

Natural Selections



Department of Defense Natural Resources Program

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THE SIKES ACT

The Sikes Act is a cornerstone piece of environmental legislation that created the first roadmap to natural resources conservation for today's military installations. Originally signed into law in 1960 by President Eisenhower, the Sikes Act was born out of a need to address public access to military lands for hunting and fishing activities. The Sikes Act has been strengthened several times throughout its history—mainly through the National Defense Authorization Act—to adapt to changing natural resource management needs on installations, such as protected species conservation, invasive species management, encroachment, and impacts from climate change. Today, the Sikes Act remains one of the most influential pieces of legislation impacting natural resource stewardship on military lands, waters, and airspace while preserving the military mission through its provision of “no net loss” to the military mission.

In 1997, the Sikes Act received its most significant set of amendments, known as the Sikes Act Improvement Act of 1997, that required the development and implementation of Integrated Natural Resources Management Plans (INRMPs) on all military installations with significant natural resources. At the heart of each INRMP are several foundational elements, which include fish, wildlife, and land and forestry management and enhancement; wetland protection; public access to military lands, including opportunities for hunting and fishing; enforcement of natural resource laws; and “no net loss” of mission capability on the installation. The INRMP is, to natural resource managers on DoD installations, the equivalent of the pilot's flight computer or the mariner's navigation chart.

Collaboration among the military installations, states, the U.S. Fish and Wildlife Service (USFWS), tribes, non-governmental organizations, private partners, and other stakeholders is central to the INRMP planning and implementation process. The 1997 amendments required that INRMPs be developed and signed by USFWS and state fish and wildlife agencies, strengthening their use as collaborative documents. In 2008, the Sikes Act was amended to give installations the authority to work outside the fenceline, empowering installation natural resource managers to sign cooperative agreements with stakeholders over larger areas, where doing so would alleviate impediments to military operations while fostering trust between federal partners and surrounding communities.

At Fort Huachuca, Arizona, for example, DoD natural resource managers work in tandem with USFWS biologists to help recover the federally threatened Mexican spotted owl. At Luke Air Force Base and Marine Corps Air Station Yuma, the joint efforts of the installation natural resource managers and USFWS helped to reverse the decline of the federally listed local Sonoran pronghorn (*Antilocapra americana sonoriensis*) population and establish an experimental population on the Kofa National Wildlife Refuge and surrounding areas in Arizona. At Naval Base Coronado, installation natural resource managers established collaborative management practices, partnered to educate the public, and supported beach cleanups and maintenance to protect the vulnerable nests and chicks of the federally listed California least tern and western snowy plover, which nest on the same beaches the military uses for amphibious training and landings. Each installation faces unique conservation challenges that require innovative and collaborative solutions with various partners and stakeholders to achieve conservation while preserving the military mission.

Military installations will experience significant challenges related to climate change in the coming decades, such as sea level rise, wildfires, flooding, and drought. To address these challenges, Congress recently amended the Sikes Act to give DoD the authority to work with outside partners to evaluate climate risks and advance nature-

MESSAGE FROM THE DOD NATURAL RESOURCES PROGRAM

By Ryan Orndorff, Director, Environmental Planning and Conservation

Welcome to the Winter 2023 Edition of *Natural Selections*!

This issue of *Natural Selections* highlights the exceptional diversity of military lands and the natural resources management activities that preserve these spaces for conservation and military training. Starting with the passage of the Sikes Act in 1960, DoD natural resource managers ensure that fish, wildlife, and other natural resources that exist on, and are associated with, military lands in the United States are protected and enhanced. Ever since, the partnership among DoD, USFWS, and State fish and wildlife agencies has continually strengthened, enhancing many at-risk ecosystems on military lands.

The publication of *Conserving Biodiversity on Military Lands: A Handbook for Natural Resources Managers* in 1996 showcased and highlighted the array of conservation and public access programs available across DoD's 27 million acres. DoD has continued to build on these efforts to balance its military readiness mission while protecting ecosystems and at-risk species. DoD has long understood that sustainably managing military lands also protects and supports species and their habitats.

In this issue of *Natural Selections*, we provide an overview of the complex conservation efforts that support natural infrastructure resilience and promote stewardship through partnerships, while supporting "no net loss" of DoD's mission capabilities. Installation natural resource managers help conserve species, their habitats, and manage the natural areas on military installations while ensuring that Soldiers, Sailors, Airmen, and Marines can train and accomplish DoD's mission. The articles in this issue give a glimpse of the diverse responsibilities that DoD natural resource managers perform and the array of different natural resources that can be found across DoD's lands, waters, and airspace.

This issue of the newsletter begins with an overview and history of the Sikes Act, which recognized importance and value of military lands and the need to conserve and enhance the unique and diverse ecosystems on DoD lands while allowing DoD to meet its military mission. This article provides a glimpse of the diverse natural resources on DoD lands, waters, and airspace. Following that, we have remarks from Jarrad Kosa, current USFWS Sikes Act Coordinator, that focus on "Highlighting the Importance of Collaboration." The article spotlights the ongoing shared efforts between DoD installations and USFWS demonstrated through the Military Conservation Partner Award, established in 2005. This is not one-sided work by the installations, but a collaborative effort with USFWS and other federal agencies, academic institutions, and other stakeholders.

DoD has a diversity of land use needs for the 27 million acres entrusted to our care. While our installations are primarily to support testing, training, and operational capabilities, they also provide housing, schools, utilities, recreation, and significant natural and cultural resource values. All of this requires care and stewardship. One of the more novel, beneficial land management approaches to provide this care is through agricultural use. In "Naval Facilities Engineering Systems Command (NAVFAC) Mid-Atlantic Agricultural Outleasing Program," we see this proven land management program at work—and not just at one installation, but at seven.

Land management activities on DoD installations can benefit ecosystems and enhance installation resilience. In "Wildfire Resilience on Military Installations," you can read how DoD works

with stakeholders off installations to manage lands in ways that strengthen the resilience of forests before and after wildfires. You can learn about one of these new partnerships in "National Wildfire Coordinating Group Welcomes DoD."

Installations support public access, encouraging the public to interact and appreciate nature and the multiple recreational opportunities it offers. In "Fort Drum's Recreational Activities," Raymond Rainbolt discusses the benefits of open access hunting and fishing permits on Fort Drum and how these non-at-risk species are managed.

Furthering the aspects of outreach and public access and engagement, the article about how "Joint Region Marianas Expands Outreach and Education Programs" allows us to explore how outreach and education programs can involve local high schools, universities, and federal and local government agencies in land stewardship and encourage appreciation of natural resources found on DoD installations. These education and outreach programs are geared to highlight conservation and natural resource jobs to students who might not know of them otherwise along with highlighting DoD's conservation efforts. These engagements and opportunities can provide pathways that lead to inspiring careers, as we can see in our Natural Resources Manager Showcase article. In "Fort Stewart's Fish and Wildlife Branch Chief's Childhood Love for Wildlife Leads to Conservation Career," we detail why Larry Carlile's childhood experiences led him to a rewarding career in natural resource management.

It takes a wide range of partnerships to successfully manage an installation's natural resources. These partnerships may not always appear to be natural allies, but they always have a common goal as demonstrated in our DoD Partners in Flight (PIF) article on "Improving the Military Bird/wildlife Aircraft Strike Hazard (BASH) System." Bird strikes can cause irreparable damage to both commercial and military aircraft and harm to birds, and more importantly put safety and lives at risk. The article talks about how working together allowed the aviation safety and natural resources communities to develop a suite of BASH mitigation tools and techniques that are now well known and in use across the aviation community.

Thinking outside the norm is a vital skill for natural resource managers, as you can see in "Navy Uses Data Analytics to Improve Invasive Species Management." This article highlights how asking the right questions and gathering data led to the Navy finding innovations and out-of-the-box solutions to address the impacts from the 977 invasive species that cause issues for its land and wildlife management.

I hope you enjoy reading this issue of *Natural Selections* and learning more about the diversity of natural resource management approaches used across DoD. The abundant DoD natural resource programs, partnerships, and activities all work together across DoD's lands, waters, and airspace throughout the country to sustain both our ecosystems and landscapes along with military activities while preserving mission readiness.

We will publish our next newsletter in Summer 2023. Please contact NaturalSelections@bah.com if you would like to share any DoD success stories or contribute an article.

based solutions that will promote long-term resilience. Although climate resilience was only recently codified as a component of the INRMP, numerous installations have a long history of successfully implementing resilience projects ranging from living shorelines at Naval Weapons Station Yorktown, Virginia; longleaf pine restoration at Fort Bragg, North Carolina; and smart irrigation at Nellis Air Force Base, Nevada.

DoD natural resource managers support “no net loss” of military mission capability on installation lands, while providing for conservation, rehabilitation, and the sustainable multipurpose use of natural resources. Natural resource managers work with more than species and their habitats; they address all aspects of natural resources on an installation including climate adaptation and installation resilience, wildland fire, invasive species, alien species, noxious weeds, feral animals and nuisance wildlife, bird/wildlife aircraft strike hazards, public access and fish and wildlife-oriented recreation, resources of importance to Federally recognized Tribes and Native Hawaiian Organizations, commercial forestry, and agricultural outleasing. These focus areas, along with the range of species and habitats within DoD’s lands, waters, and airspace, highlight the diverse features and corresponding natural resource management activities our military is entrusted with to sustain military readiness and conserve our natural heritage for future generations to enjoy.

HIGHLIGHTING THE IMPORTANCE OF COLLABORATION

By Jarrad Kosa, USFWS

Although the ultimate objectives and mission of the Military Services and USFWS are different, the outcomes of their collaborative conservation partnerships are the same. These collaborative partnerships have demonstrated gains for our Nation’s natural resources, provide invaluable public outdoor recreational opportunities, and continue to provide conservation advantages into the future. In recognition of this, during the early 2000s, one of USFWS’s most notable conservation leaders, Dr. Mamie Parker, sought to recognize and celebrate military installations that demonstrate exceptional conservation success through collaboration. She established the Military Conservation Partner Award in 2005 to achieve this. Since then, USFWS has presented the award to eighteen installations.

USFWS annually selects one award winner from a large pool of nominations, so the selection process provides reviewers the chance to see many high-performing natural resource programs. The award has been presented to installations large and small with a wide variety of missions, and winners represent exceptional natural resource management by all Military Services, including the U.S. Army National Guard and Reserve. Each year, USFWS convenes a committee to review nominations for the Military Conservation Partner Award. The selection committee looks for nominees that demonstrate tangible, on-the-ground success in conservation. But just as



The Mississippi National Guard's Camp Shelby receives the 2021 Military Conservation Partner Award from the U.S. Fish and Wildlife Service. The team is shown at the award ceremony at the Mississippi Armed Forces Museum, Camp Shelby Joint Forces Training Center.

important, the committee focuses on installations with a strong spirit of collaboration with partners. It’s not about having a large number of partnerships, but about showing meaningful joint efforts to advance the state of resource management.



Marine Corps Base Camp Pendleton's natural resources

In 2022, USFWS recognized U.S. Marine Corps Base Camp Pendleton as the winner. Camp Pendleton manages over 125,000 acres of incredibly diverse habitat for fish, wildlife, and native plants, including lagoons, estuaries, coastal dunes, native grasslands, coastal sage scrub, chaparral, oak woodlands, salt and freshwater marshes, vernal pools, riparian scrubland and woodland, arroyos, streams, rivers, ponds, and lakes.

The partners that Camp Pendleton cooperates with to conserve its natural resources are even more varied than the habitats they manage. The Marine Corps works with a wide swath of public partners, volunteer groups, conservation organizations, universities, and research institutions. As a result of these diverse and valued partnerships, Camp Pendleton has made exceptional gains for natural resource conservation while



An endangered species sign posted along the coastline on Marine Corps Base Camp Pendleton

advancing the installation’s military mission. Camp Pendleton works with its partners to support 19 species listed under the Endangered Species Act (ESA), while restoring a wide variety of habitats that enhance both wildlife and military training.

Military installations use cooperative approaches to leverage resources, expertise, and opportunities that allow installations and their partners to stay at the forefront of natural resource stewardship. The selection committee frequently sees nominations that describe management or research partnerships that go beyond achieving the installation’s resource objectives and contribute to the landscape and species conservation success.

The Mississippi National Guard’s Camp Shelby received the award in 2021. Here, the National Guard manages numerous species that thrive in longleaf pine ecosystems, while working with partners to provide high-quality recreational opportunities to the military community and the public. Its creative use of partnerships has improved conditions for the federally listed black pinesnake (*Pituophis melanoleucus*), red-cockaded woodpecker (*Leuconotopicus borealis*), and dusky gopher frog (*Lithobates sevosus*).



Close-up portrait of a Mississippi gopher frog (Rana capito sevosa)

The winners of the Military Conservation Partner Award demonstrate strong diverse partnerships, which result in considerable conservation success for fish and wildlife in concert with enhanced ability to deliver the military mission. At one

past winner, Fort Hood, improved collaboration resulted in the reduction of training restrictions while increasing species populations and preserving habitat. Other winning installations improved land management practices resulting in more natural training environments and conservation successes.

Since collaboration is a powerful model for achieving positive outcomes for fish and wildlife on military lands across the United States, USFWS looks forward to continuing to recognize DoD's excellence in conservation partnership through the Military Conservation Partner Award. Military installation partnerships build trust with stakeholders while promoting unprecedented conservation successes. The Military Conservation Partner Award provides just one opportunity to shine a light on these accomplishments.

CAMP PENDLETON NAMED U.S. FISH AND WILDLIFE SERVICE'S MILITARY CONSERVATION PARTNER OF THE YEAR

Originally written by [Jessica D'Ambrosio](#)

On October 17, 2022, U.S. Marine Corps Base Camp Pendleton received USFWS's 18th Annual Military Conservation Partner Award for its significant contributions to natural resource management and listed species. USFWS's Fish and Aquatic Conservation Program established the award in 2005 to recognize military installations for their outstanding work to conserve important wildlife and their habitats on military land. The program serves to strategically improve aquatic habitat, restore connectivity of the nation's waterways, prevent infestations of invasive species, and enhance recreational use of aquatic resources.

Camp Pendleton's natural resource manager's diligent work to conserve and restore riparian, beach, and estuarine ecosystems support recovery of the tidewater goby (*Eucyclogobius newberryi*), coastal California gnatcatcher (*Poliophtila californica*), and numerous other fish and bird species, along with the last remaining coastal populations of the arroyo toad (*Anaxyrus californicus*). Furthermore, predator control efforts helped enable the Pacific lamprey (*Entosphenus tridentatus*) to return to Camp Pendleton after decades of absence.

"Camp Pendleton is a conservation leader and shining example of what can be accomplished for species recovery on military land," said Paul Souza, Regional Director of the Service's Pacific Southwest Region. "We are grateful for their dedication and stewardship and look forward to a continued partnership."

"Here at Marine Corps Installations-West, our mission is to support, sustain, and train the deploying warfighter," said Brigadier General Jason Woodworth, the Commanding General, Marine Corps Installations West-Marine Corps Base Camp Pendleton. "We do that every day while remaining good stewards of our environment and our natural resources, thanks to the support and coordination from the U.S. Fish and Wildlife Service and our Environmental Security experts. We are honored to receive this award and are excited to continue our partnership with the U.S. Fish and Wildlife Service for years to come."

The base's Environmental Security Department collaborated with USFWS, the State of California, and multiple public

and private organizations to restore and protect habitat for 19 federally endangered and threatened species. This includes the least Bell's vireo (*Vireo bellii pusillus*), California least tern (*Sternula antillarum browni*), and western snowy plover (*Charadrius alexandrinus nivosus*)—increasing their on-base populations.

NAVFAC MID-ATLANTIC AGRICULTURAL OUTLEASING PROGRAM

By [Bryan Alexander, NAVFAC Mid-Atlantic](#)

NAVFAC Mid-Atlantic currently has seven agricultural outleases, totaling 2,150 acres across the following installations: Naval Air Station Oceana/Naval Auxiliary Landing Field (NALF) Fentress, Naval Support Activity Hampton Roads (NSAHR) Northwest Annex, and Naval Weapons Station Yorktown. Agricultural outleases are federal military lands that are temporarily not in use for mission purposes which are suitable for agriculture and available for lease by qualified external groups. The agricultural outlease program is important to DoD because it helps installations accomplish mission needs around clear zones without having to spend large amounts of money to mow and maintain the area. Farmers can lease the land for their benefit while also benefiting the installation's mission.

DoD's agricultural outleases are a financially self-sustaining practice that reduces grounds maintenance costs, earns revenue to support natural resource projects, and benefits the local economy by leasing to local farmers, which provides a connection between the community and installations.

Agricultural practices optimize the use of military land retained as buffer or safety zones, while strengthening the security of the installation by providing greater visibility across surrounding areas, providing fire breaks to protect land and infrastructure from wildfires, controlling the spread of invasive species, and aiding in dust control over large open areas to support airfield operations. Installations balance agricultural outlease programs with, and use them to achieve or maintain, other natural resources management initiatives, including the protection of rare, threatened, and endangered species; biodiversity conservation; watershed protection; wildlife enhancement; and outdoor recreation.

The agricultural outleases at Naval Air Station Oceana help the Navy maintain open areas around runways on the Navy's East Coast master jet base. This arrangement drastically lowers the Navy's grounds maintenance expenses while promoting safety for all air operations. Agricultural outleases at NSAHR Northwest Annex and Naval Weapons Station Yorktown are positioned around the Navy's Relocatable Over-The-Horizon Radar (ROTHR) antennas as these installations require vast areas of open ground to eliminate all obstructions within the antenna arrays. Farming of small grain crops provides the clearance needed and reduces the Navy's grounds maintenance expenses at these installations.

A Soil and Water Conservation Plan (SWCP), which installation and regional natural resource managers develop cooperatively, accompanies each agricultural outlease agreement. The plan

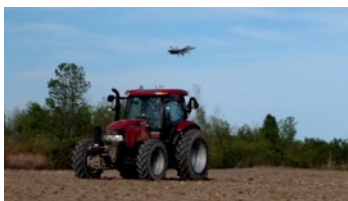


Soybean harvest at NALF Fentress

restricts use of fertilizer and pesticides, highlights areas where requirements for ROTH antennas or runways limit crop types, and provides guidance for maintaining drainage ditches and protecting cultural sites. In addition to the SWCP, approximately 400 acres of the Navy's agricultural outleasings fall within the Chesapeake Bay Watershed and require a Nutrient Management Plan that the U.S. Department of Agriculture Natural Resources Conservation Service must approve. This plan ensures that the proper best management practices are in place throughout the farming operation to protect the waters of the Chesapeake Bay.

Collectively, the NAVFAC Mid-Atlantic agricultural outleasings earn approximately \$200,000 per year. The Navy uses these funds for administrative expenses incurred for agricultural outleasings along with supporting the planning and implementing of its installation natural resource programs. Beyond administrative expenses, the Navy can use agricultural funds for projects that support objectives in its INRMPs.

Some of the challenges facing the agricultural outleasings program include preserving installation access, converting agricultural lands for other military needs (i.e., expansion of operations, facilities, or infrastructure), navigating policy and regulatory changes, and meeting administrative requirements. Effective communication between the farmers leasing the land and the Navy will continue to be critical in enabling DoD to overcome the challenges the program encounters while realizing the cost-saving and other benefits of outleasings programs.



Tractor parked in an agricultural lease field at NALF Fentress as a Navy jet passes by

WILDFIRE RESILIENCE ON MILITARY INSTALLATIONS

By Anne Jewell, Office of the Deputy Assistant Secretary of Defense for Environment and Energy Resilience (ODASD(E&ER))

The DoD Climate Adaptation Plan calls for resilient built and natural infrastructure. With the frequency of fire on military lands, as well as increasing fire intensity and potential impact to military communities, wildfire resilience is of keen interest to DoD.

Consider what wildfire resilience means to DoD, to your installation, and to the greater defense community around your installation. What can be done to increase wildfire resilience? Considering these questions enables appropriate scale of assessment, planning, and action implementation by:

1. Defining what wildfire resilience looks like for your location.
2. Assessing the landscape and communities from a holistic viewpoint.
3. Planning, implementing, tracking, and communicating mitigation activities and fire response.



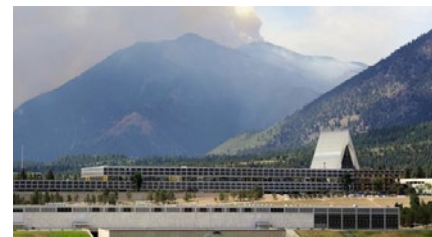
The Tomahawk Fire on Camp Pendleton 2014. Source: DVIDS- Image Camp Pendleton Fire [Image 7 of 9]

Title 10 U.S. Code § 101(e)(8) defines military installation resilience as “the capability of a military installation to avoid, prepare for, minimize the effect of, adapt to, and recover from extreme weather events, or from anticipated or unanticipated changes in environmental conditions, that do, or have the potential to, adversely affect the military installation or essential transportation, logistical, or other necessary resources outside of the military installation that are necessary in order to maintain, improve, or rapidly reestablish installation mission assurance and mission-essential functions.”

Resilience centers on the ability to anticipate, avoid, prepare for, mitigate, minimize, and effectively recover from an adverse event. For wildfire, this includes assessing wildfire hazard and identifying values at risk, reducing potential ignition sources and hazardous fuels, incorporating an effective wildfire detection and reporting system, providing community outreach and education, establishing defensible space around facilities and an optimized firebreak system, and ensuring wildfire response and post-fire recovery capabilities.

Whether in a wildfire prone region or not, installations need to consider the diverse impacts of wildfires beyond an installation's unimproved, wildland areas or even its jurisdictional boundaries. Think about assessing your installation and community from the “30,000-foot” view and expand beyond an ecosystem management perspective to engage an array of stakeholders not always included in installation wildland fire discussions.

Wildfire assessments must consider impacts specific to the local mission and related training and testing assets. Wildfires not only have the potential to destroy training infrastructure, but they may also severely degrade and/or cut off access



The Waldo Canyon Fire (2012) as seen from the USAF Academy. Source: DVIDS-Search-waldo canyon fire (dvidshub.net)

to training lands. Additionally, assessments should consider housing areas and facilities (e.g., evaluating defensible space and construction materials), installation services (e.g., smoke impacts to transportation or watershed impacts), as well as impacts to the local defense community. While a fire may not impact an installation directly, it may still force the evacuation of installation personnel living in the local community, cause road closures for installation access, cause widespread power outages, or otherwise impact personnel outside the installation fence line in several different ways.

Assessing each aspect of the installation, mission, landscape, and local community creates a holistic approach that allows mitigation priorities to become apparent and actionable. While the application of prescribed fire to ensure ecosystem health, species diversity, invasive species control, and hazardous fuel reduction embeds perfectly in achieving natural infrastructure resilience, mitigation activities go beyond prescribed fire and fuels treatments. They include community outreach and clean-up days, home and infrastructure hardening, evacuation planning and practice, interagency response exercises, and redundancies in critical infrastructure. Prioritizing burned area assessments

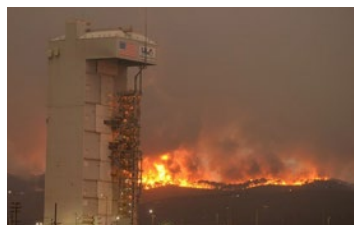
and recovery actions on high value watersheds, assessing lands adjacent to major transportation corridors, and leveraging installation partnerships add to the vast list of mitigation activities that installations should consider and prioritize. These activities require a long list of stakeholders, inside and outside the installation's boundary.

Establishing partnerships with stakeholders inside and outside the fence is a critical step to inform the full wildfire hazard assessment itself and leverage mutual capabilities for mitigation and communication projects. Installation stakeholders may include the Wildland Fire Program Manager; Natural Resources Program Managers; Fire and Emergency Services; Range Operations; Master Planning; Public Works; Civil Engineering; Morale, Welfare, and Recreation; Public Affairs; and other installation leaders and cooperators depending on the scale and scope of the wildfire threat and potential impacts. Outside of the installation, stakeholders may include neighboring federal and state land managers, community planning and outreach organizations, county or municipal boards, prescribed fire councils, watershed protection organizations, or other critical stakeholders that perform similar work with different program titles and authorities. It is equally vital to identify and establish partnerships with these cooperators, agencies, and other stakeholders to assess the full scope of wildfire prevention, response, and recovery.

Increasing your awareness of existing wildfire preparedness programs for communities including [Ready, Set, Go!](#) from the International Association of Fire Chiefs, [Fire Adapted Communities](#), and FireWise improves access to resources and support to broaden wildland fire management planning from the landscape to the greater community. Additionally, the Readiness and Environmental Protection Integration ([REPI](#)) Program and Office of Local Defense Community Cooperation ([OLDCC](#)) have many valuable resources for building partnerships and coordinating wildfire mitigation efforts outside the fence.

For more information on other DoD wildland fire management initiatives, visit the DoD Wildland Fire Science Initiative at: <https://www.serdp-estcp.org/focusareas/26abb3ae-46e9-48ea-b83b-d20b735954ac>.

Assessments and mitigation efforts are most effective when activities are consistently tracked and reassessed. Wildfire mitigation efforts are best measured based on outcomes, rather than outputs. For example, in the event of a wildfire, a small, strategically implemented 50-acre fuels treatment around a housing area may have a more valuable outcome than 1,000 acres of fuels treatment (high output) in a remote area. Tracking project outcomes also helps inform future wildfire resilience planning and project initiatives. Reassessing with partners and



The Owens River Fire (2016) at Vandenberg AFB. Source: <https://apnews.com/article/f3941e09d9ae4bb14769e79229816ca>

stakeholders while adjusting mitigation priorities based on remaining or newly identified risks will ensure continued success.

The wildland fire environment is changing rapidly, with fires becoming more frequent and destructive. Communities feel these impacts in various ways, during a wildfire and in the days, months, and years that

follow. Applying a holistic perspective to defining wildfire resilience, conducting land and community assessments, and planning and tracking mitigation activities and outcomes allow installations and defense communities to more effectively transition toward fire resilient built and natural infrastructure.

NATIONAL WILDFIRE COORDINATING GROUP WELCOMES DoD

Originally published at <https://www.defense.gov/News/Releases/Release/Article/3236529/national-wildfire-coordinating-group-welcomes-dod/>

On December 1, 2022, the National Wildfire Coordinating Group (NWCG) Executive Board formally welcomed DoD as a primary member.

DoD manages 1 million acres for wildland fire annually across its 27 million acres of training and testing lands. The cross-jurisdictional nature of wildfire demands an interagency approach. Partnerships are key to wildfire planning, prevention, response, and recovery.



Firefighters from Joint Base San Antonio, the Air Force Wildland Fire Branch, the U.S. Fish and Wildlife Service, Bureau of Land Management, and local agencies brief before conducting a prescribed burn at Camp Bullis



Firefighters from numerous Southern California firefighting agencies participate in the annual Wildland Fire School on Marine Corps Base Camp Pendleton, California, June 5, 2019

NWCG provides national leadership to enable interoperable wildland fire operations among federal, state, local, tribal, and territorial partners. Membership provides a common approach to fire management standards and supports the goals of the National Cohesive

Wildland Fire Management Strategy. Including DoD as an NWCG member is a critical step to enhancing interagency collaboration to prepare fire adapted communities, provide safe and effective wildfire response, and increase mission and landscape resilience. The DoD Climate Adaptation Plan identifies wildfire as a significant threat to military readiness and recognizes that the wildland fire environment is changing, and wildfire frequency and severity are increasing.

"A key function of NWCG is the establishment of standards for the wildland fire community," said Shane McDonald, NWCG Executive Board Chair. "With the addition of DoD to the NWCG Executive Board, they will now be a part of the process to help create the common operating framework for wildland fire resources."



An aerial view of a prescribed fire at Fort Stewart in 2020

Other primary members of NWCG include the U.S. Department of Agriculture's Forest Service, Bureau of Indian Affairs, Bureau of Land Management, National Park Service, USFWS, National Association of State Foresters,

U.S. Fire Administration, Intertribal Timber Council, and International Association of Fire Chiefs. Associate members include the U.S. Department of the Interior's Office of Wildland Fire and the National Weather Service.

Through NWCG membership, DoD is further empowering its workforce and partnerships to manage resilient landscapes, increasing the sustainability of the mission and DoD lands. To learn more about NWCG and its members, please visit nwcg.gov.

FORT DRUM'S RECREATIONAL ACTIVITIES

By Raymond E. Rainbolt, U.S. Army Garrison Fort Drum

After Army Regulation 420-74 was issued in 1958, U.S. Army installations were required to open all or part of their lands to the public for hunting and fishing if feasible. A year later, Fort Drum became a New York State Fish & Wildlife Management Act Cooperative Hunting Area, which ensures public access.

Fort Drum remains the largest cooperator in New York State (NYS) to this day, as well as one of the largest contiguous tracts of federal land that allows public access for outdoor recreation in the northeastern United States.

Approximately 75,000 acres, out of 109,000 total acres of Fort Drum, are open to recreation for active-duty Soldiers, family members, and the general public. Hunting is the most common recreational activity on Fort Drum—with deer (*Cervidae*) hunting and small game hunting for ruffed grouse (*Bonasa umbellus*), woodcock (*Scolopax*), and snowshoe hare (*Lepus americanus*) being the most popular activities. The only area and activity with restricted access is hunting in the Cantonment Area. Through the use of nighttime recreation passes, a joint use policy, and ice fishing opportunities, fishing is permitted throughout Fort Drum practically 24/7/365. Anglers can fish seven lakes and ponds and miles of rivers and streams. For trappers, beaver (*Castor canadensis*) is the most sought-after furbearer. Overnight camping in the Fort Drum Training Areas is allowed year-round. Wildlife viewing is another popular activity, and birdwatchers come from all over NYS to see birds that are more common on Fort Drum than almost anywhere else.

The Natural Resources Branch is primarily responsible for recreation on Fort Drum, including all recreation in the Training Area as well as hunting in the Cantonment Area. All recreationists must possess a Fort Drum Recreational Access Pass and check in/check out through iSportsman (<https://fortdrum.isportsman.net/>).

Since 2010, no fees have been charged for recreational permits on Fort Drum for the following reasons: (1) to maximize the number of recreationists able to enjoy the outdoors; (2) to not waste staff resources for accounting

purposes; and (3) to minimize discontent when military training closes the training area to recreation, which occurs frequently including during the hunting season. In addition, there are generally no expenses for habitat management because no food plots are maintained since game species benefit from land management actions that occur through normal forestry operations at no cost to the government or recreationists, and trout are stocked by NYS for put-and-take angling opportunities at no cost to Fort Drum.

The goal is to maintain access control for recreation in the simplest and least restrictive process necessary, while ensuring a safe and high-quality experience that does not conflict with military training. For this reason, there are no quotas, lotteries, or restrictions on the number of recreationists allowed to access the training area for recreation at any given time.

JOINT REGION MARIANAS EXPANDS OUTREACH AND EDUCATION PROGRAMS

By Megan Parker, NAVFAC Marianas

Joint Region Marianas (JRM) consists of three installations covering 50,452 terrestrial and 157,876 submerged acres on Guam and leased lands in the Commonwealth of the Northern Mariana Islands (CNMI). In recent years, JRM has made big strides through outreach and education to enhance its Natural Resources Program and its interactions with the public.

The facility's current goals, featured in JRM's most recent INRMP, focus on public outreach plans for inside and outside the installation fence. These plans include:

- Enhancing opportunities for environmentally sustainable commercial, recreational, and cultural activities with public access within JRM-administered terrestrial and submerged lands, where appropriate.
- Developing and encouraging coordination, communication, outreach, and partnerships between JRM and federal, Guam, and CNMI government agencies and other stakeholders.

These goals were established in collaboration with USFWS, the National Marine Fisheries Service (NMFS), the Guam Division of Aquatic and Wildlife Resources (Guam DAWR), and the Commonwealth of the Northern Mariana Islands Division of Fish and Wildlife (CNMI DFW).

Megan Parker, Outreach Coordinator and Natural Resources Specialist within Naval Facilities Engineering Systems Command Marianas (NAVFACMAR), formalized plans to develop educational programs, design sustainable promotional materials,



Snowshoe rabbit hunter. Taken December 20, 2013 at Antwerp Tank Trail



Fishermen watching a fly-by on Indian River. Taken July 29, 2004



Annual pumpkin drop at Guam High School



Hunters at Fort Drum showing their wild turkeys

and network with other Navy natural resources outreach program managers and coordinators. To accomplish this, she leveraged the support of the U.S. Fleet Forces Command (FFC) [Stewards of the Sea](#) outreach program and the U.S. Pacific Fleet (PACFLT).

Examples of these successful outreach programs include:

- The Young Environmental Stewards (YES!):** This pilot program began at McCool Middle School on Naval Base Guam (NBG) with 20 students and two McCool teacher sponsors participating. In this extracurricular outreach program, NAVFACMAR, along with resource partner agency professionals from USDA Wildlife Services, the Colorado State Center for Environmental Management of Military Lands, Guam DAWR, the University of Guam (UOG) Sea Grant, and the Guam Energy Office, provides presentations and science, technology, engineering, and mathematics (STEM) activities to middle school students and teachers bimonthly. During the COVID-19 pandemic, McCool had a smaller number of participants, but in the 2022-2023 school year, signups improved to more than 30 students. Future growth of this program is expanding to Andersen Air Force Base Middle School as well as middle schools across the Government of Guam Department of Education jurisdiction to get more youth interested in and excited about natural resources and STEM in the region.
- Regional Natural Resources Outreach Working Group:** Installation staff from each installation share their learning opportunities and successes and work on coordinating efforts across national and international stewardship and conservation events. They support local outreach events held by resource partners to strengthen collaboration and communication. These events are popular with the local community and afford face-to-face opportunities and interactions for DoD natural resource specialists to present information on their important work.
- UOG's Sea Grant Institutional Status Celebration:** The event featured an interactive table display and a giveaway of over 200 pieces of sustainable outreach materials and pamphlets to attendees, including UOG academics, resource partners, Guam legislators, and the public.
- McCool Middle School's School Preview and Open House Events:** Outreach Coordinator, Megan Parker, and YES! teacher, Dr. Gina Gonzales, hosted an informational presentation and signup tables, reaching not only prospective participants, but also parents and guardians interested in volunteering for conservation and stewardship events in the future. At these tables, the school year YES! schedule, native species reusable totes, and information on NAVFAC's NR management efforts were provided to more than 100 families of active-duty, reserve, and civilian staff within JRM.
- First YES! Meeting:** Participants discussed stewardship, what it means to them, and what active stewardship might look like.
- Guam International Coastal Cleanup (presented by the Government of Guam):** YES! participants and their families were given an opportunity to put their words into action by participating in this event. Cleanup locations were along all of Guam's coastline, hosted by various villages and resource partners. NBG NAVFAC natural resource specialists along with representatives from the Coast Guard Auxiliary planned for and provided a cleanup beach and roadside location directly adjacent to NBG for participants to clean. While only

a small number of YES! participants and their family members were able to attend, 20 NAVFAC civilian staff members and Coast Guard Auxiliary members participated as well. Natural resource specialists were also able to support over 100 additional students from the local Southern High School Army ROTC with supplies and water.

- First Annual Arbor Fest Hosted by UOG:** NAVFAC natural resource specialists participated in this one-day event. Approximately 600 attendees accessed information and services from resource partners, local farmers, and food vendors. Attendees stopping at the NAVFAC table were able to participate in a game to win sustainable prizes, while learning more about specific natural resource projects happening within JRM lands, as well as gathering new Stewards of the Sea informational materials on work the Navy does to protect and conserve marine resources.
- 2022 Pumpkin Drop with DoDEA Guam High School (HS):** LTJG Devin Cowley from NAVFAC Facilities Engineering and Acquisition Division (FEAD) collaborated with Ms. Parker, Guam High School Science teacher Paul Cuaresma, the local chapter of the Society of American Military Engineers, and engineering contractor DZSP 21 LLC to execute this event. Sixty students participated in an educational challenge: building "housing" for pumpkins that would prevent damage to the gourds when dropped from 50 feet. Judges including FEAD engineers and natural resource specialists spoke about what brought them to their career within STEM and provided feedback on student "elevator pitches" on their pumpkin drop devices. Different students presented their structures to judges, hoisted their pumpkins on a DZSP 21 LLC crane, and dropped them a distance of 50



Promotion of STEM beyond just natural resources is also a tenet of outreach plans. Recently, natural resources specialists from the working group partnered with Facilities Engineering and Acquisition Division leads to coordinate and execute a pumpkin drop at Guam High School, a DoDEA institution.



Over the past three years, NAVFACMAR, along with PACFLT, and contractor ManTECH have worked diligently to design and produce high-quality, unique, and sustainable outreach materials (including the pictured species reusable totes, nature journals, and passports). With these materials, natural resources managers will be able to engage the public in a meaningful way while also highlighting the important conservation work the Navy has accomplished.

feet. Observers, made up of additional students, teachers, the JRM PAO, NAVFAC Executive Office CDR Jeremy Gates, and additional NAVFAC Engineering and Public Works professionals, were excited to witness the destruction of all but two pumpkins. Plans for next year's drop include restricting building materials to more sustainable items like those able to be recycled or composted

For more information on the NAVFACMAR Natural Resources Outreach Plans and coordination, please contact Megan Parker at Megan.A.Parker11.civ@us.navy.mil or 671-339-2344.

OUTDOOR ADVENTURES AT EGLIN AIR FORCE BASE

By Michael Spaits, Eglin Environmental Public Affairs

If you're the "outdoorsy type," then Eglin Air Force Base is the place for you!

Eglin has many outstanding natural features and bountiful outdoor recreational opportunities that attract more than 26,000 outdoor recreators annually. Roughly 250,000 acres are open to the public.

Popular activities include deer, turkey, and feral hog hunting; Mobility Impaired and Youth Special Opportunity Lottery Hunts; fishing at Eglin's 20 ponds and along 186 miles of steephead streams; primitive camping; canoeing of scenic waters; mountain biking on 40 miles of single-track trails within established mountain bike areas; and hiking on the 70 miles of the Florida National Scenic Trail that traverse Eglin's landscape.

Eglin AFB is also home to more than 106 rare or listed plant and animal species, 63 of which are considered globally rare. Included in this list is the previously threatened and recently delisted Okaloosa darter (*Etheostoma okaloosae*), which is found in only six creek systems in the central portion of the reservation. Other rare species at home on Eglin are the reticulated flatwoods salamander (*Ambystoma bishop*), the red-cockaded woodpecker (RCW) (*Leuconotopicus borealis*), and the gopher tortoise (*Gopherus polyphemus*).

Eglin has the largest contiguous acreage of old-growth longleaf pine in the world and the fourth-largest RCW population. Forest Product Permits are also available for gathering pine straw, cutting firewood, and collecting reindeer moss and turkey oak leaves for craft projects. This area is also a site on the Great Florida Birding Trail offering both inland and barrier island birding opportunities.

Eglin offers an 18-hole Frisbee golf course within the Anderson Pond Recreation Area that has recently been rated as one of the top courses in the state. Camping permits allow access to approximately 68 primitive campsites across 31 established recreation areas.

Please see <https://eglin.isportsman.net/OutdoorRecPermits.aspx> for more information about outdoor activities at Eglin Air Force Base.



With more than 186 miles of rivers and streams, kayaking or canoeing on Eglin's scenic waters is always one of the more popular recreational events on Eglin AFB. U.S. Air Force photo



NATURAL RESOURCES MANAGER SHOWCASE: FORT STEWART'S FISH AND WILDLIFE BRANCH CHIEF'S CHILDHOOD LOVE FOR WILDLIFE LEADS TO CONSERVATION CAREER

By Kevin Marc Larson, Fort Stewart-Hunter Army Airfield

Larry Carlile was destined to work with wildlife from an early age. When he was in third grade, he would wait until he was out of his mother's sight before ducking into the desert for his daily walks to school at Luke Air Force Base near Phoenix, Arizona. "She told me don't walk to school in the desert, but I did anyway because I was just so fascinated with it," Carlile says. "I could see roadrunners (*Geococcyx*), Gambel's quail (*Callipepla gambelii*), horned lizards (*Phrynosoma*), hummingbirds (*Trochilidae*), and all sorts of cacti. I was just totally, totally fascinated by it."

After the family moved to Moody Air Force Base near Valdosta, Georgia, his love for wildlife grew stronger. "I continued to be fascinated with all the stuff that's in this state like gopher tortoises, longleaf pine trees, and indigo snakes," Carlile says.

Carlile's childhood fascination led to hands-on work with RCWs on Fort Stewart-Hunter Army Airfield when he joined the Directorate of Public Works Fish and Wildlife Branch as a wildlife biologist in 1994. He worked his way up to supervisor in 2010 and then branch chief in 2019.

Among his responsibilities as a wildlife biologist, Carlile conducted RCW cavity tree surveys, early-morning banding, nighttime roosting surveys, and preparation of tree clusters for prescribed burns by the Forestry Branch. In his nearly 30 years on staff there, Carlile has steadily grown the RCW population to its recovery threshold.

"In the U.S. Fish and Wildlife Service's recovery plan for the RCW, Fort Stewart was supposed to achieve 350 groups of woodpeckers before we could consider this population recovered," Carlile says. "Most other installations and most other state-owned and private properties had been growing all this time, too. The woodpecker is in much better shape today than when I started working here in 1994. At that time, we had 150 groups. This past breeding season, we had 612. We've far exceeded our recovery threshold."



Male Gambel's quail with chick. Source: Jaynes Gallery/Danita Delimont

The steady growth of the RCW population allowed training restrictions associated with the species to be dropped in 2012. Dropping the restrictions opened previously closed areas to maneuver, which benefited 3rd Infantry Division Soldiers, who call the installation home, resulting in increased training opportunities.

"When we reached that recovery threshold, we took down the reflective white bands from all the woodpecker cavity trees," Carlile says. "We took down the diamond yellow signs that designated Soldiers were near a RCW cluster, which allowed them to not have to worry about that when they're out there in an actual training scenario—they could just go through the woods the way they needed to."

In addition to protecting wildlife, the Fish and Wildlife Branch contributes to the readiness of the 3rd Infantry Division, other units from the Army, and sister services by working with landowners who own property adjacent to the installation. The partnerships are codified by the Army Compatible Use Buffer (ACUB) under the Defense Environmental Restoration Program. The lands are not purchased from the owners. Instead, conservation easements are placed on the lands of willing neighbors that ensure any use is compatible with Fort Stewart's mission.



Larry Carlile at Fort Stewart

"For the most part, the easements around Fort Stewart are working land easements, so the landowners continue to use their land as they did before the easement was on it," Carlile says. "Whether it's growing Vidalia onions or planting pine trees or having a hunt

club, they continue to do that. Those properties still stay on the tax rolls so counties aren't missing out on the income that they're expecting from taxes."

A recent ACUB effort was established in conjunction with the Georgia Department of Natural Resources, the Conservation Fund, The Nature Conservancy, and other agencies and organizations to protect the Altamaha River corridor on the southwest part of Fort Stewart. This effort establishes a conservation area that will allow little to no development in the coming years, thus allowing for ease of aerial maneuvers between Townsend Bombing Range near Darien, Georgia—operated by Marine Corps Air Station Beaufort in South Carolina—and Fort Stewart's artillery impact area.

"You could have fast movers coming in off the ocean to drop bombs at Townsend and then use that same corridor to get to Fort Stewart without blasting people's eardrums out who might live underneath the flight path," Carlile says.

"Another project with readiness implications is the 2010 purchase of Elbow Swamp by the Georgia Alabama Land Trust, another Fort Stewart ACUB partner, to create a wetland mitigation bank," Carlile says. The wetland credits are used to offset the environmental impacts of building new training facilities, like ranges, on existing wetlands. The installation already has several wetland credits saved from past range projects not built due to funding shortfalls.

Fort Stewart Garrison Commander Col. Manuel Ramirez says, "Efforts like these are a testament to Carlile's commitment to conservation. Larry and team are deeply embedded with their conservation partners. Together, they are working hard to protect lands around Fort Stewart in continuation of our premier power projection platform capability to provide our Nation trained and ready forces."

Carlile and his team ensure that the flora and fauna of Fort Stewart-Hunter Army Airfield work in harmony with the installation's primary mission of training our Nation's military. Wildlife stewardship and land conservation efforts make that possible. At the end of the day, though, Carlile stressed that while the goal is to conserve the ecosystem, he wants the public to know they can come see the wonders of nature here.

"All they need to do is get a permit from iSportsman," he says. "You purchase a hunting permit or a fishing permit or just a

recreational permit to pick blueberries and birdwatch if people are interested in seeing how really beautiful this landscape is. A lot of people are surprised it's a military installation. They think it's just a barren landscape until they get here and realize that there are so many threatened and endangered species here, so many state-listed species, intact longleaf pine wiregrass ecosystem—that's very rare these days. They can come see it for themselves."

From days wandering in the Arizona desert and taking in the beauty of the local flora and fauna, Carlile has in many ways fulfilled his childhood dreams of working in and around nature. His work at Fort Stewart has made a huge impact on the resilience of the installation's plants and animals and the ecosystems they inhabit all while helping the DoD mission.

IMPROVING THE MILITARY BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD (BASH) SYSTEM

By Paul Block, Commander, Navy Installations Command (CNIC/NAVFAC, and Kyle Russell, Air Force Safety Center

Each year, the Military Services sustain thousands of wildlife strikes to aircraft around the world, impacting readiness, reducing combat

capability of airframes, and threatening the safety of aircrews. In 2021, 3,363 wildlife events were reported in the U.S. Air Force Safety Automated System (AFSAS), 319 of which caused \$18.5 million in aircraft damage. Also in 2021, 1,255 wildlife events were reported in



Two BASH operators at 39th Air Base Wing (ABW) at Incirlik Air Base in Adana, Turkey, keeping an eye on the airfield

the U.S. Navy Risk Management Information (RMI) System, with 68 involved in damaging strikes. The indirect effects of wildlife strikes are just as impactful as damage and risk to aircrew safety. Although this impact is unquantified, non-damaging bird strikes interrupt training, may temporarily remove aircraft from service for inspection, and place burdens on aircraft maintenance personnel. The common Bird/Wildlife Aircraft Strike Hazard (BASH) mitigation tools and techniques are well known within the aviation community. Effective BASH programs are proactive. Managing risk by decreasing the probability of an aircraft-wildlife collision is advantageous to flight operations and the wildlife itself. Managing an airfield's/installation's habitat to make it less attractive to wildlife benefits flight operations, the safety of aircrews/aircraft, national security and keeps wildlife out of harm's way. However, the increasing scarcity of fiscal and personnel resources challenge BASH programs, requiring conscious efforts for effective risk management and novel concepts for minimizing bird/wildlife hazards on airfields.

Through partnerships and collaborative efforts, subject-matter experts in flight safety and natural resources management work together to develop effective solutions for mitigating wildlife hazards to safe aircraft operations that are compatible with stewardship requirements for military lands. Airfield wildlife hazard mitigation is a focused profession in the wildlife biology field; there are BASH experts within the federal government and private sector. There is a national Bird Strike Committee USA (BSC USA) that was founded in 1991 that is dedicated to providing leadership in managing wildlife hazards to aviation (www.birdstrike.org).

Many of the experts can be found on the Bird Strike Committee USA webpage.

To support Service safety missions, the interdisciplinary experts from DoD PIF and aviation safety programs coordinate across Service lines to devise strategic solutions for reducing wildlife strikes. The BASH Working Group within DoD PIF promotes flight safety through various initiatives, communicating technical information, developing outreach materials, and evaluating new management techniques. The DoD PIF BASH workgroup includes individuals with subject-matter expertise in bird conservation, aviation safety, and natural resources management. For BASH-related issues on installations, the working group relies on our respective Military Services BASH experts to liaison with installation BASH teams. We also have an ad hoc BASH working group forming under the Office of the Secretary of Defense (OSD) umbrella that includes subject-matter experts from DoD PIF, the Military Services, NAVY CNIC, the Air Force Safety Center, and USDA Wildlife Services. This group was formed initially to begin seeking solutions to turkey and black vultures aloft that occupy military airspace and pose significant strike hazards.

Military BASH programs use hazard identification mechanisms and Integrated Pest Management (IPM) approaches (i.e., multiple techniques and strategies) in combination with employing new and emerging wildlife control tools for risk management in the field to identify and mitigate BASH risk. Hazard identification and analysis are two critical steps in the Air Force five-step process for effective risk management. Air Force Instruction 91-212, *Bird/wildlife Aircraft Strike Hazard (BASH) Management Program*, requires programs to implement multiple hazard detection mechanisms, which include formal wildlife surveys at all Air Force-controlled airfields. This survey data complements bird strike data to empower stakeholders with the information they need to assess BASH risk and develop mitigation strategies.

The Navy approaches its BASH Program in a similar manner using the Integrated Wildlife Damage Management (IWDM) approach as a strategy to mitigate BASH risks. Navy Instruction 3750.21, *Policy for Administering the Bird Animal Aircraft Strike Hazard Program in the U.S. Navy*, establishes the program and assigns responsibilities for implementing the BASH Program. The Navy Instruction establishes primary objectives to sustain the safest possible airfield operating environments, enhance fleet operational readiness, and protect limited Navy resources through three primary approaches: (1) proactive hazard monitoring, evaluation, management, and mitigation; (2) documentation of the effects of wildlife strikes; and (3) compliance with federal environmental laws and regulations to avoid significant negative impacts to natural resources within installation ecosystems. This Navy Instruction along with the Navy BASH Manual establishes an Integrated BASH Program that assigns and guides the major natural resource stakeholders of the airfield. This includes aligning the BASH Program with the installation's INRMP and IPM Plan.

In addition, the Navy BASH Program at each airfield is supported by three required documents. The first is the Installation BASH Instruction that establishes the program and assigns responsibilities at the installation level. The second is the Wildlife Hazard Assessment (WHA), which is a data-driven wildlife survey that documents the airfield-specific BASH hazards. The third document is the Wildlife Hazard Management Plan (WHMP); this final component specifies IWDM actions to address hazards to local airfield operations. In addition, the WHMP risk-prioritizes BASH hazards to target limited resources

in implementing mitigations for the highest BASH-related risks on an installation to reduce these greatest threats to flight safety.

Both the Air Force and Navy BASH programs employ an integrated approach to managing wildlife for achieving a desired outcome. To minimize wildlife strikes, wildlife damage control techniques may include the reduction of attractive habitat on and surrounding the airfield, harassment, avoidance, and depredation when necessary. An effective IPM or IWDM strategy requires consistent and dedicated stakeholder involvement while applying new information for risk management decisions.

Joint Base McGuire-Dix-Lakehurst Case Example:

New Jersey is the most densely populated state in the United States. Inevitably, the flying community of the Garden State, along with DoD installations, experiences conflicts with the abundance of natural resources and wildlife populations present there, posing challenges to flight safety. Joint Base McGuire-Dix-Lakehurst (JBMDL) supports multiple airfields and service flying missions impacted by various avian and terrestrial mammals. White-tailed deer



Airfield fencing in 2015 at Joint Base McGuire-Dix-Lakehurst (JBMDL) before replacement

(*Odocoileus virginianus*), which are a state game species and a significant flight safety hazard, occur throughout the JBMDL complex. The 787th Civil Engineering Squadron implements a robust hunting program to control the deer population. However, poor airfield perimeter fencing, open gates, and the occurrence of deer in garrison safety zones increased the potential for deer to occur on the airfields. Through effective collaboration between the 787th CES and the 305th Air Mobility Wing, stakeholders were able to systematically quantify deer densities around the airfield and capture photographic evidence of vulnerable fencing entry points. Using this hazard information, JBMDL commanders implemented effective risk management operations to minimize deer hazards to flight safety. The applied

integrated approach reduced airfield deer observations from more than 40 sightings per year to one or none. This was achieved by applying several million dollars in airfield perimeter fence replacement projects, an airfield gate stewardship program, targeted control of local deer populations, and a continuous monitoring effort to ensure an acceptable deer carrying capacity.



Airfield fencing in 2018 at Joint Base McGuire-Dix-Lakehurst (JBMDL) after replacement

Incirlik Air Base Case Example:

The 39th Air Base Wing (ABW) at Incirlik Air Base in Adana, Turkey, supports airpower for strategic deterrence and combat support through international partnerships with NATO allies in Eastern Europe. Located in the southeast region of Turkey, Incirlik annually experiences seasonal migratory bird activity from Eastern Europe and western Asia, including white storks (*Ciconia ciconia*) and birds of prey. The 39th ABW is responsible for implementation of the installation BASH program. However, host nation restrictions for wildlife control and habitat management limit the wing's ability to implement an IPM approach. In 2021, the 39th ABW revitalized the program by developing a local harassment procedure instruction using various dispersal tools, including pyrotechnics, air cannons, and a sound device. Consistent with Air Force policy, the wing instruction included a recall roster of volunteers functioning as the Bird Dispersal Team for the installation BASH program. By implementing multiple harassment methods into an organized response by knowledgeable stakeholders, Incirlik experienced the lowest fall bird strike rate in six years.

Examples of Navy BASH Mitigations:

BASH mitigation is a daily effort at Navy airfields with most of the efforts employing typical and successful integrated approaches including awareness, monitoring, communication, harassment tools, habitat management, and depredation (when other efforts fail). Sometimes, other methods are developed to address unique BASH issues at various airfields. One of the approaches of a Navy Integrated BASH Program is to avoid significant negative impacts to natural resources; the following examples highlight methods in which BASH mitigation protected flight safety and supported habitats and/or species.

One success is the reduction of tern strikes caused by nesting adjacent to runways; the installation BASH program mitigated this issue with a unique and successful approach by painting, with a non-toxic grass paint, the gravel nesting areas green in the non-breeding season. This was done in a systematic process of observation and testing prior to full implementation. After implementation, the terns would no longer nest in these green-painted areas and relocated their nesting colonies away from the runway, greatly decreasing tern mortality through strikes. A second example is the removal of a starling roost site that nightly hosted 10,000 plus European starlings (*Sturnus vulgaris*) a few hundred feet from the runway. This roost site was made up of the invasive plant species common reed (*Phragmites australis*), and it covered a soil disposal area that unintentionally held water. Once the BASH program observed this nightly event, the installation mechanically removed the reed bed and stopped the reestablishment of this invasive plant species over time. As a result, the starlings no longer used the roost around the airfield after removal and therefore are no longer considered a BASH risk. The last example is an airfield with a large stormwater retention pond near the runway, which, during fall and winter seasons, would attract hundreds of ducks (*Anatidae* species) and cormorants (*Phalacrocoracidae* species). Pond replacement or other changes had proved difficult or untenable. Currently, the base is testing a sound deterrence system, and initial results indicate a significant decrease in these species groups on this pond. Further testing is ongoing, but this mitigation is showing promise to increase flight safety, protect the mission, and reduce duck and cormorant mortalities through strikes.

New Tools, Research, and Approaches:

In addition to the various management approaches, reduction of BASH risk requires the employment of new tools and research.

Management of common hazards requires stakeholder coordination and policy development across the Military Services. High-hazard species such as vultures and eagles appear to be increasing threats to flight safety, so to ensure flight safety, efficient and unified



BASH operator at 39th ABW at Incirlik Air Base in Adana, Turkey keeping an eye on the airfield

solutions to common challenges are required. The ranges of black vultures (*Coragyps atratus*) and turkey vultures (*Cathartes aura*) continue to expand throughout the United States, which along with the behavior of these species has anecdotally resulted in more damaging strikes to military aircraft. While the recovery of the bald eagle (*Haliaeetus leucocephalus*) is one of the single greatest wildlife conservation stories of our time, the resurgence of bald eagle populations near airfields has increased concerns for flight safety.

New technologies may serve critical functions for mitigating bird strikes in training and operational military environments. In order to ensure flight safety, each service affected by wildlife hazards is exploring new and innovative tools and approaches, such as light, sound, and perhaps directed energy, that may mitigate BASH risk by repelling hazardous species from on or above the airfield environment. Avian radar systems continue to mature for enhanced bird detection on and around airfields. The increased sophistication of avian radar systems is a result of technological advancements for small unmanned aerial systems surveillance. Vendors market mobile airfield radar units with a dual capability to detect bird hazards and asymmetric threats that may present an increased operational benefit for BASH risk management and justify investment into this maturing technology. However, these radar units' substantial upfront costs have obstructed broad implementation, and utilization of these systems remains limited within flight safety programs.

Advancing research in aircraft lighting has potential to offer an avoidance solution for managing bird hazards from aircraft in flight. Current research has determined that aircraft lighting designs and altering the visual spectrum of targeted bird hazards may generate avoidance behavior, thus reducing bird strikes. To advance these concepts, further coordination is necessary to ensure the desired lighting effect is achieved without compromising the air worthiness of aircraft. The Navy is also researching the effects of tall grass management on the most hazardous species; the correlation of vulture and raptor activity using radar data with forecasted climatic conditions as a flight-planning tool; the testing of alternative airfield plants as a replacement of current airfield grass-like regimes; and sound deterrence systems.

The natural environment of an airfield is a constant challenge, often producing BASH risk conditions that shift daily and change over time. Mitigating BASH in these difficult conditions requires a team effort from bottom to top, which includes military and commercial airfields worldwide and a variety of other stakeholders from federal and state regulators, local municipalities, aircraft manufacturers, technology companies, and others. BASH programs are a vital aspect to protect flight safety and, in the military, to protect the mission. Efforts of the current Air Force and Navy BASH Programs are effective. Working toward the future through investigating technological advances and better data gathering and analysis is the pathway to risking BASH risk and achieving further improvements in flight safety.

DoD LAUNCHES DEFENSE-WIDE BAT PROGRAMMATIC CONSULTATION

By David McNaughton, NAVFAC Southwest

A team of bat biologists is developing a DoD-wide ESA formal consultation for the northern long-eared bat (NLEB; *Myotis septentrionalis*) funded by the DoD Legacy Program. This effort will create a DoD-wide programmatic consultation covering as many mission activities as possible throughout the species' range. This effort is led by Dr. Eric Britzke of the U.S. Army Engineer Research and Development Center and Mr. David McNaughton of NAVFAC Southwest. This programmatic consultation constitutes the first major effort conducted by a newly formed subject group, the DoD Small Mammal Committee (affectionately nicknamed DoD Bats and Rats).

Actions that are expected to be covered by this consultation with USFWS or by streamlined consultation support from USFWS include military training (terrestrial and aerial), habitat management (including forestry and fire), and typical installation support (facilities, public works, and transportation) actions. Pending USFWS availability, the formal programmatic consultation for NLEB is expected to be in place by the start of the active season for bats, which begins April 1. In addition, the team is developing an overall bat conservation strategy that will include both currently listed bat species (Indian and NLEB) as well as bats that are being evaluated for near-future listing (tricolored and little brown). The team is preparing for tricolored bat (*Perimyotis subflavus*) and little brown bat (*Myotis lucifugus*) programmatic consultations, if or when USFWS commits to listing those species.

DEVELOPING A NATIONWIDE STRATEGY FOR MONARCHS

By Sarah Moor, ODASD(E&ER)

In December 2020, USFWS determined the monarch butterfly (*Danaus plexippus*) was a candidate for listing under the ESA, but listing was precluded due to higher priority listing actions. In anticipation of the proposed listing in Fiscal Year (FY) 2024, the DoD Natural Resources Program is diligently collaborating with USFWS to develop a nationwide Species Action Plan (SAP) for the monarch butterfly under the Recovery and Sustainment Partnership Initiative. The SAP will focus on the following preliminary goals:



Monarch on echinacea

- Improving conservation status,
- Developing a consistent, predictable approach for future consultations, if needed,
- Developing standards and protocols for inventory and monitoring; and
- Developing best management practices (BMPs) for DoD installations.

The DoD Legacy Resource Management Program is working on funding monarch conservation and research. In early 2022, Congress awarded the Legacy Program an additional \$5 million in FY22 funding to support monarch conservation efforts in partnership with the U.S. Forest



Monarch butterfly cluster

Service International Program (FSIP), which ultimately funded six monarch butterfly conservation projects. The FSIP FY2022 Monarch conservation projects are:

- *Conservation and Management of Monarch Butterfly and Pollinator Communities on DoD Lands*, which is the focal project for Monarch Conservation Congressional appropriation. This continuation of Legacy projects monitors western monarchs at six installations across five states.
- *Recovering Monarch Butterflies in California and the West: Habitat Restoration at Overwintering Sites and within the Breeding Zone*, with a Focus on Department of Defense Lands, which is a modification of USFS #21-DG-11132762-274 to conserve the California population, develop management guidance for monarch overwintering habitat, and expand efforts on DoD lands.
- *Partnerships in Habitat Conservation, Science, and Education on and near DoD Installations*, which is a modification of USFS 20-CA-11132762-177 to continue the Monarch Joint Venture (MJV)—a network of over 120 partner organizations—and its partner grant program, which provides monitoring, educational opportunities, and technical assistance to DoD installations.
- *Internships for Monarchs and Pollinators*, which provides funding for an internship program through Environment for the Americas (EFTA) that focuses on monitoring, habitat assessment, outreach, and education. The EFTA will partner with the MJV to develop this program.
- *Implementing Western Monarch Habitat Projects in Priority Action Zones*, which is a modification of USFS 21-DG-11132762-298 to continue and expand monarch habitat projects in California through the California Association of Resource Conservation Districts (CARCD).
- *Western Monarch Conservation in Oregon*, a modification USFS 21-DG-11132762-357 to continue restoration of pollinator habitat along the western monarch corridor in Oregon.

Through research and collaboration with our partners, DoD can determine conservation priorities that inform a unified strategy regarding western monarchs, which could be used in the development of programmatic regulatory solutions for DoD installations. The development of BMPs would limit the consultation burden on DoD installations and help alleviate any potential military operation/training restrictions through practices which could be easily implemented using planning documents such as the INRMP.

NAVY USES DATA ANALYTICS TO IMPROVE INVASIVE SPECIES MANAGEMENT

By Tom Mayes, NAVFAC Headquarters; Jennifer Podbesek, Chief of Naval Operations; Tammy Conkle, NAVFAC Headquarters; and Jeffrey Gardner, NAVFAC Headquarters



Sailors and members of the local community re-pot plants. Sailors partnered with local community members, in observance of Prince Kuhio Day, to help restore the Loko Pa'aiau fishpond by removing invasive plant species and planting local flora. U.S. Navy photo by Mass Communication Specialist 2nd Class, Greg Hall

The U.S. Navy Natural Resources Management Program enables military readiness through responsible and proactive stewardship and conservation of natural resources on over 2 million acres of Navy lands and in nearshore waters. One of the most significant challenges to the Navy's Natural Resources Management Program is the impact of invasive species, nuisance wildlife,

and noxious weeds (hereafter, "invasive species"). Invasive species reduce biodiversity, degrade habitat quality, and have serious negative impacts on military mission activities. For example, feral swine on DoD installations degrade landscapes, increase soil erosion, and destroy critical infrastructure, such as underground cables and targets. To address challenges like these, the Navy is making great strides to prevent and mitigate the adverse impact of invasive species, as well as ensure compliance with applicable laws, regulations, and policies, including the Noxious Weed Control and Eradication Act of 2004 (7 U.S. Code § 7701), and Executive Order (EO) 13751, *Safeguarding the Nation from the Impacts of Invasive Species* (amends EO 13112).

To address the prevention, control, and management of invasive species on Navy installations, the Navy has set out to:

- Determine a baseline list and number of invasive species (both terrestrial and aquatic) on Navy lands and in nearshore waters.
- Evaluate risk associated with invasive species' presence and possible range expansion, biosecurity, and potential impacts to natural resources and operational readiness.
- Assess current efforts to manage, control, or eradicate species, including estimated costs.



Military members and families, Ali'i Pauahi Hawaiian Civic Club members, and the local community join together to improve the ancient Hawaiian fishpond, Loko Pa'aiau, as part of National Public Lands Day onboard Joint Base Pearl Harbor-Hickam, Hawaii. Naval Facilities Engineering Systems Command Hawaii was awarded grants from the National Environmental Education Foundation and DoD Legacy Resource Management Program for both Loko Pa'aiau fishpond and Ahua Reef Wetland. This event included removing invasive species and putting a stone path along the coastline of the pond. U.S. Navy photo by Mass Communication Specialist 1st Class, Corwin M. Colbert

The Navy developed an invasive species module on the established Navy Conservation website, a secure web-based system that the Navy uses to support natural and cultural

resources data. The module was developed to organize data and allow decision makers to take a more systematic and strategic approach to managing, controlling, and eradicating invasive species.



Oceana invasive removal (before)

To support the deployment of the module, the Navy team established standard terminology and definitions, which were based on existing regulations (i.e., Noxious Weed Control and Eradication Act (7 U.S. Code § 7702) and policies (i.e., Department of Defense Instruction (DoDI) 4150.07, *DoD Pest Management Program*; DoDI 4715.03, *Natural Resources Management*). The Navy team created a list of invasive species based on the U.S. Department of Agriculture (USDA) National Invasive Species Information Center, consolidated and organized the list by species range, cross-referenced it with installation locations, coordinated its evaluation by installation personnel, and uploaded it to the module on the Navy Conservation website. Once the module was in place, natural resource managers across the Navy conducted the beta testing to ensure it was capturing the Navy's needs. After incorporating feedback, the team used the module to conduct an invasive species data call to solicit important installation specific invasive species information, including an evaluation of installation impacts.



Oceana invasive removal (after)

As a result of this process, Navy natural resource managers cataloged 977 unique invasive species worldwide across 19 taxonomic groups. Of these, 695 were found in the continental United States, Hawaii, and the Marianas. Of these, 482 invasive species, 138 noxious weeds, and 75 nuisance species are being actively managed. The remaining 282 are not actively managed for a variety of reasons. Currently, Navy leadership is further evaluating these species to determine if they present any risk to the military mission.

Due to the successful implementation of the Navy's invasive species data collection efforts, DoD is working to broaden the understanding of the impact of invasive species on DoD properties and its mission. DoD needs this data to quantify the number of acres adversely impacted by invasive species across DoD, reduce the potential impacts of invasive species on military operations and readiness, and reduce overall costs associated with their management and mitigation. DoD will be issuing a DoD-wide data call to all Military Components to gather critical information to inform policy, guidance, and adaptive management.

For more information on the Navy's efforts, please contact Mr. Thomas Mayes, NAVFAC, at thomas.a.mayes4.civ@us.navy.mil or (202) 685-9321.

Actively Managed: Any invasive, noxious weeds and nuisance wildlife species that received funding in fiscal year to control, interdict, survey, manage, or monitor the species. Active management includes in-house labor, contract, inter-agency, cooperative agreement, and/or volunteers (Earth Day Events, National Public Lands Day events, Boy Scouts, Girl Scouts, etc.)

Non-Actively Managed: Any invasive, noxious weeds and nuisance wildlife species that did NOT receive funding in fiscal year to control, interdict, survey, manage, or monitor the species, but could still cause risk.

Invasive Species: Invasive species means, with respect to a particular ecosystem, a non-native organism whose introduction causes economic harm, or harm to human, animal, or plant health.

Nuisance Wildlife: Animal species that cause annoyance, but do not adversely affect human health. Feral species may be considered "nuisance wildlife."

Noxious Weeds: The term "noxious weed" means any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment.

AMERICA'S LONGLEAF CELEBRATES BANNER YEAR

Originally published at <https://americaslongleaf.org/news/2022/america-s-longleaf-celebrates-banner-year/>

America's Longleaf released its [2021 Range-wide Accomplishment Report](#), which highlights its 2.29 million acres of longleaf management activities across the Southeast—the most acreage covered since the organization formed in 2010. The collective accomplishments of the organization and its partners translate into positive outcomes for local economies, national defense, recreation, forest resilience, and more.

"Longleaf forests are an economic driver in the region," says Colette DeGarady, chair of America's Longleaf, a public-private partnership working to grow and manage longleaf forests that once thrived on 90 million acres from Texas to Virginia. Today, longleaf forests account for 4.7 million acres, up from a low of 3.2 million acres, thanks to America's Longleaf and other conservation partners.

"Increasing and improving longleaf forests has myriad benefits," she adds. "Military installations are buffered from incompatible development that could negatively impact operations. There are also substantial benefits to people and nature including clean air and water, reduced wildfire risk, carbon sequestration, climate change mitigation, and protection of rare species."

In 2021, the partnership focused on increasing minority participation in longleaf forestry through the Longleaf for All program. The program works to address challenges faced by minority landowners, with America's Longleaf [publishing a report](#) that lays out barriers and proposed actions to address those barriers.

America's Longleaf was also recognized as an example of landscape-level conservation partnership success in a report about America the Beautiful, a U.S. Department of the Interior initiative to conserve, connect, and restore land and water.

Other 2021 accomplishments highlighted in the report include:

- Establishment of more than 135,000 acres of new longleaf forests.
- Protection of more than 54,000 acres of longleaf forests.
- DoD's contribution of over 9,000 acres of plantings.
- 436,000 acres of prescribed fires.
- Over 23,000 acres of land protected.

Note: The report covers FY 2021, which ran from October 1, 2020, to September 30, 2021. America's Longleaf was previously known as "America's Longleaf Restoration Initiative."

NATIONAL FISH AND WILDLIFE FOUNDATION ANNOUNCES \$7.5 MILLION IN CONSERVATION GRANTS TO RESTORE ICONIC LONGLEAF PINE ECOSYSTEM

Originally published at <https://americaslongleaf.org/news/2022/nfwf-announces-7-5-million-in-conservation-grants-to-restore-iconic-longleaf-pine-ecosystem/>

The [National Fish and Wildlife Foundation](#) (NFWF), through the [Longleaf Landscape Stewardship Fund](#) (LLSF), announced that \$7.5 million will go toward 22 grant projects to restore, enhance, and protect longleaf pine forests in nine southern states. An additional \$9 million in matching partner contributions brings the total conservation impact for longleaf pine to \$16.5 million, the largest grant slate in the program's history! Projects will help advance the America's Longleaf restoration goals articulated in its [Range-wide Conservation Plan](#).



America's Longleaf 2021 Accomplishments



America's Longleaf 2021 - acres established

Longleaf pine forests are not only critically important for wildlife and biodiversity but also provide clean water, recreational opportunities, and forest sector jobs while contributing to our national defense by buffering military installations from encroaching development.

In the upcoming year, LLSF grant awardees will work to establish new longleaf pine acres; improve additional longleaf pine acres through prescribed burning, invasive species removal, and other wildlife-benefiting forest management techniques; and engage private landowners looking to restore and maintain longleaf pine habitat through workshops, trainings, and one-on-one technical assistance.

"Year after year, the Longleaf Landscape Stewardship Fund has served as a catalyst in leveraging federal funds to achieve far more within the longleaf pine landscape than we could accomplish independently," said Regional Forester Ken Arney with the U.S. Forest Service Southern Region. "Positive outcomes for local economies, national defense, threatened and endangered species, recreation, forest resiliency, clean air and water, and climate change mitigation validate the outstanding 'return on investment' of the stewardship fund."



America's Longleaf 2021 - acres of prescribed fire

DOD PARTNERS IN AMPHIBIAN AND REPTILE CONSERVATION (PARC) NETWORK MEMBERS BENEFIT FROM EDUCATIONAL AND OUTREACH PRODUCTS

By Chris E. Petersen, DoD PARC National Representative, and Robert E. Lovich, DoD PARC Technical Representative

As we all know, it is a challenge to keep up with the latest scientific publications, news, and survey techniques in the field of conservation and wildlife management. Conservation and wildlife management are important topics to DoD natural resource managers because knowledge of these practices is the foundation to maintaining healthy population of common and at-risk species on military land. It seems like a mountain of new scientific literature is published each year, and trying to read it all can seem like a full-time job.

The DoD PARC network understands this challenge and has made education, training, and outreach one of our core strategies to help our network members stay informed. Through our sponsorship of web-based training, education, and outreach materials, DoD PARC helps natural resource managers throughout DoD increase their knowledge base and networking capabilities. Having a close partnership with the national PARC network only enhances our abilities to bring installation natural resource and military personnel training and educational opportunities in line with the latest and best science and methodologies.

The benefits to our network members derived from our training, educational, and outreach materials are diverse. First, natural resource members, who may not be experts in the field of herpetology, gain a baseline understanding of the ecology, life history, threats, and survey techniques of herpetofauna. Second, we provide information and tools for managing amphibian and reptile populations that members can incorporate into existing natural resources and land management programs. This support can help reduce or eliminate population declines of both common and at-risk species. Last, our products promote partnerships and collaborative efforts among the military community and external stakeholders to develop win-win outcomes that support military readiness and conservation.

DoD PARC's volunteer, education, and outreach products encompass the following:

Volunteer Research Efforts: To help understand the effects that pathogens have on herpetofauna on military installations, we have solicited and implemented research on both *Batrachochytrium dendrobatidis* (Bd) and *ophidiomycosis* (snake fungal disease [SFD]) using volunteer personnel from military installations both within and outside the continental United States. Over the years, these efforts have resulted in the engagement of well over 100 participant installations, with volunteers from not only the environmental teams, but also other installation personnel. In some instances, even senior installation leadership and headquarters staff have participated. The lessons learned from this hands-on and inclusive research and monitoring efforts resulted in increased education and awareness of the threats posed by pathogens to the species and populations of amphibians and snakes. Knowing if the disease is present on a military installation, what snake species it is infecting, and how prevalent it is are key to maintaining healthy, realistic, and resilient ecosystems for military training.

Species Profile Videos: Species profile videos are DoD PARC's newest effort to inform and educate installation residents and natural resource managers about the exciting amphibian and

reptile species they may encounter in the places they live and work. These videos are approximately three to seven minutes long and contain information, pictures, and video footage of a particular species on a military site. DoD PARC's species profile videos are a benefit to installation natural resource personnel and installation residents as they educate and inform them about amphibians and reptiles living in the habitats where installation personnel train, work, and recreate. Since 2021, we have developed 16 videos, which are posted both on our DoD PARC [YouTube Channel](#) and milTube. In total, the videos have received approximately 51,000 views!

Online Training Modules:

We have developed seven amphibian and reptile training modules that are available on the Navy's Environmental Compliance, Assessment, Training, and Tracking System ([ECATTS](#)) website. This free training is available to all Navy, Marine Corps, Air Force, and Army personnel with a .mil email address as well as DoD contractors. DoD PARC's training modules benefit military natural resource personnel by providing baseline knowledge regarding amphibian and reptile ecology, biology, life history, and snake safety. Training modules include *An Introduction to Amphibians and Reptiles*; *Diversity of Amphibians and Reptiles in the U.S.*; *General Inventory and Monitoring of Herpetofauna*; *Venomous Snake Safety and Removal*; and several more. Take all seven modules and get a certificate from DoD PARC!



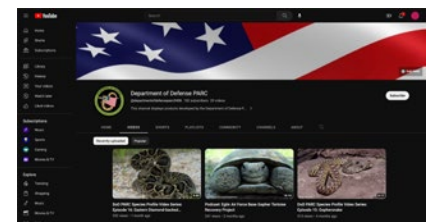
ECATTS login page

Photographic Website: Our [photographic website](#) serves as a platform to share pictures of herpetofauna and their habitats for use in presentations, natural resource management plans, posters, pamphlets, fact sheets, and more. Network members added several dozen pictures to the website in 2022, bringing the total number to nearly 4,000. Our goal is to feature pictures of every amphibian and reptile species confirmed present on military lands. Photos have been used in PowerPoint presentations, INRMPS, survey reports, social media, outreach materials (posters, fact sheets, tri-fold brochures), and species profile videos. For access to the photos, email paul.a.block6.civ@us.navy.mil.

Commander's Guide: Released in August 2020, the Commander's Guide to the DoD PARC Network describes (a) why DoD should care about amphibians and reptiles, (b) what DoD resource managers are doing to manage and conserve these animals, and (c) how these activities support and enhance military readiness. The guide also highlights the successes of our network, how DoD PARC supports the military mission, and how military commanders can support herpetofaunal management on their installations.

Download the guide on the [DoD PARC website](#).

Hardcopies are also available by contacting the DoD PARC National Representatives. DoD PARC's Commander's Guide benefits senior military leadership by



DoD PARC YouTube screenshot

educating them about why the Department should care about amphibians and reptiles, what its resource managers are doing to manage and conserve these animals, and how these activities support and enhance readiness.

Species Fact Sheets: DoD PARC has developed 50 amphibian and reptile species fact sheets, five venomous snake posters, and more than 20 trifold pamphlets about the snakes on DoD installations worldwide. These products play a significant role in educating installation personnel about less understood and often feared species. DoD PARC's fact sheets benefit installation natural resource personnel, base residents, and children by educating and informing them about the species of amphibians and reptiles living in habitats where people live and work. All outreach products are available on the [DoD PARC website](#).

Venomous Snake ID Cards:

To help military personnel and natural resource managers identify venomous snakes while in the field, DoD PARC developed venomous snake ID cards for the 12 most common species of venomous snakes on military lands. The 4-inch-by-2-inch cards are printed on waterproof plastic, and the set is held together with a loose-leaf ring. These double-sided cards contain multiple pictures of each species, information about their colors and patterns, and a map of their range. Over 1,000 sets of ID cards have been printed and distributed to military personnel. DoD PARC's venomous snake cards provide a benefit to military and civilian personnel by educating them about the common venomous snakes on DoD lands, indicating how to identify them, and providing general snake safety tips. All ID cards are available for download on the DoD PARC website, or hard copies can be requested from the DoD PARC National Representatives.



Venomous Snake Cards

Herpetofaunal Inventories: During our annual business meeting, DoD PARC travels to installations that need a modern and thorough herpetofaunal inventory to supplement information and data related to their INRMPS. By analyzing the DoD PARC species database for installations that have an incomplete or outdated list of herpetofauna, we can determine what installations need such inventories, and we can reach out to those installations as hosts for our annual meeting. If we assemble a room full of expert herpetologists, why not give them the opportunity after the business meeting to provide a real-time inventory of the species on the installation—and involve and train other personnel on the methods employed so that they can continue doing the same? This helps the installation personnel build their knowledge and allows for a more accurate INRMP so that conservation and management practices are better defined and implemented.

TEAMING UP FOR SNAKE CONSERVATION FROM EMERGING DISEASE

By Matt Allender, Robert E. Lovich, and Chris E. Petersen, DoD PARC

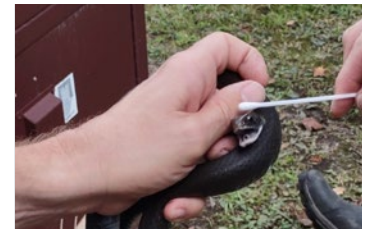
Snakes play essential roles as both predators and prey in the ecosystems of DoD lands. *Ophidiomyces* sp. (formerly referred to as snake fungal disease [SFD]), an emergent pathogen on the North American landscape caused by the fungal pathogen *Ophidiomyces ophidiicola*, is threatening snake population stability nationally. It has been documented in over 15 genera of wild and captive snakes, and infection causes a wide range of clinical signs, from difficulty shedding to crusts and ulcers on the head and body. It can even result in death.



Mike Ravesi and Rob Lovich swabbing a snake for snake fungal disease at Fort Indiantown Gap, Pennsylvania. Photo by Paul Block

DoD PARC, in partnership with the University of Illinois, developed outreach materials and sampling protocols, trained military natural resource managers to sample for SFD on their respective installations, and tested snakes sampled on DoD installations using quantitative polymerase chain reaction (qPCR). From 2018 to the present, over 50 installations have participated across the continental United States and Puerto Rico. A total of 1,141 snakes representing 65 species in 31 states were observed and tested for *Ophidiomyces*. Overall, *Ophidiomyces* was detected in 19.8% of all snakes sampled, including the first ever detections in Oklahoma, Idaho, and Puerto Rico.

Data obtained through this collaboration indicates that this pathogen is endemic in certain areas of the country (e.g., eastern United States), and also identified new sites, which could represent emergence or improved detection of endemic sites. The direct mortality of snakes with *Ophidiomyces* is unknown from this study, but the presence of numerous individuals with clinical disease warrants further investigation, and possibly conservation action. This research is helping to inform the DoD natural resource



Researchers swabbing a North American racer at Naval Air Station Oceana, 2022. Photo by Alexis Ohman



Mike Ravesi and Rob Lovich swabbing an eastern ratsnake for snake fungal disease at Fort Indiantown Gap, Pennsylvania. Photo by Paul Block

community about the presence, distribution, and prevalence of this potentially deadly pathogen across the DoD landscape, which will help DoD support robust training and testing environments that contribute to military readiness.

DOD NATURAL RESOURCES STORYMAP

Check out the revamped DoD Natural Resources [StoryMap!](#) This interactive tool tells the story of the DoD Natural Resources Program as it pertains to conservation, climate resilient installations, partnerships, and ways you can get involved.

If you have a story to contribute, or if you have updates to any information currently included in the storymap, please contact DoDNatRes@bah.com.

LEGACY PROGRAM PROJECT HIGHLIGHTS

The following are summaries of recently completed Legacy Program projects that the natural resources community may find interesting and useful. Explore these and additional projects on the [Natural Resources Legacy Project Deliverables](#) page on DENIX.

1. Legacy Program # DoD PIF-22: Citizen Science

Points of Contact (POC): [Elizabeth Neipert](#) and [Richard A. Fischer](#), PhD., ERDC

Citizen science relates to science projects and research initiatives that gather data through crowd sharing, broad user groups, and educational efforts. Government or academic organizations usually host these projects and fund them through grants and donations.



Volunteers observe birds in live fire area from a Vietnam-era jeep, Fort Hood, Texas CBC. Photo by Scott Summers

Anyone and everyone can participate in these projects. Participants often range from the entry-level and uninitiated (such as young students) to the professional and highly educated (such as career biologists, academics, and even government employees). Defense communities can participate through educational efforts in Military Service schools and homes via installation Conservation Offices, and through backers and funding mechanisms, such as the Strategic Environmental Research and Development Program and the Legacy Resource Management Program.

2. Legacy Program # DoD PIF-22: Sound Deterrence and Harassment

POC: [Elizabeth Neipert](#) and [Richard A. Fischer](#), PhD., ERDC

Birds generally have a hearing range similar to humans; therefore, using sound is an effective tool to deter and disperse birds and wildlife from airfields and the surrounding environment to protect flight safety and the mission. Installations



Remote operated propane sound cannon. Photo by Paul Block

should implement sound deterrence techniques only when complying with all required federal and state regulations. Many types of acoustic or sound devices are available to an installation's BASH program for mitigating hazardous species on an airfield. Proper uses of sound and acoustic tools are key for deterrence and dispersal success. No single BASH tool or technique alone can cure an installation's BASH issues, but each of these tools or techniques should be used as part of an Integrated Wildlife Damage Management strategy designed to minimize hazards identified in the airfield-specific Wildlife Hazard Assessment.

3. Legacy Program # DoD PIF-22: Hangar Bird Control

POC: [Elizabeth Neipert](#) and [Richard A. Fischer](#), PhD., ERDC

Birds in hangars and other large structures create a very

messy and expensive problem for military installations. Cleanup costs are not only expensive, but can also impact readiness. Bird droppings are corrosive and cause expensive damage to aircraft coatings, windscreens, and other sensitive surfaces. Nesting material poses potential fire hazards and foreign object debris damage engines and other aircraft components. A steady rain of droppings, mites, and bird lice from overhead nests threatens human health and erodes morale. There are three main categories of treatment action: repellents, lethal control, and exclusion. Exclusion is, by far, the most effective control strategy.

4. Legacy Program # DoD PIF-22: Reducing Avian Electrocution

POC: [Elizabeth Neipert](#) and [Richard A. Fischer](#), PhD., ERDC

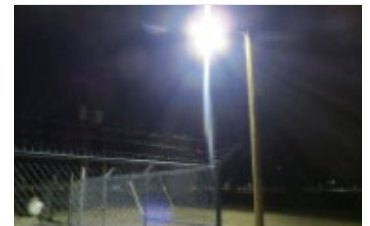
Overhead wires and equipment in North America electrocute millions of birds each year. Electrocution disproportionately kills larger birds such as eagles, osprey, hawks and owls, and many corvid species (i.e., crows) but can be a common cause of mortality for many other avian species. DoD facilities have high avian electrocution exposure compared to other federal agencies because of their often remote settings and extensive electrical systems. Avian electrocution is a conservation challenge that also threatens mission readiness. An estimated 5 to 10% of power outages are attributed to birds and other wildlife; many wildfires and incidences of large-scale (>\$1M) equipment damage have been linked to avian and wildlife electrocution. Avian electrocution causes interruptions and delays, poses safety hazards, and diverts resources from essential missions. However, tools are available to effectively prevent and mitigate electrocutions.

5. Legacy Program # DoD PIF-22: Artificial Light at Night

POC: [Elizabeth Neipert](#) and [Richard A. Fischer](#), PhD., ERDC

Millions of birds are killed each year by outdoor lighting associated with tall buildings, navigation beacons, communications towers, and other illuminated facilities.

Attraction to artificial light at night (ALAN) causes avian mortality when migrating birds become "captured," circling light sources to the point of exhaustion or colliding with obstacles and other birds. ALAN impacts are particularly relevant in the military context because many DoD facilities have extensive outdoor lighting for operational and security reasons.

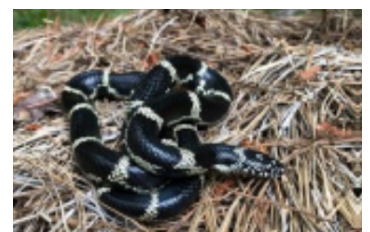


Conspicuous light sources can attract and trap birds, sometimes leading to mortality. Photo by Duncan Eccleston

6. Legacy Program # DoD PARC-22: Eastern Kingsnake Species Profile Video

POC: [Chris E. Petersen](#) and [Robert E. Lovich](#), DoD PARC

Eastern kingsnakes (*Lampropeltis getula*) range from eastern West Virginia, Maryland, Delaware, and southern New Jersey southward through the southeastern Atlantic coastal states to southern Alabama and



Eastern kingsnake. Photo by Chris E. Petersen

Florida. Eastern kingsnakes are found in a variety of habitats including hardwood forests, pine forests, and old fields and along streams in agricultural and urban areas. This species is commonly encountered along the borders of swamps and marshes. The purpose of this video is to inform and educate military installation natural resource managers and base residents about the eastern kingsnake, a common snake species on DoD lands, confirmed present on 42 military sites.

7. Legacy Program # DoD PARC-22: Common Snapping Turtle Species Profile Video

POC: [Chris E. Petersen](#) and [Robert E. Lovich](#), DoD PARC

The common snapping turtle (*Chelydra serpentina*) is native to eastern North America, stretching from the Great Lakes region and Nova Scotia south to Florida and central Texas. In addition, this turtle has been introduced into the western United States, particularly California and Arizona. The species occupies a variety of freshwater habitats such as streams, lakes, reservoirs, ponds, marshes, and swamps, especially those with soft mud bottoms and abundant aquatic vegetation. The purpose of this video is to inform and educate military installation natural resource managers and base residents about the common snapping turtle, which is confirmed present on more DoD properties than any other turtle species.



Common snapping turtle. Photo by J.D. Willson

8. Legacy Program # NR-20-002: Building Capacity for Managing At-risk Species to Enable Mission Readiness on Military Installations: Spotted Turtle Status Assessment and Surveys

POC: [Chris E. Petersen](#) and [Robert E. Lovich](#), DoD PARC

Spotted turtle (*Clemmys guttata*) populations have declined across their range in the eastern United States, and this is particularly true in coastal areas where many DoD installations are located. The spotted turtle is confirmed present on 39 military sites, is a DoD Mission-Sensitive Species, and is currently under review by USFWS for listing under the ESA. However, little information is known about the distribution and population status of spotted turtles on military lands. Expanding the current knowledge of this species on military installations will enable natural resource personnel to improve INRMPs, thereby promoting mission readiness through support of spotted turtle conservation and improved habitat management.



An adult female Spotted Turtle (*Clemmys guttata*) showing the characteristic carapace, head, and leg markings that distinguish the species. Photograph taken by Smithsonian Institution (SI) personnel, Spring 2019.

9. Legacy Program # DoD PARC-22: Gophersnake Species Profile Video

POC: [Chris E. Petersen](#) and [Robert E. Lovich](#), DoD PARC

The gophersnake (*Pituophis catenifer*) is one of the most widespread snakes in North America and is distributed throughout the central and western United States, southwestern Canada, and northern Mexico. There are currently seven subspecies of gophersnakes. This species is found in a wide variety of habitats including woodlands, deserts, agricultural areas, prairies, chaparral, and shrublands. The purpose of this video is to inform and educate military installation natural resource managers and base residents about the gophersnake, a wide-ranging snake species that is confirmed present on approximately 100 DoD properties.

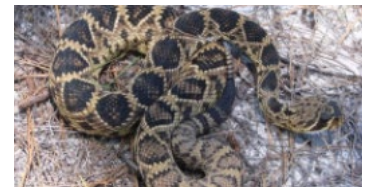


Gopher snake. Photo by Andrew DuBois

10. Legacy Program # DoD PARC-22: Eastern Diamond-backed Rattlesnake Species Profile Video

POC: [Chris E. Petersen](#) and [Robert E. Lovich](#), DoD PARC

The eastern diamond-backed rattlesnake (*Crotalus adamanteus*) is a DoD Mission-Sensitive Species that is confirmed present on 28 military properties. It is the largest rattlesnake species in the United States by length and weight. This species is indigenous to southeastern pine savannah and woodlands, a fire climax system that includes longleaf pine, sand hills, clay hills, and flatwoods. The purpose of this video is to inform and educate military installation natural resource managers and base residents about the eastern diamond-backed rattlesnake, a venomous pit viper species on DoD lands.



Eastern diamond-backed rattlesnake. Photo by Martin Korenek

11. Legacy Program # NR 21-010: Creating an Installation-wide Library of Improved Distribution Maps to Guide Stewardship of Priority Species

POC: [Dr. Gio Rapacciuolo](#), [Dr. Healy Hamilton](#), and [Dr. Max Tarjan](#), NatureServe

NatureServe is working collaboratively with DoD to develop an assessment framework for determining the DoD list of priority at-risk species, create a national library of improved distribution maps of at-risk species, and develop a better understanding of how USFWS listing decisions on these species could impact the military mission on its bases. The NatureServe Explorer is an online guide that provides information on the 100,000 species and ecosystems tracked by NatureServe. This online guide provides free access to conservation status, taxonomy, broad-scale distribution, and life history information for more than 95,000 plants, fungi, and animals in the United States and Canada, and more than 10,000 ecosystems in the Western Hemisphere.

UPCOMING EVENTS, CONFERENCES, WORKSHOPS, AND TRAININGS

International Association for Landscape Ecology—North American Regional Chapter Annual Meeting

March 19-23, 2023
Riverside, California

Efforts within the field of landscape ecology often blend design science, sustainability science, and creative conservation. This annual meeting brings together leaders in landscape ecology who are dedicated to preserving and protecting natural resources, including educators and practitioners in the fields of geology, ecology, biology, geography, urban and regional planning, and landscape preservation and design.

National Military Fish and Wildlife Association (NMFWA) Annual Meeting and Training Workshop

March 19-24, 2023
St. Louis, Missouri

Held in conjunction with the North American Wildlife and Natural Resources Conference (below), the 40th NMFWA annual meeting and training workshop is the primary event where installation natural resource managers meet to discuss key concerns and opportunities, recent policy and legislative changes, ongoing activities and recent accomplishments, and emerging issues and potential new challenges.

North American Wildlife and Natural Resources Conference

March 20-24, 2023
St. Louis, Missouri

The 88th North American Wildlife and Natural Resources Conference will bring together natural resource professionals from all sectors to exchange knowledge and best practices on issues such as endangered species, migratory birds, and landscape management through workshops and meetings. The event serves as the annual forum to set conservation policy in North America and includes conference sessions, workshops, and more than 150 separate meetings and functions.

15th Biennial Western Association of Fish and Wildlife Agencies (WAFWA) Deer and Elk Workshop

May 15-18, 2023
Flagstaff, Arizona

Hosted by WAFWA and the Arizona Game and Fish Department, the WAFWA represents 24 states, provinces, and territories and is a strong advocate for their authority to manage fish and wildlife within their borders. The theme of this year's event is "Changing Landscapes" with emphasis on renewable energy, fire, drought, migration and movement, and recreational impacts.

Western Black Bear Workshop

May 23-25, 2023
Jackson, Wyoming

The Western Black Bear Workshop is held every three years by the Human-Wildlife Conflicts Committee sanctioned by WAFWA. The workshop provides a forum where leading black bear managers and researchers share research results, management strategies, and emerging issues in the realms of black bear management throughout North America.

DoD Climate Resilience Workshop

July 10-13, 20223
St. Louis, Missouri

This workshop is hosted by the Office of the Assistant Secretary of Defense for Energy, Installations, and Environment (ASD(EI&E)) to provide a forum for DoD stakeholders and partners to explore the many facets of climate change, a national security threat that has tangible impacts to military readiness. Installations, environmental organizations, and climate change professionals will all be broadly represented to help inform the Military Departments on data, tools, and resources for addressing and combating climate change threats. Attendees will share lessons learned on built and natural infrastructure solutions and set the course for new and improved partnerships to connect missions, resources, and communities in support of military installation resilience.

World Animal Day

October 4, 2023
Global

World Animal Day promotes the many ways we interact with animals to support wildlife conservation and animal welfare. Activities range from awareness events at zoos and aquariums to adoption and vaccination drives. Join one of the estimated 1,000 events in 100 countries that occur annually.

DoD Environmental Planning and Conservation (EP&C) Webinar Series

Virtual

The EP&C team hosts webinar presentations from Legacy Program project principal investigators, Natural and Cultural Resources Program partners, and other stakeholders on relevant topics for the Military Services, federal and state agencies, non-governmental organizations, and other interested groups. Webinars are held monthly via Microsoft Teams. To join the mailing list to receive notifications about these webinars, contact DoDNatRes@bah.com or DoD_CRProgram@bah.com.

Strategic Environmental Research and Development Program (SERDP) & Environmental Security Technology Certification Program (ESTCP) Webinar Series

Virtual

The SERDP and ESTCP Webinar Series promotes the transfer of innovative, cost-effective, and sustainable solutions developed through projects funded in five program areas. The webinar series targets DoD and Department of Energy practitioners, the regulatory community, and environmental researchers with the goal of providing cutting edge and practical information that is easily accessible. Most webinars will feature two 30-minute presentations and interactive question and answer sessions.

Readiness and Environmental Protection Integration (REPI) Program Webinar Series

Virtual

The REPI Webinar Series highlights best practices and provides knowledge sharing tutorials on REPI partnership efforts that support military missions, accelerate the rate of conservation, and promote military installation and community resilience.

LINKS OF INTEREST

DoD Natural Resources Program

DoD's Natural Resources Program provides policy, guidance, and oversight to manage natural resources on approximately 25 million acres of military land, air, and water resources. Visit the Natural Resources Program website for more information on DoD's natural resources initiatives, policy updates, presentations, and links to other conservation and natural resources sites.

DoD Legacy Resource Management Program

Congress established the DoD Legacy Resource Management Program (Legacy Program) in 1990 and modified it under the FY 1997 National Defense Authorization Act. The Legacy Program funds natural and cultural resources projects that support military readiness and enhance conservation objectives. Projects eligible for Legacy Program funding must have regional or DoD-wide significance and involve more than one Military Service; be necessary to meet legal requirements or to support military operations; be more effectively managed at the DoD level; and not be an assigned responsibility of a Military Service.

DoD Environment, Safety and Occupational Health Network and Information Exchange (DENIX)

The DENIX Natural Resources website is another resource that provides access to natural resources information. Specifically, the website includes DoD Legacy Resource Management Program fact sheets and reports, as well as other natural resources materials.

Armed Forces Pest Management Board (AFPMB)

AFPMB recommends policy, provides guidance, and coordinates the exchange of information on pest management throughout DoD. Its mission is to ensure that environmentally sound and effective programs are in place to prevent pests and disease vectors from adversely affecting natural resources and DoD operations.

Strategic Environmental Research and Development Program (SERDP) and Environmental Security Technology Certification Program (ESTCP)

SERDP and ESTCP are independent DoD research programs that use the latest science and technology to develop innovative solutions to DoD's environmental challenges. They promote partnerships and collaboration among academia, industry, the Military Services, and other federal agencies that support military readiness, compliance with legislation and policy, and natural and cultural resources management.

Readiness and Environmental Protection Integration (REPI)

Under REPI, DoD partners with conservation organizations and state and local governments to preserve land around military installations to combat encroachment. REPI promotes innovative land conservation, which preserves the military's ability to train and test on its lands now and into the future.

Cooperative Ecosystem Studies Units (CESU) Network

DoD participates in the CESU Network, which is a national consortium of federal agencies, tribes, academia, state and local governments, and non-governmental organizations working together to provide research, technical assistance, and training to federal agencies and their partners. The CESU Network also provides managers with the adaptive management approaches necessary to preserve installation natural and cultural resources.

DoD Partners in Flight (PIF)

DoD PIF consists of natural resources personnel from military installations across the United States and works collaboratively with partners throughout the Americas to conserve migratory and resident birds and their habitats. In addition, DoD PIF supports and enhances the military mission through proactive, habitat-based management strategies that help protect birds on DoD lands and maintain healthy landscapes and training lands. Visit the DoD PIF website for fact sheets, reports, and other materials with information about DoD's migratory bird conservation efforts.

DoD Partners in Amphibian and Reptile Conservation (PARC)

DoD PARC is a partnership dedicated to the conservation and management of herpetofauna (reptiles and amphibians) and their habitats on military lands. DoD PARC membership includes natural resource specialists and wildlife biologists from the Military Services, and individuals from state and federal agencies, museums, universities, and environmental consultants. Visit the DoD PARC website for information about herpetofauna management projects on DoD lands.

DoD Pollinator Initiatives

Visit this website for an overview of pollinators and why they are important to DoD. The website also contains information on how people can help protect pollinators and their habitat, including fact sheets, technical reports, and how-to guides.

DoD Invasive Species Outreach Toolkit

This toolkit has materials to help DoD natural resources managers communicate with agencies, organizations, and the public about invasive species issues on DoD lands. Specifically, the tool kit includes modifiable outreach materials, such as posters, brochures, reference cards, and a PowerPoint presentation.

Conserving Biodiversity on Military Lands: A Guide for Natural Resource Managers

The DoD Biodiversity Handbook contains a thorough introduction to biodiversity and how it is essential to support the military mission. It also details the scientific, legal, policy, and natural resources management contexts for biodiversity conservation on DoD lands, and includes 10 case studies with practical advice from DoD natural resources managers.

DoD PARC Photo Library, DoD PIF Photo Library, and DoD Natural Resources Photo Library

Visit these three websites to share pictures, news, information, and ideas with the DoD Natural Resources, DoD PARC, and DoD PIF communities. Please review the [photo policy](#) and [photo submission instructions](#) to contribute your images. In addition, account users can download photographs for reports, PowerPoint presentations, and educational materials.

DoD Chesapeake Bay Program (CBP)

DoD was one of the first federal departments to be formally involved in the Chesapeake Bay Watershed restoration effort. Military installations in Maryland, Pennsylvania, Virginia, New York, West Virginia, and the District of Columbia play an important role in defending and preserving the Bay. DoD-funded efforts advance the goals and outcomes of the Bay and further the ability for DoD to test, train, and operate in the watershed.



DOD NATURAL RESOURCES PROGRAM

Enabling the Mission, Defending the Resources

www.denix.osd.mil/nr

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