

Natural Selections



Department of Defense Natural Resources Program



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SPOTLIGHT: THE NATIONAL SEED STRATEGY: THE RIGHT SEED IN THE RIGHT PLACE AT THE RIGHT TIME

By Lewis Gorman, Biologist, Endangered Species Recovery Program, U.S. Fish and Wildlife Service; Peggy Olwell, Plant Conservation Alliance; Leah Prescott, BLM Seeds of Success Program

Natural resources managers on Department of Defense (DoD) installations comply with federal natural resources laws while managing their lands to support military testing, training, and operations in a sustained, cost effective manner. Healthy environments are needed to ensure that military personnel have access to high quality, realistic training areas. To maintain these training areas, DoD lands must have healthy native plant communities. DoD habitat management plans often include supporting native plant populations depending on the availability of locally adapted native seeds. It is important to promote native plants and control non-native and invasive plant species because non-native plants can rob an ecosystem of its optimal biodiversity, and require more resources to maintain a naturally functioning ecosystem. On the other hand, native plants are naturally adapted to their ecosystems, meaning native species and pollinators are more likely to thrive when native plants are present.

As native plants face increased pressure from threats including natural disasters and non-native species, the demand for commercially available native plant seed for restoration purposes increases. Currently, native seed production does not meet this increasing demand. There is estimated to be more than 18,000 species of native plants in the United States (U.S.), but only 1,949 of these are commercially available and often times sold by only one producer. It can take 10-20 years to develop sustainable supplies of seed from the time of wild collection until commercially available crops are developed.

In response to this shortage, a strong and diverse coalition of federal and non-federal agencies, as well as nonprofit organizations and private sector businesses, developed and began to



A wasp rests on native milkweed. Source: Lew Gorman

implement the **National Seed Strategy for Rehabilitation and Restoration** in 2015. The mission of the strategy is to ensure the availability of genetically appropriate seed reserves to restore viable, productive plant communities and sustainable ecosystems in a cost-effective manner. It seeks to accomplish this mission through four major goals:

1. identifying and quantifying seed needs,
2. undertaking research and improving technologies for seed production and use,
3. developing tools for land managers, and
4. ensuring good communications.

The National Seed Strategy provides a framework for working with federal, state, tribal, non-profit, and private partners to shorten the process of native seed collection and to increase the capacity for habitat restoration.

Twelve federal agencies signed on to participate in the National Seed Strategy for Rehabilitation and Restoration in 2014

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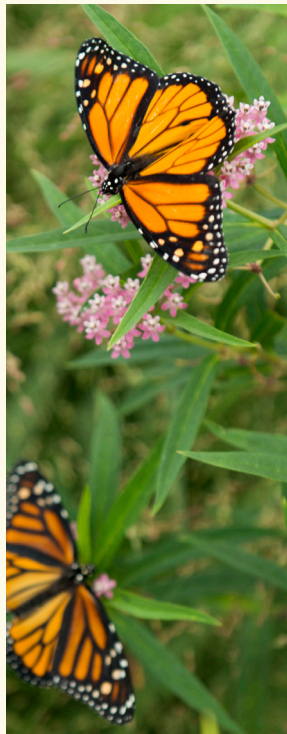
MESSAGE FROM THE NR PROGRAM

By Alison A. Dalsimer, Program Manager

Welcome to another edition of Natural Selections!

This month we are pleased to feature a 'Plants as Habitat' theme. Early on in my first natural resources related job, I was told that – regardless of which charismatic megafauna was lucky enough to get funding – the key to good management was to remember that it's all about the habitat. Meaning that if you manage the lands properly, you can benefit not only the target species but many other plants and animals that also use or are in the same system.

With that lesson in mind, in this issue we offer a collection of articles related to the landscapes on which our soldiers, sailors, and air personnel depend. As all of you who are familiar with the NR Program know, DoD manages approximately 25 million acres of land that encompass a wide variety of habitats, including many that are now rare and unique. We manage these lands to a high standard because healthy ecosystems are vital to carrying out mission requirements. Diverse native plant communities are resilient to impacts from various testing, training, and operational activities (e.g., erosion, fire) and other stressors (e.g., drought, invasive species). In addition to benefitting readiness, it is a core DoD value to be good stewards of our nation's natural heritage and to protect our imperiled species.



Monarch Butterflies rest on milkweed plants. Source: U.S. Army photo by Rachel Larue

Articles in this issue highlight research, monitoring and management, and feature partnership efforts that help make broad success a reality. For example, the National Seed Strategy story describes how federal, state, tribal, and private stakeholders are working together to restore native plant communities and ensure the availability of genetically appropriate seeds. Similarly, the Sentinel Landscapes and Longleaf Pine articles focus on efforts that support off-base compatible land uses, provide natural buffers to DoD facilities, and increase flexibility under the Endangered Species Act (ESA).



Longleaf pine seedlings at Robins Air Force Base, GA. Source: U. S. Air Force Photo by Raymond Crayton, Jr.

We also feature species-specific articles, including one on planting milkweed along monarch butterfly migration routes to prevent the monarch's listing under the ESA, another about how keeping landscapes healthy can help sustain the rusty patched bumblebee, and even one featuring efforts to restore submerged aquatic vegetation (SAV).

Before I close, one programmatic note: in case you haven't yet heard, Ryan Orndorff has joined the NR Program. Ryan comes to us from the DoD REPI Program, where he served as Deputy Program Director for the last three years. Ryan will take on management responsibilities for the Legacy Program and for Cooperative Ecosystem Studies Units (CESU), and will continue to serve as lead for Southeast Regional Partnership for Planning and Sustainability (SERPPAS) and other partnership programs. Ryan has a decade of experience spent in Army Guard, Headquarters USMC, and at REPI. He and I will work as a team for the foreseeable future.

I hope you enjoy this edition of Natural Selections.

PS: Keep an eye out for our next issue, which will have a marine-based theme and, if you have a good DoD natural resources story to tell, please contact DoDNatRes@bah.com.

(The National Seed Strategy: The Right Seed in the Right Place at the Right Time, continued from page 1)

to facilitate native seed production from diverse native plants. Although DoD is not currently part of this multi-agency team, military installations including Camp Lejeune, Fort Stewart, and Joint Base Lewis-McChord all collect local native seed. The National Seed Strategy Federal Implementation Working Group warmly and wholeheartedly invites DoD and its military services and programs to join the effort to implement the National Seed Strategy.

With both signatory and non-signatory agencies and organizations joining this seed collection and habitat enhancing effort, the National Seed Strategy represents a quiet but profound milestone in support of ecological restoration. For a copy of the seed strategy visit <https://www.blm.gov/programs/natural-resources/native-plant-communities/national-seed-strategy>.

SAV IN THE CHESAPEAKE BAY – A UNIQUE PARTNERING OPPORTUNITY FOR DOD

By Adam Wright, DoD Regional Environmental Coordinator Chesapeake Bay Program

Contiguous and healthy SAV beds are a critical component of a sustainable Chesapeake Bay ecosystem. SAV provides food and shelter for a wide variety of interdependent species, contribute to improved water quality, and reduce erosion by slowing water currents as they anchor bottom sediment and reduce the impact of waves that break along the shoreline. These underwater grasses also act as an excellent measure of Chesapeake Bay health. Although SAV is sensitive to pollution, it responds fairly quickly to improvements in water quality. This means the abundance of SAV is a good indicator of Chesapeake Bay restoration progress.

SAV beds provide habitat that is especially important to bay scallops, blue crabs, Atlantic menhaden, and juvenile rockfish (striped bass), as well as food for microscopic zooplankton, small invertebrates, and migratory waterfowl. Due to the importance of SAV in the Bay, the Chesapeake Bay Program Partnership (Partnership) identified SAV restoration and sustainment as one of the goals of the 2014 Chesapeake Bay Watershed Agreement. The Partnership's target outcome is to achieve and sustain the presence of 185,000 acres of SAV across the Bay. Partnership researchers are measuring progress toward this ultimate outcome against targets of 90,000 acres by 2017 and 130,000 acres by 2025. Data gathered in 2016 indicates that the Partnership achieved the first, goal, mapping 97,433 acres of SAV in the Chesapeake Bay and its tributaries.

The Virginia Institute of Marine Science (VIMS) under the direction of Dr. Robert J. Orth, along with numerous federal, state, and local partner organizations and volunteer citizen scientists, conducts the annual SAV survey to document the extent, health, and diversity of SAV in the Bay. This undertaking is extensive given the areal extent of the Chesapeake Bay and its tributaries. SAV aerial survey data acquisition includes pre-planning and coordination with an aerial photographic contractor and digital imagery collection. Flights are dependent on weather, requiring optimal conditions and continuous monitoring to ensure photo quality. VIMS processes the photos,

and includes them and the data collected to generate the SAV report. This report can help DoD natural resources managers better understand the presence of SAV on their installations.

DoD plays an important role in compiling this report as installations with shorelines on the Chesapeake Bay and its major tributaries are included in the SAV survey. In airspace over Aberdeen Proving Ground (APG), Naval Air Station Patuxent River, and installations along the Potomac River, DoD must provide prior approval and flight clearance. In some airspace, DoD also requires the presence of armed security personnel in the plane during flights. Mr. Todd Beser, Natural Resources Specialist with the Army Chesapeake Bay Program at APG, and the point of contact for the VIMS survey, ensures that national security requirements during SAV surveys are met. For example, he accompanies the photographic contractor during certain flights, maintains control of the digital imagery with APG land features through the processing stage, and deletes APG land features out of the photos before sending them back to VIMS. Mr. Beser also takes the final SAV maps that VIMS generates and uses geographic information systems to delineate where SAV exists on and near-shore to all DoD installations included in the survey area.



SAV beds. Source: Will Parson, Chesapeake Bay Program

The VIMS SAV survey report, maps and imagery, along with Mr. Beser's mapping output, are available to DoD natural resources managers upon request, and may be used for Sikes Act and/or National Environmental Policy Act (NEPA) compliance as applicable at each installation. This represents a potential cost savings to DoD if they can use these maps as part of an Integrated Natural Resources Management Plan (INRMP) update or NEPA documentation for an action that may impact the near shore environment. The DoD Chesapeake Bay Program is investigating additional opportunities for DoD to partner with VIMS during the SAV survey, including: 1) increasing installation personnel involvement during planning and aerial photography flights to minimize delays in obtaining approvals and clearance, and 2) funding a portion of the SAV survey through the DoD Chesapeake Bay Program or through regional or installation-level natural resources budgeting processes.

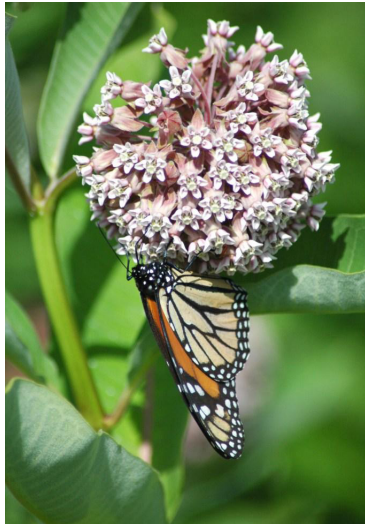
For more information about the Chesapeake Bay Program and VIMS SAV Survey, go to: www.chesapeakebay.net/issues/bay_grasses and web.vims.edu/bio/sav/index.html

BOOSTING MONARCH MIGRATION SUPPORTS DOD AND NATIVE PLANTS

By David McNaughton, Assistant Wildlife Program Manager, Pennsylvania Department of Military and Veterans Affairs

In recent years, habitat loss and a reduction in milkweed have caused the monarch population to decline. Conservation managers across the U.S. are preparing for the possible inclusion of the monarch butterfly (*Danaus plexippus*) on the ESA list. The butterfly species is found in most of the contiguous U.S., summering throughout its range before migrating to Mexico and the southern U.S. during the winter. Monarchs are adapted to multiple habitats and pollinate native plants as they complete their migration, improving native plant populations along their route.

Monarch butterflies are important to DoD, promoting native plant communities and preserving the realistic environments that the DoD relies on for testing and training. Because of the expansive range of the species, monarch butterflies are found on many DoD installations. In fact, during a Pollinator Workshop at the 2017 National Military Fish and Wildlife Association Annual Workshop, DoD natural resources managers from across eastern installations like Fort Belvoir and Camp Robinson noted monarch sightings outside the known breeding range in the Northeast.



A monarch butterfly feeds on a common milkweed at Fort Indiantown Gap NGTC, PA. Source: PA Dept. of Military and Veterans Affairs

IN THE NEWS: DOD PARTNERS TO PROTECT NATIVE HABITAT FOR THE PUBLIC

Snow Hill Park, a 1-acre natural area along the Patuxent River, opened to the public on July 22. The waterfront property was acquired partially through funding from the DoD Readiness and Environmental Protection Integration (REPI) program. The property was purchased and is now owned and managed by St. Mary's County, who then granted a sole easement to the Navy.

Lindsay Tempinson, a contractor working with Atlantic Test Ranges (ATR) at Naval Air Station Patuxent River explained the benefit to local communities and DoD by saying, "The Navy does not own the property but will hold an easement that will limit incompatible development such as tall structures or intense residential development. Snow Hill Park is beneath air space used for testing and training. These easements are legally binding and are in perpetuity, meaning they will remain in place forever." Limiting development will preserve the natural resources in Snow Hill Park and ensure that they are available for recreation.

DoD proactively promotes monarch butterfly populations on its lands. While monarch butterflies are adapted to multiple habitats, they rely on over 100 species of milkweed (*Asclepias* spp.) for breeding. Milkweed does well in open areas, grasslands, fire adapted ecosystems, and areas with low-nutrient soils, all common attributes on DoD lands. Monarch eggs are laid on the leaves of milkweed plants, the growing caterpillars then feed exclusively on the plant before building their chrysalis.

The National Environmental Education Foundation (NEEF), through National Public Lands Day (NPLD), has partnered with DoD to fund small pollinator projects and public education opportunities with grants of up to \$6,500. Installations including Joint Base San Antonio, Fort Bragg, Redstone Arsenal, and Langley Air Force Base have used NPLD funds for various projects, including seed, tools, and landscaping materials for butterfly gardens, interpretive trails, small habitat management projects, and roadside plantings. Applicants coordinate with volunteers to implement these projects, and installation personnel work with families from military housing and administrative officers to fulfill project requirements. Some unique plantings for monarchs and other pollinators include "waste area" beautification projects with milkweed seedlings and plantings along rights-of-way, roadsides, and traffic islands; over shallow or remediated soils; and in other locations with constant invasive plant or lawn grass coverage and plenty of sunlight. Joint Base San Antonio incorporates native nectar plants into permaculture areas, creating monarch habitat while storing groundwater.

To learn more about NEEF and NPLD, to see how DoD is involved, or to find a project site near you, visit <https://www.neefusa.org/public-lands-day>. Maybe next year, you too can host or volunteer for an event!

SENTINEL LANDSCAPES: WHERE NATURAL RESOURCES, WORKING LANDS, AND NATIONAL DEFENSE COLLIDE

By Kristin Thomasgard-Spence, Director, REPI Program, DoD

The United States Departments of Agriculture (USDA), Defense (DoD), and the Department of the Interior (DOI) established the Sentinel Landscapes Partnership in 2013. By participating in Sentinel Landscapes, DoD more efficiently reduces land-use conflicts by preserving natural resources around military installations to maximize flexibility for testing, training, and operational activities.

Sentinel Landscapes is a nationwide federal, local, and private collaboration dedicated to promoting natural resources sustainability and preserving agricultural and conservation land uses in areas surrounding military installations. The Partnership coordinates resources from USDA, DoD, and DOI, and seeks participation and support from state and local governments; non-governmental organizations; and individual landowners to focus on geographic areas where partner priorities overlap. These areas, known as Sentinel Landscapes, are working or natural lands that are important to the Nation's defense mission—places where preserving the working and rural character of key landscapes not only strengthens the economies of farms, ranches, and forests, and conserves habitat and natural resources, but also protects the vital testing, training, and operational missions conducted on those military installations.



Aircrews from 16th Combat Aviation Brigade and their AH-64E Apache Guardians fly over the Joint Base Lewis-McChord Sentinel Landscape. Source: Sgt. Daniel K. Johnson, 25th Combat Aviation Brigade Public Affairs

The partner agencies coordinate activities through the Sentinel Landscapes federal Coordinating Committee (FCC), which helps to identify areas of shared priority and coordinate mutually beneficial programs. To-date, the FCC has chosen to designate six Sentinel Landscapes:

1. Joint Base Lewis-McChord Sentinel Landscape (WA)
2. Fort Huachuca Sentinel Landscape (AZ)
3. Camp Ripley Sentinel Landscape (MN)
4. Middle Chesapeake Sentinel Landscape (MD, DE, VA)
5. Eastern North Carolina Sentinel Landscape (NC)
6. Avon Park Air Force Range Sentinel Landscape (FL)

The Sentinel Landscapes FCC has identified three core characteristics that apply to every Sentinel Landscape, including 1) at least one military installation or range that anchors the Landscape, 2) a defined Landscape boundary that reflects the partners' overlapping priorities, and 3) a set of defined goals and desired outcomes that sustain military operations and benefit the landscape.



The San Pedro basin is one of several important ecosystems that the Fort Huachuca Sentinel Landscape is helping to preserve. These efforts have helped to restore key habitat for numerous species in the area. Source: Fort Huachuca Sentinel Landscape Partnership

The designation of a Sentinel Landscape has several benefits for all of the partner entities associated with the installation's mission footprint. Though no dedicated funding necessarily accompanies a Sentinel Landscape designation, individual partner agencies may choose to provide program-specific funding or give priority consideration in

existing funding processes to landowners within a designated Landscape. In addition, the designation provides greater recognition for conservation projects within the Landscape's boundary at the local, state, and national level, in effect providing partners with a mechanism through which to identify and market projects using a prominent national designation.

Through the Sentinel Landscapes Partnership, individuals within a designated Landscape have access to representatives of each of the partner federal agencies who are available to help the Landscape meet its goals and address any challenges that it faces.

The Sentinel Landscapes designation also improves communication and coordination between partner agencies, organizations, and local communities, leading to greater landowner participation in existing voluntary conservation programs. Leveraging a wide array of interests within a defined landscape, including national security, conservation, and working lands, broadens the spectrum of willing landowners to engage in projects. This landscape-scale, innovative collaboration represents a true win-win for conservation efforts and the warfighter, ensuring the preservation of some of the Nation's most vital natural resources and enabling the military to serve its critical defense mission.

To learn more about the Partnership please visit www.SentinelLandscapes.org.

PATRIOTIC PINE: LONGLEAF PLAYS AN IMPORTANT ROLE IN NATIONAL DEFENSE

By Stephanie Hertz, Project Manager, Texas A&M Natural Resources Institute

Did you know that longleaf pine forests play an important role for military testing and training in the southeastern U.S.? The remote and open pine savannas provide installation commanders across 30 military installations from Louisiana to Virginia with an intact habitat for realistic testing and training.

The longleaf pine ecosystem was the predominate forest type in the southeastern U.S., covering an estimated 90 million acres. Beginning in the 18th century, commercial logging reduced the species to 5% of its historic range. Now, land conversion to agricultural, residential, and industrial uses has eliminated much of the longleaf pine habitat that was once so plentiful across the region. Furthermore, years of fire suppression practices altered the natural wildfire cycle in which the longleaf pine thrives. Today, only 700,000 acres of longleaf pine habitat exist on military installations across a region that was once characterized by this southern tree.



Military training in southern longleaf pine habitat.

As longleaf pine forests were converted to commercial, residential, and industrial uses, military installations became key refuges for the tree and its unique inhabitants. Longleaf pine forests are some of the most biologically diverse ecosystems outside of the tropics, supporting a substantial diversity of plant and animal species. The open canopy structure with a rich understory of grasses and herbs provide ideal habitat for species like the red-cockaded woodpecker, indigo snake, flatwoods

salamander, and gopher tortoise. Regular testing and training activities for the military, such as live-fire exercises, result in frequent wildfires that reduce underbrush, improve endangered species habitat, and suppress undesirable hardwoods in the longleaf system. In return, longleaf pine forests on military installations provide natural habitats for realistic testing and training conditions and are resilient to fires that may result from these activities.

Today, the longleaf pine forests that DoD manages represent a significant portion of the remaining longleaf pines in the U.S. DoD natural resources managers conduct a variety of management activities to keep longleaf pine forests healthy, such as prescribed burning and invasive species control. Additionally, conversion from other forest types to longleaf pine habitats enhance the ecosystem and support the recovery of threatened, endangered, and at-risk species. Currently, longleaf pine forests support 29 federally-listed threatened or endangered species, and many more species that are candidates for listing under the ESA, primarily from the loss of longleaf pine habitat.

To promote the recovery of the longleaf ecosystem and its inhabitants, DoD is an active and committed partner in America's Longleaf Restoration Initiative (ALRI). ALRI is a coalition of federal and state agencies, non-profit organizations,

forest industry, private landowners, and other interests who have united in a single cause: to restore the iconic longleaf pine forest in the southeastern U.S. ALRI developed a Conservation Plan in 2009 to guide efforts by participating agencies, organizations and individuals to a 15-year Initiative goal of increasing longleaf from 3.4 to 8.0 million acres by the year 2025.

DoD is contributing to ALRI's range-wide efforts by sustaining and enhancing longleaf ecosystems both on and off installation. In fiscal year 2016, DoD spent over \$7.8 million to manage longleaf pine forests on its bases, including prescribed burning, reforestation, forest stand improvement, and species management. Outside the installations, the DoD REPI Program is working with the National Fish and Wildlife Foundation (NFWF) Longleaf Stewardship Fund — a landmark public-private partnership supported with federal and private funding to expand, enhance and accelerate longleaf pine ecosystem restoration across the historical range. Since 2012, the NFWF Longleaf Stewardship Fund has maximized DoD's investment by leveraging non-DoD funds and surpassing 1 million acres of restored or enhanced longleaf pine. Working with partners has been a true win-win for conservation efforts and the military, helping to ensure the warfighter's continued ability to test, train, and operate on military installations and ranges through the Southeast.

MISSION CRITICAL: THE IMPORTANT ROLE OF THE RUSTY PATCHED BUMBLE BEE

By Kimberly Alles, Booz Allen Hamilton

On March 21, 2017, the rusty patched bumble bee joined seven other U.S. bee species on the ESA list. Once commonly found across 28 U.S. states, the rusty patched bumble bee has declined in nearly 90 percent of its range over the last two decades. Since 2000, this bumble bee has been reported from only 13 states: Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Minnesota, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and Wisconsin. The decline is attributed to several factors including pesticide and herbicide use, habitat loss, disease, and climate related factors.



Rusty patched bumble bee. Source: Christy Stewart, U.S. Fish and Wildlife Service

Rusty patched bumble bees are a keystone species, meaning its environment would be drastically changed if it was absent. Pollination by the rusty patched bumble bee is necessary not only for native wildflower reproduction, but also for creating the seeds and fruits that feed wildlife as diverse as birds and black bears. Healthy landscapes are vital to carrying out the military mission, and DoD has a vested interest in preventing further rusty patched bumble bee declines. Bees sustain the plants they pollinate and help maintain the integrity of the landscape on which DoD personnel depend for realistic training and testing activities. Pollinators like bumble bees are an essential component to these vital habitats, and play a key role in keeping landscapes healthy.

Rusty patched bumble bees are an especially important pollinator because of their ability to "buzz pollinate." This technique, exclusive to a handful of bee species, involves vigorously vibrating the flight muscles to shake off excess pollen. The technique is extremely effective at pollinating, and is the primary pollination method for several plants, including tomatoes. The economic value of pollination services provided by native insects, mostly bees, is estimated at \$3 billion per year in the U.S. Without pollinators, native landscapes might become barren, or be overrun by invasive species. Further declines of endangered species like the rusty patched bumble bee might translate into access restrictions, which in turn could reduce the military's capacity to test and train.

In 2010, DoD established the DoD Pollinator Working Group which held its first formal meeting at the 2011 National Military Fish and Wildlife Association Annual Workshop. The Working Group's primary goal is to conserve pollinators and their habitats on lands used for training by the Military Services. The Working Group coordinates with military personnel, and creates outreach materials for the public, serving as a resource for information about pollinators on DoD lands.

Read the Rusty Patched Bumble Bee Guidance on ESA Implementation at www.fws.gov/midwest/endangered/insects/rpbb/guidance.html.

To learn more about pollinators and see how DoD is involved, visit www.dodpollinators.org/index.html.

While this iconic forest has recovered significantly since the development of the 2009 Conservation Plan, DoD and its partners will continue to work together to uphold their long-term commitment to protecting this ecosystem to ensure that longleaf pines persist now and into the future.

DOD: MAINTAINING RELATIONSHIPS BETWEEN HERPETOFAUNA AND VEGETATION

By Robert E. Lovich, Ph.D., DoD Partners in Amphibian and Reptile Conservation (PARC) National Technical Representative; Chris E. Petersen, DoD PARC National Representative

Herpetofauna and plants have a long-standing relationship dating to the earliest amphibian and reptile species. Both of these organism groups (plants, and amphibians and reptiles) have co-evolved throughout the millennia to depend on one another for a number of ecosystem functions. Plants and vegetation communities support herpetofauna, providing not only substrate, shade, shelter, and obvious structural diversity on the landscape, but also a primary food source. For example, Desert Tortoises feed on the native grasses and plants found on Edwards Air Force Base, Marine Corps Air Ground Combat Center Twentynine Palms, and other installations in the southwest. DoD proactively manages the native plants on which herpetofauna rely to support military readiness and healthy populations of amphibians and reptiles.

DoD lands are home to many examples of how herpetofauna interact with the vegetation communities they occupy. Take a moment to visit the DoD PARC photo website (<https://dodparcphotolibrary.shutterfly.com/>), where a quick look at the hundreds of photos from military installations will show you the diversity of plants and vegetation communities interacting with herpetofauna.

Degradation or loss of plants and vegetation can have harmful effects on herpetofauna. Non-native plant invasions and human-related increased fire frequencies can reduce diversity of herpetofauna. Increased fire frequency in southern California has converted native shrublands to non-native grasslands, resulting in a continued loss of herpetofauna diversity. This reduction in native plants may impact species such as orange-throated whiptails, long-nosed snakes, and red diamond rattlesnakes that are not typically found in converted non-native grasslands.



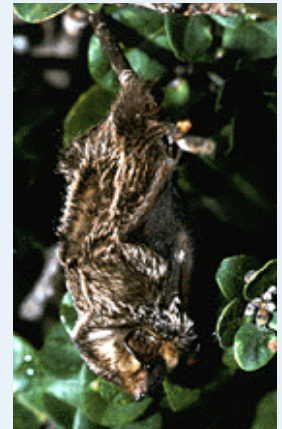
Butler's Garter Snake (*Thamnophis butleri*)
Battle Creek, MI. Source: Paul Block via
DoD PARC photo library

Vegetation and native plant debris provide a foundation for herpetofauna to live and reproduce. Downed logs are known to provide structure for skinks and salamanders on the forest floor in the southeast, while mesquite branches serve as home to tree lizards in the southwest. For example, the federally endangered reticulated flatwoods salamander found on Eglin Air Force Base uses downed logs in pine forests as refuge during breeding. Current research enables DoD natural resources managers support species growth and prevent further restrictions on testing and training caused by federal endangered species protections.

ESA SECTION 7(A)(1)

By Kimberly Alles, Booz Allen Hamilton

DoD depends on high quality training ranges to conduct mission-critical training and readiness activities. On many of these same ranges, DoD plays a vital role in sustaining habitat for many rare plant and animal species. DoD lands contain the highest density of federally listed species of all federal land management agencies. More specifically, DoD is responsible for protecting approximately 430 threatened and endangered species (TES) and over 550 species-at-risk. DoD coordinates with U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA) to meet Endangered Species Act (ESA) requirements, help recover species, and prevent future species listings that could impact mission-critical activities via testing and training restrictions.



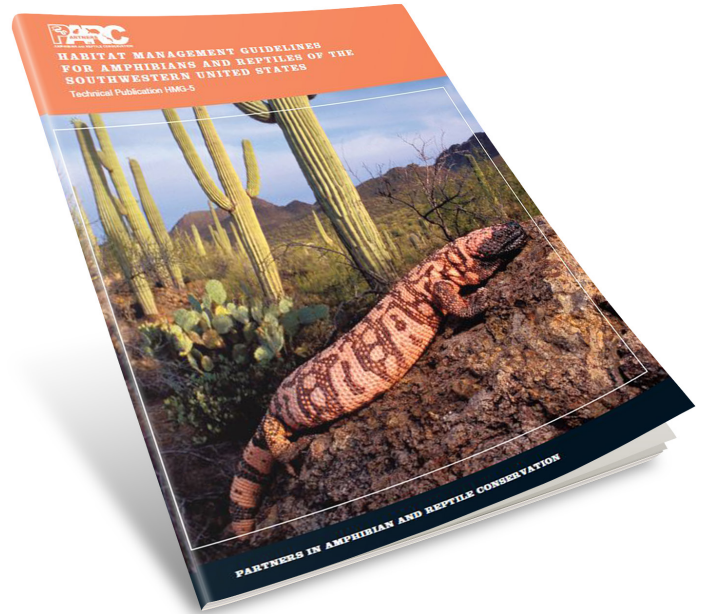
Schofield Barracks Military Installation, HI, works with federal partners to manage species including the endangered Hawaiian Hoary Bat. Source: USFWS

The protection and management of TES is mandated under the ESA. Section 7 of the Act, called "Interagency Cooperation," is the mechanism federal agencies follow to ensure the actions they take, including those they fund or authorize, do not jeopardize the existence of any listed species. Section 7 is split into multiple parts that relate to how action agencies cooperate with USFWS and NMFS to protect species. DoD works with the USFWS and NMFS primarily via formal and informal consultations under Section 7(a)(2) of the ESA. However, many of the proactive conservation activities undertaken on military lands pertain directly to Section 7(a)(1) of the ESA, which describes voluntary conservation measures by federal agencies for TES, and provides federal agencies a mechanism to distribute conservation obligations program wide, as well as to exploit conservation opportunities outside of defined action areas to achieve compliance with ESA in a way that promotes efficiency, cost effectiveness, ingenuity, and improved conservation outcomes. The Military Services use Integrated Natural Resources Management Plans (INRMPs) to promulgate ESA Section 7(a)(1) conservation actions. Benefits to DoD of using 7(a)(1) include reducing regulatory surprises and conflicts during 7(a)(2) consultations, more readily increasing species baselines (which will be considered during consultations), and making proactive commitments to actions installations would be predisposed to undertake anyway under Section 7(a)(2).

In the U.S., DoD manages roughly 25 million acres of land across approximately 520 military installations; 65 percent of those installations have natural resources significant enough to require an INRMP. DoD has a total of 341 INRMPs, and 240 of them contain management actions for at least one listed species. DoD is working to familiarize installations with ESA Section 7(a)(1) authorities as a means to improve conservation outcomes, reduce costs, and most importantly, to reduce testing and training restrictions that might hinder military readiness.

Dr. Howard Reinert investigated the habitat of timber rattlesnakes and Northern copperheads in eastern Pennsylvania. Extensive research revealed that the habitats used by the two species differed significantly. Copperheads used more open, less vegetated areas in a deciduous hardwood forest, with higher rock density than timber rattlesnakes. This information will inform DoD natural resources managers and help ensure the continued success of both species populations on military installations. Copperheads are the most abundant venomous snake species on DoD properties and have been confirmed present on approximately 80 military sites. Additionally, the timber rattlesnake has been confirmed present on nearly 40 military sites. These species serve as top predators in the ecosystems that they occupy and contribute to healthy environments for military testing and training.

PARC developed a series of books called the Habitat Management Guidelines (HMGs). The HMGs discuss how to manage vegetation and habitats to enhance populations of herpetofauna. These best management practices can be used on military lands to support military readiness and support healthy populations of amphibians and reptiles. More information on HMGs can be found [here](#). This fall, DoD PARC will be releasing an online training module on how to incorporate the PARC HMG recommendations into INRMPs. This free training will be available to all DoD personnel and will be posted on the Environmental Compliance Assessment, Training and Tracking System website (<https://environmentaltraining.ecatts.com>).



Habitat Management Guidelines for Amphibians and Reptiles of the Southwestern United States, PARC, Jones et al. 2016. Source: Thomas Wiewandt, wildhorizons.com

STEPPINGSTONES CORNER: VIEW FROM THE EYRIE

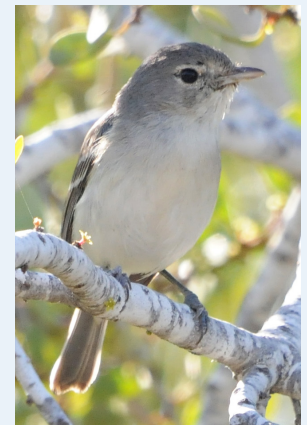
By Richard A. Fischer, PhD, DoD Bird Conservation Program Coordinator

The majority of *Natural Selections* readers are familiar with the term “riparian.” Riparian plant communities along waterways provide a multitude of functions, including protecting and improving water quality, streambank stabilization, shade for aquatic organisms, and habitat for a wide range of plants and animals. Unfortunately, loss and degradation of riparian ecosystems has been extensive over the past century. Upwards of 80% of southeastern bottomland hardwoods have been converted to agriculture. In the southwestern U.S., losses are higher, as in the Central Valley of California, where an estimated 99% of original riparian systems are gone. Thus, it’s not surprising that a large number of riparian-dependent species are imperiled.

Riparian plant communities are an important landscape component on most military installations. For DoD, riparian areas are not only functioning ecosystems; they also provide important concealment cover, and navigation aids, for a wide variety of military training exercises. The DoD has invested heavily in riparian restoration at over 85 installations in the Chesapeake Bay watershed; funded studies on ephemeral streams on southwestern DoD installations to improve range sustainability for training and testing, as well as riparian habitat for listed and at-risk species; and conducted a multitude of riparian rehabilitation projects on installations such as Beale Air Force Base, CA; Bellows Air Force Station, HI; and Fort Lee, VA. Many of our INRMPs specify riparian systems as priority management areas for both fish and wildlife, and for training. This is especially true in the

southwest where installations such as Marine Corps Base Camp Pendleton intensively manage riparian habitat for both federally threatened and endangered species and as training areas.

In the Fall 2016 edition of *Natural Selections*, I reported on the USACE’s Threatened and Endangered Species Team approach to regional conservation planning for federally listed species. Since then, DoD has partnered with several other federal agencies under the Cooperative Wildlife Protection and Recovery Initiative. This interagency team is working collaboratively to identify range-wide opportunities for conservation planning, habitat restoration, and monitoring, for a variety of riparian-dependent species in the southwest, such as Least Bell’s Vireo, Southwestern Willow Flycatcher, and Arroyo Toad. DoD installation management of riparian habitats, as promulgated through INRMPs, will contribute significantly to regional and range-wide recovery efforts. Recovery not only is good for species, but also for DoD, as it reduces restrictions on our ability to train and prepare warfighters.



Riparian-dependent species like the Least Bell’s Vireo rely on DoD natural resources management to protect their unique habitat. Source: USGS

UPCOMING EVENTS, CONFERENCES, WORKSHOPS, AND TRAINING

United Nations Framework Convention on Climate Change (UNFCCC) Conference of Parties (COP) 23

November 6-17, Bonn, Germany

The 23rd annual UNFCCC COP will continue negotiations of the international climate change agreement introduced at the 2015 conference, hoping to cement a global plan for combatting climate change by curbing global warming, sea-level rise, and emissions. Key focus areas of the convention include long-term strategies, adapting infrastructure to the impacts of climate change, capacity-building in the developing world, climate finance, greenhouse gas mitigation, and technology dissemination.

Annual Meeting of the Raptor Research Foundation

November 7-12, Salt Lake City, UT

The Raptor Research foundation is hosting their 2017 meeting in Utah, home to five national parks and 43 state parks that feature some of the finest natural environments in the Rocky Mountains and Desert Southwest. The 2017 conference includes workshops, field trips, scientific presentations, and a variety of symposia on topics ranging from safe field procedures, raptor handling, sampling, telemetry, and environmental contaminants.

Strategic Environmental Research and Development Program and Environmental Security Technology Certification Program Symposium

November 28-30, Washington, DC

This nationally-recognized conference will focus on DoD's priority environmental and installation energy issues. The 2017 event will bring together researchers, technology developers, DoD personnel, and the regulatory community to showcase cutting edge environmental research and technologies. Attendees can participate in 16 technical sessions, several short courses, more than 450 technical poster presentations, and exhibitors from funding and partnering organizations.

National Invasive Species Awareness Week

February TBD

Each year during National Invasive Species Awareness Week state, federal, local, and tribal officials meet with non-governmental organizations, industry, and stakeholder groups to address invasive species, and examine laws, policies, and creative approaches to prevent and reduce invasive species threats to our health, economy, environment, and natural resources. Attend events in Washington, DC, or host your own event that explores local problems and solutions to invasive species.

Climate Leadership Conference

February 28-March 2, Denver, CO

The Climate Leadership Conference gathers an audience of climate, energy, and sustainability professionals to address global climate change through policy, innovation, and business solutions. The agenda includes, but is not limited to sessions on smart infrastructure, renewable energy procurement, healthcare and the environment, and strategies for accelerating innovation.

World Wildlife Day

March 3, Global

The United Nations designated World Wildlife Day to celebrate and raise awareness of wild animals and plants, drawing attention to the threats that endangered species face from habitat loss, poaching, and the pet trade.

North American Wildlife and Natural Resources Conference

March 26-30, Norfolk, VA

Join the Wildlife Management Institute as they celebrate a century of conservation with other industry leaders dedicated to conservation, enhancement, and management of North America's wildlife and other natural resources. Please check the next issue of Natural Selections for details on conference lecture topics.

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

March 25-30, Norfolk, VA

NMFWA and the Wildlife Management Institute are hosting a training session for natural resource professionals. This event provides unique and valuable training opportunities for DoD natural resources professionals. Please check the next issue of Natural Selections for details on workshop presentation topics.

LINKS OF INTEREST

DoD Natural Resources Program (NR Program)

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

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 (Legacy 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. Their 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.

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.

Legacy Program Tracker

The DoD NR Program funds high priority natural and cultural resources projects that have regional, national, and/or multi-Military Service benefits through the Legacy Program. The Legacy Program Tracker houses fact sheets and reports with information about methods and results for completed Legacy-funded projects. Natural resources managers can use information from these materials and apply it to similar projects or improve upon completed projects.

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 and mission capabilities, quality of life, compliance with legislation and policy, and natural and cultural resources management.

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. DoD's CESU projects have netted savings of approximately \$33 million through combined efforts and a pre-negotiated, lower overhead rate for federal agencies. The CESU Network also provides managers with the adaptive management approaches necessary to preserve installation natural resources.

DoD Partners in Flight (PIF)

DoD PIF consists of natural resources personnel from military installations across the U.S. 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.

DoD Biodiversity Handbook

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 17 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, Power Point presentations, and educational materials such as brochures and posters.





DOD NATURAL RESOURCES PROGRAM

Enabling the Mission, Defending the Resources

www.dodnaturalresources.net

<http://twitter.com/#!/DoDNatRes>

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