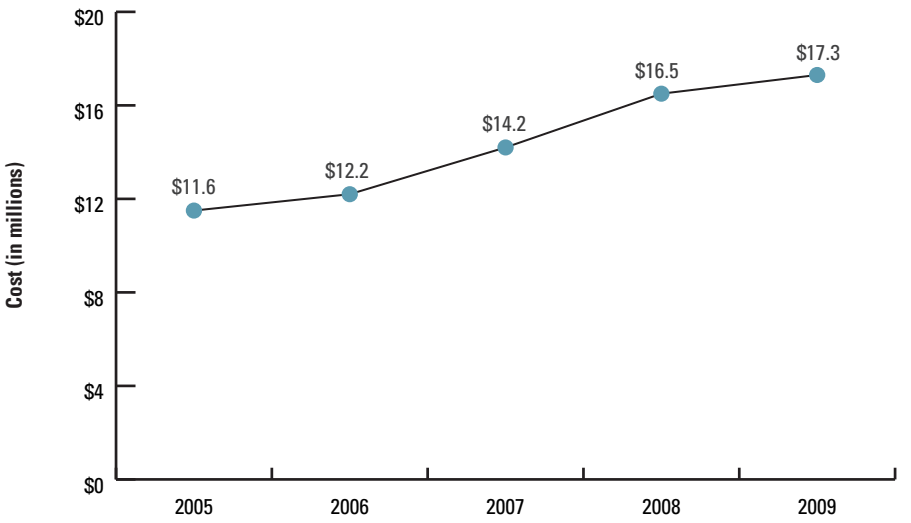
Integrated Natural Resource Management Planning

The most important tool for managing natural resources on USMC installations is the Integrated Natural Resources Management Plan (INRMP). As required by the Sikes Act, each USMC installation with significant natural resources develops a long-term strategic plan that outlines goals, objectives, and projects for natural resources programs. The INRMP is developed in cooperation with the U.S Fish and Wildlife Service (USFWS), as well as with the respective state fish and wildlife management agency. Installations that manage marine resources also cooperate with the National Oceanic and Atmospheric Administration (NOAA)-Fisheries for species under their jurisdiction. Implementation of the plan not only sustains the natural environment, but also the military training environment. The INRMP integrates natural resource management and the sustainment of training missions at our bases, air stations, and ranges. Program areas covered by the USMC INRMPs include

- Threatened, Endangered, and Candidate Species Programs
- Marine Mammal and Coral Reef Community Conservation
- Wetlands, Watersheds, and Coastal Conservation
- Forest Management
- Outdoor Recreation, Hunting, and Fishing
- Agricultural Outleases
- Non-native and Invasive Species Control
- Fire Management
- Erosion Control
- Conservation Law Enforcement
- Migratory Bird Management
- Bird Aircraft Strike Hazard
- Grounds and Landscape Management

Copies of USMC INRMPs can be found on the Headquarters Marine Corps, Installations and Logistics website: *http://www.marines.mil/unit/logistics/Pages/LFL/LFL-1/NaturalResourcesPlans.aspx.*

Figure 1: USMC Natural Resources Funding



*Funding does not include personnel, direct funding for Endangered Species Act listed species, or funds for forestry, agricultural leasing, or hunting/fishing programs.

USMC photo by Lance Cpl. Jody Lee Smith

A Marine runs for concealment after popping an M18 green smoke hand grenade at Kahuku Training Area at MCB Hawaii. Natural resources management sustains the Marine Corps' training environments.

In FY2009, USMC obligated $17.3 million for natural resource management (Figure 1). Funding was 5% more than the previous year, representing a consistent increase in conservation funding.

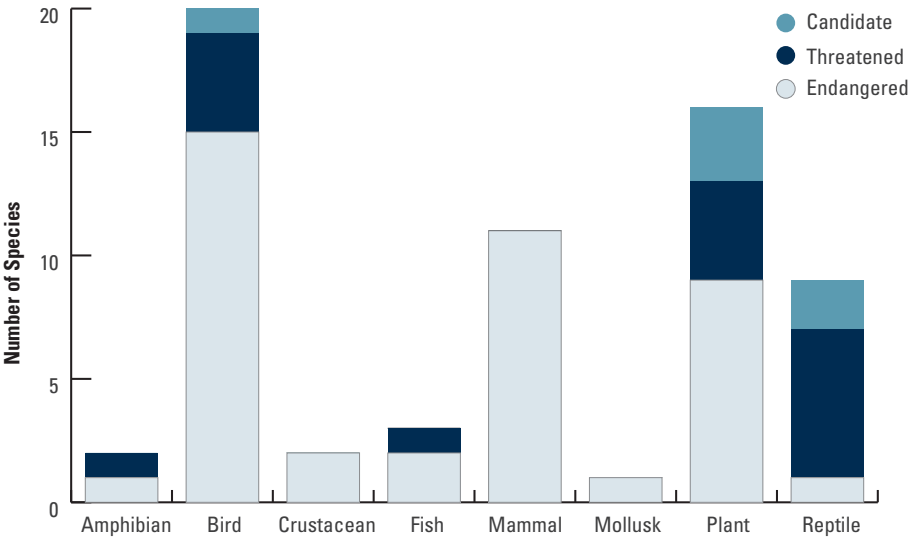
Threatened, Endangered, and Candidate Species Programs

In FY2009, 17 installations reported 59 instances of federally listed threatened, endangered, or candidate species being present on USMC land, some of which occur on more than one installation or in waters adjacent to installations (see Appendix A for complete listing). These species, many of which are birds and plants, are protected in accordance with the Endangered Species Act and USFWS guidance (Figure 2). Although not included in the figure, the USMC installation on Okinawa—Marine Corps Base (MCB) Camp Smedley D. Butler—hosts additional species recognized as endangered or vulnerable by the Government of Japan.

USMC photo

USMC installations use their INRMP to plan and protect wetlands and other natural resources while supporting mission requirements.

Figure 2: Federal Status of Species by Category for FY2009



Note: Listed sea turtles and marine mammals occur in the waters adjacent to our installations. These species are accounted for if they nest on USMC land, occur in waters under USMC jurisdiction, or if the installation reported expenditures for their protection.

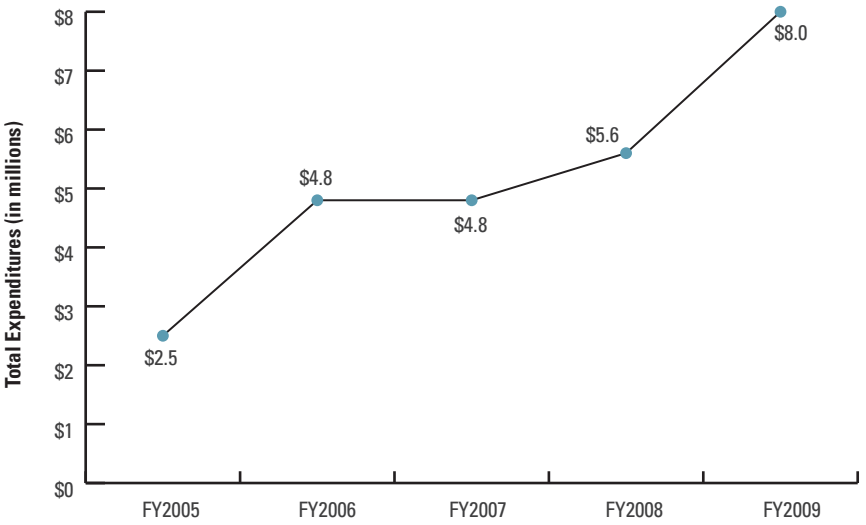
USMC photo

MCB Camp Pendleton has designated specific management zones along its coastline restricting access and implementing predator control strategies to protect nesting western snowy plovers. In FY2009, the Marine Corps invested almost $4.0 million to conserve birds.

Endangered Species Act Expenditures from FY2005-FY2009

USMC spending on listed species has progressively increased since FY2005 (Figure 3). In FY2009, our installations committed nearly $8.0 million to conserve listed species; a 225% increase since FY2005. This reflects the commitment of the Marine Corps to the protection and recovery of species, in compliance with the Endangered Species Act.

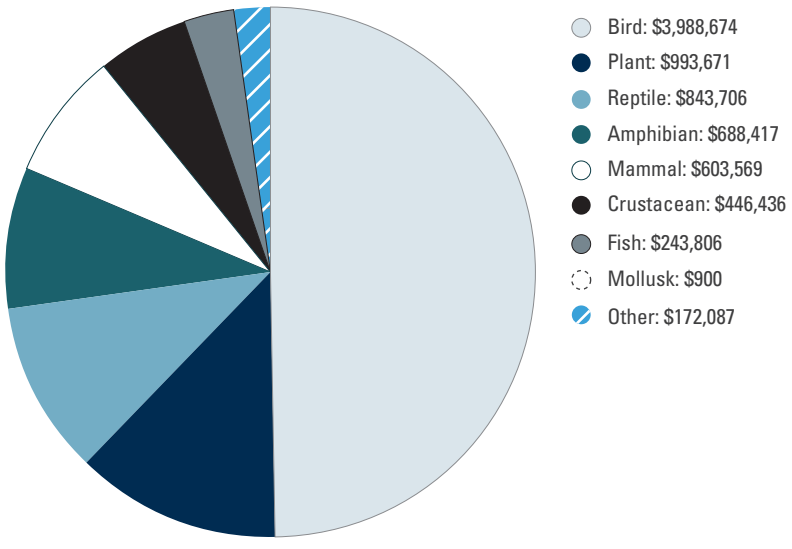
Figure 3: Threatened and Endangered Species Protection and Management Expenditures from FY2005-FY2009



Consistent with previous years, in FY2009 the Marine Corps spent four times as much to protect birds than any other category of species (Figure 4). The Marine Corps spent almost $4 million on birds in FY2009, about the same amount as spent on all other species combined.

Plant species receive the second-most funding: $1.0 million in FY2009 (Figure 4). Almost half of the plant expenditures funded efforts at MCB Camp Pendleton to protect the thread-leaved brodiaea, a total of $401 thousand in FY2009. Expenditures for other categories are similarly driven by efforts related to single

Figure 4: Threatened and Endangered Expenditures by Category in FY2009



Total: $7,981,266

USMC Photo

Threatened seabeach amaranth located on the beaches of MCB Camp Lejeune.

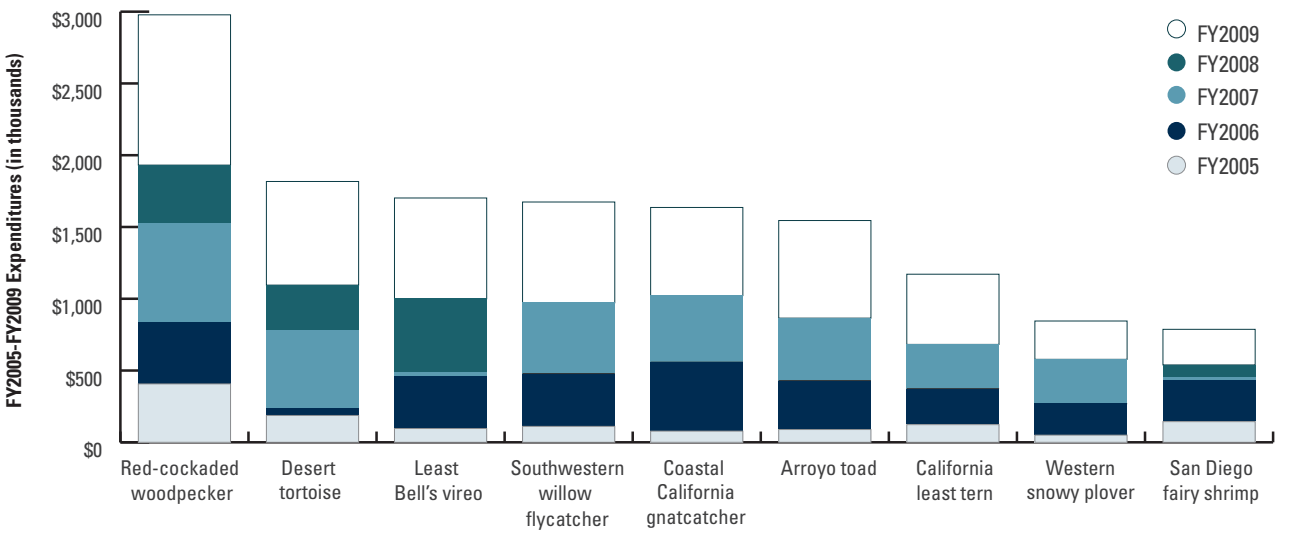
species, including the desert tortoise at three installations accounting for 86% of reptile funding, the arroyo toad at MCB Pendleton accounting for all amphibian funding, and the Stephens' kangaroo rat at MCB Pendleton accounting for 41% of mammal funding.

Top 10 Expenditures by Species for FY2005-FY2009

Of the ten listed species receiving the most USMC funding for their protection, six are birds (Figure 5). A quarter of the bird expenditures in FY2009 went to the red-cockaded woodpecker at MCB Camp Lejeune. The Marine Corps has spent nearly $3 million since FY2005 to protect the woodpecker, with the greatest increase (of over $600 thousand) between FY2008 and FY2009. Expenditures for the other five bird species average $1.4 million over the FY2005-FY2009 period. Coastal California gnatcatcher spending increased the most: 681% since FY2005.

Two reptiles and one crustacean form the rest of the ten most-funded species (Figure 5). Expenditures for desert tortoise programs at three California

Figure 5: Top 10 Threatened and Endangered Expenditures by Species for FY2005-2009



DoD photo

Red-cockaded woodpecker at MCB Camp Lejuene.

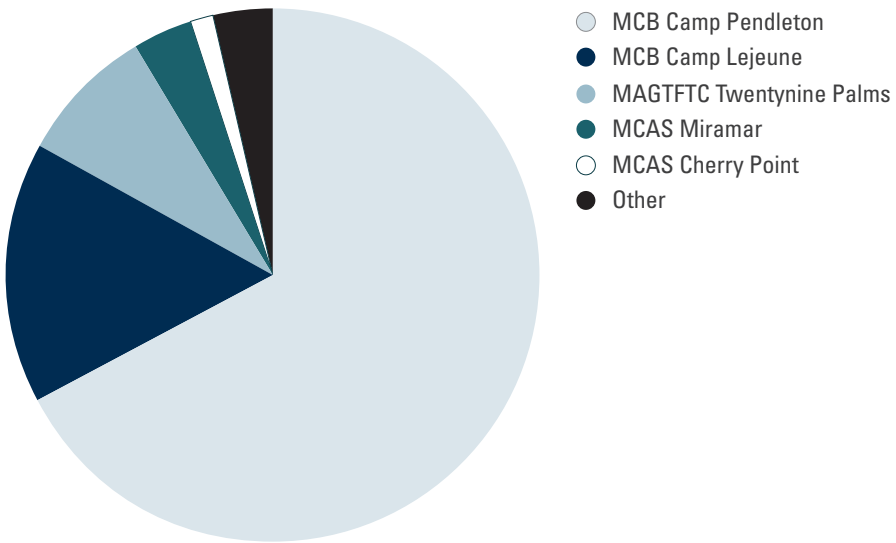
installations reached $1.8 million between FY2005 and FY2009, increasing 284% since FY2005. Spending on the arroyo toad has also increased—by 661% since FY2005—to total $1.5 million for the past five years.

Expenditures by Installation for FY2009

MCB Camp Pendleton spends more to protect listed species than any other USMC installation (Figure 6): $5.4 million in FY2009. This is more than double the commitments of all other USMC installations—combined. The base's disproportionate requirements are primarily explained by the number of species (19) and extent of habitat. This is a greater number of species than any other military installation on the continental United States. Only installations in Hawaii have greater numbers of listed species (see Appendix B).

Expenditures at four other installations surpassed $100 thousand in FY2009 (Figure 6). MCB Camp Lejeune spent the second-most of any USMC installation, a total of $1.3 million. Of that total, 83% went to programs for the red-cockaded woodpecker. Marine Corps Air Ground Combat Center (MCAGCC) Twentynine Palms spent $666 thousand, most of which funded programs for the protection and recovery of the desert tortoise. Marine Corps Air Station (MCAS) Miramar has nine threatened or endangered species (see Appendix B), and spent $309 thousand on their protection. MCAS Cherry Point expenditures reached $100 thousand, all of which funded programs for sea turtles and marine mammals in waters adjacent to the station and ranges.

Figure 6: Threatened and Endangered Expenditures by Installation in FY2009



Total: $7,981,266

Critical Habitat

When a given species is proposed for listing, USFWS evaluates what habitat areas are essential to its conservation. These essential areas are designated "critical habitat," and USFWS places restrictions on those areas for the species' protection; however, not all listed species have designated critical habitat. Through amendments to the Endangered Species Act made by the 2004 National Defense Authorization Act, USFWS may exempt a defense installation from critical habitat designation for reasons of national security or if the installation's INRMP demonstrates two things: first, a benefit to the listed species; and second, management for the species' long-term conservation.

Figure 7: Threatened and Endangered Species Critical Habitat on Installations for FY2009

Installation	Status	Category	Scientific Name	Common Name	Exemption Status
Chocolate Mountain Aerial Gunnery Range	Threatened	Reptile	*Gopherus agassizii*	Desert tortoise	Not exempt
MCAGCC Twentynine Palms	Threatened	Reptile	*Gopherus agassizii*	Desert tortoise	Exempt
MCAS Miramar	Threatened	Bird	*Polioptila californica*	Coastal California gnatcatcher	Exempt
	Endangered	Crustacean	*Streptocephalus woottoni*	Riverside fairy shrimp	Exempt
	Endangered	Crustacean	*Branchinecta sandiegonensis*	San Diego fairy shrimp	Exempt
	Threatened	Plant	*Navarretia fossalis*	Spreading navarretia	Exempt
	Endangered	Plant	*Monardella linoides ssp. Viminea*	Willowy monardella	Exempt
MCB Camp Lejeune	Threatened	Bird	*Charadrius melodus*	Piping plover	Exempt
MCB Camp Pendleton	Endangered	Amphibian	*Anaxyrus californicus*	Arroyo toad	Exempt
	Threatened	Bird	*Polioptila californica*	Coastal California gnatcatcher	Exempt
	Endangered	Crustacean	*Branchinecta sandiegonensis*	San Diego fairy shrimp	Exempt
	Endangered	Bird	*Empidonax traillii extimus*	Southwestern willow flycatcher	Exempt
	Threatened	Plant	*Navarretia fossalis*	Spreading navarretia	Exempt
	Threatened	Plant	*Brodiaea filifolia*	Thread-leaved brodiaea	Exempt
	Endangered	Fish	*Eucyclogobius newberryi*	Tidewater goby	Exempt
	Threatened	Bird	*Charadrius alexandrinus nivosus*	Western snowy plover	Exempt
	Endangered	Bird	*Vireo bellii pusillus*	Least Bell's vireo	Exempt
	Endangered	Crustacean	*Streptocephalus woottoni*	Riverside fairy shrimp	Exempt
	Endangered	Fish	*Oncorhynchus mykiss*	Steelhead trout	Exempt
MCLB Barstow	Threatened	Reptile	*Gopherus agassizii*	Desert tortoise	Not exempt
Townsend Bombing Range	Threatened	Amphibian	*Ambystoma cingulatum*	Frosted flatwoods salamander	Exempt

The USFWS has documented decisions on whether to designate "critical habitat" at seven USMC installations (Figure 7). Five installations received exemption because of their effectiveness in implementing their INRMP and protecting threatened and endangered species. Two USMC installations have critical habitat and are not exempt (Chocolate Mountain Aerial Gunnery Range and Marine Corps Logistics Base Barstow).

Wetlands, Watersheds, and Coastal Conservation

Many USMC installations are rich with aquatic habitats, and the Marine Corps has installations on both the Atlantic and Pacific Coastlines, as well as Pacific Islands. About 80,000 acres of fresh- and saltwater wetlands are found on USMC lands, as well as 94 miles of coastal shoreline. Offshore areas contain a rich diversity of sea life, including abundant and essential fish habitat, marine mammal populations, and coral reefs.

The Marine Corps avoids or minimizes adverse effects to these areas. It is the Department of Navy's policy to comply with the national goal of no net loss of wetlands, and to avoid loss of size, function, and value of wetlands. To that end, the Marine Corps actively minimizes and repairs soil erosion, stabilizes stream banks, and restores wetlands.

MCB Hawaii photo by Dr. Diane Drigot

View from Mokapu Peninsula shoreline, MCB Hawaii, looking east across Kailua Bay.

Forest Management

The Department of Defense (DoD) is authorized and obligated to support commercial forest production, where possible without compromising an ecosystem's health or a military mission. No DoD Component may destroy, abandon, or give away public forest resources.

USMC photo

The Marine Corps' forest management programs ensure that installations both achieve their military missions and implement sustainable forestry practices.

USMC installations in the Southeast support productive pine, hardwood, and mixed forests. While achieving their military missions, our installations implement responsible, sustainable forestry practices to support healthy forest ecosystems, enhance wildlife habitat, reduce fire risk, and control non-native species and forest pests. Between FY2005 and FY2009, the Marine Corps received an average of $1.3 million in timber revenues each year (Figure 8). Revenues generated from the sale of forest products are used to improve forest health at the installation with a portion of revenues contributing directly to their respective state's economy.

Outdoor Recreation, Hunting and Fishing

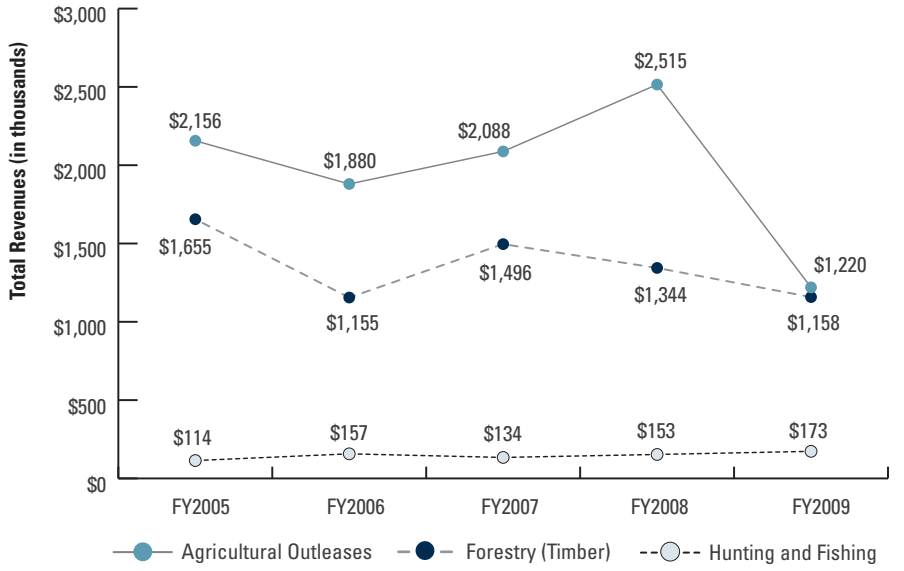
USMC bases, air stations, and ranges provide a broad diversity of habitats for various fish and wildlife species. These habitats include freshwater, saltwater, and estuarine fisheries; tropical island and beach habitats in the Pacific; upland shrub, chaparral, and desert in the Southwest; and pine and hardwood forests in the Southeast and Mid-Atlantic.

Where compatible with military and security requirements, these areas are open for public use and recreation, including hunting and fishing, bird watching, or simply enjoying the outdoors. USMC installations also proudly provide access and facilities for disabled sportsmen and women, and support the Wounded Warrior Project and Paralyzed Veterans of America.

While the greatest proportion of habitat management efforts focus on the needs for threatened, endangered, and other protected species, each installation maintains and improves ecosystems as a whole. Ecosystem-based management provides broad benefits to many species, both game and otherwise.

Many installations charge minimal fees for hunting and fishing permits. On average, sales of hunting and fishing permits generate $147,000 annually (Figure 8). The proceeds fund the enhancement of fish and wildlife habitat on the respective installations.

Figure 8: Annual Revenues from Forestry, Hunting and Fishing, and Agricultural Outleases



Agricultural Outleases

The Marine Corps supports conservation programs with revenue generated from outleasing areas for agricultural use. Agricultural outleases may provide a mission benefit, such as a hay lease keeping vegetation heights managed for training purposes, and may support the local economy. Funds may also support erosion control and land rehabilitation, invasive species control, and salaries for conservation professionals. Between FY2005 and FY2009, the USMC collected an average of $2.0 million each year from agricultural outleases (Figure 8).

Non-native and Invasive Species Control

The introduction and spread of non-native and invasive plant or animal species can severely harm ecosystems and the habitats and native species they support. Invasive species can also impact the military mission.

Invasive plants can overrun native plant communities and affect habitat for wildlife, including federally-listed species and migratory birds. Non-native plant species can also dramatically alter the natural fire regime of an ecosystem, resulting in more frequent and severe burning and putting the mission, public safety, and the natural ecosystem at risk.

The Marine Corps strives to control non-native and invasive species through early detection and rapid response initiatives. Prescribed fire and mechanical removal means—such as weed-pulling or mowing and herbicide treatments—are used to control and eradicate invasive plants.

Non-native or invasive animals can have a similarly disruptive effect on an ecosystem and to the mission. Competition and predation from non-native species can harm native wildlife, and foraging can help non-native plants become established. For example, invasive pine beetles kill standing trees and facilitate fires. The Marine Corps employs Integrated Pest Management and other control programs at installations to manage the risk posed by non-native animals.

Fire Management

Fire is a natural part of any ecosystem, though the frequency and intensity of natural fire differs greatly among regions. Military and other human activities may contribute to an unnatural fire regime, however, by causing unusually frequent

USMC photo

The Marine Corps proudly supports hunting for paralyzed and wounded veterans on its installations.

Photo by Chuck Bargeron, University of Georgia

Chinese tallow tree (*Sapium sebiferum*) is an invasive plant affecting much of the southeastern United States. Marine Corps Recruit Depot Parris Island is implementing a control plan to eradicate Chinese tallow tree and many other invasive species off the installation. Eradication efforts include combinations of pesticide applications, cutting, pulling, and prescribed fire. Clemson University is surveying previously treated areas to make recommendations on control methods.

USMC photo by Warrant Officer Keith A. Stevenson/ Released

Conservation Law Enforcement Officer Patrick M. O'Neal stands next to a stuffed black bear, killed at night while crossing a road at MCB Camp Lejeune. O'Neal, a former Marine, is raising Marines' awareness of the local black bear population.

fires, allowing too much fuel to build up, or allowing non-native species to alter an ecosystem and make it more susceptible to fire. Uncontrollable wildfires may impact the mission and threaten infrastructure, but—most importantly—are a public safety risk.

The Marine Corps implements Integrated Wildland Fire Management Plans to minimize the effects of uncontrolled wildfires. Land management strategies include vegetation control, restrictions on land use, establishing fire breaks, and suppressing fires when they occur. Some installations maintain Interagency Agreements with other federal land managers for cooperative wildland and prescribed fire management.

Conservation Law Enforcement Officers

To meet our obligation to enforce conservation laws and policies, the Marine Corps maintains a robust Conservation Law Enforcement Program. Through a Memorandum of Agreement with USFWS, USMC Conservation Law Enforcement Officers are granted the legal authority to enforce federal laws pertaining to the protection of fish, wildlife, and other natural and cultural resources. They have the same authority to search, seize, arrest, and exercise other law enforcement functions as personnel from USFWS authorized by the Secretary of the Interior.

The officers are a vital part of any conservation strategy, not only providing law enforcement, but also ensuring public safety and helping to implement hunting, fishing, and wildlife conservation programs.

Bird Aircraft Strike Hazard Programs

USMC air stations implement Bird Aircraft Strike Hazard (BASH) programs, primarily to ensure the safety of pilots, but also to prevent impacts to wildlife. These programs use a variety of techniques to deter birds from airfields and runways, including harassment, management of vegetation and water features that would attract birds, and training bird predators—such as falcons—to fly over airfields. Biologists also use sophisticated radar and acoustic technologies to identify and monitor migratory birds.

Most USMC air stations and facilities implement BASH programs through agreements with the U.S. Department of Agriculture's (USDA's) Wildlife Services. The Marine Corps partners with the Navy and the Smithsonian Institution to identify the bird remains collected after a strike. Identification of the species, as well as the date, time, and location of a strike, can assist station managers in identifying trends leading to management adaptations that improve the well-being of wildlife and improve program efficiency for pilots.

Encroachment Partnerships

Land use trends beyond installation fence lines not only have significant ecological effects, but more and more are having a mission effect for the Marine Corps. Loss or fragmentation of habitat across a region increases the conservation pressure on military and other undeveloped lands. Urban development can create pollution, interfering with nighttime operations, or lead to noise complaints. The combination of these factors can lead to a reduced capability of installations to provide essential training environments.

The Marine Corps partners with conservation organizations and state and local governments to protect habitats near their installations. While the primary purpose is to buffer installations from development that would be detrimental to the mission, preventing urban encroachment also protects wildlife habitat, wetlands, and other sensitive resources. Additionally, it supports the sustainability of working lands, including farms and forests.

DoD photo

MCB Qunatico, in partnership with the Virginia Department of Game and Inland Fisheries and Prince William Conservation Alliance, permanently preserved the Merrimac Farm adjacent to the base. The farm preserves habitat and recreational areas, and buffers the mission from incompatible development.

Recently, the Marine Corps has focused specifically on protecting nearby habitats for threatened and endangered species. Protecting these listed species can alleviate training restrictions, while continuing to promote protection and recovery goals.

Department of Defense Project Funding: Legacy, SERDP, and ESTCP

DoD funds projects to solve urgent environmental problems confronting the Military Services. The projects leverage the capabilities of national experts to support military readiness by reducing environmental liability, improving efficiency, and increasing cost savings. The three primary DoD programs that review applications and award funding are

- **The Legacy Resource Management Program (Legacy)**, which funds management efforts to protect natural and cultural resources. A Legacy project may involve habitat conservation, regional ecosystem management, or invasive species control.
- **The Strategic Environmental Research and Development Program (SERDP)**, which funds research on innovative technologies for DoD's most challenging environmental problems. SERDP is a partnership between DoD, the U.S. Department of Energy, and the U.S. Environmental Protection Agency.
- **The Environmental Security Technology Certification Program (ESTCP)**, which demonstrates and validates promising, innovative technologies that target DoD's most urgent environmental needs.

USMC installations have participated in projects funded by these three DoD programs. Examples include

- *National Public Lands Day.* Each year, volunteers restore habitat on installations throughout the United States on National Public Lands Day. In 2009, Legacy awarded funding to five Marine Corps sites: MCB Camp Pendleton, MCAGCC Twentynine Palms, MCB Quanitco, MCB Camp Lejeune, and Marine Corps Recruit Depot Parris Island.
- *Sea level rise risk assessment for North Carolina coastal installations.* In 2009, Legacy funded an assessment of sea level rise for natural, cultural, and operational risks at five DoD installations, including MCAS Cherry Point and MCB Camp Lejeune.

USMC photo

Virginia blue-bells are a prominent natural resource protected on the Merrimac Farm.

USMC photo

As part of National Public Lands Day, site managers at MCAGCC Twentynine Palms organized volunteers to design and establish a nectar garden to provide habitat and food for pollinating species such as hummingbirds and butterflies. The nectar garden was established close to an existing nature trail where many base personnel visit.

- *Identifying landscape habitat patterns and sub-species designations of desert tortoises on three southwestern military installations.* In 2009, Legacy funded the development of a landscape-scale pattern recognition model to predict desert tortoise activity centers. This would assist natural resource managers in appraising impacts of military activities on desert tortoise populations. MCAS Yuma participated.
- *Removal of invasive fire prone grasses to increase training lands in the Pacific.* MCB Hawaii hosted this Legacy-funded project to investigate whether mechanical removal, herbicide application, or cattle grazing is most effective to reduce invasive guinea grass on Marine Corps Training Area-Bellows. This study will help land managers through the Pacific Islands find alternatives to controlled burns, which can threaten endangered native flora and fauna, cultural sites, and adjacent urban communities.
- *Defense Coastal/Estuarine Research Program.* SERDP selected MCB Camp Lejeune as a site for scientists from the around the world to investigate ecosystem processes and thresholds for change. Scientists began the second phase of this 10-year project in 2007.
- *Examination of habitat fragmentation and effects on species persistence in the vicinity of Naval Base Point Loma and Marine Corps Air Station, Miramar, San Diego, California.* In 2006, SERDP sponsored a project to develop tools for identifying undeveloped land near DoD installations, including near MCAS Miramar. This land would help identify the minimum size and number of small, separate populations needed in order to sustain a stable, regional metapopulation.
- *DoD Pacific Islands Region Threatened, Endangered, and At-Risk Species (TER-S) Workshop.* In 2006, through SERDP and Legacy funding, MCB Hawaii hosted a workshop. The workshop led to a prioritized list of information gaps and management needs for TER-S. It also set a foundation for improved communication and data sharing.

The following sections highlight key aspects of the Natural Resource Conservation Programs at Marine Corps installations. The summaries discuss the unique military mission, ecological setting, key species and program issues and successes for each base, air station, range, and depot.

Barry M. Goldwater Range-West

USMC photo by Lance Cpl. Aaron Diamant/Released

Mission

Barry M. Goldwater Range-West (BMGR-W) is part of the Bob Stump Training Range Complex. The complex is 1,900 square miles and the largest tactical aviation training range used by the Marine Corps. It has aerial bombing and gunnery ranges, and special-use airspace. BMGR-W is primarily a training site for Marine Corps Air Station (MCAS) Yuma. MCAS Yuma is the busiest air station in the Marine Corps, and serves as a base of operations for Marine Aviation Weapons and Tactics Squadron-1 and other units. The squadron trains aircrew and support personnel in advanced aviation warfighting techniques.

Ecology

BMGR-W is a significant part of the largest remaining tract of relatively unfragmented and undisturbed Sonoran Desert in southwestern Arizona. The Sonoran Desert is recognized as the most biologically diverse of the great North American deserts. The region surrounding BMGR-W is predominantly rural and undeveloped, with many federal and tribal lands.

Acreage 691,929

Wetland Acreage 0

USFWS Region 2

Website www.yuma.usmc.mil

PROGRAM HIGHLIGHTS

Sonoran Pronghorn Recovery Initiative

BMGR-W provides about 40% of the Sonoran pronghorn's range in the United States. In conjunction with the Air Force, Mexican government, U.S. Fish and Wildlife Service, and others, the Marine Corps has engaged in a major initiative to save the Sonoran pronghorn. Four recovery projects are underway:

1. Provide watering holes for the pronghorn during periods of drought
2. Establish irrigated plots for grasses and shrubs to ensure long-term food sources
3. Maintain a breeding enclosure to protect fawns from coyote predation before release into the wild
4. Integrate the genetically diverse Mexican Sonoran pronghorns with the U.S. population at the breeding enclosure

Terry L Spivey, Terry Spivey Photography, Bugwood.org

The Sonoran pronghorn is the fastest land mammal in North America. BMGR provides 40% of its range in the United States.

Threatened and Endangered Species

Acuña cactus, Candidate
Echinomastus erectocentrus acunensis

Flat-tailed horned lizard, Candidate
Phrynosoma mcallii

Lesser long-nosed bat, Endangered
Leptonycteris curasoae yerbabuenae

Sonoran pronghorn, Endangered
Antilocapra americana sonoriensis

Outdoor Recreation

BMGR-W offers limited rock and native plant collecting, camping, hunting, target shooting, hiking, and climbing. The area east of the Copper Mountains is closed to the public from March to July, during the Sonoran pronghorn's fawning season.

Conservation Law Enforcement Officers

In partnership with the Arizona Game and Fish Department, four BMGR-W Conservation Law Enforcement Officers enforce state and federal laws and regulations for game and wildlife. The Arizona Game and Fish Department also assists BMGR-W with wildlife surveys (e.g., for bighorn sheep) and Sonoran Pronghorn recovery efforts. The Arizona Game and Fish Department provides habitat and species management recommendations to BMGR-W.

In collaboration with the U.S. Border Patrol, Conservation Law Enforcement Officers prevent drug smuggling and undocumented individuals from illegally entering the United States from nearby Mexico. Aside from their impacts to national security, smuggling and illegal entry impact BMGR-W's natural resources with vehicular and other disturbances.

The Sonoran Desert Military Ranges Conservation Partnership Team

To more efficiently conserve natural resources over the vast BMGR and to unify conservation efforts across federal lands in the Sonoran Desert, the Marine Corps began participating in a regional partnership. The Sonoran Desert Military Ranges Conservation Partnership Team includes:

- Army (Yuma Proving Grounds)
- Navy (Naval Facilities Engineering Command Southwest)
- Marine Corps (MCAS Yuma and BMGR-W)
- Air Force (Luke Air Force Base, Davis-Monthan Air Force Base and BMGR-East)
- U.S. Fish and Wildlife Service
- Arizona Game and Fish Department
- The Nature Conservancy
- The Sonoran Alliance

The partnership supports the military mission and readiness, supports stewardship programs at military installations, and works together and with other partners to prevent encroachment near military installations.

Current initiatives focus on several desert bird and bat species, the Sonoran pronghorn, the desert tortoise (*Gopherus agassizii*), and the flat-tailed horned lizard.

LISTED SPECIES HIGHLIGHTS

Sonoran pronghorn, Endangered

(Antilocapra americana sonoriensis)

With its small size and light coloring, the Sonoran pronghorn is uniquely adapted for the desert. Threats include disturbances due to illegal immigration and border security, livestock grazing, development, and barriers that fragment pronghorn habitat and prevent movement (including fences and roads).

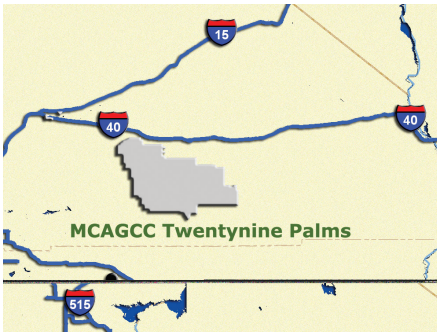
Lesser long-nosed bat, Threatened

(Leptonycteris curasoae yerbabuenae)

The lesser long-nosed bat is a migratory species living in the southwestern United States. It breeds in colonies in mines and caves. The species has been seen at water sources on BMGR-W, possibly signifying a range extension.

Marine Corps Air Ground Combat Center Twentynine Palms

USMC photo by Lance Cpl. Brandyn E. Council/Released



Acreage 599,627

Wetland Acreage 0

USFWS Region 8

Website www.29palms.usmc.mil

USGS photo by Forest & Kim Starr

The invasive Russian thistle spreads seeds by detaching from its roots and tumbling in the wind. MCAGCC Twentynine Palms removes the thistle and other invasive species to protect people and the environment.

Mission

Marine Corps Air Ground Combat Center (MCAGCC) Twentynine Palms primarily develops, conducts, administers, and evaluates the Marine Corps' Combined Arms Exercise Training Program. This is the premier training exercise for the Marine Corps, involving integrated, combined-arm live fire training. MCAGCC also serves the 7th Marine Regiment and hosts the Marine Corps Communication and Electronics School.

Ecology

MCAGCC Twentynine Palms is located in the Mojave Desert at the western base of the Bullion Mountain Range. The area is characterized by mountainous terrain with steep slopes and large valleys.

PROGRAM HIGHLIGHTS

Outdoor Recreation

MCAGCC Twentynine Palms provides opportunities for horseback riding and hiking. The installation also maintains a Wildlife Viewing Area and Nectar Garden for nature study, particularly bird watching, and a skeet range.

Invasive Species Control

Invasive species impact wildlife habitat, outdoor beauty, land value, and the military training mission at MCAGCC Twentynine Palms. To mitigate these impacts, the installation removes saltcedar (*Tamarix spp.*), Russian thistle (*Salsola spp.*), Saharan mustard (*Brassica tournefortii*), and Mediterranean grass (*Schismus barbatus*). Over 40,000 invasive plants were removed between 1996 and 2007. Removing invasive plants and facilitating natural desert landscapes both conserves water and enhances biodiversity.

Bird Management

When certain birds nest near tactical vehicles or other locations where they may be in danger, MCAGCC natural resources staff may relocate their nests. The U.S. Fish and Wildlife Service (USFWS) permits installation natural resources

personnel to relocate up to ten occupied nests each year. The nests must belong to the mourning dove, roadrunner, common raven, barn owl, great horned owl, or mallard.

Desert Tortoise Management

MCAGCC Twentynine Palms protects and improves desert tortoise habitat, and encourages population growth. The installation uses research, habitat management, awareness, and other methodologies within the requirements and recommendations of the Endangered Species Act. Since 1991, the installation has maintained a 7,300-acre Special Use Area that limits military operations and off-road vehicles. This protects the desert tortoise and archeological resources.

In cooperation with the University of California, Los Angeles, MCAGCC Twentynine Palms has operated a Tortoise Research and Captive Rearing Site (TRACRS) since 2005. The captive rearing program brings females to the facility for egg deposition, and then returns them to their original location. Researchers are closely monitoring juveniles until their shells have hardened enough to resist most predation. Upon release into the wild, the tortoises will be monitored by radio telemetry for at least one year, and some will be monitored for five or more years.

Between 2005 and 2009, the Tortoise Research and Captive Rearing Site has successfully cared for over 300 hatchlings. MCAGCC Twentynine Palms is currently evaluating the best way to reintroduce juveniles back to the wild population.

USMC photos by Ryan Orndorff

In 2005 MCAGCC Twentynine Palms constructed the TRACRS to contribute to the recovery of the desert tortoise.

Nelson's Bighorn Sheep Management

In 1991, the Marine Corps, the California Department of Fish and Game, and the Society for the Conservation of Bighorn Sheep began a pilot experiment to reintroduce Nelson's Bighorn Sheep (*Ovis canadensis nelsoni*) back into their historic range. The three partners moved 15 ewes and 5 rams into MCAGCC Twentynine Palm's Bullion Mountains.

If successful, returning the sheep could reestablish the genetic link between sheep from the Sheephole Mountains just to the south of the combat center, and those from the Newberry Mountains to the north. MCAGCC Twentynine Palms maintains two reliable water sources for the sheep, and monitors them with motion-activated cameras.

LISTED SPECIES HIGHLIGHTS

Desert Tortoise, Threatened

Gopherus agassizii

The desert tortoise is a large, herbivorous reptile found throughout much of the Mojave and Sonoran deserts. It is one of most elusive inhabitants of the desert, spending up to 95% of its life underground in burrows that it digs with its front limbs. The burrow protects tortoises from extreme heat, cold, and lack of moisture. So many other species use its abandoned burrows—including burrowing owls, snakes, lizards, and badgers—that it is considered a keystone species in the desert.

The major threat is habitat loss and degradation due to the construction of roads and houses, the conversion of native habitats to agriculture, grazing, and off-road-vehicle use. Other threats include illegal collection, upper respiratory disease, and the predation of juveniles by ravens.

While USFWS has designated no critical habitat for the desert tortoise on the installation, MCAGCC Twentynine Palms does share a six-mile boundary with the Ord-Rodman critical habitat to the northwest. There is another area of critical habitat six miles to the southeast, called the Pinto Mountain critical habitat.

Threatened and Endangered Species

Desert tortoise, Threatened
Gopherus agassizii

USMC photo

A desert tortoise hatchling being raised at the TRACRS.

Marine Corps Air Station Camp Pendleton

USMC photo

Acreage 488

Wetland Acreage 0.5

USFWS Region 8

Website www.marines.mil/unit/mcaspendleton/Pages/Environmental

Mission

Marine Corps Air Station (MCAS) Camp Pendleton houses the 180 rotary wing aircraft from Marine Air Group 39. These aircraft are instrumental to the First Marine Expeditionary Force's readiness near and at sea. While MCAS Camp Pendleton is fully enclosed within Marine Corps Base Camp Pendleton, it is managed separately.

Ecology

MCAS Camp Pendleton is part of the Santa Margarita Floodplain, an important wildlife corridor. A levee, constructed in 2000, protects the station from flooding by the Santa Margarita River. Despite its isolation, three endangered species are found on or in transit through MCAS Camp Pendleton.

PROGRAM HIGHLIGHTS

Wetlands Restoration

The station has always been largely vegetated outside of its built-up areas and runways. Over many years these areas had become degraded by construction and invasive plants had replaced native ones, lessening habitat and requiring increased maintenance. In 2003, the station began an ambitious restoration of existing wetland and other habitat areas.

The success of the restoration project is evidenced by the increase in Least Bell's vireo territories: between 2006 and 2009, the bird's occupied territories more than doubled.

Invasive Species Control

During levee construction, station contractors raised a site for mixing cement using non-native soil. The soil contained invasive weed spores that quickly spread.

Once the levee was complete, the station began restoring degraded habitats to their riparian status. In partnership with the U.S. Fish and Wildlife Service and the Army Corps of Engineers, MCAS Camp Pendleton removed non-native soil

and returned the raised site to its original grade. The station and its partners also removed invasive plants and planted native ground cover.

Hydrology Restoration

Aside from restoring vegetation, MCAS Camp Pendleton had to provide water in the degraded habitats. The station's challenge was two-fold: the hydrology that previously linked these habitats to the river was gone, and the station had to protect itself from flooding that could compromise the mission.

In partnership with the Army Corps of Engineers, the station designed and installed a series of earthen canals to route water from ponds toward the isolated riparian habitats. MCAS Camp Pendleton also enhanced the wetland, and redirected water flow away from the runway and toward habitat areas.

As a result of this innovative design, most stormwater remains on site. The stormwater replenishes the water in the riparian habitats, which continue to be isolated from the river. As an added benefit, the earthen canals purify the stormwater before it is discharged into the Santa Margarita River.

Community Outreach

As evidence of the station's steadfast commitment to strengthening relationships with neighbors, MCAS Camp Pendleton participates in numerous community events, including cleanups of Oceanside Waterway, Santa Rosa Plateau, and World Waterways Day; Earth Day; and environmental expositions for San Diego county.

LISTED SPECIES HIGHLIGHTS

Arroyo toad, Endangered

Anaxyrus californicus

The arroyo toad is a small, dark-spotted toad found in the coastal plains and mountains of California. The main threat is habitat loss due to urbanization, agriculture, and dam construction. The arroyo toad is found at the western end of MCAS Camp Pendleton. The station protects the arroyo toad by conducting surveys, monitoring the population, and controlling tadpole predators (such as the bullfrog).

Least Bell's vireo, Endangered

Vireo bellii pusillus

The Least Bell's vireo is a small, migratory bird that arrives at MCAS Camp Pendleton in March and April, and leaves for its wintering ground in southern Baja California in August. Vireos primarily inhabit dense, willow-dominated habitats with lush undergrowth. Five to seven pairs are thought to be present on the western end of the station.

Life NBII photo by Charles H. Warren

The Least Bell's vireo nests in dense foliage and feeds on insects. They are very vulnerable to nest parasitism by cowbirds. Several breeding pairs live on MCAS Camp Pendleton.

Threatened and Endangered Species

Arroyo toad, Endangered
Anaxyrus californicus

Least Bell's vireo, Endangered
Vireo bellii pusillus

Southwestern willow flycatcher, Endangered
Empidonax traillii extimus

Marine Corps Air Station Miramar

USMC photo by Cpl. William L. Dubose III/Released

Mission

Marine Corps Air Station (MCAS) Miramar maintains and operates facilities, and provides services and material to support operations of the Third Marine Aircraft Wing, Marine Aircraft Group 46, and other units.

Ecology

North of San Diego, MCAS Miramar provides important habitat corridors for wildlife moving among adjoining spaces. Vegetation types include chaparral, coastal sage scrub, and grasslands. MCAS Miramar boasts the largest example of vernal pool habitat in southern California, meriting its status as Miramar Mounds National Natural Landmark. The eastern side of the station has coastal foothills and canyons, with moderate to steep slopes; the western side is relatively flat, with canyons cut through mesas by coastal drainages.

Acreage 23,047

Wetland Acreage 322

USFWS Region 8

Website www.miramar.usmc.mil/ems/environmental_programs/nat_resources

PROGRAM HIGHLIGHTS

Vernal Pool Conservation

Vernal pools—also known as ephemeral or depressional wetlands—hold water after seasonal rains in the late winter and spring (vernal times of the year), and dry up in early summer. Because vernal pools are free of fish, certain amphibians and invertebrates breed very successfully. Extensive residential, commercial, agricultural, and infrastructure development has led to the loss of most of southern California's vernal pools and the endemic plants and animals they foster.

Surveys across almost all of MCAS Miramar have identified more than 7,000 basins and depressions that pool water. Many of the vernal pools are not naturally occurring; rather, they result from past human activities and include ditches, ruts, and excavations.

These habitats are essential to the survival of six plants and animals protected under the Endangered Species Act. The rapid colonization capability of some vernal pool species necessitates careful land use management and periodic surveys of operationally important areas.

USMC photo

On MCAS Miramar, vernal pool habitat is essential to the survival of six species protected under the Endangered Species Act.

MCAS Miramar maintains protective fencing and signs around vernal pools, when in close proximity to operational activities, and is currently developing a vernal pool interpretive kiosk and demonstration site for education and public awareness.

Ecosystem and Species Management

MCAS Miramar surveys the entire station periodically for threatened and endangered species, including monitoring surveys for threatened and endangered birds every three years. The station also maintains over 100 long-term monitoring plots, including plots specifically for the endangered Del Mar manzanita and willowy monardella. The station samples the plots for vegetation and soil conditions; small mammals, reptiles, and amphibians; and birds. In 2006, MCAS Miramar began a study of willowy monardella habitat enhancement.

Because of the station's success at managing natural resources in accordance with its Integrated Natural Resources Management Plan (INRMP), the designation of critical habitat for six species has been unnecessary.

Outdoor Recreation

In coordination with Marine Corps Community Services, MCAS Miramar maintains a seven-acre pond that allows authorized patrons to fish without a state fishing license. The station hosts occasional field trips to view natural resources, particularly vernal pools.

Photo by MCAS Miramar Natural Resources Division

Since 2001, MCAS Miramar has restored three eroded sites near the Miramar Fish Pond with native coastal sage scrub vegetation. The station also stabilized the soil to reduce sediment runoff into the pond.

Agricultural Outleases

About half of the revenue from leasing out parts of MCAS Miramar for agriculture funds INRMP implementation. Funds have also supported updates to a soil erosion inventory, vernal pool habitat surveys and studies, vegetation mapping, and rare plant surveys. In accordance with outlease agreements, the government may require lease holders to perform conservation and maintenance work.

Fire Management

The primary reason for fire management at MCAS Miramar is to protect human life, health, and property. Fire is a natural component of the landscape in southern California, especially during the fall when there are warm winds and vegetation

is dry. The station sets controlled fires to prevent plant debris from accumulating, making successive fires less intense and less destructive. Wildfires help maintain ecological diversity by fostering a mixture of vegetation types at various development stages.

The MCAS Miramar Fire Department is responsible for fire management on the station. The Fire Department maintains fuel breaks using multiple methods to retain low vegetation and roots in the soil to reduce soil erosion.

In 2003, the Cedar Fire wildfire swept through MCAS Miramar and much of the region. It affected about 17,600 acres on the station, significantly reducing fuel loads. Vegetation regrowth after the fire is progressing as expected, with no apparent adverse impact to vernal pools. By 2009, the coastal California gnatcatcher and least Bell's vireo populations had rebounded to pre-fire numbers. Del Mar manzanita is adapted to periodic fire and resprouts well. Willowy monardella populations decreased following the fire and subsequent droughts and erratic rainfall; however, seedling recruitment appears to have improved recently. As years pass following this fire, more active fuel load reduction measures will be needed. The station is preparing a Wildland Fire Management Plan to address future fire management needs.

Photo by MCAS Miramar Natural Resource Division

Del Mar Manzanita is adapted to periodic fire, and grew back well after the 2003 Cedar Fire burned 17,600 acres at MCAS Miramar.

USMC photo by Miramar Natural Resources team

San Diego mesa-mint is found only in vernal pools of central, coastal San Diego County in southern California. This plant blooms into dozens of beautiful flowers and smells strongly of mint.

LISTED SPECIES HIGHLIGHTS

San Diego fairy shrimp, Endangered

Branchinecta sandiegonensis

The San Diego fairy shrimp is a small, aquatic crustacean, restricted to vernal pools and similar habitats in coastal southern California. The shrimp are found in a large number of vernal pools and other seasonally-ponded features on MCAS Miramar. Threats include habitat destruction and fragmentation from agricultural and urban development, alteration of wetland hydrology by draining, off-highway vehicle activity, and cattle and sheep grazing.

San Diego mesa-mint, Endangered

Pogogyne abramsii

San Diego mesa-mint is an annual plant that inhabits vernal pools throughout MCAS Miramar. The mint is sensitive: even in a healthy, undisturbed vernal pool it does not tolerate overcrowding by other plants (even those of its own species), nor soil that is too wet or too dry. Similar to other vernal pool species, habitat destruction threatens the mint.

Willowy monardella, Endangered

Monardella linoides ssp. viminea

The willowy monardella is a perennial herb typically found on sandbars or low benches in drainage beds. The species is endemic to San Diego County, and found primarily in canyons on the east side of MCAS Miramar. A smaller population is in San Clemente Canyon on the west side. An estimated 80% of the domestic range of this species occurs on MCAS Miramar.

Coastal California gnatcatcher, Threatened

Polioptila californica

The coastal California gnatcatcher is a small, blue-gray songbird that is abundant on coastal sage scrub at MCAS Miramar. The major threat is loss of coastal sage scrub habitat due to urban and agricultural development. The annual population on the station ranges between 24 and 62 pairs.

Threatened and Endangered Species

California Orcutt grass, Endangered
Orcuttia californica

Coastal California gnatcatcher, Threatened
Polioptila californica

Del Mar manzanita, Endangered
Arctostaphylos glandulosa ssp. crassifolia

Least Bell's vireo, Endangered
Vireo bellii pusillus

Riverside fairy shrimp, Endangered
Streptocephalus woottoni

San Diego button-celery, Endangered
Eryngium aristulatum var. parishii

San Diego fairy shrimp, Endangered
Branchinecta sandiegonensis

San Diego mesa-mint, Endangered
Pogogyne abramsii

Spreading navarretia, Threatened
Navarretia fossalis

Willowy monardella, Endangered
Monardella linoides ssp. viminea

Marine Corps Base Camp Pendleton

U.S. Navy photo by Prince A. Hughes III/Released

Acreage 125,146

Wetland Acreage 1,166

USFWS Region 8

Website www.pendleton.usmc.mil/base/environmental

Mission

Marine Corps Base (MCB) Camp Pendleton is one of the most intensively used Marine Corps installations, supporting ground, air, and amphibious training requirements. Marines and Sailors from the 11th, 13th, and 15th Marine Expeditionary Units train on the base for regular deployments to the Middle East. MCB Camp Pendleton provides formal schooling for Marines: the School of Infantry trains Marines in basic warfighting, the Field Medical Service School trains Fleet Marine Force corpsmen, and the Professional Military Education Academies train thousands of Marines each year. Marine Corps Air Station Camp Pendleton (see page 17) is within MCB Camp Pendleton.

Ecology

MCB Camp Pendleton is one of the last remaining undeveloped areas on the southern California coast. The base's semiarid climate, varied topography, and diverse soil types promote a vast diversity of plants and wildlife. MCB Camp Pendleton is characterized by oak woodlands, chaparral and sage scrub (including the largest remaining tract of Diegan coastal sage scrub), coastal bluff scrub, grasslands, coastal dunes, riparian communities, and wetlands.

PROGRAM HIGHLIGHTS

Ephemeral Wetlands Conservation

A number of areas at Camp Pendleton contain ephemeral wetlands, of which vernal pools are the most common type. Ephemeral wetlands hold water after seasonal rains in the late winter and spring (vernal times of the year), and dry up in early summer. Because they are free of fish, certain amphibians and invertebrates breed very successfully. Extensive residential, commercial, agricultural, and infrastructure development has led to the loss of most of southern California's ephemeral wetlands and the endemic plants and animals they foster.

Ephemeral wetlands at MCB Camp Pendleton support tremendous biodiversity, including specialized rare and endangered species. Many animals, such as migratory birds, stop at the wetlands to forage and rest during seasonal migration.

USMC photo

Vernal pools at MCB Camp Pendleton represent some of the last remaining habitat in Southern California and support tremendous biodiversity, including four federally listed species. Swallows are seen here collecting mud to build their nests.

MCB Camp Pendleton has completed two inventories of ephemeral wetlands species. The base manages, in consultation with the U.S. Fish and Wildlife Service, four listed species present in the vernal pools including spreading navarretia, San Diego button-celery, Riverside fairy shrimp, and San Diego fairy shrimp.

Outdoor Recreation

MCB Camp Pendleton provides fish- and wildlife-oriented recreation and education for the public to enjoy. Lake O'Neill provides fishing and boating opportunities. Several areas of the base are open to hunting for southern mule deer (*Odocoileus hemionus fuliginatus*), California quail (*Callipepla californica*), and other game species. The base maintains jogging trails, hunting and camping areas, equestrian facilities, a golf course, and 3.5 miles of beach for recreation.

Agricultural Outleases

The base leases out 300 acres for agriculture. Additional land is available for native seed harvesting. Each outlease specifies soil and water conservation practices, pest management practices, and provisions for land restoration upon termination of the lease. Funding supports administration of the agriculture program, as well as some land management.

Non-native and Invasive Species Control

Maintaining and enhancing native plant communities—particularly those of threatened and endangered species—is one of MCB Camp Pendleton's primary management goals. The introduction and spread of non-native and/or invasive plants and animals can hurt these communities. Preventing introductions is particularly challenging in a military environment, where training activities disturb the ground and fire can limit the success of native plants.

Threatened and Endangered Species

Arroyo toad, Endangered
Anaxyrus californicus

Brand's phacelia, Candidate
Phacelia stellaris

California least tern, Endangered
Sterna antillarum browni

Coastal California gnatcatcher, Threatened
Polioptila californica

Least Bell's vireo, Endangered
Vireo bellii pusillus

Light-footed clapper rail, Endangered
Rallus longirostris levipes

Pacific pocket mouse, Endangered
Perognathus longimembris pacificus

Riverside fairy shrimp, Endangered
Streptocephalus woottoni

San Diego button-celery, Endangered
Eryngium aristulatum var. Parishii

San Diego fairy shrimp, Endangered
Branchinecta sandiegonensis

Southwestern willow flycatcher, Endangered
Empidonax traillii extimus

Spreading navarretia, Threatened
Navarretia fossalis

Steelhead trout, Endangered
Oncorhynchus mykiss

Stephens' kangaroo rat, Endangered
Dipodomys stephensi

Thread-leaved brodiaea, Threatened
Brodiaea filifolia

Tidewater goby, Endangered
Eucyclogobius newberryi

Western snowy plover, Threatened
Charadrius alexandrinus nivosus

Yellow-billed cuckoo, Candidate
Coccyzus americanus

USFWS photo by Eric Engbretson

The steelhead trout lives in both fresh and saltwater and—unlike most salmon species—can spawn more than once. MCB Camp Pendleton surveys for this endangered fish, and protects watershed habitats.

Giant reed (*Arundo donax*), which chokes out streams and riparian areas, is of significant concern. Species that depend on riparian habitats, including the arroyo toad and southwestern willow flycatcher, are particularly susceptible to the reed's effects. MCB Camp Pendleton is making progress toward controlling giant reed, but without more comprehensive action throughout watersheds outside MCB Camp Pendleton, control measures will be a perpetual challenge.

Invasive animals can also out-compete native species for resources, or prey upon native species. The brown-headed cowbird (*Molothrus ater*) lays its eggs in the nests of other bird species, relying on those hosts to incubate and raise their chicks. In 1983, the base began to remove cowbirds from riparian areas to benefit the endangered Least Bell's vireo and other birds. Since the program began, vireo nests have increased from 64 to 1,200 in 2009.

Fire Management

Fire strongly influences the biological structure and composition of MCB Camp Pendleton's vegetation, and can be necessary for the regeneration of native plants. Fires are especially frequent at the base, in part due to the use of live-fire ammunition during military training. When fires are too frequent, slower-growing plants never establish themselves and biodiversity suffers. The base's Fire Management Plan balances military training requirements, the conservation of natural resources, and fiscal limitations.

Encroachment Control: South Coast Conservation Forum

MCB Camp Pendleton engages in partnerships to relieve the encroachment of urban areas on agricultural areas and open spaces. Rapid development has increased fragmentation and pressures on important habitats, ultimately threatening the survival of native species. San Diego County leads the continental United States in the number of threatened and endangered species. MCB Camp Pendleton and the adjacent Cleveland National Forest occupy some of the last, significant open spaces and wildlife habitats in the region.

MCB Camp Pendleton actively partners with the South Coast Conservation Forum, San Diego County, and the Nature Conservancy to identify opportunities for land conservation. They look for land that both supports species conservation and protects the military mission. The forum is made up of states, counties, universities, and nongovernmental conservation organizations. These groups have a common goal of supporting land use that is compatible with relieving encroachment and achieving resource conservation objectives.

LISTED SPECIES HIGHLIGHTS

Steelhead trout, Endangered

Oncorhynchus mykiss

Steelhead trout migrate through lower San Mateo Creek and the Santa Margarita River on MCB Camp Pendleton. Threats include loss of watershed habitat, blocked access to spawning areas, and decreases in stream levels. The base has worked with USFWS to implement a riparian management program and with the National Marine Fisheries Service on projects, such as removing water-diverting structures from San Mateo Creek to return the creek to a more natural state.

California least tern, Endangered & Western snowy plover, Threatened

Sterna antillarum browni & Charadrius alexandrinus nivosus

The California least tern and the western snowy plover are small shorebirds that forage and nest on coastal beaches, including at MCB Camp Pendleton. Threats include loss of nesting and foraging habitat, and disturbance to breeding colonies.

MCB Camp Pendleton installs temporary fences around breeding colonies as protection from predators and military training. Training and recreational activities are minimized during the breeding and nesting seasons. The base also posts warning signs, removes vegetation that hinders nesting, monitors bird populations, and bands chicks. In addition, MCB Camp Pendleton controls predators in the immediate vicinity of the nesting areas.

Coastal California gnatcatcher, Threatened

Polioptila californica

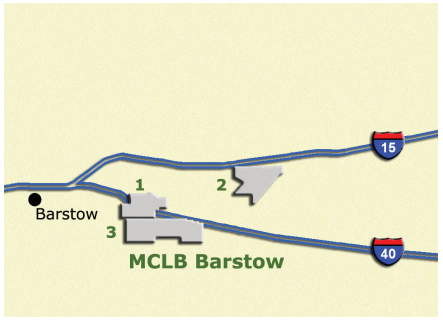
The coastal California gnatcatcher is a small bird found in coastal sage scrub on MCB Camp Pendleton. The major threat is habitat fragmentation and loss. To conserve this bird, the base conducts surveys, restricts training during breeding and nesting season, and enhances coastal sage scrub.

USMC photo

Western snowy plovers will use almost anything they can find on the beach to make their nests, including kelp, driftwood, and shells. MCB Camp Pendleton protects the bird's nests from training and recreational activities.

Marine Corps Logistics Base Barstow

USMC photo by Staff Sgt. Houston F. White Jr.



1. Nebo Area
2. Yermo Annex
3. Rifle Range

Acreage 5,405

Wetland Acreage 18.6

USFWS Region 8

Website www.bam.usmc.mil

Mission

Marine Corps Logistics Base (MCLB) Barstow provides infrastructure, services, and support to Marine Corps forces, tenant activities, and other customers. The highly technical nature of the work done at MCLB Barstow requires a stable work force, best achieved by experienced career civilians. There are 225 active duty Marines and Sailors, over 200 active duty Soldiers, and 2,500 civilians working at MCLB Barstow.

Ecology

MCLB Barstow lies east of Los Angeles in the Mojave Desert. The desert's arid conditions enhance the base's mission as a storage and warehousing facility: low humidity and limited yearly rainfall significantly reduce mold, rust, and mildew damage to equipment.

PROGRAM HIGHLIGHTS

Wetlands Conservation and Community Outreach

Historically, wetlands on MCLB Barstow were open to the public and had become a site for illegal dumping. In 2006, the base constructed fencing to prevent dumping, and put up signs declaring it a Wildlife Wetlands Sanctuary. In 2007 and 2008, volunteers—including a Boy Scout Troop—collected six tons of trash or recyclables from the wetland.

The cleanup effort exemplifies the base's role in the community, and its support for environmental conservation.

Outdoor Recreation

For the small number of military members and civilians living at MCLB Barstow, some recreational opportunities are available. These activities include picnicking, walking and jogging, biking, a golf course, and wildlife watching. There is also a riding stable.

Invasive Species Control

The Mojave River area of MCLB Barstow has suffered many invasive plant introductions due to an intersecting railroad than incidentally moves plant seeds. Saltcedar (or Tamarisk) (*Tamarix ramosissima*) and giant reed (*Arundo donax*) are some of the most challenging invaders. They are highly invasive in desert riparian areas, and can modify the structure and function of an ecosystem. MCLB Barstow is coordinating with upstream and downstream land managers to control saltcedar through regional strategies. The proliferation of saltcedar is a concern because it displaces native woody riparian vegetation, such as willows and cottonwoods. Saltcedar also uses more water than native plants, taking already scarce water away from native plants.

Bugwood.org photo by Richard Old, XID Services, Inc.

Saltcedar displaces and steals water away from native plants. MCLB Barstow coordinates with regional land managers to control this invasive plant.

Erosion Control

In the Mojave Desert, wind more often than water creates soil erosion. Wind sweeps up dust or sand, obscuring visibility and polluting the air. On MCLB Barstow, areas of open and unimproved lands, disruption of the desert crust by vehicle operations, and the proximity of the Mojave River floodplain contribute to the severity of wind-related soil erosion.

To maximize cost-effectiveness, MCLB Barstow seeks to prevent erosion before it begins. When possible, the base avoids disturbing existing plants and soil crust. When avoidance is not possible due to mission requirements, MCLB Barstow uses best management practices for construction and landscaping, stabilizing sources of sand with natural vegetation, and constructing windbreaks to manipulate the movement and distribution of sand.

USMC photo by Donna J. Redes

MCLB Barstow's test track includes a test pond for amphibious vehicles. The base's efforts to stabilize soil and construct windbreaks prevents wind-related soil erosion.

LISTED SPECIES HIGHLIGHTS

Desert tortoise, Threatened

Gopherus agassizii

Of the existing desert tortoise habitat on MCLB Barstow, approximately 540 acres are designated as critical habitat by the U.S. Fish and Wildlife Service. The critical habitat is part of the Ord-Rodman Desert Wildlife Management Area. All of it is on the southern portion of the Rifle Range, which is currently the most remote and least used part of the base.

Threatened and Endangered Species

Desert tortoise, Threatened
Gopherus agassizii

Southwestern willow flycatcher, Endangered
Empidonax traillii extimus

USGS photo

The southwestern willow flycatcher breeds in the Southwest. It has been endangered since 1995, and was seen at the base in 2005.

MCLB Barstow has erected fencing to keep tortoises from migrating back onto unprotected areas from the critical habitat, deter off-road vehicles, and prevent illegal dumping. The base has a desert tortoise education program for all Rifle Range users, newly assigned base personnel, contractors, and visitors.

Southwestern willow flycatcher, Threatened

Empidonax traillii extimus

The southwestern willow flycatcher migrates through the Mojave desert, and its presence was documented at MCLB Barstow in 2005. Otherwise, the nearest sighting has been 50 miles away. The small bird breeds in riparian woodlands in the southwestern United States, and winters in central America.

Marine Corps Support Facility Blount Island

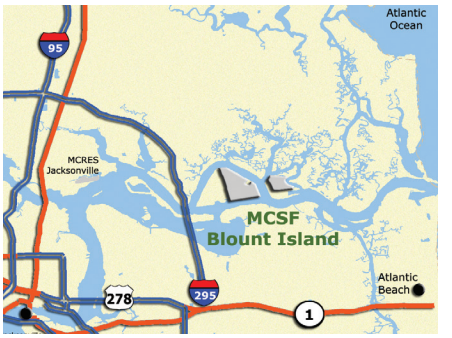
USMC photo by PH1 J.F. Slaughenhaupt

Mission

Marine Corps Support Facility (MCSF) Blount Island provides facilities, infrastructure, and support services to tenant commands whose missions directly support the warfighter. When possible, MCSF Blount Island also provides port services to other Department of Defense agencies for purposes relating to national security.

Ecology

In the 1960s, the U.S. Army Corps of Engineers dredged a straight-line channel in the St. Johns River to improve navigation; the deposited dredge formed Blount Island. Most of MCSF Blount Island consists of military facilities and associated infrastructure (such as stormwater ponds). The shoreline of the original channel, a tidal lagoon, and marsh system are the major remaining natural areas. There are also several undeveloped areas of native grass, which the installation mows regularly.



Acreage 1,235

Wetland Acreage 334

USFWS Region 4

Website www.bic.usmc.mil

PROGRAM HIGHLIGHTS

Migratory Birds Conservation

MCSF Blount Island is located along the Atlantic Flyway, a principal migration route for migratory birds in eastern North America. Because of its importance as a resting or feeding stop for migratory birds, the installation preserves and monitors bird habitats. MCSF Blount Island also coordinates maintenance and construction activities so as not to disturb nesting or brooding birds. The installation incorporates protections for migratory birds into the planning process for all future construction designs.

Invasive Species Control

MCSF Blount Island is developing an Integrated Pest Management Plan to control non-native, invasive plants. The installation has focused on saltcedar (*Tamarix spp.*) and chinaberry (*Melia azedarach*), which can damage or displace native species. MCSF Blount Island is committed to maintaining quality habitat for wildlife, and preventing the continued spread of these invasive plants to nearby areas.

USMC photo by MC1 Leah Stiles

A ship receives cargo from MCSF Blount Island that will support relief efforts in Haiti. The base achieves its missions while protecting natural resources.

Photo by Matthew J. Aresco, Auburn University

The gopher tortoise is a terrestrial species found in dry habitats. The gopher tortoise is unique in that it is one of the few tortoises to dig large burrows. While the gopher tortoise is currently listed as threatened in some areas, in Florida the species is currently under review.

Threatened and Endangered Species

American alligator, Threatened
Alligator mississippiensis

Gopher tortoise, Candidate
Gopherus polyphemus

West Indian manatee, Endangered
Trichechus manatus

Wood stork, Endangered
Mycteria americana

LISTED SPECIES HIGHLIGHTS

West Indian manatee, Endangered
Trichechus manatus

The West Indian manatee is a large aquatic mammal, with a broad tail and flipper-like front limbs. Manatees occasionally swim in St. John's River near the installation, and have also swum into the slipway. MCSF Blount Island coordinates with the Florida Fish and Wildlife Conservation Commission before allowing ships to enter or leave the installation.

Gopher tortoise, Candidate
Gopherus polyphemus

MCSF Blount Island has identified tortoises and their burrows in the southeastern corner of the installation, an undeveloped area with deep, sandy soils. After the tortoises were first discovered, the installation ceased using the area as a test vehicle track and posted signs to prohibit vehicle traffic. In 2009, a burrow survey identified 30 active burrows and 15 inactive burrows. MCSF Blount Island improved the habitat removing dense underbrush.

Marine Corps Logistics Base Albany

USMC photo by Nathan L. Hanks Jr.

Mission

Marine Corps Logistics Base (MCLB) Albany provides infrastructure to support organizations and personnel as they accomplish Marine Corps Logistics Command (MARCORLOGCOM) missions. MCLB Albany provides, procures, maintains, repairs, stores, and distributes supplies, services, and equipment as needed to support operating forces and the organizations and personnel aboard the installation; conducts schools and training; and performs other tasks and functions, as directed.

Ecology

MCLB Albany lies within the Atlantic Coastal Plain. About 40% of the base is forested. Types of forest include pine flatwoods and plantations, southern mixed hardwood, dense shrubs and saplings, and wooded swamps. There are also pecan orchards and a variety of wetlands.

Acreage 3,549

Wetland Acreage 133

USFWS Region 4

Website www.ala.usmc.mil

PROGRAM HIGHLIGHTS

Forest Management

Pine trees predominate forested areas of MCLB Albany, primarily slash (*Pinus elliottii*) and longleaf pine (*P. palustris*). MCLB Albany completed a timber inventory in 2006, with the next scheduled for 2016. Income from timber typically provides more than $40,000 to the base every year.

MCLB Albany manages its forest for multiple uses, and to foster wildlife habitat. The base conducts prescribed burns to enhance wildlife habitat and increase biodiversity. The base also surveys forests for insect infestations and diseases. In addition, efforts to plant seedlings and restore longleaf pine benefit migratory birds, and may encourage gopher tortoises to recolonize the area.

Outdoor Recreation

MCLB Albany provides opportunities for hunting and fishing, wildlife viewing, canoeing, jogging, and picnicking. In particular, the base encourages hunting to control white-tail deer and their impact on forest regeneration.

Photo by Nathan L. Hanks Jr.

MCLB Albany holds an annual "Buddy Fishing Tournament" for children. The event is open to the public and has been ongoing for over 20 years.

Threatened and Endangered Species

American alligator, Threatened
Alligator mississippiensis

Gopher tortoise, Candidate
Gopherus polyphemus

Wood stork, Endangered
Mycteria americana

Agricultural Outleases

MCLB Albany leases out 205 acres of pecan orchards, providing $2,050 for base operations each year. The outlease contains provisions for erosion control, insect and disease control, and habitat improvements for wildlife.

The most important recreation area is the Indian Lake Wildlife Refuge, an 85-acre cypress swamp. The refuge supports abundant wildlife, including the threatened American alligator and endangered wood stork. A boardwalk and nature trail are on the southern end of Indian Lake. The boardwalk is open to educational tours for school children and other visitors.

LISTED SPECIES HIGHLIGHTS

Wood stork, Endangered

Mycteria americana

Wood storks are large, long-legged wading birds that often nest in the upper branches of cypress trees in wetlands. Wood storks have been observed passing by Indian Lake Refuge on MCLB Albany, but no nesting or breeding populations are present on the base. The base conserves wetlands as potential stork foraging habitat.

American alligator, Threatened

Alligator mississippiensis

American alligators can be found in still or slow-moving water bodies throughout the southeastern United States, including on MCLB Albany. The American alligator was once on the verge of extinction due to overhunting and habitat destruction, but protective laws have enabled their population to increase.

Gopher tortoise, Candidate

Gopherus polyphemus

The gopher tortoise is native to dry habitats of the coastal plains. They feed on low plant growth and dig burrows that can be up to 40 feet long and 10 feet deep. While once present on the base, an extensive search by MCLB Albany in 2007 did not find any burrows. The base continues to monitor potential habitats.

USFWS photo

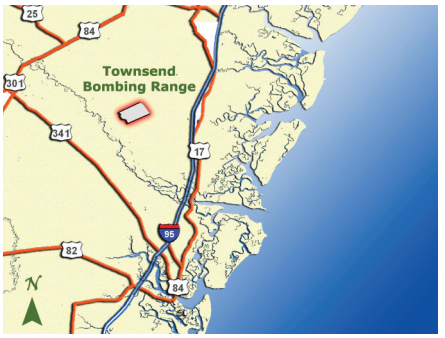
While there is not a confirmed population of Gopher tortoise present at MCLB Albany, the base continues to monitor for its long burrows.

Townsend Bombing Range

USMC photo

Mission
Townsend Bombing Range supports training requirements for Department of Defense Components. Fixed- and rotary-wing aircraft use the range, and Townsend Bombing Range also provides opportunities for training ordnance (no live ordnance). Marine Corps Air Station (MCAS) Beaufort is responsible for land management (see page 49); the Georgia Air National Guard Combat Readiness Training Center operates the range.

Ecology
Townsend Bombing Range is almost entirely forested: due to historic commercial use, pine plantations predominate. Surface water includes freshwater marshes, swamps, ponds, streams, and depressions that may hold water seasonally. Wetlands are dominated by trees, shrubs, and herbaceous plants. Townsend Bombing Range mows or conducts prescribed burns to maintain open upland areas near military infrastructure.



Acreage 5,165

Wetland Acreage 1,343

USFWS Region 4

Website www.beaufort.usmc.mil

PROGRAM HIGHLIGHTS

Wetlands Conservation

Townsend Bombing Range maintains and develops protective vegetation buffer strips around wetlands and along streams. These buffers improve water quality by filtering sediment and other pollutants from runoff. The installation also contains depressions that hold water seasonally. These depressions are important breeding sites for a variety of invertebrates and vertebrates, including the threatened frosted flatwoods salamander.

In 2008, Townsend Bombing Range completed a wetland mitigation survey. The survey assessed wetland areas for potential restoration and enhancement opportunities. These areas will be used to offset wetlands impacted by future development on the range.

USMC photo

MCAS Beaufort and Townsend Bombing Range have both mapped their wetlands to identify wetlands restoration and enhancement opportunities.

Forest Management

On Townsend Bombing Range, the Marine Corps manages 2,192 acres and the local McIntosh County retains timber rights to an additional 3,007 acres. Almost 70% of the installation's forest is planted slash (*Pinus elliottii*) and loblolly pine (*P. taeda*). Low-grade hardwoods predominate in drainages and wetlands, providing soil erosion control, vegetation diversity, and wildlife habitat.

Townsend Bombing Range applies an ecosystem approach to forest management. The installation mimics natural fire regimes with prescribed burns and thinning as needed; it also identifies pine stands suitable for conversion to longleaf pine (*P. palustris*). In 2009, Townsend Bombing Range executed prescribed burns over 1,400 acres of forest.

Because much of the timber at Townsend Bombing Range may be contaminated with fragments from the range activities, it cannot be used for pulpwood or saw timber products. Instead, the installation is pursuing selling its timber as pole logs.

Soil Erosion Control

Poorly drained soils, in combination with military and forestry activities (such as thinning, which exposes soil to water runoff), contribute to soil erosion at Townsend Bombing Range. Excessive soil erosion not only degrades the landscape and increases stormwater maintenance, but also negatively affects water quality and aquatic habitats.

The installation uses soil surveys from the U.S. Department of Agriculture to determine appropriate management practices. Townsend Bombing Range minimizes areas of disturbance to prevent erosion, stabilizes soil with vegetation once it becomes disturbed, and stabilizes drainages that may be particularly susceptible to sedimentation.

Outdoor Recreation

Townsend Bombing Range allows hunting, and monitors and improves habitat for deer. Prescribed burns benefit wild turkeys and bobwhite quail by providing an open understory.

Since 2004, Townsend Bombing Range has been hosting annual or biannual deer and turkey hunts for the Paralyzed Veterans of America. Townsend Bombing Range, along with Marine Corps Air Station Beaufort, also assists the Paralyzed Veterans of America with the Annual Southeastern Bass Tournament.

Feral Pig and Coyote Control

In 2008 and 2009, Townsend Bombing Range trapped and removed 50 feral pigs from the installation. While foraging, feral pigs damage vegetation and dig up soil. This can result in erosion and poor stream quality, and facilitate the invasion of non-native weeds. It also exposes insects that attract large birds, creating a bird aircraft strike hazard (BASH) risk for pilots.

More recently, the U.S. Department of Agriculture has confirmed that there is a growing coyote population on the installation. Coyotes prey on young wild turkeys. A mitigation plan is in development to address coyote issues.

USMC photo

The Huntmaster enables paralyzed veterans from all over the country to hunt at Townsend Range. The Paralyzed Veterans of America presented MCAS Beaufort with the equipment for this purpose.

LISTED SPECIES HIGHLIGHTS

Frosted flatwoods salamander, Threatened

The frosted flatwoods salamander occurs in isolated populations across the coastal plain in Florida, Georgia, and South Carolina. The major threat is habitat loss and degradation due to agriculture, urbanization, and forestry. Townsend Bombing Range supports habitat for the salamander around isolated depressions and wetlands. Two ponds are known flatwoods salamander breeding sites.

The installation monitors for the salamander annually, conducts hydrology studies, and reduces the access of predator fish to salamander breeding sites. Since the salamander prefers open, moderate moisture woodlands maintained by frequent fires, the installation prescribes burns in known salamander habitat.

Threatened and Endangered Species

American alligator, Threatened
Alligator mississippiensis

Frosted flatwoods salamander, Threatened
Ambystoma cingulatum

Wood stork, Endangered
Mycteria americana

Georgia Department of Natural Resources photo by John B. Jensen

The threatened frosted flatwoods salamander breeds in two ponds at Townsend Bombing Range.

Marine Corps Base Hawaii

USMC photo

1. MCBH Kaneohe Bay
2. Marine Corps Training Area Bellows
3. Waikane Valley Impact Area
4. Camp H.M. Smith
5. Pu'uloa Training Facility
6. Manana Housing Area
7. Pearl City Annex
8. Molokai Training Support Facility

Acreage 3,361

Wetland Acreage 133

USFWS Region 1

Website www.mcbh.usmc.mil/g4/environ/natural

Mission

Marine Corps Base (MCB) Hawaii maintains facilities and provides services that support military readiness and the global projection of operating forces. The base also provides for the well-being, morale, and safety of military personnel, their families, and the civilian workforce. As the home to major tenant units, including U.S. Navy Pacific Fleet and Marine Forces Pacific, MCB Hawaii supports critical sustainment training for West Coast units deploying to the Middle and Far East.

Ecology

Natural environments vary among the eight facilities that make up MCB Hawaii, from completely developed areas to endangered waterbird habitat. Three facilities composing 90% of MCB Hawaii's acreage are on windward O'ahu and contain significant natural resources covered in MCB Hawaii's Integrated Natural Resources Management Plan. These resources include dramatic sea cliffs, sand dunes, extinct volcanic craters, mountain-to-sea stream systems, coastal wetlands, estuaries, bays, and offshore reef communities with rich biodiversity despite close proximity to urban communities and active training areas.

PROGRAM HIGHLIGHTS

Seabird Conservation

MCB Hawaii preserves a colony of several thousand federally-protected red-footed boobies (*Sula sula rubripes*). The boobies nest and roost near a line of fire for vital combat weapons training at Ulupa'u Crater. Over the years, MCB Hawaii has invested millions of dollars into improving range operations, fire response, and bird habitat. The base is committed to reducing fire risk and ensuring that both "bullets and boobies" can be sustained on MCB Hawaii.

In addition, MCB Hawaii has helped a wedge-tailed shearwater (*Puffinus pacificus*) colony to thrive over the last 20 years. The colony is in sand dunes and beach areas next to Nu'upia Ponds, on MCB Hawaii Kaneohe Bay. The shearwater's success is partially due to predator trapping and restrictions on human access. Native beach strand and dune vegetation also thrives in this protected area, including a population of endangered `Ohai.

Shorebird Partnerships

Since the early 1980s, MCB Hawaii—in cooperation with state and federal wildlife biologists and combat assault Marines—began deploying amphibious assault vehicles at Nu'upia Ponds. The ponds are a protected wetland, a cultural resource, and key habitat for the resident endangered Hawaiian stilt. Under careful supervision from environmental managers, these 26-ton vehicles systematically plow through the mudflats, effectively crushing invasive plants, and opening water channels, thus improving opportunities for stilt nesting and feeding. Operators simultaneously gain valuable training experience.

The vehicles continue to deploy annually, just before the stilt's nesting season. The activity provides Marines with a break from routine training and has become ritualized as the "Mud Ops" maneuvers. As evidence of this "win-win" activity's positive effect on Hawaiian stilt habitat, the number of resident stilts has more than doubled since 1985.

USMC photo

MCB Hawaii provides artificial nests to help conserve the red-footed booby. Several thousand successfully nest near a line of fire for combat training.

Wetlands Conservation

MCB Hawaii implemented a Percolation Ditch Wetland Improvement Project to reduce flooding of a nearby compound and protect bird habitat. Previously, invasive weeds choked the wetland. This caused flooding and the degradation of endangered waterbird and shorebird habitat. In 2006, MCB Hawaii widened and deepened the ditch, and planted native plants along the wetland shoreline. The base also created a surface hydraulic connection to nearby ponds, allowing excess floodwater to drain off safely. Since the project's completion, flooding has stopped and waterbirds, shorebirds, and migratory waterfowl (primarily Hawaiian coots) use the area more frequently.

USMC photo

The newly-expanded percolation ditch provides enhanced wetlands habitat for numerous bird species, including two Hawaiian Coots who can be seen foraging.

USMC photo

Marines work with other volunteers during events such as "Take Pride/Malama I Ka `Aina Day" to maintain healthy wetland habitat by removing invasive mangrove trees that otherwise crowd out the native species, including the endangered Hawaiian stilt.

Since the early 1980s, MCB Hawaii's on-going battle with invasive weeds in wetlands has involved the deployment of military and civilian volunteers from communities both on and off the installation. Over ten thousand "weed warrior" volunteers have participated, helping conquer non-native plant invaders while building community bonds.

MCB Hawaii has also restored a stormwater retention basin at Klipper Golf Course. Projects included minor dredging, weed removal and replacement with native plants, and installing solar-powered pond aerators. As a result, waterbirds—the Hawaiian moorhen in particular—have increased their use of the golf course's basin. Pond flooding occurs less often and the area requires less maintenance.

Threatened and Endangered Species

Green sea turtle (Honu), Threatened
Chelonia mydas

Hawaiian duck (Koloa maoli), Endangered
Anas wyvilliana

Hawaiian common moorhen (`Alae ula), Endangered
Gallinula chloropus sandvicensis

Hawaiian coot (`Alae keo'keo), Endangered
Fulica americana alai

Hawaiian monk seal (`Ilio-holo-i-ka-naua), Endangered
Monachus schauinslandi

Hawaiian stilt (Ae'o), Endangered
Himantopus mexicanus knudseni

Humpback whale (Kohola), Endangered
Megaptera novaeangliae

Newell's Townsend's shearwater (`A'o), Threatened
Puffinus auricularis newelli

'Ohai, Endangered
Sesbania tomentosa

Olive Ridley sea turtle, Threatened
Lepidochelys olivacea

These and recent Watershed Program improvement projects were summarized in two case studies within the 2008 Department of Defense and NatureServe publication, *Conserving Biodiversity on Military Lands: A Guide for Natural Resources Managers*. The publication is available from *www.dodbiodiversity.org*.

Coastal and Marine Management

MCB Hawaii harbors some of the last coastal wetlands, barrier dunes, and relatively intact offshore coral reef ecosystems left around urban O'ahu. In 2008, coral reef biologists from multiple federal and state agencies updated a marine biological survey of MCB Hawaii Kaneohe Bay's 500-yard security buffer zone.

NOAA photo

The Ilio-holo-i-ka-uaua (Hawaiian monk seal) literally means "the dog that runs in the rough (seas)."

Endangered Hawaiian monk seals increasingly visit MCB Hawaii's off-shore and coastal areas. MCB Hawaii protects monk seals and their "haul out" areas. MCB Hawaii has often supported National Oceanic and Atmospheric Administration Fisheries scientists by providing protected shoreline areas for temporary erection of pens to rehabilitate injured or orphaned Hawaiian monk seals before their release back into the wild. The stewardship efforts of MCB Hawaii, both on land and in the water, are helping to sustain the coral reef ecosystem biodiversity found in the security buffer zone.

Conservation Law Enforcement Officers

MCB Hawaii was the first USMC installation to establish a Conservation Law Enforcement Program. The base's officers work closely and aggressively with federal and state conservation enforcement personnel to enforce all resource-related laws and regulations related to MCB Hawaii and the U.S. Fish and Wildlife Service. Numerous instances and/or attempts at poaching, illegal use of gill nets, dumping, camping, drug use, assault, property theft, off-road vehicle activities, trespassing, and take of protected species have been successfully addressed since the inception of this program.

LISTED SPECIES HIGHLIGHTS

Hawaiian coot, Endangered

The Hawaiian coot is dark gray waterbird with a white bill. Its natural habitat is freshwater marshes, but it has adapted to living in taro patches, irrigation ditches, reservoirs, and wet pastures. On MCB Hawaii, it has become prevalent at the Percolation Ditch Wetland since the 2006 improvement project.

USMC photo

Hawaiian Moorhen (`Alae ula), at the Klipper Golf Course ponds. Wetlands restoration at MCB Hawaii benefits this endangered bird.

Hawaiian moorhen, Endangered

The Hawaiian moorhen has a black head and neck and a very distinctive red frontal shield. Threats include loss of wetland habitat and predation by non-native animals. The moorhen nests and feeds in a variety of wetland habitats at MCB Hawaii, but primarily at the Klipper Golf Course ponds.

Hawaiian stilt, Endangered

The Hawaiian stilt is the endangered waterbird found in greatest abundance at MCB Hawaii. It benefits from many of the base's wetland restoration projects.

'Ohai, Endangered

(Sesbania tomentosa)

'Ohai is an endangered species of flowering plant that is native to the main Hawaiian Islands inhabiting low shrublands. Off-road vehicles, wildfires, grazing, and non-native species competition have destroyed their habitat on the main islands. On MCB Hawaii 'Ohai are found in a protected area in sand dunes and beach areas next to Nu'upia Ponds.

Marine Corps Reserve Centers Syracuse and Jacksonville

USMC photo by Sgt. Randall A. Clinton/Released

Acreage 263

Wetland Acreage 53

USFWS Region 5

Website http://www.mfr.usmc.mil/4thmardiv/4thlar/

Marine Corps Reserve Center Syracuse

Mission

Marine Corps Reserve Center (MCRC) Syracuse supports Company E, 4th Light Armored Reconnaissance Battalion, 4th Marine Division. Company E prepares Marine reserve units and personnel to conduct reconnaissance, security, and limited offensive and defense operations as directed by the 4th Division or supported commander.

Ecology

Land at MCRC Syracuse is primarily open space grasslands, with large forests in the south, three wetlands, and one pond. The forested areas have been disturbed by previous land uses, and consist of immature, second-growth forest. Urbanization around MCRC Syracuse has increased by 92% since 1970s which has concentrated wildlife populations on the center.

PROGRAM HIGHLIGHTS

Wetlands Conservation

MCRC Syracuse protects and enhances wetlands, as much as possible without impacting the military mission. Military activities avoid wetlands if practical, or coordinate with regulatory agencies to obtain permits when impacts are necessary.

Invasive Species Control

Numerous invasive species are becoming dominant at MCRC Syracuse, outcompeting native species and diminishing wildlife habitat. Surveys suggest 60, or 38% of the center's plants are non-native species. At least 10 are highly invasive and threaten the natural environment. In 2012, MCRC Syracuse plans to identify and map all invasive species present on the center, and implement a control plan.

Soil Erosion Control

The soil types at MCRC Syracuse are particularly prone to erosion. Coupled with vehicle maneuvers and other mission activities, soil erosion is a continuing challenge. Where possible, the center plants vegetation to control erosion, or lays down straw bales and shortens slopes to control water runoff.

When continued vehicle use is required, MCRC Syracuse uses structural best management practices to catch runoff and to promote infiltration and sediment deposition. The center has installed retention ponds, vegetative filter strips, and riparian buffer areas to mitigate the effects of unavoidable erosion.

SPECIES OF INTEREST

Sharp-shinned hawk

Accipiter striatus

The sharp-shinned hawk has been observed twice in the forested, southern part of MCRC Syracuse. The hawk is a state species of special concern, due to its decline in the 1960s and 1970s as a result of DDT and other pesticide use and continuing habitat loss. Training operations do not occur where the hawk was observed.

USFWS photo

Sharp-shinned hawks eat primarily other birds. Hawks hunt with short bursts of flight, and their small size allows them to fly through thick woodlands.

Marine Corps Reserve Center Jacksonville

Mission

MCRC Jacksonville supports Company B, 4th Amphibious Assault Battalion, 4th Marine Division. Marine Corps Reserves train at the installation for amphibious operations and inland objectives.

Ecology

MCRC Jacksonville lies on the shore of St. Johns River in Florida. The center is primarily wetlands, specifically mixed hardwood forest, while land use surrounding the center is primarily industrial.

Acreage 110

Wetland Acreage 83

USFWS Region 4

Website http://www.marforres.usmc.mil/4thmardiv/4thAAV//

PROGRAM HIGHLIGHTS

Ecosystem and Species Management

On an annual basis, MCRC Jacksonville monitors for migratory birds, water quality, erosion, and the presence of threatened and endangered species.

To manage the center's forest resources, MCRC Jacksonville occasionally thins areas needed for training. The center also maintains tracks for Amphibious Assault Vehicle and High Mobility Multipurpose Wheeled Vehicle training.

Erosion Control

MCRC Jacksonville actively stabilizes the shoreline along St. John's River to reduce erosion and prevent negative impacts to the mission.

SPECIES OF INTEREST

West Indian manatee

Trichechus manatus

The West Indian manatee is a large aquatic mammal, with a broad tail and flipper-like front limbs. Manatees occasionally swim in St. John's River near the installation, where the Marine Corps Reserves conduct amphibious training exercises.

USFWS photo

The St. John's River, which abuts MCRC Jacksonville on the east, has been designated as critical habitat for the West Indian manatee.

Marine Corps Air Station Cherry Point

USMC photo by Lance Cpl.Cory D. Polom

1. Marine Corps Auxiliary Landing Field Bogue
2. Marine Corps Outlying Field Atlantic
3. Piney Island Bombing Range (BT-11)
4. Cat Island
5. Maw Point
6. Pamlico Point
7. Brant Island Shoal Bombing Range (BT-9)

Acreage 14,471

Wetland Acreage 1,600 (approx.)

USFWS Region 4

Website www.cherrypoint.usmc.mil

Mission

Marine Corps Air Station (MCAS) Cherry Point is the world's largest Marine Corps air station and is home to the Second Marine Air Wing (2D MAW). By providing logistical, operational, and maintenance training support, MCAS Cherry Point enables 2D MAW to fight anywhere, at anytime. MCAS Cherry Point is also the headquarters Commander, Marine Corps Air Bases Eastern Area (COMCABEAST). COMCABEAST commands aeronautical shore activities and supports Fleet Marine Force units from all eastern Marine Corps bases. Aircraft and aircrews routinely shuttle between MCAS Cherry Point and MCAS Beaufort (see page 49) for operational and administrative missions.

Ecology

MCAS Cherry Point's unique natural areas, river and estuarine shorelines, nursery areas for fish and shellfish, wetlands, and forestlands support tremendous species biodiversity. The installation is surrounded on three sides by the Croatan National Forest, which harbors the red-cockaded woodpecker.

PROGRAM HIGHLIGHTS

Forest Management

Loblolly pine (*Pinus taeda*) dominates most forested areas on MCAS Cherry Point. The forest is burned on three- to five-year cycles to facilitate military training, improve wildlife habitat, and promote native plant communities. The station is restoring longleaf pine (*P. palustris*), which has been reduced throughout the southeast due to human activity. MCAS Cherry Point also has mixed hardwood communities on the lower slope.

Over the last 32 years, carefully managed timber harvests and stand improvement have more than doubled the standing inventory of timber to 58 million board feet. Timber sales to local buyers average $150,000 per year.

USMC photo by Lance Cpl. Robert J. Maurer/Released

Marines load a simulated stinger missile at MCAS Cherry Point during sustainment training. Partnerships to prevent encroachment preserve land use that is compatible with military training.

Outdoor Recreation

MCAS Cherry Point provides hunting, fishing, and other recreational opportunities on more than 10,000 acres of forestland. Users take advantage of these opportunities 20,000 times each year, providing about $10,000 in fees to the installation.

To support recreational fishing, the station manages three freshwater ponds by stocking fish, controlling aquatic weeds, and applying lime or fertilizer. The ponds are managed for largemouth bass, channel catfish, bluegill sunfish, redear sunfish, and hybrid striped bass.

Bird Airstrike Hazard Program

Due to the large quantity of wetlands and other natural habitats, MCAS Cherry Point is a haven for many avian species. The installation has a well-established Bird Airstrike Hazard (BASH) program to prevent danger to birds and pilots. The program minimizes BASH through land and vegetation management, research and data collection, and animal control.

MCAS Cherry Point recently tested and implemented a remote bird tracking system that uses radar, called eBirdRad. The system was designed to identify large flocks of migrating birds near flight lines or flight operations. Data from eBirdRad will help the station identify trends regarding interactions between migratory birds and military flight operations, and support conservation.

To further improve mission safety, the stations is currently working to provide information from eBirdRad directly to operators in real-time.

Encroachment Control: Onslow Bight Conservation Forum

MCAS Cherry Point actively participates in the Onslow Bight Conservation Forum. The Forum addresses encroachment and protects natural ecosystems on coastal North Carolina. Preventing encroachment near MCAS Cherry Point provides valuable outdoor recreation to the public and preserves land use that is compatible with military training.

Between 2003 and 2009, the Onslow Bight partners have acquired and conserved 4,200 acres of forest that might otherwise be developed.

Threatened and Endangered Species

American alligator, Threatened
Alligator mississippiensis

Green sea turtle, Threatened
Chelonia mydas

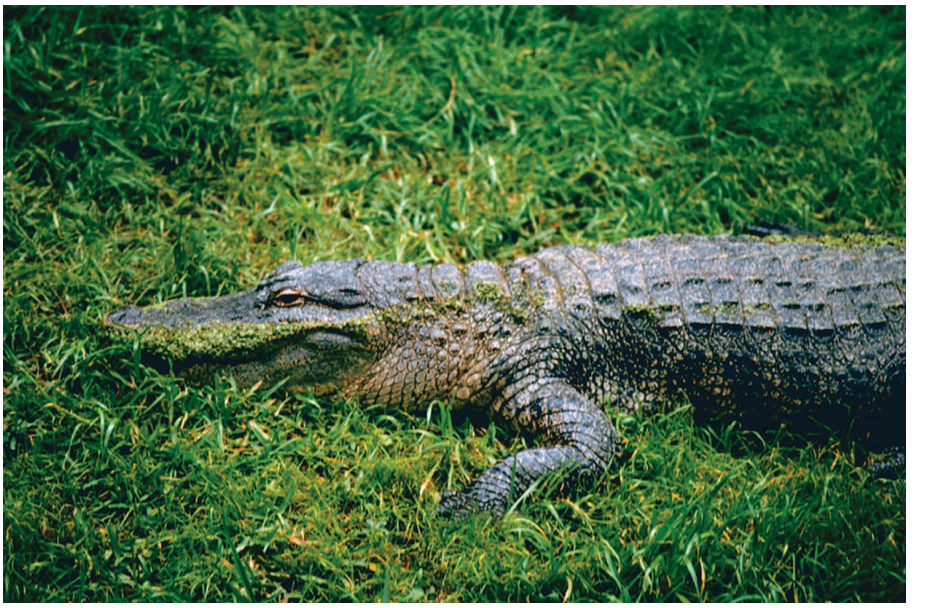
Kemp's ridley sea turtle, Threatened
Lepidochelys kempii

Loggerhead sea turtle, Threatened
Caretta caretta

West Indian manatee, Endangered
Trichechus manatus

Life NBII photo by John J. Mosesso

MCAS Cherry Point has developed a system to monitor bottlenose dolphin sounds in real-time at the BT-9 bombing range.



USFWS photo by Gary M. Stoltz

American alligators were once heavily hunted, almost to extinction. While the alligator has now fully recovered, it remains protected to prevent people from trading in the products of listed caimans and crocodiles and falsely pretending they are American alligator products. American alligators nest at MCAS Cherry Point.

LISTED SPECIES HIGHLIGHTS

American alligator, Threatened
Alligator mississippiensis

MCAS Cherry Point supports a breeding population of the American alligator. The alligator is common in the Hancock and Slocum Creek areas, and nests have been found in Jack's Branch.

OTHER SPECIES OF INTEREST

Bottlenose dolphin
Tursiops truncatus

Bottlenose dolphins occur in the Neuse River and have been observed in Slocum Creek, which bisects MCAS Cherry Point property. The species is not listed under the Endangered Species Act, but is protected by the Marine Mammal Protection Act. The installation has supported research related to dolphin demography and vocalization detection. MCAS Cherry Point has also developed a real-time acoustic monitoring system at the BT-9 bombing range.

Marine Corps Base Camp Lejeune

USMC photo by Lance Cpl. David J. Beall/Released

Mission

Marine Corps Base (MCB) Camp Lejeune is the largest Marine Corps amphibious training base in the world, housing 47,000 Marines and Sailors. MCB Camp Lejeune supports operating forces and its community with services to enhance operational readiness and quality of life. The base provides logistics support, transportation, and coordination for deployments to active and reserve warfighting commands, including Marine Expeditionary Units and Brigades. MCB Camp Lejeune also gives resident formal school training to approximately 39,000 Marines annually. Marine Corps Air Station (MCAS) New River is located within the northwest part of MCB Camp Lejeune.

Ecology

The Onslow Bight region, in which MCB Camp Lejeune is situated, consists of a rich mosaic of saltwater marshes, wetlands, longleaf pine savannas, and other coastal ecosystems. Over half of MCB Camp Lejeune is wetland habitat, including forested and coastal estuarine systems. The installation also has 11 nautical miles (nm) of ocean coastline, including 1.4 nm capable of supporting amphibious operations.

Acreage 139,237

Wetland Acreage 62,456

USFWS Region 4

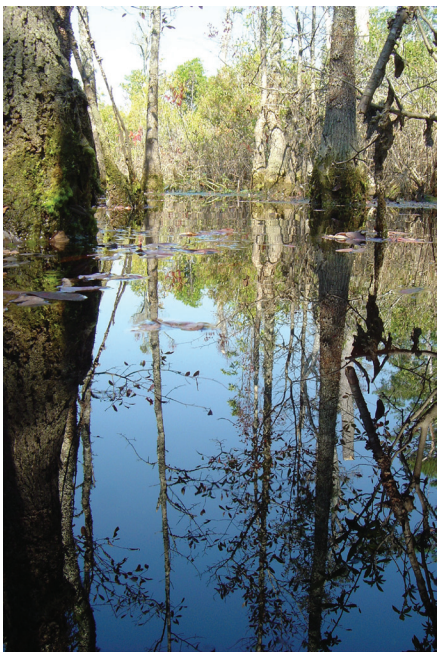
Websites www.lejeune.usmc.mil, www.newriver.usmc.mil

PROGRAM HIGHLIGHTS

MCB Camp Lejeune has made significant progress in managing natural resources, including increasing its red cockaded woodpecker population and reducing restrictions on military training, increasing prescribed burning to over 20,000 acres per year, restoring longleaf pine (*Pinus palustris*), restoring wetlands in the Greater Sandy Run Mitigation Bank, restoring and stabilizing hundreds of acres of eroded landing zones, and cooperating with regional conservation partners to prevent encroachment.

Wetland Conservation

MCB Camp Lejeune has a Wetland Mitigation Bank—totaling 1,250 acres—specifically to mitigate impacts of range and infrastructure development in the Greater Sandy Run Area. The Greater Sandy Run Area was once owned by the International Paper Company, which ditched and drained vast wetlands to facilitate intensive timber management. MCB Camp Lejeune is now restoring and



USMC photo by Martin Korenek

Ephemeral wetlands at Holover Creek on MCB Camp Lejeune support tremendous biodiversity, including four listed species.

enhancing wetlands in the area by plugging ditches and installing water control structures and wooden check dams. The installation monitors hydrology and vegetation annually to evaluate the bank's effectiveness.

Forest Management

MCB Camp Lejeune's Forest Management Program meets the military mission's needs across a varied forest environment, while sustaining a flow of forest products across 92,300 acres of commercial timberland. The timber is primarily pine. As outlined in the annual Long Range Silvicultural Prescription Plan, the base achieves ecosystem management goals while complying with applicable laws and regulations.

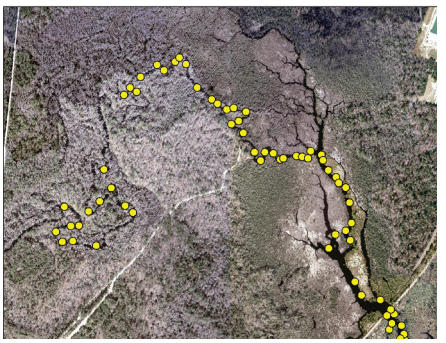
MCB Camp Lejeune has an aggressive program to return longleaf pine to its historic range: in addition to planting seedlings for ecosystem restoration, the base mows 600-800 acres of fire-neglected forest each year in an effort to restore prescribed fire to those areas.

USMC photo

MCB Camp Lejeune supports the wildlife and plant associations typical of a fire-maintained ecosystem. Prescribed fires help lessen the number of uncontrolled wildfires, protecting natural resources and Marines.

Outdoor Recreation

Recreational users at MCB Camp Lejeune log 100,000 hours per year in hunting, fishing, and trapping. Anglers have access to 80 miles of creeks and tidal estuaries that connect with the New River and the Atlantic Intracoastal Waterway. MCB Camp Lejeune also maintains a fishing pier. Wildlife biologists at MCB Camp Lejeune scientifically manage wildlife and fisheries resources to balance the needs of recreational users with habitat conservation. The biologists seek to meet the demand of recreational users, while balancing conditions of wildlife habitat. Aside from hunting and fishing, 1.6 nm of the installation's coastline are available for recreation.



USMC photo

Since 2005, GPS has been employed by Station personnel to map alligatorweed distribution in the White Oak River watershed. Marines and civilian volunteers use this GPS information to focus and coordinate their alligatorweed beetle releases.

Invasive Species Control

To help reduce the impacts of non-native, invasive plants to military training and recreation, MCB Camp Lejeune has targeted the removal of alligatorweed (*Alternanthera philoxeroides*), Brazilian elodea (*Egeria densa*), and water hyacinth (*Eichhornia crassipes*).

MCAS New River, in coordination with state and local organizations, is using a small beetle to control alligatorweed. This South American weed can quickly form large, floating mats capable of blocking navigation, crowding out native plants, decreasing dissolved oxygen in the water, and ultimately jeopardizing the health

of the watershed. The appropriately named alligatorweed flea beetle eats leaves and lays larvae in the plants' stems. MCAS New River in cooperation with local communities, has released thousands of beetles annually to reduce the invasive weed's spread.

Encroachment Control: Onslow Bight Conservation Forum

Development adjacent to MCB Camp Lejeune has increased, especially since the early 1990s. Development has the potential to constrain military training due to noise complaints and reduction in habitat for protected species, placing greater conservation emphasis on training lands.

Since 2002, the Marine Corps has partnered with the Nature Conservancy to address encroachment and protect natural ecosystems in coastal North Carolina. The forum—called the Onslow Bight Conservation Forum—now also includes MCAS Cherry Point (see page 42), the North Carolina Coastal Land Trust, other non-governmental organizations, several North Carolina state agencies, the U.S. Fish and Wildlife Service, and the U.S. Forest Service. MCB Camp Lejeune works with the forum to identify opportunities for ensuring that development is compatible with natural resources conservation and the military mission.

Between 2003 and 2009, the Onslow Bight partners have acquired and conserved 4,200 acres of forest that might otherwise be developed. This area provides valuable outdoor recreation to the public and preserves land use that is compatible with military training. The partnership was highlighted in the 2008 Department of Defense and NatureServe publication, *Conserving Biodiversity on Military Lands: A Guide for Natural Resources Managers*. The publication is available from *www.dodbiodiversity.org*.

Defense Coastal/Estuarine Research Program

The Department of Defense's Strategic Environmental Research and Development Program (SERDP) selected MCB Camp Lejeune as the site of the Defense Coastal/Estuarine Research Program. More than 40 scientists from universities and institutes around the world are capturing change across ecosystems, identifying underlying ecosystem processes, stressors, and thresholds for change that threaten sustainability. This research will lead to more effective management guidelines for sustainable ecosystems. For more information, and to view the annual technical reports, visit dcerp.rti.org.

USMC photo

Marines restore eroded dunes on the coast of MCB Camp Lejeune. The base's coast is an international research site for understanding coastal and estuarine ecosystems.

LISTED SPECIES HIGHLIGHTS

Red-cockaded woodpecker, Endangered

(Picoides borealis)

The red-cockaded woodpecker is a small, black and white woodpecker that is dependent upon mature pine forest habitat for cavity nesting, roosting, and foraging for insects. Since 1986, when population monitoring began, MCB Camp Lejeune's red-cockaded woodpecker population has nearly tripled—from 31 active clusters to 90 by 2009. The significant increase is partially due to MCB Camp Lejeune providing artificial cavities and increasing prescribed burns, as well as broader efforts to restore and conserve longleaf pine. MCB Camp Lejeune's conservation goal is 173 active clusters.

Rough-leaved loosestrife, Endangered

(Lysimachia asperulaefolia)

Rough-leaved loosestrife plants do best in habitat where vegetation is kept low by frequent fires. The loosestrife occupies 25 acres at MCB Camp Lejeune. MCB Camp Lejeune prescribes fire every two or three years for the loosestrife's benefit.

Photo by Kevin Rose, Virginia Polytechnic Institute and State University

Conservation efforts at MCB Camp Lejeune have tripled the number of red-cockaded woodpeckers on the base.

Threatened and Endangered Species

American alligator, Threatened
Alligator mississippiensis

Fin whale, Endangered
Balaenoptera physalus

Green sea turtle, Threatened
Chelonia mydas

Hirsts' panic grass, Candidate
Dichanthelium (=Panicum) hirstii

Humpback whale, Endangered
Megaptera novaeangliae

Leatherback sea turtle, Endangered
Dermochelys coriacea

Loggerhead sea turtle, Threatened
Caretta caretta

Northern right whale, Endangered
Balaena glacialis

Piping plover, Threatened
Charadrius melodus

Red-cockaded woodpecker, Endangered
Picoides borealis

Rough-leaved loosestrife, Endangered
Lysimachia asperulaefolia

Seabeach amaranth, Threatened
Amaranthus pumilus

Sei whale, Endangered
Balaenoptera borealis

Sperm whale, Endangered
Physeter catodon

West Indian manatee, Endangered
Trichechus manatus

The installation also protects loosestrife sites by evaluating and coordinating training, construction, and land management activities.

Sea turtles and marine mammals, Endangered/Threatened

The green sea turtle (*Chelonia mydas*) and the loggerhead sea turtle (*Caretta caretta*) currently nest at MCB Camp Lejeune on Onslow Beach. Every year from May to August, MCB Camp Lejeune monitors the entire beach for sea turtle nests. When nests are found in the military training section, they are carefully relocated.

To protect turtles and the seven species of marine mammals that occur off the coast, MCB Camp Lejeune has guidance in place for water-borne operations. The installation consults with the National Oceanic and Atmospheric Administration—Fisheries on any military activities that may affect marine species.

Piping plover, Threatened

(Charadrius melodus)

Onslow Beach at MCB Camp Lejeune protects nesting, foraging, and migration habitat for piping plover—a small, sandy-colored bird that resembles a sandpiper. Since 2000, the installation has conducted bi-weekly shorebird surveys. MCB Camp Lejeune also participates in international piping plover census counts.

During the nesting season, surveys intensify and MCB Camp Lejeune protects high-quality potential nesting habitat. The first verified piping plover nest was observed during the 2009 nesting season.

USMC photo

Green sea turtles nest at MCB Camp Lejeune on Onslow Beach. The base carefully relocates nests found in military training areas.

Marine Corps Air Station Beaufort

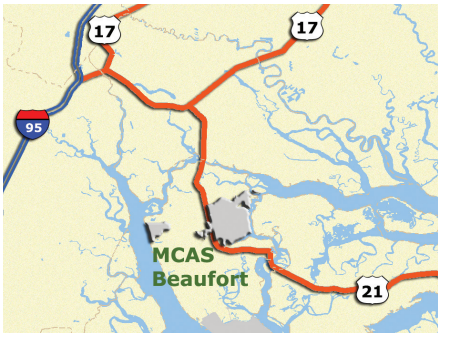
USMC photo by Staff Sgt. Wade E. Spradlin/Released

Mission

Marine Corps Air Station (MCAS) Beaufort is primarily an operational base for Marine Aircraft Group 31 (MAG-31). MCAS Beaufort conducts and supports all active-duty USMC F/A-18 air operations on the East Coast. MAG-31 conducts anti-air-warfare and offensive air support operations in support of Fleet Marine Forces from advanced bases, expeditionary airfields, or aircraft carriers. Aircraft and aircrews routinely shuttle between MCAS Beaufort and MCAS Cherry Point (see page 49) for operational and administrative missions.

Ecology

MCAS Beaufort occupies the South Carolina Low Country, or what is also classified as Sea Island/Coastal Marsh in the Southern Coastal Plain Ecoregion. Southern pine forest dominate the station, while rivers, estuaries, and saltwater marshes surround it. MCAS Beaufort lies near a vast wilderness preserve known as the Ashepoo-Combahee-Edisto Basin Preserve. The preserve has 134,000 acres of protected, diverse estuarine communities.



Acreage 6,935

Wetland Acreage 579

USFWS Region 4

Website www.beaufort.usmc.mil

PROGRAM HIGHLIGHTS

Wetlands Conservation

MCAS Beaufort's extensive wetlands protect and improve water quality, provide fish and wildlife habitat, buffer floodwaters, and provide other beneficial services. To support these ecological functions, the station maintains vegetation buffer strips around wetlands and along streams. These protective buffers improve water quality by filtering sediments and other pollutants from runoff before they can reach the wetlands.

In 2008 and 2009, the station completed a wetlands restoration plan and began to convert 115 acres formerly used for agriculture into forested wetlands. This project will restore natural hydrology to the area. It will also prevent bird aircraft strike hazards by removing the small farm pond and row crops, which attract birds into the flight line.

Life NBII photo by John J. Mosesso

The wood stork is the only stork breeding in the United States. MCAS Beaufort maintains wetlands for the storks that fly over the station.

Forest Management

MCAS Beaufort manages approximately 2,000 acres of forest, which primarily consist of slash (*Pinus elliottii*) and loblolly pine (*P. taeda*). Longleaf pine (*P. palustris*) also occurs in some areas. Forests support mission training, provide forest products, enhance wildlife habitat, and provide beautiful recreation opportunities. Sale of forest products provides funds to support forest health programs at the station.

In 2009, MCAS Beaufort used revenue from timber sales to purchase equipment for maintaining and improving forest health. The equipment enabled the station to reduce underbrush from forested areas, thereby promoting biodiversity and game species (such as quail), and reducing fire fuel and invasive species. The station also conducted prescribed burns over 193 acres.

MCAS Beaufort stores basic data, prescriptions, and records of completed actions in a Forest Management Information System. This system allows the station to record and later retrieve data required for inventory control, analysis of stand information, and improving forest practices.

Outdoor Recreation

MCAS Beaufort allows hunting and fishing where it complies with state, federal, and mission requirements. White-tailed deer are the most sought-after game. MCAS Beaufort hosts public hunts and fishing rodeos. The station controls vegetation at station ponds to improve access for anglers and others; MCAS Beaufort also stocks ponds with bass and bream.

In addition, MCAS Beaufort maintains nature trails, picnic areas, boat ramps, equestrian areas, and interpretive centers. The station hosts annual Earth Day celebrations, with poster and recycling contests for school children.

Invasive Species Control

MCAS Beaufort conducted an invasive plant survey and completed a management plan in 2005, indicating a significant problem with invasive plants. The survey found that Chinese privet (*Ligustrum sinense*) is the dominant woody shrub in many areas, and Chinese tallow (*Triadica sebifera*) the dominant tree.

In 2009, the station applied herbicide to 30 forested acres that were infested by Chinese privet and Chinese tallow. MCAS Beaufort also uses prescribed fire and manually pulls seedlings to control these invaders.

Bird Aircraft Strike Hazard Program

One of MCAS Beaufort's greatest management challenges is controlling deer and birds near the airfield and within flight paths, which would otherwise put aircraft operations at risk. The station regularly removes vegetation near runways that might attract dear. In 2009, the station removed encroaching vegetation that was creating standing water in a ditch and attracting waterfowl.

In 2006 and 2007, MCAS Beaufort tagged individual birds; the station continues to monitor them with global positioning system (GPS). In 2009, MCAS Beaufort began testing bird detecting radar to track the movement and habitat of various bird species.

USMC photo

Ed EuDaly assesses the size of a pondberry stand on MCAS Beaufort by counting stems. This delicate shrub grows in five locations on the station, and personnel apply herbicides to other plants encroaching on the sites.

LISTED SPECIES HIGHLIGHTS

Wood stork, Endangered

Mycteria americana

The wood stork is a large, long-legged wading bird. Threats include loss of feeding habitat and nesting sites. Storks have been observed flying over the station's Laurel Bay area. MCAS Beaufort maintains existing wetlands and educates natural resources staff about wood storks.

Pondberry, Endangered

Lindera melissifoli

Pondberry is fire-dependent, growing in colonies in the upper edges of intermittently wet ponds in pinewoods. Possible threats include habitat loss, loss of pollinators, and a lack of wildfires to prevent tree and shrub encroachment. The station monitors pondberry, and takes special cautions to protect the plant when burning or harvesting timber.

Threatened and Endangered Species

American alligator, Threatened
Alligator mississippiensis

Pondberry, Endangered
Lindera melissifolia

Wood stork, Endangered
Mycteria americana

Marine Corps Recruit Depot Parris Island

USMC photo by Sgt. Michael Molinski/Released

Acreage 8,047

Wetland Acreage 4,773

USFWS Region 4

Website www.mcrdpi.usmc.mil

Mission

Marine Corps Recruit Depot (MCRD) Parris Island trains 19,000 recruits each year. The depot's mission is to provide basic training to all female Marine recruits and the male Marine recruits east of the Mississippi, to maintain and operate facilities, and to provide services and housing for depot personnel. The secondary mission is to provide schools to train enlisted Marines as drill instructors and field staff, to conduct rifle marksmanship training for Marine officers and enlisted personnel in the southeastern United States, and to conduct training for Marine Reserves.

Ecology

MCRD Parris Island is located at the confluence of the Broad and Beaufort Rivers about six miles south of downtown Beaufort, South Carolina. The seasonal high water table on the installation presents a constraint for agricultural, building construction, and most land uses requiring heavy equipment. The depot is surrounded by substantial tidal marshes and rivers, which serve as nursery grounds for shrimp, crabs, and fish and helps sustain most commercial and recreational maritime fisheries in the area.

PROGRAM HIGHLIGHTS

Wetlands and Coastal Resources

MCRD Parris Island protects and enhances wetlands and coastal resources through best management practices and analysis of projects to avoid and minimize impacts. The depot's wetland resources consist primarily of saltwater or tidal wetlands with few acres of freshwater wetlands consisting of wet flatwoods. The marsh and creeks surrounding and adjacent to the property support a wide diversity of fish including flounder, sheepshead, black drum, black sea bass, pinfish, croaker, spotted sea trout, channel bass, whiting, mullet, ladyfish, and juvenile stages of many other species. The adjacent estuaries also contain oysters, hard clams, shrimp, and blue crabs. The endangered wood stork forages in the installation's marshes.

Essential Fish Habitat Conservation

Federal agencies are required to identify and protect important marine and fish habitats. Fishery management councils, with assistance from National Marine Fisheries Service, have delineated "essential fish habitat" (EFH) for managed species. EFH is defined as "…those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity."

The estuary and marine habitats found near MCRD Parris Island are considered EFHs. The depot's management actions are reviewed for their impacts to marine habitats. Improved management of fire breaks and using best management practices during forest management actions should have positive effects on EFHs near the depot by reducing soil erosion and runoff of fertilizers and pesticides into coastal marshes.

Outdoor Recreation

Saltwater fishing is permitted from the shore and piers around the installation in accordance with South Carolina Department of Natural Resources (SCDNR) regulations. The South Carolina Department of Health and Environmental Control regulates harvest of shellfish from areas covered by a cooperative agreement by limiting the number of harvest days and the season. Access to approved shellfish areas by the general public is allowed; however, access to these areas within the impact area of the rifle range is closed during range operations.

Migratory Birds

Migratory birds at MCRD Parris Island are abundant and diverse, with over 150 species detected during surveys. Several areas of the depot have been identified as important to migratory birds, including the maritime forest open tidal flats, Third Battalion Pond, Hammock Islands, and shrub edge communities. Bald eagles nest on Gibbs and Goat Islands.

Since management for all species is impractical, the various groups have developed lists of priority species. These include the bald eagle, painted bunting, brown-headed nuthatch, colony nesting wading birds and shorebirds. Other species may be identified as priority species in the future. Currently, depot natural resources personnel are working with SCDNR to develop a bird banding migration station to monitor migratory bird activity, acquire bird banding training and experience, and apply for a federal bird banding permit. Personnel are also involved with a multi-state (SCDNR) effort to band and monitor painted buntings.

USMC photo

MCRD Parris Island captures and bands many migratory bird species such as the black-throated blue warbler (*Dendroica caerulescens*) on the left and the common yellowthroat (*Geothlypis trichas*) on the right.

USMC photo

The the waters in and around the depot support a wide diversity of marine and estuarine fish including flounder (pictured).

USMC photo

Conservation Law Enforcement Officers help manage wildlife and control public access, which ensures mission sustainability and public safety. Here a MCRD Parris Island Conservation Law Enforcement Officer checks the fishing license of a recreational fisherman.

Threatened and Endangered Species

American alligator, Threatened
Alligator mississippiensis

West Indian manatee, Endangered
Trichechus manatus

Wood stork, Endangered
Mycteria americana

USMC photo

University of South Carolina researcher cajoles an Eastern diamondback rattlesnake into a safe handling tube on MCRD Parris Island. After the snake is tubed, the researchers measure, sex, weigh, mark and tag as a part of the ongoing monitoring work.

Invasive Species Management

Invasive and non-native species are managed through removal and restrictions designed to prevent the introduction of new species to the MCRD Parris Island. The depot monitors for invasive and non-native species, and implements a control plan (completed in 2001). Chinese tallowtree (also called popcorn tree) and Chinaberry are the worst invaders. Saltcedar and privet are also present and in need of control. Problem areas are concentrated around disturbed sites, but also occur in moist, freshwater soils and along roads where saltcedar was historically planted. Following the study, the depot initiated eradication, which has continued to the present with good success. This involves combinations of pesticide applications, cutting, pulling, and prescribed fire. Currently, Clemson University is monitoring the efficacy of treatment and will make recommendations to improve or maintain control.

Conservation Law Enforcement Officers

MCRD Parris Island's Conservation Law Enforcement Officer enforces state and federal regulations. The officer helps the South Carolina Department of Health and Environmental Control to regulate access to and the harvest of shellfish. The officer plays an integral role in assisting with the management of wildlife, facilitating public use for hunting and fishing, and ensuring public safety.

LISTED SPECIES HIGHLIGHTS

Wood stork, Endangered

Mycteria americana

The wood stork is a long-legged wading bird that feeds and rests over most of the MCRD Parris Island's saltwater wetlands. The depot is committed to protecting all areas the stork is known to inhabit.

SPECIES OF INTEREST

Eastern diamondback rattlesnake

Crotalus adamanteus

The eastern diamondback rattlesnake is the largest venomous snake in North America, averaging six feet in length as adults. They live in the dry, pine flatwoods, sandy woodlands, and coastal scrub habitats of the southeast. The preliminary results of an eastern diamondback rattlesnake population study on the depot indicate that the maritime rattlesnake population is behaving differently than the inland populations; however, further monitoring, tracking, and population evaluations are necessary to fully understand this species for more effective management. Radio telemetry research complements current efforts on MCRD Parris Island aimed to reduce rattlesnake-human encounters. GIS based habitat models will be developed to reduce the probability of these encounters. This work is related to ongoing comprehensive surveys for other reptiles and amphibians aboard the depot. Baseline surveys and understanding these sensitive and declining animals are the first steps to proactively manage the resources around the recruit training mission. These models and programs may also be applied at other locations with similar experiences, and thus benefit the entire coastal region.

Tiny leaved buckthorn

Sageretia minutiflora

An uncommon plant species occurs on an accumulated shell area west of the golf course. The tiny leaved buckthorn is not listed but is considered rare, as it only occurs in high alkaline soils. The calcium supplied by the shells alters soil properties and provides habitats for plants not normally located in the area.

Marine Corps Base Quantico

USMC photo by Lance Cpl. Michael V. Walters/Released

Mission

Marine Corps Base (MCB) Quantico provides the resources—including facilities, ranges, services, and personnel—to support the initiation of concepts, doctrine, training, and equipment for the future of the Marine Corps. MCB Quantico optimizes readiness by providing operational and training support, infrastructure, and community services that respond to Marine Corps, Marine Corps Combat Development Command, and tenant requirements—and the needs of military members, families, and civilians—within a safe and secure environment. Dubbed the "Crossroads of the Marine Corps," MCB Quantico serves as the focal point for professional military education: the base operates Marine Corps University, Officer Candidate School, Basic School, Staff Non-Commissioned Officers Academy, Marine Corps War College, School of Advanced Warfighting, and Expeditionary Warfare School.

Ecology

MCB Quantico is southwest of Washington, DC, along the Potomac River. Nearly 88% of the base is forested, with a mix of oak, pine, and hardwood. The installation is within the Chesapeake Bay watershed, and its freshwater wetlands support diverse vegetation. Training areas are cleared, and there are woodland openings and native grasslands.

Acreage 59,022

Wetland Acreage 2,960

USFWS Region 5

Website www.quantico.usmc.mil/activities/?Section=NREA

PROGRAM HIGHLIGHTS

Waterfowl Management

Waterfowl are valued for hunting, wildlife viewing, and their natural beauty. Since 1989, and in cooperation with the U.S. Fish and Wildlife Service (USFWS), MCB Quantico has been increasing and enhancing the availability of wetland habitat. Wetland habitat supports both brood-rearing and wintering areas for waterfowl.

MCB Quantico is guided by an agreement between the Department of Defense and USFWS, called the Joint Agreement of Cooperation to Perpetuate North American Waterfowl Populations.

USMC photo

Radio-tagged white-tailed deer fawn at MCB Quantico. Deer were tagged to study coyote predation on the base.

Forest Management

The extensive and diverse forests of MCB Quantico are a unique component of the military environment, integral for flexibility in training exercises. The installation maintains healthy, sustainable forest ecosystems through the implementation of science-based timber management practices.

Forested areas are divided into five Forest Management Zones, each with its own management objectives according to military and natural resource priorities. Objectives include commercial forest management; improving forest health, biodiversity, and wildlife habitat through timber harvest and prescribed burning; forest insect and disease management; and maintenance of old growth forests and other exceptional forest ecosystems.

Outdoor Recreation

Each year, 2,000 active duty and retired military personnel and civilians hunt at MCB Quantico. White-tailed deer and wild turkey are the most popular game species. The installation also hosts special youth hunts, as well as annual white-tailed deer and wild turkey hunts for the Wounded Warrior Regiment. MCB Quantico maintains over 300 planted wildlife openings, in addition to waterfowl nest boxes and hunting blinds.

In 2008, the base coordinated with the Virginia Department of Game and Inland Fisheries to study coyote predation on white-tailed deer. The study involved radio-monitoring with break-away collars, and thermal imaging equipment. Other surveys to address species of importance to conservation and hunting are ongoing or planned.

MCB Quantico maintains three large impoundments and several ponds for fishing, ranging from 5 to 16 acres. Anglers also enjoy access to tidal freshwater fishing. The installation stocks several fish species in the spring for youth fishing events.

USMC photo by LCpl Michael V. Walter

MCB Quantico provides wheelchair-accessible duck blinds for wounded warriors.

Conservation Volunteer Program

Since its inception in 1986, the Conservation Volunteer Program has helped manage natural resources. On average, over 60 members are active in the program each year, including members of the public, as well as active duty and retired military personnel. Volunteers bring invaluable expertise and commitment.

Volunteers have completed the following projects and more:

- Constructed a wildlife viewing platform, information kiosks, fishing access areas, boat docks, and trail bridges

USMC photo

Conservation Volunteers construct a bridge to improve the Mainside Trail system.

- Provided hunter education courses and constructed an archery qualification facility and wheelchair accessible hunting and fishing facilities
- Collected litter and trash from roadsides and training areas
- Conducted a base-wide inventory to map potential historic building and cemetery sites
- Helped with wildlife surveys and ecosystem research
- Maintained vegetation in portions of range and training areas
- Controlled gypsy moth outbreaks

Threatened and Endangered Species

Dwarf wedgemussel, Endangered
Alasmidonta heterodon

Harperella, Endangered
Ptilimnium nodosum

Small whorled pogonia, Threatened
Isotria medeoloides

LISTED SPECIES HIGHLIGHTS

Dwarf wedgemussel, Endangered
Alasmidonta heterodon

Dwarf wedgemussels live in freshwater streams and rivers along the Atlantic coast. Threats include habitat degradation, water pollution, and stream impoundments. In the 1990s, MCB Quantico found mussels in a small section of Aquia Creek; however, recent surveys have not identified the mussel. The installation continues to monitor for the species and limit disturbances of riparian areas near Aquia Creek.

USFS photo by Hugh and Carol Nourse

The endangered harperella blooms in July and August.

Harperella, Endangered
Ptilimnium nodosum

Harperella is an annual herb with small white flowers. It is found in rocky areas along the edges of ponds and seasonally flooded streams. On MCB Quantico, harperella grows along Aquia Creek. The installation monitors the harperella population annually during the growing season to make population size counts and note hydrologic conditions.

Small whorled pogonia, Threatened
Isotria medeoloides

The small whorled pogonia is a perennial herb in open, dry, deciduous woods in the eastern United States. Threats include loss of habitat, collection by plant enthusiasts, and eating by deer and invertebrates. MCB Quantico monitors known colonies and records population data. The installation also surveys forested lands prior to any planned disturbances.

USFS photo by Gary Kaufmann

MCB Quantico surveys for the threatened small whorled pogonia prior to planned activities.

Marine Corps Base Camp Smedley D. Butler

USMC photo by Pfc. Michael E. Warren/Released

1. Camp Gonsalves/Jungle Warfare Training Center (JWTC)
2. Ie Jima Auxiliary Airfield
3. Camp Schwab
4. Henoko Ordnance Ammunition Depot
5. Camp Hansen
6. Central Training Area
7. Kin Red Beach and Kin Blue Beach
8. Higashionna Ammunition Storage Point II
9. Camp Courtney
10. Camp Lester
11. Camp Foster
12. MCAS Futenma
13. Camp Kinser
14. Camp Fuji

Acreage 43,616

Website www.mcbbutler.usmc.mil

Mission

Marine Corps Base (MCB) Camp Smedley D. Butler (Butler), Okinawa primarily provides ranges, training areas, and a wide spectrum of infrastructure requirements for forward-deployed Marines and Sailors. In particular, MCB Camp Butler supports III Marine Expeditionary Force, 3rd Marine Division, 1st Marine Aircraft Wing, and 3rd Force Service Support Group. The base also supports other Marines and Service members and their families, as well as joint training.

Ecology

The Marines on Okinawa train on some of the last, large tracts of sub-tropical rain forest left in Asia. These lands support one quarter of Okinawa's Red Data Book plants, one fifth of its reptiles, and one quarter of its amphibians. The base has wetlands, but there is currently no Japanese standard for their delineation. MCB Butler spans coastal plains and beaches near coral reefs, where Marines train for amphibious landings. Developed areas for small arms ranges contain vegetated areas to protect streams and provide habitat.

PROGRAM HIGHLIGHTS

Erosion Control

To train Marines as they fight, MCB Butler must maintain the jungle environment. The dense tree canopy covers and conceals troop movements from air reconnaissance. Dense understory vegetation provides excellent cover for ground maneuvers. Since many plants are edible, Marines are taught to survive off the land.

Okinawa's intense rainfall, steep slopes, thin soils, and highly engineered watercourses, however, make controlling soil erosion a challenge. Recent increases in military activities have also reduced vegetation and increased erosion: helicopter landing zones, which are bare of vegetation, add to erosion; munitions damage soil and vegetation upon impact; and worn trails in land navigation areas increase erosion, in addition to reducing the realism of training.

To reduce erosion, MCB Butler has aggressively incorporated new technologies into its comprehensive erosion control program. Examples include weirs, silt

screens, and detention ponds. Rubber devices that catch bullets, and deceleration devices that prevent bullets from impacting bare soils, will minimize erosion on impact berms—while reducing lead in the area. The base has invested more than $1.5 million toward four range reconstruction projects using these technologies.

In addition, MCB Butler has an aerial hydroseeding program. The program, which began as a demonstration project for the Japanese government, has seeded over 11 hectares of impact areas. The government has now applied MCB Butler's technology to other parts of Japan. MCB Butler has experimented with other new techniques, such as road stabilization compounds and soil nailing, which promote vegetative cover instead of concrete.

Non-native and Invasive Species Control

The mongoose was introduced to Okinawa in 1910 to exterminate rats and Habu snakes threatening the sugar cane industry, but with little effect. The mongoose population has since exploded, and is now estimated at 10,000. Mongooses are fierce daytime hunters that feed on small, ground-living animals, eggs, and insects.

At the Jungle Warfare Training Center, the mongoose threatens ground-dwelling animals and insects, including some species that are already endangered. These include the Ryukyu robin, Okinawa rail, Amami woodcock, and several kinds of snakes and turtles.

In 2004, MCB Butler—in coordination with the Japanese Government—began trapping mongooses in the Yambaru Jungle for extermination. Between 2006 and 2007, MCB Butler trapped 48 mongooses using 200 live traps.

Research and Management Partnerships

MCB Butler developed a cooperative relationship with scientists at Keio University and the Yanbaru Wildlife Research Center for joint research and management projects. Base and Yanbaru Wildlife Research Center staff have combined efforts to reduce poaching at the Jungle Warfare Training center and other areas of northern Okinawa.

USMC photo

Marines train for amphibious landings on the beaches of Okinawa.

Protected Species

Peregrine falcon
Falco peregrinus japonensis

Okinawa rail
Rallus okinawae

Amami woodcock
Socolopax mira

Pryer's woodpecker
Sapheopipo noguchii

Ryukyu robin
Erithacus komadori namiyei

Jambar long-armed beetle
Cheirotonus jambar

Kinawa-sekkoku (orchid)
Dendrobium okihawensse

Kunigami-tonbosou (orchid)
Platanthera sonoharai

These species are endangered, as designated by Japan's Ministry of the Environment. They are protected by the Law for the Conservation of Endangered Species of Wild Fauna and Flora.

LISTED SPECIES HIGHLIGHTS

Okinawa rail, Endangered

Rallus okinawae

The Okinawa rail does not fly, but runs quickly on the ground. It roosts in trees and has a high-pitched call. Threats include predation by Habu snakes, mongooses, and feral cats. During construction projects, MCB Butler requires ditches to have sloped sides so that birds do not become trapped if they fall in.

USMC photo by K. Minato

The Okinawa rail, which is endangered, lays nests of four to five eggs under brush or ferns.

Amami woodcock, Endangered

Scolopax mira

The nocturnal Amami woodcock eats earthworms, beetle larvae, and other soil insects. The woodcock is a ground-nesting bird, making it highly susceptible to predation by feral dogs and cats, and mongoose. Logging is also a threat. MCB Butler cooperates with other agencies to reduce mongoose populations and protect the woodcock.

Jambar long-armed beetle, Endangered

Cheirotonus jambar

The Jambar long-armed beetle is the largest beetle in Japan: males are up to 2.5 inches long. The beetle has a dark, metallic, blue-green head and black wings with yellow-brown spots. It inhabits oak forests, and adults lay eggs in tree holes. The larvae reach maturity after four years, an unusually long time for a beetle.

Appendix A: Threatened, Endangered, and Candidate Species by Category

Category	Common Name	Scientific Name	Status[1]	FWS Region	Installation	State	Critical Habitat/ Exempt or Non-Exempt[2]
Amphibian	Frosted flatwoods salamander	Ambystoma cingulatum	T	4	Townsend Bombing Range	GA	Y/E
	Arroyo toad	Anaxyrus californicus	E	8	MCAS Pendleton	CA	N
					MCB Camp Pendleton	CA	Y/E
Bird	Western snowy plover	Charadrius alexandrinus nivosus	T	8	MCB Camp Pendleton	CA	Y/E
	Piping plover	Charadrius melodus	T	4	MCB Camp Lejeune	VA	Y/E
	Yellow-billed cuckoo	Coccyzus americanus	C	8	MCB Camp Pendleton	CA	N
	Southwestern willow flycatcher	Empidonax traillii extimus	E	8	MCAS Pendleton	CA	N
					MCB Camp Pendleton	CA	Y/E
					MCLB Barstow	CA	N
	Hawaiian coot (‘Alae keo‘keo)	Fulica americana alai	E	1	MCB Hawaii	HI	N
	Hawaiian common moorhen (‘Alae ula)	Gallinula chloropus sandvicensis	E	1	MCB Hawaii	HI	N
	Hawaiian stilt (Ae‘o)	Himantopus mexicanus knudseni	E	1	MCB Hawaii	HI	N
	Wood stork	Mycteria americana	E	4	MCAS Beaufort	SC	N
					MCLB Albany	GA	N
					MCRD Parris Island	SC	N
					MCSF Blount Island	FL	N
					Townsend Bombing Range	GA	N
	Red-cockaded woodpecker	Picoides borealis	E	4	MCB Camp Lejeune	VA	N
	Coastal California gnatcatcher	Polioptila californica	T	8	MCAS Miramar	CA	Y/E
					MCB Camp Pendleton	CA	Y/E
	Newell’s Townsend’s shearwater (‘A‘o)	Puffinus auricularis newelli	T	1	MCB Hawaii	HI	N
	Light-footed clapper rail	Rallus longirostris levipes	E	8	MCB Camp Pendleton	CA	N
	California least tern	Sterna antillarum browni	E	8	MCB Camp Pendleton	CA	N
	Least Bell’s vireo	Vireo bellii pusillus	E	8	MCAS Miramar	CA	N
					MCAS Pendleton	CA	N
					MCB Camp Pendleton	CA	Y/E
	Hawaiian duck (Koloa maoli)	Anas wyvilliana	E	1	MCB Hawaii	HI	N

[1] T = Threatened Species, E = Endangered Species, C = Candidate Species

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Appendix A: Threatened, Endangered, and Candidate Species by Category, cont.

Category	Common Name	Scientific Name	Status[1]	FWS Region	Installation	State	Critical Habitat/ Exempt or Non-Exempt[2]
Crustacean	San Diego fairy shrimp	Branchinecta sandiegonensis	E	8	MCAS Miramar	CA	Y/E
					MCB Camp Pendleton	CA	Y/E
	Riverside fairy shrimp	Streptocephalus woottoni	E	8	MCB Camp Pendleton	CA	Y/E
					MCAS Miramar	CA	Y/E
Fish	Tidewater goby	Eucyclogobius newberryi	E	8	MCB Camp Pendleton	CA	Y/E
	Steelhead trout	Oncorhynchus mykiss	E	8	MCB Camp Pendleton	CA	Y/E
	Lahontan cutthroat trout	Oncorhynchus clarki henshawi	T	8	MCMWTC Bridgeport	CA	N
Mammal	Sonoran pronghorn	Antilocapra americana sonoriensis	E	2	Barry M. Goldwater Range	AZ	N
	Northern right whale	Balaena glacialis	E	4	MCB Camp Lejeune	VA	N
	Sei whale	Balaenoptera borealis	E	4	MCB Camp Lejeune	VA	N
	Fin whale	Balaenoptera physalus	E	4	MCB Camp Lejeune	VA	N
	Stephens' kangaroo rat	Dipodomys stephensi	E	8	MCB Camp Pendleton	CA	N
	Lesser long-nosed bat	Leptonycteris curasoae yerbabuenae	E	2	Barry M. Goldwater Range	AZ	N
	Humpback whale (Kohola)	Megaptera novaeangliae	E	4	MCB Camp Lejeune	VA	N
				1	MCB Hawaii	HI	N
	Hawaiian monk seal ('Ilio-holo-i-ka-naua)	Monachus schauinslandi	E	1	MCB Hawaii	HI	N
	Pacific pocket mouse	Perognathus longimembris pacificus	E	8	MCB Camp Pendleton	CA	N
	Sperm whale	Physeter catodon	E	4	MCB Camp Lejeune	VA	N
	West Indian manatee	Trichechus manatus	E	4	MCAS Cherry Point	NC	N
					MCB Camp Lejeune	VA	N
					MCRD Parris Island	SC	N
					MCSF Blount Island	FL	N
Mollusk	Dwarf wedgemussel	Alasmidonta heterodon	E	5	MCB Quantico	VA	N
Plant	Seabeach amaranth	Amaranthus pumilus	T	4	MCB Camp Lejeune	VA	N
	Del Mar manzanita	Arctostaphylos glandulosa ssp. crassifolia	E	8	MCAS Miramar	CA	N

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Appendix A: Threatened, Endangered, and Candidate Species by Category, cont.

Category	Common Name	Scientific Name	Status[1]	FWS Region	Installation	State	Critical Habitat/ Exempt or Non-Exempt[2]
Plant	Thread-leaved brodiaea	Brodiaea filifolia	T	8	MCB Camp Pendleton	CA	Y/E
	Hirsts' panic grass	Dichanthelium (=Panicum) hirstii	C	4	MCB Camp Lejeune	NC	N
	Acuña cactus	Echinomastus erectocentrus acunensis	C	2	Barry M. Goldwater Range	AZ	N
	San Diego button-celery	Eryngium aristulatum var. parishii	E	8	MCAS Miramar	CA	N
					MCB Camp Pendleton	CA	N
	Small whorled pogonia	Isotria medeoloides	T	5	MCB Quantico	VA	N
	Pondberry	Lindera melissifolia	E	4	MCAS Beaufort	SC	N
	Rough-leaved loosestrife	Lysimachia asperulaefolia	E	4	MCB Camp Lejeune	VA	N
	Willowy monardella	Monardella linoides ssp. Viminea	E	8	MCAS Miramar	CA	Y/E
	Spreading navarretia	Navarretia fossalis	T	8	MCAS Miramar	CA	Y/E
					MCB Camp Pendleton	CA	Y/E
	California Orcutt grass	Orcuttia californica	E	8	MCAS Miramar	CA	N
	Brand's phacelia	Phacelia stellaris	C	8	MCB Camp Pendleton	CA	N
	San Diego mesa-mint	Pogogyne abramsii	E	8	MCAS Miramar	CA	N
	Harperella	Ptilimnium nodosum	E	5	MCB Quantico	VA	N
	Sesbania tomentosa ('Ohai)	Sesbania tomentosa	E	1	MCB Hawaii	HI	N
Reptile	American alligator	Alligator mississippiensis	T	4	MCAS Beaufort	SC	N
					MCAS Cherry Point	NC	N
					MCB Camp Lejeune	VA	N
					MCLB Albany	GA	N
					MCRD Parris Island	SC	N
					MCSF Blount Island	FL	N
					Townsend Bombing Range	GA	N
	Loggerhead sea turtle	Caretta caretta	T	4	MCAS Cherry Point	NC	N
					MCB Camp Lejeune	VA	N

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Appendix A: Threatened, Endangered, and Candidate Species by Category, cont.

Category	Common Name	Scientific Name	Status[1]	FWS Region	Installation	State	Critical Habitat/ Exempt or Non-Exempt[2]
Reptile	Green sea turtle (Honu)	Chelonia mydas	T	4	MCAS Cherry Point	NC	N
				4	MCB Camp Lejeune	VA	N
				1	MCB Hawaii	HI	N
	Leatherback sea turtle	Dermochelys coriacea	E	4	MCB Camp Lejeune	NC	N
	Desert tortoise	Gopherus agassizii	T	8	Chocolate Mountain Aerial Gunnery Range	CA	Y/NE
					MCAGCC Twentynine Palms	CA	Y/E
					MCLB Barstow	CA	Y/NE
	Gopher tortoise	Gopherus polyphemus	C	4	MCLB Albany	GA	N
					MCSF Blount Island	FL	N
	Kemp's ridley sea turtle	Lepidochelys kempii	T	4	MCAS Cherry Point	NC	N
	Olive Ridley sea turtle	Lepidochelys olivacea	T	1	MCB Hawaii	HI	N
	Flat-tailed horned lizard	Phrynosoma mcallii	C	2	Barry M. Goldwater Range	AZ	N

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Appendix B: Threatened, Endangered, and Candidate Species by Installation

Installation	State	FWS Region	Category	Common Name	Scientific Name	Status[1]	Critical Habitat/ Exempt or Non-Exempt[2]
Barry M. Goldwater Range	AZ	2	Mammal	Sonoran pronghorn	*Antilocapra americana sonoriensis*	E	N
			Plant	Acuña cactus	*Echinomastus erectocentrus acunensis*	C	N
			Mammal	Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E	N
			Reptile	Flat-tailed horned lizard	*Phrynosoma mcallii*	C	N
Chocolate Mountain Aerial Gunnery Range	CA	8	Reptile	Desert tortoise	*Gopherus agassizii*	T	Y/NE
MCAGCC Twentynine Palms	CA	8	Reptile	Desert tortoise	*Gopherus agassizii*	T	Y/E
MCAS Beaufort	SC	4	Reptile	American alligator	*Alligator mississippiensis*	T	N
			Plant	Pondberry	*Lindera melissifolia*	E	N
			Bird	Wood stork	*Mycteria americana*	E	N
MCAS Cherry Point	NC	4	Reptile	American alligator	*Alligator mississippiensis*	T	N
			Reptile	Loggerhead sea turtle	*Caretta caretta*	T	N
			Reptile	Green sea turtle	*Chelonia mydas*	T	N
			Reptile	Kemp's ridley sea turtle	*Lepidochelys kempii*	T	N
			Mammal	West Indian manatee	*Trichechus manatus*	E	N
MCAS Miramar	CA	8	Plant	Del Mar manzanita	*Arctostaphylos glandulosa ssp. crassifolia*	E	N
			Crustacean	San Diego fairy shrimp	*Branchinecta sandiegonensis*	E	Y/E
			Plant	San Diego button-celery	*Eryngium aristulatum var. parishii*	E	N
			Plant	Willowy monardella	*Monardella linoides ssp. Viminea*	E	Y/E
			Plant	Spreading navarretia	*Navarretia fossalis*	T	Y/E
			Plant	California Orcutt grass	*Orcuttia californica*	E	N
			Plant	San Diego mesa-mint	*Pogogyne abramsii*	E	N
			Bird	Coastal California gnatcatcher	*Polioptila californica*	T	Y/E
			Crustacean	Riverside fairy shrimp	*Streptocephalus woottoni*	E	Y/E
			Bird	Least Bell's vireo	*Vireo bellii pusillus*	E	N

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Appendix B: Threatened, Endangered, and Candidate Species by Installation, cont.

Installation	State	FWS Region	Category	Common Name	Scientific Name	Status[1]	Critical Habitat/ Exempt or Non-Exempt[2]
MCAS Pendleton	CA	8	Amphibian	Arroyo toad	*Anaxyrus californicus*	E	N
			Bird	Southwestern willow flycatcher	*Empidonax traillii extimus*	E	N
			Bird	Least Bell's vireo	*Vireo bellii pusillus*	E	N
MCB Camp Lejeune	NC	4	Reptile	American alligator	*Alligator mississippiensis*	T	N
			Plant	Seabeach amaranth	*Amaranthus pumilus*	T	N
			Mammal	Northern right whale	*Balaena glacialis*	E	N
			Mammal	Sei whale	*Balaenoptera borealis*	E	N
			Mammal	Fin whale	*Balaenoptera physalus*	E	N
			Reptile	Loggerhead sea turtle	*Caretta caretta*	T	N
			Bird	Piping plover	*Charadrius melodus*	T	Y/E
			Reptile	Green sea turtle	*Chelonia mydas*	T	N
			Reptile	Leatherback sea turtle	*Dermochelys coriacea*	E	N
			Plant	Hirsts' panic grass	*Dichanthelium (=Panicum) hirstii*	C	N
			Plant	Rough-leaved loosestrife	*Lysimachia asperulaefolia*	E	N
			Mammal	Humpback whale	*Megaptera novaeangliae*	E	N
			Mammal	Sperm whale	*Physeter catodon*	E	N
			Bird	Red-cockaded woodpecker	*Picoides borealis*	E	N
			Mammal	West Indian manatee	*Trichechus manatus*	E	N
MCB Hawaii	HI	1	Bird	Hawaiian duck (Koloa maoli)	*Anas wyvilliana*	E	N
			Reptile	Green sea turtle (Honu)	*Chelonia mydas*	T	N
			Bird	Hawaiian coot ('Alae keo'keo)	*Fulica americana alai*	E	N
			Bird	Hawaiian common moorhen ('Alae ula)	*Gallinula chloropus sandvicensis*	E	N
			Bird	Hawaiian stilt (Ae'o)	*Himantopus mexicanus knudseni*	E	N
			Reptile	Olive Ridley sea turtle	*Lepidochelys olivacea*	T	N
			Mammal	Humpback whale (Kohola)	*Megaptera novaeangliae*	E	N
			Mammal	Hawaiian monk seal ('Ilio-holo-i-ka-naua)	*Monachus schauinslandi*	E	N

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Appendix B: Threatened, Endangered, and Candidate Species by Installation, cont.

Installation	State	FWS Region	Category	Common Name	Scientific Name	Status[1]	Critical Habitat/ Exempt or Non-Exempt[2]
MCB Hawaii	HI	1	Bird	Newell's Townsend's shearwater ('A'o)	*Puffinus auricularis newelli*	T	N
			Plant	Sesbania tomentosa ('Ohai)	*Sesbania tomentosa*	E	N
MCB Pendleton	CA	8	Crustacean	San Diego fairy shrimp	*Branchinecta sandiegonensis*	E	Y/E
			Plant	Thread-leaved brodiaea	*Brodiaea filifolia*	T	Y/E
			Amphibian	Arroyo toad	*Anaxyrus californicus*	E	Y/E
			Bird	Western snowy plover	*Charadrius alexandrinus nivosus*	T	Y/E
			Bird	Yellow-billed cuckoo	*Coccyzus americanus*	C	N
			Mammal	Stephens' kangaroo rat	*Dipodomys stephensi*	E	N
			Bird	Southwestern willow flycatcher	*Empidonax traillii extimus*	E	Y/E
			Plant	San Diego button-celery	*Eryngium aristulatum var. Parishii*	E	N
			Fish	Tidewater goby	*Eucyclogobius newberryi*	E	Y/E
			Plant	Spreading navarretia	*Navarretia fossalis*	T	Y/E
			Fish	Steelhead trout	*Oncorhynchus mykiss*	E	Y/E
			Mammal	Pacific pocket mouse	*Perognathus longimembris pacificus*	E	N
			Plant	Brand's phacelia	*Phacelia stellaris*	C	N
			Bird	Coastal California gnatcatcher	*Polioptila californica*	T	Y/E
			Bird	Light-footed clapper rail	*Rallus longirostris levipes*	E	N
			Bird	California least tern	*Sterna antillarum browni*	E	N
			Crustacean	Riverside fairy shrimp	*Streptocephalus woottoni*	E	Y/E
			Bird	Least Bell's vireo	*Vireo bellii pusillus*	E	Y/E
MCB Quantico	VA	5	Mollusk	Dwarf wedgemussel	*Alasmidonta heterodon*	E	N
			Plant	Small whorled pogonia	*Isotria medeoloides*	T	N
			Plant	Harperella	*Ptilimnium nodosum*	E	N
MCLB Albany	GA	4	Reptile	American alligator	*Alligator mississippiensis*	T	N
			Reptile	Gopher tortoise	*Gopherus polyphemus*	C	N
			Bird	Wood stork	*Mycteria americana*	E	N

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Appendix B: Threatened, Endangered, and Candidate Species by Installation, cont.

Installation	State	FWS Region	Category	Common Name	Scientific Name	Status[1]	Critical Habitat/ Exempt or Non-Exempt[2]
MCLB Barstow	CA	8	Bird	Southwestern willow flycatcher	*Empidonax traillii extimus*	E	N
			Reptile	Desert tortoise	*Gopherus agassizii*	T	Y/NE
MCMWTC Bridgeport	CA	8	Fish	Lahontan cutthroat trout	*Oncorhynchus clarki henshawi*	T	N
MCRD Parris Island	SC	4	Reptile	American alligator	*Alligator mississippiensis*	T	N
			Bird	Wood stork	*Mycteria americana*	E	N
			Mammal	West Indian manatee	*Trichechus manatus*	E	N
MCSF Blount Island	FL	4	Reptile	American alligator	*Alligator mississippiensis*	T	N
			Reptile	Gopher tortoise	*Gopherus polyphemus*	C	N
			Bird	Wood stork	*Mycteria americana*	E	N
			Mammal	West Indian manatee	*Trichechus manatus*	E	N
Townsend Bombing Range	GA	4	Reptile	American alligator	*Alligator mississippiensis*	T	N
			Amphibian	Frosted flatwoods salamander	*Ambystoma cingulatum*	T	Y/E
			Bird	Wood stork	*Mycteria americana*	E	N

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Appendix C: Threatened, Endangered, and Candidate Species by Common Name

Common Name	Scientific Name	Status[1]	Category	FWS Region	Installation	State	Critical Habitat/ Exempt or Non-Exempt[2]
Acuña cactus	*Echinomastus erectocentrus acunensis*	C	Plant	2	Barry M. Goldwater Range	AZ	N
American alligator	*Alligator mississippiensis*	T	Reptile	4	MCAS Beaufort	SC	N
				4	MCAS Cherry Point	NC	N
				4	MCB Camp Lejeune	NC	N
				4	MCLB Albany	GA	N
				4	MCRD Parris Island	SC	N
				4	MCSF Blount Island	FL	N
				4	Townsend Bombing Range	GA	N
Arroyo toad	*Anaxyrus californicus*	E	Amphibian	8	MCAS Pendleton	CA	N
				8	MCB Camp Pendleton	CA	Y/E
Brand's phacelia	*Phacelia stellaris*	C	Plant	8	MCB Camp Pendleton	CA	N
California least tern	*Sterna antillarum browni*	E	Bird	8	MCB Camp Pendleton	CA	N
California Orcutt grass	*Orcuttia californica*	E	Plant	8	MCAS Miramar	CA	N
Coastal California gnatcatcher	*Polioptila californica*	T	Bird	8	MCAS Miramar	CA	Y/E
				8	MCB Camp Pendleton	CA	Y/E
Del Mar manzanita	*Arctostaphylos glandulosa ssp. crassifolia*	E	Plant	8	MCAS Miramar	CA	N
Desert tortoise	*Gopherus agassizii*	T	Reptile	8	Chocolate Mountain Aerial Gunnery Range	CA	Y/NE
				8	MCAGCC Twentynine Palms	CA	Y/E
				8	MCLB Barstow	CA	Y/NE
Dwarf wedgemussel	*Alasmidonta heterodon*	E	Mollusk	5	MCB Quantico	VA	N
Fin whale	*Balaenoptera physalus*	E	Mammal	4	MCB Camp Lejeune	NC	N
Flat-tailed horned lizard	*Phrynosoma mcallii*	C	Reptile	2	Barry M. Goldwater Range	AZ	N
Frosted flatwoods salamander	*Ambystoma cingulatum*	T	Amphibian	4	Townsend Bombing Range	GA	Y/E
Gopher tortoise	*Gopherus polyphemus*	C	Reptile	4	MCLB Albany	GA	N
				4	MCSF Blount Island	FL	N

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Appendix C: Threatened, Endangered, and Candidate Species by Common Name, cont.

Common Name	Scientific Name	Status[1]	Category	FWS Region	Installation	State	Critical Habitat/ Exempt or Non-Exempt[2]
Green sea turtle (Honu)	*Chelonia mydas*	T	Reptile	4	MCAS Cherry Point	NC	N
				4	MCB Camp Lejeune	NC	N
				1	MCB Hawaii	HI	N
Harperella	*Ptilimnium nodosum*	E	Plant	5	MCB Quantico	VA	N
Hawaiian duck (Koloa maoli)	*Anas wyvilliana*	E	Bird	1	MCB Hawaii	HI	N
Hawaiian common moorhen (‘Alae ula)	*Gallinula chloropus sandvicensis*	E	Bird	1	MCB Hawaii	HI	N
Hawaiian coot (‘Alae keo’keo)	*Fulica americana alai*	E	Bird	1	MCB Hawaii	HI	N
Hawaiian monk seal (‘Ilio-holo-i-ka-naua)	*Monachus schauinslandi*	E	Mammal	1	MCB Hawaii	HI	N
Hawaiian stilt (Ae’o)	*Himantopus mexicanus knudseni*	E	Bird	1	MCB Hawaii	HI	N
Hirsts’ panic grass	*Dichanthelium (=Panicum) hirstii*	C	Plant	4	MCB Camp Lejeune	NC	N
Humpback whale (Kohola)	*Megaptera novaeangliae*	E	Mammal	4	MCB Camp Lejeune	NC	N
				1	MCB Hawaii	HI	N
Kemp's ridley sea turtle	*Lepidochelys kempii*	T	Reptile	4	MCAS Cherry Point	NC	N
Lahontan cutthroat trout	*Oncorhynchus clarki henshawi*	T	Fish	8	MCMWTC Bridgeport	CA	N
Least Bell’s vireo	*Vireo bellii pusillus*	E	Bird	8	MCAS Miramar	CA	N
				8	MCAS Pendleton	CA	N
				8	MCB Camp Pendleton	CA	Y/E
Leatherback sea turtle	*Dermochelys coriacea*	E	Reptile	4	MCB Camp Lejeune	NC	N
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	E	Mammal	2	Barry M. Goldwater Range	AZ	N
Light-footed clapper rail	*Rallus longirostris levipes*	E	Bird	8	MCB Camp Pendleton	CA	N
Loggerhead sea turtle	*Caretta caretta*	E	Reptile	4	MCAS Cherry Point	NC	N
				4	MCB Camp Lejeune	NC	N
Newell's Townsend's shearwater (‘A’o)	*Puffinus auricularis newelli*	T	Bird	1	MCB Hawaii	HI	N
Northern right whale	*Balaena glacialis*	E	Mammal	4	MCB Camp Lejeune	NC	N

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Appendix C: Threatened, Endangered, and Candidate Species by Common Name, cont.

Common Name	Scientific Name	Status[1]	Category	FWS Region	Installation	State	Critical Habitat/ Exempt or Non-Exempt[2]
Olive Ridley sea turtle	*Lepidochelys olivacea*	T	Reptile	1	MCB Hawaii	HI	N
Pacific pocket mouse	*Perognathus longimembris pacificus*	E	Mammal	8	MCB Camp Pendleton	CA	N
Piping plover	*Charadrius melodus*	T	Bird	4	MCB Camp Lejeune	NC	Y/E
Pondberry	*Lindera melissifolia*	E	Plant	4	MCAS Beaufort	SC	N
Red-cockaded woodpecker	*Picoides borealis*	E	Bird	4	MCB Camp Lejeune	NC	N
Riverside fairy shrimp	*Streptocephalus woottoni*	E	Crustacean	8	MCAS Miramar	CA	Y/E
				8	MCB Camp Pendleton	CA	Y/E
Rough-leaved loosestrife	*Lysimachia asperulaefolia*	E	Plant	4	MCB Camp Lejeune	NC	N
San Diego button-celery	*Eryngium aristulatum var. parishii*	E	Plant	8	MCAS Miramar	CA	N
				8	MCB Camp Pendleton	CA	N
San Diego fairy shrimp	*Branchinecta sandiegonensis*	E	Crustacean	8	MCAS Miramar	CA	Y/E
				8	MCB Camp Pendleton	CA	Y/E
San Diego mesa-mint	*Pogogyne abramsii*	E	Plant	8	MCAS Miramar	CA	N
Seabeach amaranth	*Amaranthus pumilus*	T	Plant	4	MCB Camp Lejeune	NC	N
Sei whale	*Balaenoptera borealis*	E	Mammal	4	MCB Camp Lejeune	NC	N
Sesbania tomentosa (‘Ohai)	*Sesbania tomentosa*	E	Plant	1	MCB Hawaii	HI	N
Small whorled pogonia	*Isotria medeoloides*	T	Plant	5	MCB Quantico	VA	N
Sonoran pronghorn	*Antilocapra americana sonoriensis*	E	Mammal	2	Barry M. Goldwater Range	AZ	N
Southwestern willow flycatcher	*Empidonax traillii extimus*	E	Bird	8	MCAS Pendleton	CA	N
				8	MCB Camp Pendleton	CA	Y/E
				8	MCLB Barstow	CA	N
Sperm whale	*Physeter catodon*	E	Mammal	4	MCB Camp Lejeune	NC	N
Spreading navarretia	*Navarretia fossalis*	T	Plant	8	MCAS Miramar	CA	Y/E
				8	MCB Camp Pendleton	CA	Y/E
Steelhead trout	*Oncorhynchus mykiss*	E	Fish	8	MCB Camp Pendleton	CA	Y/E
Stephens' kangaroo rat	*Dipodomys stephensi*	E	Mammal	8	MCB Camp Pendleton	CA	N
Thread-leaved brodiaea	*Brodiaea filifolia*	T	Plant	8	MCB Camp Pendleton	CA	Y/E

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Appendix C: Threatened, Endangered, and Candidate Species by Common Name, cont.

Common Name	Scientific Name	Status[1]	Category	FWS Region	Installation	State	Critical Habitat/ Exempt or Non-Exempt[2]
Tidewater goby	*Eucyclogobius newberryi*	E	Fish	8	MCB Camp Pendleton	CA	Y/E
West Indian manatee	*Trichechus manatus*	E	Mammal	4	MCAS Cherry Point	NC	N
				4	MCB Camp Lejeune	NC	N
				4	MCRD Parris Island	SC	N
				4	MCSF Blount Island	FL	N
Western snowy plover	*Charadrius alexandrinus nivosus*	T	Bird	8	MCB Camp Pendleton	CA	Y/E
Willowy monardella	*Monardella linoides ssp. Viminea*	E	Plant	8	MCAS Miramar	CA	Y/E
Wood stork	*Mycteria americana*	E	Bird	4	MCAS Beaufort	SC	N
				4	MCLB Albany	GA	N
				4	MCRD Parris Island	SC	N
				4	MCSF Blount Island	FL	N
				4	Townsend Bombing Range	GA	N
Yellow-billed cuckoo	*Coccyzus americanus*	C	Bird	8	MCB Camp Pendleton	CA	N

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