Department of Defense
Legacy Resource Management Program

Natural Selections

Volume 6, Issue 3 March 2010

Legacy Program Update

FY 2010 Project Approvals Delayed: An unexpected additional cut to all DoD Installations and Environment programs, as well as funding reallocation delays, caused a delay in the release of funds. We expect to start making announcements as soon as possible.

Legacy Project 07-362: Removal of Invasive Fire Prone Grasses to Increase Training Lands in the Pacific

Invasive fire prone grasses like Guinea grass (*Panicum maximum*) have become the dominant cover on several training areas in the Pacific, including Marine Corps Training Area Bellows (MCTAB), Hawaii. Dense stands of Guinea grass provide fuel for fast moving, high intensity fires, thereby increasing the fire risk to weapons firing training and threatening wildlife and their habitats.

Military installations have spent millions of dollars to mitigate risk from such fire prone grasses. Traditionally, installations used mechanical removal and prescribed fire to reduce Guinea grass fuel loads in Hawaii. But since MCTAB shares its borders with urban landscapes, smoke, air quality restrictions and liability associated with prescribed burns are major concerns. In addition, limited burn windows and the lack of trained fire fighters on staff make prescribed burning efforts a challenge. Given such limitations, MCTAB personnel and land managers in the Pacific seek alternative fuel reduction treatments, such as mechanical removal, herbicides, and grazing to reduce Guinea grass fuel loads; however, very little information is available.

The fuel loads of grasses, shrubs, litter, and wood that are in contact with the ground surface on MCTAB were not known at the beginning of this study. The overarching objective of this study was to develop site-specific data on Guinea grass fuel loads to strengthen

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In The News

PTA Monitors Nēnē Activity at Range 1

By John T. Polhemus
J.T. Productions, consultant for PTA Natural Resources Office

The Range 1 complex at Pōhakuloʻa Training Area (PTA) has long served military training needs for troops stationed in Hawaii and the Pacific. In recent years, training operations have been under greater scrutiny due to what appears to be the seasonal presence of the endangered Hawaiian goose, or Nēnē (pronounced “nay-nay"). Range 1 plays a key role in the progression of military training exercises, serving as the second of a three-tiered training regimen employed at PTA. Because Range 1 is considered a vital training asset, PTA’s Natural Resource Office (NRO) has stepped up its monitoring efforts to better understand the role of Range 1 in the Nēnē life cycle. Data collection began in earnest in January 2009, following the issuance of a Biological Opinion by the U.S. Fish and Wildlife Service (USFWS) the previous month. Data collection will continue through 2011, at which time a final recommendation will be presented on the best approach to military training at Range 1.

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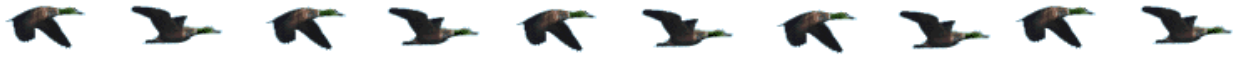
Inside This Issue

Naturally Speaking

From the Desk of L. Peter Boice,
DoD Deputy Director, Natural Resources and Director, Legacy Program



March Madness!

It's an exciting and invigorating time to be in Washington. Spring is upon us, tip-off for the NCAAs is imminent, and the DoD Natural Resources Conservation Team is putting the finishing touches on important efforts than span the breadth of the Program. We've been making progress in three 'brackets'…

Policy and Oversight

- DoD Instruction (DoDI) 4715.03, Natural Resources Conservation Program. We placed the revised Instruction in formal coordination on March 5th! Reviewers have 45 working days to comment. The new DoDI formalizes legislative and policy changes made since 1996, including Sikes Act revisions and amendments to various Defense Authorization acts. It emphasizes proactive management of species at-risk, sustainable ecosystem services and the importance of considering climate change in long-range planning.
- DoD Natural Resources Conservation Metrics. The new DoDI also will institutionalize the new metrics in seven focus area. These metrics are intended to evaluate the effectiveness of natural resources management support to the military mission, assess the overall health and trends of each installation's natural resources program, and identify and correct potential funding and other resource shortfalls.
- INRMP Manual. The DoDI will have a companion Manual to capture details that we could not place in the Instruction. The Manual will provide specific procedures to prepare, review, update and implement INRMPs through ecosystem-based management. It will include a revised INRMP Template and will summarize the importance of ecosystem services to DoD installations.
- DoD Natural Resources Strategic Plan. I am overseeing development of a strategic visioning document to guide the DoD Natural Resources Conservation Program over the coming years. I plan to use the Plan to guide resourcing decisions and to inform our senior leadership of the Program's future directions, challenges, and opportunities, and needs.
- DoD PIF Strategic Plan. The new DoD PIF Plan is still awaiting formal coordination. Once finalized, the Plan will describe how bird conservation activities provide vital mission support through inventories, on-the-ground management, education and long-term monitoring. The Plan also will outline issues and challenges, goals and priorities for eight key bird conservation areas.
- DoD PARC Strategic Plan. Many herp populations are in serious decline. We are sponsoring East Coast and West Coast strategy sessions this spring to develop a new national plan to better integrate amphibian and reptile management across DoD. I anticipate this new initiative will enhance our existing partnership with the national PARC group, as well as foster new herp-based partnerships.

Tools and Training

- NMFWA Training Workshop. The upcoming NMFWA meetings is always a prime opportunity to provide training for DoD's natural resources managers. This year is no different; we will offer:
  - A BETA test of a new Sikes Act Implementation course.
  - A Climate Change Tools workshop
  - The annual DoD Policy Session. In addition to my presentation, I will be joined by two colleagues from the U.S. Fish and Wildlife Service – Gary Frazer, Assistant Director for Endangered Species, and Paul Schmidt, Assistant Director for Migratory Birds.

- Pacific TER-S Workshop II. Our latest TER-S Workshop, held February 2-4, is described in detail on page 12. The workshop was an excellent opportunity to revisit Pacific region natural resources management priorities, identify and prioritize potential new projects, and bolster regional partnerships.
- Endangered Species Act (ESA) Implementation Course. Details have yet to be developed, but we will be offering a DoD-focused ESA course this fall.

Outreach and Partnerships

- New Program Fact Sheets. We are working to build awareness of the DoD Natural Resources Conservation Program and the key role it plays in helping sustain the military mission and ensure realistic training conditions. Currently available fact sheets include a program summary, companion fact sheets on T&E species and species at-risk on DoD lands, two pollinator fact sheets, two revised DoD Partners in Flight fact sheets, and a series of state fact sheets that highlight key Legacy-funded projects.
- New Website. In addition to the above-referenced fact sheets, the new www.DoDNaturalResoruces.net Website includes links to information on invasives, pollinators, our workshops, DoD PIF and DoD PARC.
- DoD Invasive Species Outreach Toolkit. The Toolkit helps installation natural resource managers and others protect the natural resources on our nation's military lands. The new Website listed above provides templates, brochures, posters, reference cards, and other useful online resources.

I will continue to update you on these and other efforts over the next year. I am truly excited by the progress we've made to date and the future directions in which I see our Natural Resources Conservation Program proceeding. I look forward to hearing your thoughts on how we can continue to move forward.

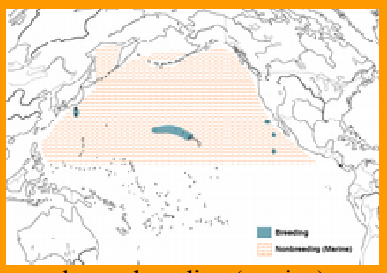
Did You Know?

The **Laysan Albatross**, *Phoebastria immutabilis*, is a large seabird but a relatively small albatross, distinguished from most other species of albatross by its Northern Hemisphere distribution and its sub-tropical breeding range. It breeds mainly on atolls in the Hawaiian Archipelago during the northern winter, and spends the non-breeding months of July-November in the North Pacific Ocean.

Like other albatrosses, the Laysan's mating dance is elaborate and its method of flying ("dynamic soaring") is spectacular. In the absence of wind, however, albatrosses have difficulty becoming airborne or landing. Although Laysans usually do not breed successfully until age 8-9 years, they are long-lived (individuals at least 55 years old have bred) and capable of breeding annually.

Laysan Albatrosses feed mainly on squid, but fish, fish-eggs, and crustaceans are also taken. These seabirds are known to possess high levels of rhodopsin, a visual pigment that enhances nocturnal vision and are known to be active at night when squid are plentiful in surface waters. However, daytime activity suggestive of foraging is common, and diurnal scavenging is another potential feeding strategy. At sea, Laysans are sometimes caught on fish hooks and in salmon and squid gillnets.

Laysan Albatrosses at Ka'ena Point State Park, O'ahu, Hawai'i. Photo: Peter Boice



Breeding and none breeding (marine) range of the Laysan Albatross

From: Awkerman, Jill, David Anderson and G. Causey Whittow. 2009. Laysan Albatross (*Phoebastria immutabilis*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna.html/species/066doi:10.2173/bna.66

Legacy, continued from page 1

the scientific foundation of fuel treatment decisions by land and resource managers at DoD installations in the Pacific. Twelve, 2500 square meter (0.6 acre) plots were set up in Guinea grass dominated training areas on MCTAB, to which the following four treatments were applied in replicates of three: mechanical removal, herbicide, cattle grazing, and control.

Mechanical removal of Guinea grass

Mechanical removal of Guinea grass was accomplished using a Bob Cat – skid steer. Guinea grass was pushed over, run-over, and the shovel end was run over the grubs. Koa haole trees were not intentionally removed while removing the Guinea grass; however, in the process of removing the grass, some koa haole trees, branches and twigs also broke. The fallen grass and shrub was pressed and somewhat tilled in with the dirt inconsistently throughout the plot. The large kiawe (*Prosopis pallida*) trees that occurred at the study location were not removed. The grubbed material was left in place or distributed over the plot for decomposition. It took a total of three days to apply the mechanical treatment to the three plots.

Herbicide application

A 2% solution of the herbicide 'Honcho' (EPA Reg No. 524-445) was used to spray the three herbicide plots. The chemical was hauled on site in a tanker and since all the plots were relatively close to the dirt road a long hose was used to evenly spray all ground vegetation. A total of 450 gallons of solution was used over 1.8 acres. It took a total of 1.5 days to spray three herbicide plots. Herbicides were used only by trained and certified herbicide applicators.

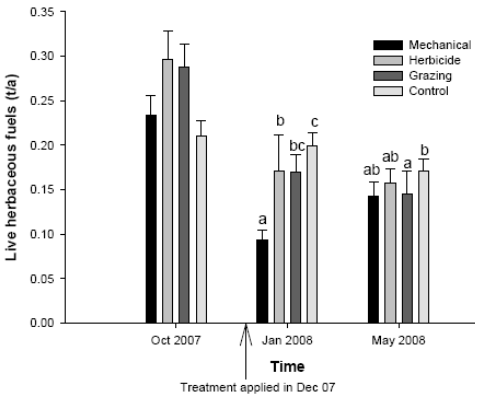
Cattle grazing

Plot # 1 on the ninth day of cattle grazing.

Due to the logistic difficulties in maintaining herds of goats or sheep, and due to their plant selectiveness, cattle were determined to be the most suitable ungulates for grazing Guinea grass on MCTAB (Mark Thorne, personal communication). The stocking rate of cattle for each of the three treatment plots was determined based on the stocking rate calculations in Thorne and Stevenson (2007). Due to logistic and budget constraints, SWCA could not apply the grazing treatment beyond 10 days. For this reason, the two fixed factors while calculating the stocking rate for each plot was the number of days (10 days) and the amount of herbaceous biomass available in each plot. Sixteen cows were used: four mature cows were introduced in plot #6, six mature cows were introduced in each of plot #1 and plot #2. The cattle were transported to the plots and allowed to graze continuously for a period of 10 days. Temporary 'field fences' were established around each of the plots to keep the cattle enclosed within the plot. A strand of barbed-wire was run around and on top of the 'field fence' to keep the cattle from pushing down on the fence. Water troughs for the cattle were provided via potable water trucked to the plots.

Results

Mechanical treatment was the fastest method of reducing Guinea grass fuel loads. However, in May 2008, Guinea grass fuel loads decreased by 6%, 15% and 24% in the herbicide, control and grazing plots respectively, but increased by 56% in the mechanical plots. Thus, it seems that the long term effectiveness of cattle grazing over the 5 months (January to May 2008) post application of treatment was better than other treatments in maintaining low Guinea grass fuel loads. At the end of the experiment in May 2008, cattle grazing plots also had the lowest fuel loads and although not statistically significant, the total fine fuel loads also averaged the lowest in the cattle grazing plots.



Live herbaceous fuel loads before and after application of the fuel treatments

Nēnē, continued from page 1

Endangered Nēnē at PTA. Photo: PTA NRO staff.

In 2009, monitoring of Range 1 was conducted four times per week, and motion-activated still cameras placed in high traffic areas produced supplemental information on the presence of the geese outside regularly scheduled monitoring visits. As a result, 72 individual geese were recorded from more than 1,700 observations during the 12-month period. On July 15, 2009, 34 individual geese were seen at Range 1, which is the largest number of geese ever observed in a single day. Comparison of older (and less intensive) observation records with those of 2009 indicate use trends to support the theory that the Range 1 complex serves primarily as summer flocking habitat, where birds come to feed, loaf, and socialize. There is no evidence that Range 1 serves as a nesting site, and very few observations occurred there after the nesting season began in October. Another marked drop in activity occurred in April and May, coinciding with the annual molting period for Nēnē on the Island of Hawaii, which further supports the notion of the site's function as a summer flocking area.

Cross-referencing band information from other Nēnē populations on the Island of Hawaii has shown that a large proportion (76%, n=55) of the birds that visited Range 1 in 2009 are from the Hakalau National Wildlife Refuge (approximately 29 km to the northeast of PTA) where the resident population numbers approximately 130 birds. The remaining birds that visited Range 1 (24%, n=17) originate from a smaller population of approximately 75 birds located in Puuanahulu and Puu Wa‘a Wa‘a (approx. 35 km to the southwest). To date, there have been no observations of birds originating from Hawaii Volcanoes National Park (HAVO, approx. 40 km to the southeast). It is thought that the HAVO sub-population of approximately 200 individuals (40% of the island population) remains localized in and around the Park, while the Hakalau and Puuanahulu birds use a wider range of habitat.

To better understand the habitat utilization patterns of the Hawai'i Island Nēnē, the NRO is collaborating with the U.S. Geological Survey to track individual Nēnē over a period of two years using GPS telemetry units. While the main focus of this project is to gain a better understanding of the role played by the newly acquired Kahuku section of HAVO, it is also expected to yield important information about available habitat on and around PTA.

In addition to monitoring at Range 1, the NRO began exploration of methods to draw Nēnē away from critical areas of the complex to enable training without interruption. A 13-acre area was fenced to exclude sheep and other mammals that may be present, and a variety of temporary and long-term attractants including shade, water, and forage were deployed within the fenced area. The site was chosen based on its proximity to the training facility, similarity of habitat, and previous observations of Nēnē there. While no birds have been observed within the exclosure to date, the fencing and attractants were not completed until October 2009, coinciding with the onset of nesting season and the aforementioned seasonal drop-off in activity at the site.

The NRO continues to fulfill the requirements set forth in a 2008 Biological Opinion prepared by the USFWS. Ongoing monitoring of Nēnē activity and periodic analysis of behavioral patterns through 2011 will help determine a final recommendation by NRO, which is expected to guide the military's approach to future use of the Range 1 complex.

This article is published with permission from the author and is adapted and an update to the article first published in the Autumn 2009 Ecosystem Management Program Bulletin on the Endangered Nēnē at Pōhakulo‘a Training Area by John T. Polhemus.

Restoration of the Upper Waikiʻi Gulch in the Keamuku Parcel at Pōhakuloʻa Training Area

By Bridget Frederick
Colorado State University

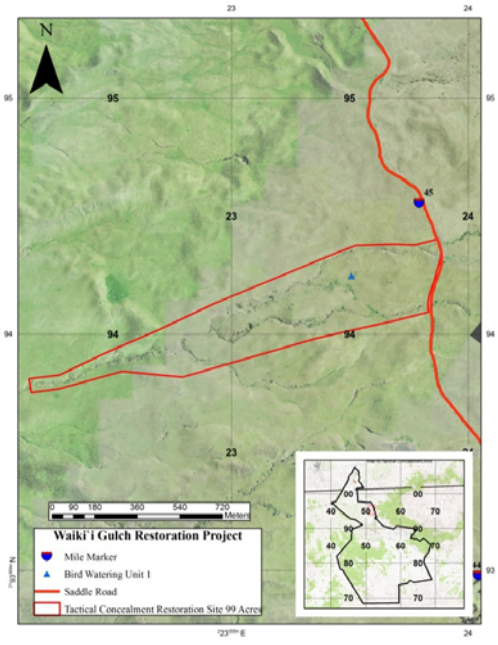
Native dryland forest on the Island of Hawaiʻi is degraded and fragmented. A healthy native dryland forest canopy reduces light and solar insolation, which leads to elevated soil nutrients, better water retention, and reduced soil temperatures, all of which serve to improve propagation of native species. Removal of the canopy via land clearing for ranching results in alien species, especially grasses, out-competing native species in the full-sun conditions in the dry, windy, and high elevation areas. As the native forest in the Keamuku Maneuver Area (KMA) at Pōhakuloʻa Training Area (PTA) was cut, trampled, browsed, and repeatedly burned, the microclimate began to change.

Remaining native dryland forest at Waikiʻi Gulch.

Moisture in this area became less available and native fauna and flora rapidly disappeared. All that remains today of the native forest in the Keamuku are trees and shrubs located in isolated inaccessible areas or above the ungulate browse line. Water is a limiting resource in the Keamuku, and restoration of the native forest will allow fog drip to reach the ground to recharge the soil moisture. By restoring the native forest, the moisture that is currently dissipated back into the atmosphere can be captured and used by native plants.

The National Environmental Education Foundation awarded the PTA Natural Resources Office (NRO) a $5,000 grant to restore the upper portion of Waikiʻi Gulch and an adjacent gulch within the Puʻu KeeKee Mauka fence unit of the KMA. These gulches converge to form a large canyon near milepost 45 on Saddle Road. This area is in the heart of the fog belt and receives significant moisture in the form of fog. Before ranching became the predominant land use in this area, a very diverse native forest once existed.

The Integrated Training Area Management (ITAM) staff will provide technical assistance to implement the project, along with volunteer support from the Big Island Bird Hunters (BIBH) and Department of Land and Natural Resources. The first step is to fence approximately 100 acres of the gulch canyon complex to create an outplanting site free of feral ungulates. Following fence construction, site preparation for vegetation control will begin. Volunteers from the Boy Scouts, school groups, and other community organizations will then plant a thousand endemic and indigenous trees, shrubs, and grasses in this attempt to reestablish the native forest habitat. ITAM will also build trails to create potential for troops to move through the area for tactical training.



Project area west of Saddle Road on Hawaiʻi Island.

This forest restoration project has several beneficial purposes. The restored area will provide improve habitat for non-endangered native birds that still can be seen and heard within the gulches. Also, the restored forest will act as a breeding ground for nonnative game birds that can populate other areas of the KMA, which will sustain recreational and hunting opportunities for BIBH members in the future. The BIBH will install a bird watering unit within the restoration site. Another purpose of this project is to provide a long-term outplanting site for public participation in restoration work. It is widely recognized that restoration of native habitat in Hawai‘i requires intensive and long-term management, and enlisting public participation will help ensure that the effort continues until the habitat returns to its original state. The site will also provide opportunities for development of research projects. A fog capture study is in the planning stages, and ITAM is seeking funding to fully implement the project. Finally, the area will be available as a potential training area, to provide troops with tactical concealment for training exercises, but no off trail maneuvers will be allowed.

The restoration of the upper portion of Waiki‘i Gulch and another adjacent gulch in the KMA is a public outreach project that will strengthen community relationships. Volunteer support is vital to long-term restoration projects such as this one. Together, NRO and ITAM, combined with public participation, will have the technical and personnel capacity to implement a restoration project that will benefit multiple users.

Mitigating disease risks in Island Foxes

By Brian R. Hudgens
Institute for Wildlife Studies

Managing species endemic to islands pose unique challenges. Island species are not exposed to the same diversity of competitors, predators, or parasites as their mainland counterparts. Consequently, island species evolve in very different ways than their closest mainland relatives. For example, while grey foxes on the mainland are almost exclusively nocturnal, island foxes are commonly active day and night. One of the most underappreciated consequences of island species isolation is that they are not exposed to the same suite of pathogens as mainland species. When a pathogen is introduced to an island, it can cause devastating losses to host species, placing them at a higher risk of extinction.

The island fox, one of the most visible denizens at Naval stations off the California coast, is particularly at risk from an epidemic. The risk faced by island foxes was brought to light when a strain of distemper virus reached neighboring Catalina Island; the virus decimated the island’s fox population, triggering the listing of the Catalina Island fox under the Endangered Species Act. The Institute for Wildlife Studies is working with the Naval Auxiliary Landing Field on San Clemente Island, and the Naval Outlying Landing Field on San Nicolas Island on a DoD Legacy funded project (Projects 06-308: *Remote Monitoring of Island Foxes*, 07-308: *Digital radio-telemetry monitoring of San Nicolas Island Foxes*) to develop optimal strategies to monitor, prevent, and mitigate the effects of infectious diseases on island foxes.

Older Island Fox adult from San Nicolas Island.
Photo: Brian Hudgens

The first step in our project was to understand natural patterns of fox mortality. We demonstrated a system of remote receiving stations, which collected daily survival checks on over 60 animals over the course of two years on San Nicolas Island. We learned that adult island foxes have low mortality rates (~5%/year) until they reach 5-6 years of age, when mortality rates increase substantially (to ~30%/year). Moreover, mortalities of young adults were always associated with human-fox interactions (e.g., vehicular trauma), while older foxes died from a variety of causes. Based on these findings, we recommended that monitoring programs focus on young adults and exclude older adults with naturally high mortality rates.

Legacy Project "*Spatial Ecology of the San Nicolas Island Fox*" (Project 09-308) takes the next step to develop a spatial model of disease spread across the islands. A critical component to this model is an understanding of how disease transmission rates are affected by fox densities. Preliminary studies on San Clemente Island suggest that some fox behaviors, such as how much area they cover from day to day and how aggressively they maintain territorial boundaries against intrusion by neighboring foxes, change with differences in fox densities. In areas with higher density of foxes, home-ranges were smaller and the number of overlapping home-ranges were bigger. We are currently monitoring sets of neighboring foxes in areas of San Clemente Island with relatively high and low fox densities to confirm these patterns and link them to contact rates (i.e., how frequently two animals encounter each other), which may ultimately determine transmission rates for many infectious diseases.

Young Island Fox adult from San Clemente Island. Photo: Brian Hudgens

Young Island Fox adult from San Nicolas Island. Photo: Brian Hudgens

Plans are to use these data to model disease transmission for the two pathogens believed to have a high risk of reaching the two islands: rabies and canine distemper. We will use the model to evaluate the effectiveness of the different proposed vaccination strategies that could prevent an epidemic. We will also evaluate how effective different monitoring strategies are at detecting a disease early in an epidemic, while most foxes are uninfected and there is time to mount an appropriate response. Finally, we will evaluate the effectiveness of different responses (e.g., vaccination, quarantining healthy animals or a combination) for minimizing the impact of an epidemic on the island fox population, and the cost to the Navy.

Strategic Environmental Research and Development Program Activities Related to Pacific Island Ecology and Management

By John Thigpen[1] and John A. Hall[2]
[1] HydroGeoLogic, Inc
[2] Office of Secretary of Defense, SERDP and ESTCP

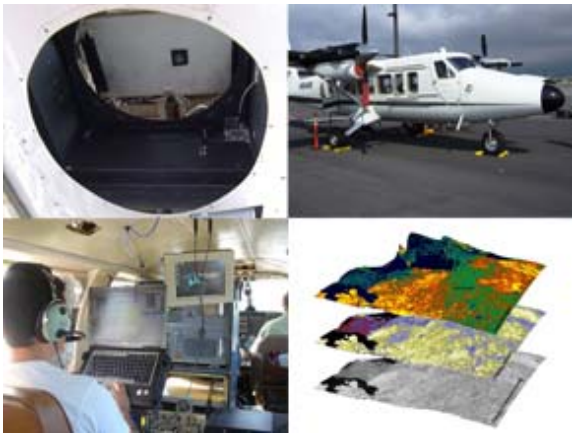
The Pacific Islands region of the United States is home to one of our planet's richest collections of biodiversity, and its arrangement of unique terrestrial and marine ecosystems offers a wealth of ecosystem services for the region. The military has long recognized the value of this region for conducting mission-related activities, as the region's geography and unique terrain offer critical training opportunities that cannot be realized elsewhere. Proper management and stewardship of this region is essential for ensuring sustainable mission activities within this region over the long-term.

A combination of both natural disturbances and anthropogenic stressors challenge the long-term sustainability of Pacific Island ecosystems. The Department of Defense (DoD) must determine how to effectively use the available land and water resources for military missions, while simultaneously conserving the species and their associated habitats within the region. This article will showcase three Strategic Environmental Research and Development Program (SERDP) projects whose results can be used to advance our understanding of the structure, composition, and function of tropical dry forests and freshwater/near-shore marine ecosystems in the Pacific Islands and their response to management interventions.

Makua Military Reservation. Photo: Pedro Morales

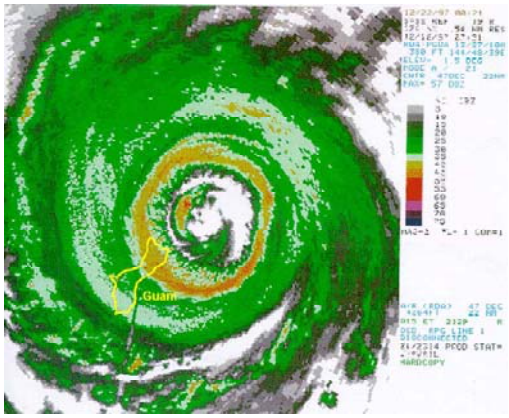
Tropical dry forests are among the most endangered ecosystems in the word. Continued invasion of these forests by non-native invasive grasses increase the risk and frequency of wildfires, thereby prolonging the system's endangerment. Dr. Susan Cordell of the U.S. Forest Service, the Institute of Pacific Island Forestry, and additional researchers from the Carnegie Institution for Science and the University of Puerto Rico are seeking ways to minimize this chronic threat to tropical dry forests through project *SI-1645: The Potential for Restoration to Break the Grass/Fire Cycle in Dryland Ecosystems in Hawai'i*. Specific objectives of their research include: (1) defining the current condition and historical changes to tropical dry forest ecosystems in Hawaii, (2) advancing the technology for regional restoration planning and ecosystem monitoring, (3) quantifying restoration potential and developing restoration prescriptions for remnant Hawaiian dry forests and shrublands, and (4) developing effective fuel and fire risk reduction measures that initiate succession of degraded grasslands into native woody communities.

Efforts to date have focused on developing a series of studies aimed at understanding the potential of native species restoration to reduce fine fuels and minimize risks associated with extensive fires and subsequent invasion by non-native species. Recent field studies have evaluated the seasonal and physiological characteristics of native and non-native plants that are common in sub-alpine systems of Hawai'i, a critical step in assessing which species are prone or resistant to fire. In addition, the project is developing historical maps of dry forest cover change, as well as state-of-the-art high resolution maps of vegetation cover, species dominance, and fire fuel cover for purposes of setting a clear baseline for potential restoration efforts. Ultimately, this research aims to provide managers with an efficient and quantitative method to assess the outcome of restoration efforts and to create opportunities for adaptive management of Hawai'i's threatened tropical dry forest ecosystems.



Carnegie Airborne Observatory (CAO) Airborne Platform and Operations: an integrated remote sensing and analysis system for large-scale studies of vegetation and ecosystems.

Dr. Jeffrey Donnelly of Woods Hole Oceanographic Institution is complementing tropical dry forest research efforts by testing a proof-of-concept that can potentially help inform appropriate restoration targets. Project *SI-1644: Understanding the Role of Typhoons, Fire, and Climate on the Vegetation Dynamics of Tropical Dry Forests: Looking to the Past to Develop Future Management Solutions* evaluated whether or not an island's sedimentary record can be used to reconstruct its vegetational history in the context of different disturbances. Specific objectives of this proof-of-concept were to: (1) use a paleoecological approach that links evidence of past changes in climate and disturbance regimes as a way to develop understanding of the dry forest ecological system's response to changing environmental conditions and to guide restoration and mitigation efforts, and (2) use a high-resolution lagoonal sedimentary record on the island of Guam to determine the role of changing typhoon activity, fire regime, and legacy land uses in driving changes to ecosystem structure and function.



Changes in the frequency of typhoon strikes, related to varying climate conditions, may have important implications for dry tropical forest ecosystems on DoD lands. Radar reflectivity as Typhoon Paka strikes Guam on December 16, 1997 is shown here.

This effort involved a significant amount of sediment coring and analysis from Guam's Cocos Lagoon and the Gues River delta. The research team found sediments in these cores dating back more than 2,700 years. The pollen and fossil charcoal found within those cores were well preserved and provided excellent proxies for vegetation history and wildfires, respectively. Results of this proof-of-concept demonstrated that sediments deposited in Cocos Lagoon over the past several millennia provide a unique opportunity to reconstruct detailed paleoecological and paleoclimatological data that can help improve our understanding of the complex interplay between climate, typhoon activity, human disturbance, and dry tropical forest ecosystems. Potential future efforts will involve actual development of these reconstructions.

Pacific Island stream and watershed resources are also at risk because of a combination of stressors, including erosion, non-native invasive grasses, and military activities. Degradation of these systems ultimately may lead to negative impacts on sensitive near-shore marine ecosystems through the fluxes of nutrients, sediment, and contaminants that reach the near-shore environment. Dr. Michael Blum of Tulane University is attempting to find new ways to monitor and assess the interaction of these systems through *project SI-1646: Development and Use of Genetic Methods for Assessing Aquatic Environmental Condition and Recruitment Dynamics of Native Stream Fishes on Pacific Islands*. This project involves developing and demonstrating genetic assays of aquatic environmental conditions, focusing on at-risk native fishes, as a means of monitoring and assessing the condition of stream ecosystems and their watersheds on islands across the Pacific. The two-phased study consists of: (1) examining ocean-island stream connectivity over broad spatial scales to determine whether local populations of native gobies draw recruits from well-mixed or local immigrant pools, and (2) examining how genetic measures of native goby population size and immigration vary according to in-stream conditions and watershed land use. In combination, these studies are intended to illustrate how patterns of genetic variation reflect in-stream and watershed conditions as well as connectivity between streams and adjoining near-shore habitats.

The Bicolor goby (*Lentipes concolor*), found only on islands in the Hawaiian archipelago, is capable of climbing sheer rock faces to colonize areas above the highest waterfalls in the state. Photo: Hawaii Division of Aquatic Resources

Preliminary results indicate that: (1) genetic diversity of native gobies varies according to both watershed land use and in-stream conditions, (2) population densities of native gobies and assemblage structure vary according to watershed land use, and (3) military activities likely do not impose any greater adverse effect on stream ecosystems than other human land uses within a watershed. The work to date demonstrates the utility of using genetic methods for tracking dispersal among populations and assessing responses to watershed land-use and in-stream conditions.

Each of these SERDP projects is generating promising results for informing appropriate long-term management and stewardship of land and water resources in the Pacific Islands region. SERDP will continue to invest in research designed to improve ecosystem-based management in this region. In addition, as these projects complete their research, SERDP will consider options for transferring newly developed restoration and monitoring approaches to DoD end users through demonstration efforts under the Environmental Security Technology Certification Program.

Targeting Pōhakuloʻa's "Most Un-Wanted": The Incipient Weed Program at Pōhakuloʻa Training Area

By Julia Parish,
Center for Environmental Management of Military Lands

In Hawaiʻi, the introduction of invasive species is a significant threat to our native plant species. A non-native plant is considered invasive if it likely to or known to cause harm, either economically or environmentally. Invasive species increase the risk of wildland fires, displace native species, and alter native habitat. They also hinder the military's ability to train and increase operations cost. According to Westbrook and Ramos (2005), invasive species negatively impact installations in four major ways: they limit training activities by reducing land availability, alter the type of training that can occur in an area because of increased fire risks or the reduction in "realistic conditions," increase operations cost, and pose a security risk or create safety hazards such as reducing the line of sight on runways.

At Pōhakuloʻa Training Area (PTA), non-native invasive species are extremely detrimental to military operations and to the viability of biological resources. An example of an established invasive species at PTA is fountain grass (*Pennisetum setaceum*), which was introduced to the Hawaiian Islands in the early 1900s. This North African grass now covers a vast portion of the PTA dryland forest. It appears to out-compete native plants for limited soil and water resources, thus hindering the ability of native species to regenerate, which ultimately alters wildland fire regimes. At PTA, the introduction of invasive plants and the management of incipient weeds are important program concerns because of the movement of air and land vehicles between the islands of Hawaiʻi and Oʻahu, and the extensive movement of vehicles and personnel throughout the PTA ranges during training activities. Locating and eradicating invasive plants immediately upon arrival and before a population can become established in an un-infested area is a critical first step towards effectively managing invasive plants at PTA. Besides the ecological advantages and the benefits for training capacity, managing incipient weeds reduces the overall cost of managing weed populations.

To identify new and potentially invasive plant populations, and to prevent the spread of high risk weed species, the Incipient Weed Program (IWP) was developed by the PTA Natural Resource Office (NRO) in 2009. This program is an important step in fulfilling related directives outlined in the 2003 Biological Opinion issued by the U.S. Fish and Wildlife Service. IWP objectives are to detect and eradicate new introductions of invasive plants before they establish, and to prevent the spread of established invasive plant populations. The program defines a plant "incipient" if it is newly discovered in an area and has not yet become invasive, but is known to be an invasive weed in a similar type of habitat. These objectives are met through implementing roadside and high-use area surveys, using written and electronic documentation regarding incipient plant locations. Chemical or manual control methods for eradication are employed once target areas are identified and prioritized. In addition to the eradication of incipient weed species, an important programmatic goal is to educate staff, military personnel, and recreational users of PTA, regarding the threats invasive non-native species pose to the installation operations, as well as to natural and cultural resources.

Field surveys indicate there are over 140 naturalized non-native plant species documented on PTA lands. Of these, almost 30 species are designated by the PTA NRO as potential incipient weed targets. Drawing on previous research and early detection efforts in place on Maui and Oʻahu, the PTA IWP implements a "target-based" early detection approach using roadside surveys and monitoring in locations of rare and endangered plant management (Areas of Species Recovery or ASRs). Two target species lists were developed from the potential incipient weed target species to aid staff during incipient weed surveys. The first is a "Five Most Un-Wanted" list of potentially invasive plant species that occur on the island, but are not currently known to exist on PTA. This list includes species such as Pampas grass (*Cortaderia selloana*) and gorse (*Ulex europaeus*). The second list is comprised of plant species that are currently known to occur on PTA and the Keʼāmuku Maneuver Area, and includes banana poka (*Passiflora tarminiana*), fennel (*Foeniculum vulgare*), and bull thistle (*Cirsium vulgare*). These potential target species currently have small population distributions, or are high-risk for dispersion, and must be prevented from spreading to ASRs.

To prioritize incipient weed management, a list of high-use areas and areas of significant infrastructure development was compiled in order to rank priority regions for roadside surveys at PTA. These regions include areas mandated by the Biological Opinion (USFWS, 2003) to be surveyed for incipient weed species. Survey areas were prioritized

Passiflora tarminiana

Foeniculum vulgare

Cirsium vulgare

according to frequency of use for military training and other installation activities, the number of public access points, and the potential for new plant introductions. Priority survey areas are ranked 1-5 by order of significance, with Priority Area 1 being an area of greatest concern. Roadside surveys began in May 2009 and are conducted on a quarterly basis throughout the year. Surveys document species introductions and common weed distributions, and provide NRO managers with a practical and accountable basis for incipient weed control. Incipient weed control at PTA also benefits other Department of Army Installations on Hawai'i Island and neighboring islands by reducing the risk of inadvertent transportation of problem PTA species to regions not yet impacted by these non-native plants.

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DoD Hosts Successful Workshop in Pacific Islands Region

By Derrick Golla and Alison Dalsimer
Booz Allen Hamilton

The Department of Defense (DoD) Natural Resources Conservation Program sponsored a highly successful, invitation-only workshop to address threatened, endangered, and at-risk species (TER-S) priorities in the Pacific Islands Region. The workshop, held 2-4 February 2010 at the Hilton Hawai'ian Village, opened with a welcome address from Deputy Director for Natural Resources, L. Peter Boice, and featured a diverse group of DoD, federal, state, and non-governmental representatives.

In the Pacific Islands region, DoD manages more than 200,000 acres of land critical to the military's testing and training mission. In Hawaii alone, DoD manages 15 military installations that harbor more than one hundred federally-listed species – 1/3 of all listed species in Hawai'i. Many other species in the region are at risk of future listing. One of DoD's top natural resources priorities is to conserve these invaluable species and their habitats, both to ensure long-term resource sustainability and to maintain military mission flexibility.

The endangered Akepa Honeycreeper is restricted to the highest elevation forests on the island of Hawai'i.

DoD's Natural Resources Conservation Program provides policy, guidance, and oversight for management of natural resources on approximately 30 million acres of military land, air, and water resources. The Program's goal is to ensure continued access to realistic habitat conditions to support the military's combat readiness mission, while simultaneously working to ensure the long-term sustainability of our nation's priceless natural heritage.

To meet DoD's Natural Resources Conservation Program goals, this workshop sought to: revisit the adaptive management priorities identified at the 2006 workshop; identify and prioritize opportunities for future investments to

benefit TER-S and their habitats on DoD lands in the region; and to bolster existing regional partnerships and establish new connections.

In June 2006, DoD hosted the first regional TER-S workshop. As a direct result of that workshop, DoD invested $6.75 million in new funding for TER-S research, monitoring, and management needs. This amount does not include the funds and contributed goods/services provided by project partners, or projects funded wholly by other groups. Together, these projects have significantly benefited and informed natural resources issues throughout the region.

The 2010 workshop opened with a plenary session that set the stage for current conditions, and highlighted a representative sample of the efforts funded from the 2006 workshop. Plenary speakers included Laura H. Thielen, Chairperson, Hawai'i's Department of Land and Natural Resources; Dr. Samuel 'Ohukani'ohi'a Gon III, The Nature Conservancy; Loyal Mehrhoff, US Fish and Wildlife Service; and Lance Smith, NOAA – Protected Resources Division.

The second day of the workshop was devoted to breakout sessions. The top priorities identified from each group were:

Terrestrial – Species and Systems:

- Restoration: ex-situ and species level
- Climate Change Assessment and Adaptation
- Information Acquisition and Management
- Interagency Collaboration

Terrestrial – Invasive Species:

- Biosecurity Workshop [focused on troop relocation to Guam]
- Biosanitation
- Managing Established Invaders
- Outreach and Education
- Monitoring
- Biocontrol

Aquatic:

- Conduct Non-Native Fish Removal Demonstration Projects
- Research Relevant to Native and Non-Native Species Interactions
- Undertake a Pacific-Wide Risk Assessment [biosecurity and invasives related]
- Improve Barrier and Diversions Management
- Identify Extent and Location of Habitat Restoration
- Develop Best Management Practices for Coral Reefs
- Map Distribution and Conduct Life History Studies for Endangered Water Birds

Endangered plants growing in one of three OANRP plant nursery facilities at Schofield Barracks. Photo: Pedro Morales

Thursday morning, many participants donned hats and boots for a half-day field trip to learn first-hand what installations are doing to help protect TER-S and how the work they do benefits the military's mission. The trip included a behind the scenes look at the Army's endangered plant nursery facility and a hike up to a scenic overlook of the Makua Valley. Led by Michelle Mansker (Chief, Natural Resource Section, U.S. Army Garrison, Hawai'i) and her team, the tour provided great examples of several on-the-ground efforts taking place at Schofield Barracks and Kahanahaiki, and potentially shed light on ideas for future projects in the region.

In all, the workshop was successful, providing DoD the project ideas it sought, and providing participants a forum for discussion and collaboration. For more information about the regional TER-S workshops and other DoD Natural Resources Conservation program areas, please visit: http://www.DoDNaturalResources.net.

Reintroduced *Pritchardia kaalae* Flowers for the First Time

By Michelle Elmore
Oahu Army Natural Resources Program

The very first *Pritchardia kaalae* to reach maturity in a reintroduction site, (where rare plants grown from seed are planted back into the wild), was observed this past year on Ohikilolo Ridge, above Makua Military Reservation on the island of O‘ahu, Hawai‘i.

This represents a milestone for conservation efforts for this species, as scientists had no prior knowledge of how long it takes these plants to flower in a natural setting. Now there is potential for reintroduced *P. kaalae* plants to begin producing offspring.

Pritchardia kaalae is an endangered palm endemic to the Waianae Mountains of O‘ahu, where only a few more than 300 known wild plants exist. This species faces a number of threats that must be addressed by conservation efforts, including non-native predators such as rats, goats, and pigs. For example, rats prey on and destroy the plants’ fruits, thereby preventing the survival of new generations of plants. Wild goats and pigs also pose a threat to the *P. kaalae’s* habitat, by trampling, uprooting, and/or grazing on seedlings or young plants.

First mature *Pritchardia kaalae* from a reintroduction site, with OANRP natural resources management coordinator Julia Lee. Photo: Kapua Kawelo, OANRP

There is paleontological evidence that *Pritchardia* species, also known as Loulu, or native Hawai‘ian fan-palms, were much more prevalent on the islands prior to the arrival of humans and rats in Hawai‘i. Prior to Western contact, the introduction of Polynesian rats by Polynesians from other island chains may have caused populations of *Pritchardia* on O‘ahu to disappear in areas uninhabited by humans. Following Western contact, additional rat species were introduced to Hawai‘i, which may have also adversely affected *Pritchardia*.

Wild *Pritchardia kaalae* at Ohikilolo, above Makua Military Reservation, Oahu. Photo: OANRP staff.

Before management of *P. kaalae* began, only mature trees were found in the wild, with no observed seedlings or immature plants. Following rodent control at Ohikilolo by the O‘ahu Army Natural Resources Program (OANRP) staff, along with fence construction around wild plant populations and goat removal, abundant seedlings began to appear around the wild plants.

In an effort to boost the numbers of *P. kaalae* in the wild, since 1999, OANRP staff have grown over 500 individuals from collected seed, and planted these seedlings in the Waianae Mountains. Part of the goal of this effort is to produce populations that will begin to reproduce on their own.

Until now, the number of years it takes for a wild *P. kaalae* plant to reach maturity, begin flowering and produce fruit was undocumented. A single plant grown from seed and planted at O‘ahu’s Waimea Botanical Garden was estimated to have flowered after seven years. Yet because this plant received supplemental water and care in cultivation, it was unknown if the number of years it took to flower would be comparable to plants grown in the wild, nourished solely by rainwater.

One of the OANRP’s field crews conducted annual monitoring of *P. kaalae* at Ohikilolo, documenting the plants’ size, health, maturity, and presence of flowers or fruits. While monitoring the *P. kaalae*, a single plant standing over 7 feet tall was discovered with flower buds.

Based on planting records, we learned that this plant was initially collected from seed in 1998 and cultivated in the OANRP greenhouse until it was reintroduced, or planted back into the wild, at Ohikilolo in December 2001.

From this discovery, we now know that it takes at least 11 years for *P. kaalae* to reach maturity following reintroduction. This is not the oldest reintroduced plant, as several others were planted prior to this individual. The OANRP staff anticipates additional mature plants will be discovered next year, along with the creation of a new generation of plants in the years to come!

Did You Know?

Pritchardia kaalae grows up to 5m tall with the characteristic large fan-shaped, or palmate, leaves. Unlike the leaves of many Pritchardia species, which are covered with dense hair, the leaves of *P. kaalae* have a waxy coating with fine rust color scales sometimes visible. Plants can have thin and papery or thick and leathery leaves. Pritchardia flowers produce nectar in a disc formed from the fused calyx of the flower that surrounds the ovary where the fruit will develop. As the flowers mature you can often see large numbers of insects visiting the flowers to remove the nectar and in doing so they serve as pollinators by moving pollen from the male to female flowers that are found in separate inflorescences. The fruit of *Pritchardia kaalae* are about 2 cm in diameter and brown or black when ripe.

First documented flower buds on a reintroduced *Pritchardia kaalae*. Photo: Kapua Kawelo, OANRP

Michelle Elmore is a natural resources management technician with RCUH/PCSU working for the Oahu Army Natural Resources Program.

DoD Supports Pollinators

Did you know that nearly 80% of the world's crops require pollination, including fruits, vegetables, chocolate, and tequila? In fact, one out of every three mouthfuls of food we eat and beverages we drink is the result of pollinator activity! An interesting fact, to be sure, but did you know that pollinators are also vital for carrying out the military mission and for preserving installation landscapes? It's true: DoD cares about pollinators and works to benefit their populations.

Pollinators help maintain a diverse environment, thereby providing realistic, and safe training conditions for soldiers. Without pollinators, native landscapes on military installations could become barren, or overrun by invasive species. In addition, many of the federally listed and at-risk species on military installations are pollinators or, in the case of plants, are dependent on pollinators; declines of these species might translate into access restrictions for military training. For these reasons, DoD recognizes that it must protect pollinators to meet its readiness and stewardship obligations.

The DoD Natural Resources Conservation Program (NR Program) has been involved in promoting pollinator and pollinator habitat conservation efforts on DoD lands for nearly a decade, and continues to be on the lookout for new ways to support these key species. For example, the NR Program sponsored a pollinators workshop at the 2009 National Military Fish and Wildlife Association Annual Meeting. The workshop discussed pollinators' status, plight, and what DoD's land managers can do to make a difference on the ground. As a result of that workshop, the NR Program's Legacy Program funded 31 pollinator projects as part of National Public Lands Day 2009, resulting in a total benefit of over $110,000 for on-the-ground habitat creation and restoration-related efforts. After such a positive response for pollinators, the NR Program created a website dedicated to all things pollinators in DoD.

For more information on DoD's work to support pollinators, please visit our website at http://www.DoDpollinators.org.

Training, Announcements & Events of Interest

Workshops, Interagency Training Announcements, and Future Events of Interest to the Conservation Community

2010 National Military Fish and Wildlife Agencies Training Workshop: March 22-27, 2010, at the Hilton Milwaukee City Center, Milwaukee, Wisconsin. This workshop provides an excellent opportunity for DoD personnel specializing in fish and wildlife management to meet and discuss challenges and solutions to managing these resources. It also affords an opportunity for DoD natural resources managers to meet with counterparts from the U.S. Fish and Wildlife Service and state fish and wildlife agencies who work on Sikes Act issues and many other areas of common concern. For details, visit the National Military Fish and Wildlife Agencies announcement at http://www.nmfwa.org/2010_Meeting/index.cfm

Sikes Act Implementation Course: March 21, 2010 at the Hampton Inn & Suites Downtown Milwaukee, Milwaukee, Wisconsin. The DoD Natural Resources Conservation: Legacy Program is sponsoring a Sikes Act Implementation course at the 2010 National Military Fish and Wildlife Association (NMFWA) Annual Meeting. This one day, advanced-level training course is intended for experienced DoD natural resources managers and operations personnel who are familiar with the Sikes Act and have prepared an Integrated Natural Resources Management Plan (INRMP). By the end of the course, you will have a better understanding of INRMP preparation, including structure, content, and sources of preparation; how to update and revise an INRMP; the difference between an annual and a five-year review vs. revision; specific resources to include; and how to monitor and track projects successfully. This interactive course provides plenty of time for questions and answers, and features instructors who are experienced natural resources professionals. For more information or to register for this workshop, please contact DoDNRConservation@bah.com.

Climate Change Tools for Adapting Management Strategies: March 22, 2010 at the Hilton Milwaukee City Center, Milwaukee, Wisconsin. The DoD Natural Resources Conservation: Legacy Program is sponsoring a Climate Change Tools for Adapting Management Strategies workshop from 8:00-12:00 on Monday, March 22, at the 2010 National Military Fish and Wildlife Association (NMFWA) Annual Meeting. This workshop seeks to inform DoD natural resources personnel, as well as range and facilities personnel whose work relates to DoD natural resources issues, about tools that can be used to help inform management strategies in light of climate change impacts. The workshop's focus will be on describing currently available tools and providing information on how and when to appropriately use them. Specifically, the workshop will:

1. educate DoD natural resources personnel about tools that are, or will soon be, available to help them adapt management activities in light of anticipated climate change impacts;
2. describe how and when to use these various tools; and
3. guide them through the use of these tools.

Invited speakers will provide a diverse look at climate change issues, providing assessments of the tools available to better handle changes resulting from our changing climate. There will be an opportunity to view posters and displays, as well as interact with speakers at the end of the session. For more information or to register for this workshop, please contact DoDNRConservation@bah.com.

International Wild Pig Conference: April 11-13, 2010 at the Crowne Plaza Hotel, Pensacola, Florida. Wild pigs have the potential to cause ecological and economical destruction far surpassing any other invasive exotic vertebrate. The International Wild Pig Conference is the only forum in the world that provides federal, state, and private stakeholders a venue to discuss biological, financial, and social implications specific to wild pig subsistence in our ecosystems. The conference will assemble experienced managers, as well as those new to the wild pig industry in a professional, educational atmosphere. Visit http://www.wildpigconference.com/ for details.

Law for Non-Lawyers (WLD2134): April 12, 2010 at the National Conservation Training Center, Shepherdstown, WV. Do you know the difference between a law, a statute, and a regulation? What are executive orders, the Federal

Register, the Code of Federal Regulations, and the U.S. Code? Using discussion and examples, this one-day session can help those with little or no knowledge of the law. Basic concepts are explained, case law is examined, and participants learn how to read and understand laws and regulations. Using the internet, course participants also access legal resources to find laws, regulations, and current court cases. Tuition is $190. It is highly recommended that this course be taken in conjunction with Natural Resource Law (WLD2122). For more information, please visit the DOI LEARN Course Public Catalog at http://doilearn.doi.gov/coursecatalog/index.cfm.

Natural Resource Law (WLD2122): April 13-15, 2010 at the National Conservation Training Center, Shepherdstown, WV. This course provides an overview of the major federal conservation laws of interest to natural resources professionals. Sessions include information on case laws that are specific to federal species and habitat protection, pollution control, and trust responsibilities. Discussions include an historical overview of the development of wildlife and natural resource laws, legal authorities and development in the courts, as well as current legal issues. Instruction is provided by lawyers and professionals in the field of natural resource law. Tuition is $570. It is highly recommended that this course be taken in conjunction with Law for Non-Lawyers (WLD2134). For more information, please visit the DOI LEARN Course Public Catalog at http://doilearn.doi.gov/coursecatalog/index.cfm.

Planning for Climate Change Using a Green Infrastructure Approach: April 26-28, 2010 at the National Conservation Training Center, Shepherdstown, WV. In this pilot course, participants will have the opportunity to plan for potential climate change impacts (storm surge/sea level rise, changes in precipitation and temperature) using a green infrastructure approach as a guide for developing effective adaptation and mitigation strategies. Through hands-on class projects using data layers for two coastal communities in the Chesapeake Bay watershed, and lectures from cutting edge experts and on-the-ground practitioners, participants will learn and experience first-hand how Green Infrastructure can facilitate climate change planning. Visit http://www.conservationfund.org/course/gi_climate_change for details.

NatureServe Conservation Conference 2010: Biodiversity Without Boundaries: Celebrating the International Year of Biodiversity: April 26–28, 2010, in Austin, Texas. The NatureServe Conservation Conference 2010: Biodiversity without Boundaries will explore the issues and solutions to these and related conservation needs on several fronts: the science behind the pressing problems, the information and expertise needed to direct decisions, the tools and methods for setting priorities and tracking progress, and the lessons learned from conservation success, collaboration, and leadership approaches. To register, visit: http://www.regonline.com/natureserve_2010.

Field Techniques for Invasive Plant Management (WLD2139): May 3-7, 2010, at the National Conservation Training Center, Shepherdstown, West Virginia. This course provides an overview of field techniques for invasive plant management. The focus of the course is to provide participants with the practical, hands-on tools and training they need to actually begin work to control invasive species infestations. Topics include: invasive plant ecology, National Wildlife Refuge System policy, mapping and monitoring, selecting appropriate treatment methods and timing regime for effective control, herbicide use and safety, and selecting and using the proper equipment. For information please visit the DOI LEARN Course Public Catalog at http://doilearn.doi.gov/coursecatalog/index.cfm.

Applied Supervision (LED6102): May 3-7, 2010, National Conservation Training Center, Shepherdstown, West Virginia. This course covers those critical skills new supervisors need to successfully and effectively supervise employees in mission accomplishment while building and maintaining a productive work environment. Course topics include transitioning into a supervisory position, roles and responsibilities, developing and motivating staff, handling difficult situations, coaching and counseling, leadership practices, change management, and a day with Human Capital representatives on classification, hiring & recruitment, performance and conduct, diversity and EEO. For information please visit the DOI LEARN Course Public Catalog at http://doilearn.doi.gov/coursecatalog/index.cfm.

Bat Conservation International 2010 Field-training Workshops: May 28-June 2 and June 3-8, Portal, Arizona. July 30-August 4, Tulelake, California. August 27-September 1, Barree, Pennsylvania. Learn the latest bat research techniques from veteran professionals at Bat Conservation International's (BCI) six-day workshops that blend lectures, discussions, and field trips with hands-on experience using mist nets, harp traps, radio tracking gear, and

bat detectors. BCI biologists, local colleagues, and regional experts teach advanced capture techniques, safe and humane bat-handling, and species identification. Lectures cover habitat assessment, conservation challenges, management, conflict resolution, and much more. Because of the threat of White-nose Syndrome, participants at all BCI workshops will learn and follow approved decontamination guidelines. These intense sessions are invaluable to researchers, wildlife professionals, educators, consultants, and serious bat aficionados. The $1,395 fee covers course materials, lodging, meals, and field transportation. For registration, visit www.batcon.org/workshops or contact Rebecca Patterson at (512) 327-9721 or workshops@batcon.org.

Plant Invasions: Policies, Politics, and Practices: June 1-4, 2010 at the National Conservation Training Center, Shepherdstown, West Virginia. Weeds Across Borders is a biennial international conference covering the interests of professionals and organizations involved in weed management and regulation. It is composed of an affiliation of organizations from Canada, Mexico, and the United States with a common interest in sharing information and promoting weed management throughout North America. Because weeds do not respect human-imposed laws or boundaries, we rely on partnerships, information sharing, and cross boundary program coordination. The conference provides a forum for educating, sharing, and disseminating knowledge about weed management, regulatory issues, and concerns regarding weed dispersal across and between jurisdictional boundaries in Canada, Mexico, and the United States. Visit http://www.weedcenter.org/wab2010/ for details.

Bat Conservation International Acoustic Monitoring Workshop: August 5-10, 2010, Tulelake, California. Designed for biologists, consultants and researchers, Bat Conservation International's Acoustic Monitoring Workshop provides direct experience with cutting-edge technologies. You'll work directly with AnaBat/AnaLook and SonoBat software developers Chris Corben and Joe Szewczak to learn techniques for collecting, recording, and analyzing bat calls in the field. This session covers heterodyne, frequency-division, time-expansion, and direct-recording techniques, as you learn to use your own equipment more effectively and to choose proper protocols for designing an acoustic-inventory project. The fee of $1,595 covers course materials, food, lodging, and transportation in the field. For registration, visit www.batcon.org/workshops or contact Rebecca Patterson at (512) 327-9721 or workshops@batcon.org.

37th Annual Natural Areas Conference: Connecting for the Future Across Generations and Disciplines: October 26 - 29, 2010 at Tan-Tar-A Resort, Osage Beach, Missouri. This national conference will bring together natural resources professionals, students, and volunteers in a forum that provides practical, land management focused information through symposia, workshops, field trips, paper sessions, posters, round tables, and opportunities for social networking. The progressive conference program will connect new tools, places, and faces amongst a diverse audience of land managers, university faculty and students, researchers, planners, and administrators from throughout the nation who are involved with the conservation and management of natural communities. The mainstay of this annual national conference has been strong participation from local, regional, and national organizations and agencies. For more details visit: http://www.naturalarea.org/ or contact Mike Leahy at (573-522-4115, ext. 3192) or mike.leahy@mdc.mo.gov.

CALL FOR POSTERS! 5TH National Conference and Expo on Coastal and Estuarine Habitat Restoration: "Preparing for Climate Change: Science, Practice, and Policy": November 13-17, 2010, at the Galveston Island Convention Center, Galveston Island, Texas. This is the only national conference that focuses exclusively on coastal habitat restoration. Healthy coasts and estuaries are essential to the social, economic and ecological well being of everything that depends on them. Successful habitat restoration at all scales is critical to ensuring vibrant coasts. For more information please visit https://www.estuaries.org/conference/.

Recent Natural Resources Documents Online

Reports, Fact Sheets, Photos, Videos

This section highlights recently uploaded reports and factsheets on the Legacy Tracker or on the DENIX website. For Legacy related products, please visit https://www.dodlegacy.org/Legacy/intro/ProductsList_NU.aspx. All Legacy products and many more are available at https://www.denix.osd.mil/portal/page/portal/denix/environment/NR. In addition to these two websites, bird-related products are also posted on http://www.DoDPIF.org.

Evaluation of State Comprehensive Wildlife Conservation Strategies: (Legacy 06-300) A series of workshops held to determine methods to integrate State Wildlife Action Plans (SWAP) and Integrated Natural Resource Management Plans (INRMP). https://www.dodlegacy.org/Legacy/intro/ProductsList_NU.aspx

Factsheet: DoD Invasive Species Outreach Toolkit: (Legacy 08-415) Development of a nationally-relevant yet regionally-based toolkit that provides information and outreach materials and templates for installation natural resource managers. https://www.dodlegacy.org/Legacy/intro/ProductsList_NU.aspx

Listed Plant Species Evaluation: (Legacy 07-368) This Legacy-funded project evaluates the status of existing ex situ plant material of 185 federally listed and candidate plant species occurring on DoD sites. The resulting report details the species and accompanying species information with existing ex situ plant material, existing ex situ plant material from multiple collection sites (DoD and non-DoD), and species without ex situ plant material. The species information will facilitate setting priorities, budgets, and planning for any future ex situ work by individual DoD services and on specific DoD installations. https://www.denix.osd.mil/portal/page/portal/NaturalResources/ThreatenedEndageredandAtRiskSpecies/FederallyListed

Fact Sheet: Support Southwest Strategy Threatened and Endangered Species Program Managers (TEPM) Team: (Legacy 05-258) The Southwest Strategy (SWS) provides an opportunity for DoD and other land-management agencies in Arizona and New Mexico to address issues of shared importance, such as management of federally listed species and species-at-risk. In 2000, a SWS workgroup was formed to develop and implement strategies for streamlining Endangered Species Act section 7 consultations and species management in New Mexico and Arizona. This group was first called the Threatened and Endangered Species Program Manager's (TEPM) Team, and is now the Southwest Endangered Species Act (SWESA) Team. https://www.denix.osd.mil/portal/page/portal/NaturalResources/ThreatenedEndageredandAtRiskSpecies/FederallyListed

Establishing American Chestnut Test Orchards on Two TN Army National Guard Installations: (Legacy 08-401) American chestnut (*Castanea dentata*) was once one of the dominant trees in the eastern forests of the United States. By 1950, this keystone species on an estimated 9 million acres of eastern forest had all but vanished as a result of blight infection. The purpose of this project was to contribute to the efforts to develop a blight-resistant American chestnut that may be reintroduced into its former habitat across the eastern United States by establishing seed orchards on two Tennessee Army National Guard facilities: VTS-Milan and VTS-Catoosa. This report describes the methodologies in producing the crosses and establishing the orchards. Deliverables for this project included a report, fact sheet, brochure, and slide show, all of which can be found at https://www.denix.osd.mil/portal/page/portal/NaturalResources/OtherConservationTopics(A-H)/HabitatRestoration

Proof of Concept of The Range Ignition Probability Tool: (Legacy 07-374) Wildfires resulting from military training pose a significant threat to training realism and land use capabilities, natural and cultural resources, infrastructure, and human/soldier safety. Assessing incendiary munitions wildfire risk and determining best management practices requires accurate information about where fires are likely to start as ignition location can make a dramatic difference in fire outcomes. The RIP Tool is designed to fill the information gap caused by the lack of actual ignition location data. https://www.denix.osd.mil/portal/page/portal/NaturalResources/OtherConservationTopics(A-H)/Disturbance

Photo of the Month

Capturing the beauty of our natural resources

March 2010 Photo of the Month Winner!

Kilauea Crater, Kilauea Military Camp on the Big Island, Hawai'i.
Submitted by *Natural Selections* reader: Steve Manning

From the Archives—An Enduring Legacy

Legacy Project 9200227 Watchable Wildlife Trail: Columbus AFB received Legacy funds in 1992 to establish nature trails on base. Soon thereafter, the base established the trails and created signs for the trails that included some description of the routes. In 2007, two plant taxonomists visited the trails and they identified 69 plants/trees. In turn, the base developed a trail guide, which included identification of the 69 plants/trees. The guide book is designed as a self guided tour of the trails and contains descriptive information of the trees/plants along the trails. In 2009, Frank Lockhart, Conservation Manager with the 14 CES/CEAN, nominated the trails to be a Certified Arboretum with the Mississippi Urban Forestry Council Certification Program. The state recognizes Nature Trail/Garden Arboreta as a category that educates the public about different tree species and identification. As a result, Columbus AFB is now a Certified Arboretum!

Did You Know?

Little Did You Know Conservation Could Be So Much Fun!

Their big hearts will capture your love… and detect your snakes! Jack Russell Terriers are first and foremost a working dog, and known for being very friendly, curious, and intelligent. Originally bred to bolt fox from their dens during hunts, they are used on numerous ground-dwelling quarry such as groundhog, badger, and red and grey fox. The working Jack Russell Terrier is required to locate quarry in the earth, and then either bolt it or hold it in place until they are dug to. To accomplish this, the dog must bark and work the quarry continuously. Jack Russell Terriers tend to be extremely intelligent, athletic, fearless, and vocal dogs. It is not uncommon for these dogs to become moody or destructive if not properly stimulated and exercised, as they have a tendency to bore easily and will often create their own fun when left alone to entertain themselves.

Their high energy and drive make these dogs ideally suited to a number of different dog sports such as flyball or agility. The small white-fox working terriers we know today were first bred by the Reverend John Russell, a parson and hunting enthusiast born in 1795. In his last year of university at Oxford, he bought from the milkman a small white and tan Terrier female called Trump; purchased based upon appearance alone. She was the basis for a breeding program to develop a terrier with high stamina for the hunt as well as the courage and formation to chase out foxes that had gone to ground. An important attribute in this dog was a tempered aggressiveness that would provide the necessary drive to pursue and bolt the fox without resulting in physical harm to the quarry, effectively ending the chase, which was considered unsporting.

Trained in detection and search for Brown Treesnake hidden in cargo

As one of a few breeds of dogs capable of detecting brown treesnake, specially trained Jack Russell Terriers are employed to detect any brown treesnake that may hide in outgoing cargo or in military aircraft. At Andersen Air Force Base, Guam, Wildlife Services, a part of the U.S. Department of Agriculture's Animal and Plant Health Inspection Service, conducts operations on Guam aimed at keeping brown treesnake from reaching other destinations when they occasionally stow away in cargo leaving Guam. Unless intercepted, the species may become established on other islands. Brown treesnake have already been found in Hawaii, Saipan, Rota, the mainland United States, and many other locations; a small population may already exist on Saipan, and the Jack Russell Terrier plays a major role in keeping the brown treesnake out of our cargo containers.

Sarah, a Jack Russell Terrier, is inspecting outgoing cargo in Guam; handler Billy Raphael, assisting.

The Jack Russell Terrier's ability to spot stowaway snakes is really remarkable and its importance and potential impact are immeasurable; for obvious reasons the support and implementation of this monitoring program must be relentless. James Stanford, U.S. Geological Survey Rapid Response Team Coordinator, Guam, published an article about his experiences as the Rapid Response Team Coordinator. Mr. Stanford shares with us what happened the morning of September 12, 2005 and his story clearly illustrate how much we need our Jack Russell Terrier's help in keeping the brown treesnake from reaching other islands in the Pacific and beyond:

> *12 September, 2005 — With training completed for the time being, the Hotline rings again, as if on cue. It is early morning and as I try to unscramble my brain, I hear a distant but friendly voice telling me that the caller has run across one of "my" snakes in Oklahoma. Oklahoma! I am now wide awake. It turns out that a brown treesnake somehow managed to enter a shipping container that left Guam several months previously and arrived safe, secure, and alive at a military base in Oklahoma. Unluckily for the snake, the individuals opening the container spotted it and recognized it as something that they did not want to get loose. It was promptly dispatched.*

This section is dedicated to the memory of Billy Raphael, USDA inspector who passed away last summer. Excerpts of this month's Did You Know? are from http://www.wikipedia.com, http://www.aphis.usda.gov/publications, and http://www.fort.usgs.gov/StalkingSnakes.

Links of Interest on the Web

Useful URLs

DoD Natural Resources Conservation Program: http://www.DoDNaturalResources.net The DoD's NR Program provides policy, guidance, and oversight for management of natural resources on all land, air, and water resources owned or operated by DoD.

DoD Legacy Resource Management Program: https://www.dodlegacy.org DoD program that provides funding to natural and cultural resources projects that have regional, national, and/or multi-Service benefits. The Legacy Tracker lets you download fact sheets and reports for completed Legacy funded projects.

DoD TER-S Document Repository: http://www.nbii.gov/portal/community/Communities/Ecological_Topics/Threatened_&_Endangered_Species/DoD_TES_Document_Repository/ A compilation of DoD Threatened and Endangered Species documents and data made available online through National Biological Information Infrastructure. The information contained within these documents is considered "gray" literature (i.e., not peer reviewed).

Biodiversity Handbook: http://www.dodbiodiversity.org On this website you will find a thorough introduction to biodiversity and how it applies to the military mission; the scientific, legal, policy, and natural resources management contexts for biodiversity conservation on DoD lands; and practical advice from DoD natural resources managers through 17 case studies. A Commander's Guide to conserving biodiversity on military lands is also available.

DoD Partners in Flight: http://www.dodpif.org The DoD PIF Program supports and enhances the military mission while it works to develop cooperative projects to ensure a focused and coordinated approach for the conservation of resident and migratory birds and their habitats.

DoD Pollinator Workshop: http://www.DoDpollinators.org Provides an overview of pollinators and the reasons they are important to DoD. This website highlights the 2009 NMFWA workshop on pollinators, and has many useful resources, including factsheets and technical reports, pocket guides to identifying pollinators, and links to other websites on pollinators.

DoD Invasive Species Outreach Toolkit: http://www.DoDinvasives.org To help installation natural resources managers protect the natural resources on our nation's military lands, the Legacy Program funded the Invasive Species Outreach Toolkit. The Toolkit is an education and outreach tool to help DoD land managers communicate about invasive species. It contains modifiable outreach materials such as posters, brochures, reference cards, and a PowerPoint presentation. A list of resources to help identify information and funding sources is also included.

DENIX: https://www.denix.osd.mil DENIX is an electronic environmental bulletin board that provides access to environmental information, such as Executive Orders, policies, guidance, INRMPs, fact sheets, and reports. This website is under reconstruction. We will advise you when it is fully operational. In the meantime, we suggest you visit these other natural resources links.

DISDI Portal: https://rsgis.crrel.usace.army.mil/disdicac (DoD only, CAC required) The DISDI Portal offers high-level geospatial data on DoD's installations, providing strategic maps of installations and information on how to access more detailed data. IVT data forms the foundation for the DISDI Portal, which is accessible to DoD staff with a common access card.

Strategic Environmental Research and Development Program (SERDP): http://www.serdp.org/ SERDP identifies, develops, and transitions environmental technologies that relate directly to defense mission accomplishment.

Environmental Security Technology Certification Program (ESTCP): http://www.estcp.org/ A DoD program that promotes innovative, cost-effective environmental technologies through demonstration and validation at DoD sites.

Cooperative Ecosystem Studies Unit Network (CESU): http://www.cesu.psu.edu/ This network of 17 cooperative units provides research, technical assistance, and training to federal resource and environmental managers. DoD is a member of 12 units of the CESUs National Network.

Bat Conservation International: http://www.batcon.org BCI, based in Austin, Texas, is devoted to conservation, education, and research to protect bats and their ecosystems around the world.

PARC - Partners in Amphibian and Reptile Conservation: http://www.parcplace.org/ Partners in Amphibian and Reptile Conservation (PARC) is an inclusive partnership of individuals and entities dedicated to the conservation of amphibians and reptiles (i.e., herpetofauna) and their habitats as integral parts of our ecosystem and culture through proactive and coordinated public/private partnerships.

Contact Us

Who we are and where to find us!

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For additional information about DoD's Natural Resources, please contact the Deputy Director, Natural Resources or the DoD Natural Resources Conservation Staff.