



Natural Selections

Legacy Program Update

Notification of FY 2010 Legacy Projects pending:

We have successfully resolved our unanticipated contracting difficulties. We will announce our new contracting office and our FY 2010 project list shortly. The full list will be posted and updated periodically on the Legacy Tracker at <https://www.DoDLegacy.org>.

FY 2011 Pre-Proposals Due to the Legacy Office no later than Friday, June 18, 2010:

The Legacy Program plans to announce its call for FY 2011 preproposals the week of April 26. The descriptions for many Areas of Emphasis have changed! Please check the new wording, the submittal timeline, and program guidelines on the Legacy Tracker. Visit the website's Info and Guidelines page for details.

Legacy Project 05-255 Desert Tortoise Head Start Project:

In 2002, five predator-resistant portable enclosures, or Head Start pens, were installed on Edwards Air Force Base, California. These pens were located on the Precision Impact Range Area in the south central portion of the base. Because of the projects timing, the pens were not used immediately.

Edwards AFB was selected as a study site, in part, for its stressed environment (upper respiratory track disease, or URTD, is present), declining adult population, and low recruitment levels. Edwards AFB also was selected as a proposed site because of its large expanses of suitable desert tortoise habitat. This includes over 60,000 acres of critical desert tortoise habitat within the Fremont Kramer recovery unit. Two questions were of particular interest to DoD was to answer the question of what is the shortest amount of time needed to hold juvenile tortoises within these pens until they are reasonably resistant to predation? Does supplemental irrigation increase the available food within the pens and decrease the amount of time needed to house these animals?

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In The News

DoD Partners in Amphibian and Reptile Conservation Strategic Plan

By Robert E. Lovich¹, Chris Petersen¹, Michael Lannoo², Priya Nanjappa³ and Ernesto Garcia⁴

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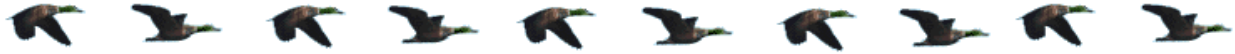
In recent years, amphibian and reptile populations have declined throughout the United States. In 2009, the DoD Legacy Resource Management Program funded the development of a strategic plan for the newly emerging DoD Partners in Amphibian and Reptile Conservation (PARC) Program. The goal is to produce a plan that provides an overview of this new initiative and benefits to herpetofaunal conservation that can be implemented through a partnership-based strategic plan.

Strategic planning for conservation and management of natural resources is a key element in the operation of the

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Report from Milwaukee

Spring and its flurry of new growth and renewed activity had not arrived in Milwaukee when I landed March 21 for the week-long National Military Fish and Wildlife Association (NMFWA) Training Workshop and North American Wildlife and Natural Resources Annual Conference. However, the shock of moving from mid-80s to rooftop snow in a few hours was soon forgotten within a blizzard of far-ranging conversations and presentations. If you were unable to attend – or even if you did attend – I'd like to share my thoughts on some of the week's highlights.

Continuing and Expanding Partnerships

NMFWA's DoD Plenary Policy Session highlighted two important ongoing partnerships. First, the informal partnership between OSD and NMFWA continues to provide top-rate information-sharing and discussions between my office and DoD's natural resources managers. OSD's role continues to expand with the offering of technical papers, workshops and courses. Second, I was pleased that Gary Frazer, Assistant Director for Endangered Species, USFWS, and Paul Schmidt, Assistant Director for Migratory Birds, USFWS, were able to join me at the podium. The USFWS is an invaluable federal partner for DoD, and it was important not only that Gary and Paul were able to share their thoughts, but also that they were able to hear about some of the complex challenges facing our managers, including the emerging conflict regarding management of a species of concern (the gull-billed tern) and a federally listed species (the western snowy plover). Another issue that both Gary and Paul raised – and a continuing theme of the week – was Landscape Conservation Cooperatives (LCCs).



LCCs could provide DoD with important new opportunities to enter into regional ecosystem-based partnerships. We had a number of hallway conversations on the issue, and already have followed up back in DC in separate meetings with the National Wildlife Refuge Association, the Department of the Interior's Military Liaison, and The Nature Conservancy.

I also was pleased to participate in the DoD-Forest Service Partnership Workshop: Conservation beyond Borders. This workshop was the first-ever joint session that our agencies have held at the North American. Among the potential opportunities for new partnership opportunities we identified were working together in regions of mutual interest that are experiencing declining populations of bats or herpetofauna, and ways to enhance existing partnerships related to invasive weeds. Also, Mike Ielmini, Forest Service's national invasive species program coordinator, provided an update of their current invasive species priorities and activities to the NMFWA's Invasive Species Working Group.

Yet another expanding partnership prompted by a hallway conversation is with the USFWS National Conservation Training Center (NCTC). We've already followed up on that conversation with a visit to NCTC's Director, Jay Slack, and his key staff at their lovely West Virginia campus. As a result of that meeting, we have initiated steps to improve Web links, identify existing courses of potential interest to DoD natural resources managers, and will provide DoD-based natural resources case studies and other information for incorporation into existing NCTC courses.

Training

While partnerships dominated much of the week, I'd be remiss not to mention several other highlights. Through Legacy, the DoD NR Conservation Program has been able to provide funding to my Booz Allen support team to expand the training opportunities we can offer at the NMFWA meeting and other conferences. Last month, we provided a:

- Sikes Act Implementation course. More than 30 DoD and USFWS personnel participated in the BETA offering on a "March Madness" Sunday. We had excellent feedback both on the course itself and the draft new INRMP Implementation Manual.
- Climate Change Tools for Adapting Management Strategies Workshop. Nearly 100 natural resources managers attended, including about 40% from partner agencies. The workshop provided tools for adapting management strategies in light of anticipated climate change impacts.
- Hands on demonstration of our DoD Online Invasive Species Outreach Toolkit.
- Please see our workshops website for information on these and other training and workshop events my program is sponsoring: <http://www.dodworkshops.org/CC-Home.html>.

Finally, we are working with Partners in Amphibian and Reptile Conservation (PARC), NAVFAC and others to develop a new DoD PARC Strategic Plan. Priya Nanjappa (Association of Fish and Wildlife Agencies, AFWA) provided me with the opportunity to solicit feedback and participation from the AFWA Amphibian and Reptile Subcommittee.

As usual, the NMFWA/North American proved to be incredibly exciting and exhausting. I'm encouraged by the amount of follow-up we've already made, not only on last month's items, but in planning for Kansas City in 2011. Springtime -- an exciting time to do policy in DC!

ATTENTION!

In support of the new DoD Partners in Amphibian and Reptile Conservation (PARC) initiative we are asking installation natural resource managers to submit their reptile and amphibian species list. This information will be used to support and further the goals of DoD PARC and will assist DoD in establishing baseline level information on herps located on military installations.

Reptile and amphibian lists can be sent to Todd Wills at Wills_Todd@bah.com. Installations are asked to provide both common and scientific names if available.

Legacy, continued from page 1

The Head Start pens are located in the south central section of Edwards AFB on the Precision Impact Range Area. Each pen is circular in design with an area of 2,900 square feet. The pens are constructed of chain link fencing with a plastic netting mesh material for the roof and a fine metal mesh at the bottom to exclude predators. These pens can be stand-alone or attached in a cluster formation. Both the Head Start pens and isolation pens were installed by base volunteers and project researchers from UCLA in a way that excluded most of the animals from entering or exiting the pens. Small mesh material was attached at the base of the pens and also buried subsurface to prevent animals from burrowing into or out of the pens. Artificial burrows were constructed in both the isolation pens, as well as the Head Start pens to provide shelter for the desert tortoises.



One of Five Head Start Pens at Edwards AFB.

Once a female was located, she was x-rayed (using a portable x-ray machine) to determine her reproductive status (eggs present or not) and given a full health exam. When each female's reproductive status was determined, individuals showing eggs were transported to and placed in the individual isolation pens where they were tested for URTD and herpes viruses.

After placement, the tortoises were monitored weekly until they deposited their eggs. Confirmation that a nest was constructed and eggs deposited within the nest was confirmed by two methods: change in the animals' weight and an x-ray to confirm the eggs were no longer present within the animal. After females deposited their eggs, they were returned to their original capture location and the cycle repeated the following year. When neonates emerged in the fall (late August to early October), individuals were marked both on the plastron and carapace; and an individual number assigned to each animal. Also, each individual was carefully weighed and measured. All hatchlings were held within the pens at least one year before release.

In addition to placing animals into the Head Start pens, a second component of this experimental study was performed concurrently. This involved artificially watering half of the non-diseased pens. The non-diseased pens were subdivided into four sections and half of the pens were artificially watered using a water truck, hose, and impulse sprinkler head twice per year. This artificial watering of the pens simulated approximately one inch of natural rainfall at each application. Water was applied by sprinklers to the pens when local annual plants begin to desiccate. The hypothesis for the experiment was that applying small amounts of water to annual plants would extend the growing season, extending the forage available to juvenile tortoises, allowing the animals to gain more energy for growth.

The two watering events were applied to half of the clustered pens simulating a total of two inches of natural rainfall. This artificial water extended the annual plants' lifespan several weeks, allowing for an extended forage season for juveniles, and also allowed the animals to obtain water if they desired. These waterings did not stimulate germination of any new plants, but only prolonged existing plant species. Waterings were conducted in late spring (one in May and one in early June). Health indices were conducted on all animals, both on the watered side and non-watered side (dry side) of the pens throughout the year.

Data indicate that animals in the half of the pen that received an additional two inches of artificial rain had dramatically increased growth rates over non-watered animals. This additional two inches of artificial rain increased overall natural "precipitation" by 20 percent on the artificially watered side. Growth rates were more than doubled in the watered side of the pen compared to the non-watered side.

Of the 19 adult female tortoises placed in the Head Start pens in 2003, one individual tested positive for URTD, three tested positive for herpes, and 15 were non-diseased animals. A total of 40 eggs were deposited in the pens in 2003, of which 32 hatched (80 percent hatchling success rate). No offspring developed from the eggs deposited from the URTD

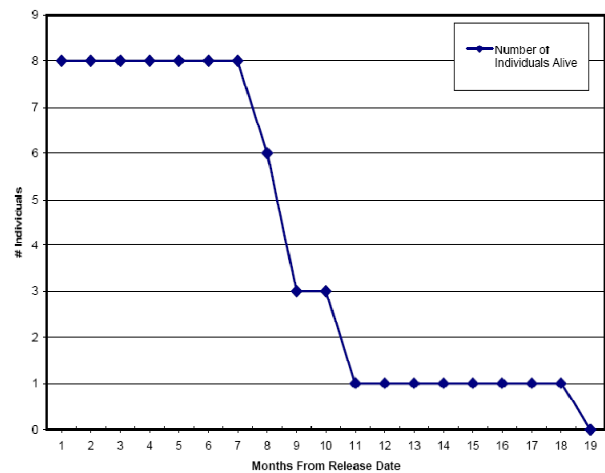
positive female. A total of 12 hatchlings emerged from the eggs laid by the herpes positive females, and 20 non-diseased hatchlings emerged from eggs laid by the non-diseased adults. All 2003 offspring were held in the pens until the fall of 2004, at which time only 20 animals remained. Of the 20 animals that remained, 12 were from non-diseased mothers and 8 were from herpes-positive mothers. Researchers determined that the eight one-year-old



A Desert tortoise hatchling inside one of the head starting pens.

herpes-positive offspring would be released in the fall of 2004. The remaining animals would remain in their pens for future releases. The yearlings were weighed and measured, and a radio transmitter and Passive Integrated Transponder (PIT) tag were attached to their carapace. On 29 September 2004, the eight animals were evenly dispersed just outside the pen enclosure. Placement was made to reduce homing behavior in the animals. The tortoises were placed in naturally-occurring, unoccupied rodent burrows at the base of creosote bushes. Scientists radio-tracked the animals weekly. Most animals stayed relatively close to their original release location; however, a few did move up to 82 feet away.

The eight one-year-old desert tortoises survived at least seven months in the wild after their initial release. Two died from predation. Four died from unknown reasons, but were not predated (most likely environmental factors) as their bodies were intact, showing no sign of predation; dead tortoises were also found within the pens, indicating that freezing most likely killed these animals as well. The remaining two animals' transmitters failed and they could not be located after several extensive searches of the area. These animals are likely dead from predation, because the animals were never found after their transmitters failed, even when other juvenile tortoises were observed aboveground. Of the eight yearlings that were released, only one individual survived more than a year in the wild, until it died of predation 19 months after its release.



Survival of Released Yearling Desert Tortoises over Time.

From the data gathered during the yearling release, researchers determined that a variety of factors resulted in the mortality of the juveniles. It appears that first-year tortoises released into the wild do not fare well when released. However, predation does not appear to be the only major cause of death. It appears that environmental factors such as freezing can also kill juvenile tortoises. However, due to the small sample size, this experiment should be repeated and a larger sample size used. The artificial watering experiment appears to hold promise. Growth rates more than doubled over the first year for individuals in the artificially watered side of the pen. The project also resulted in refinements to the original enclosure design. It also produced reliable methodologies for collecting gravid females, monitoring hatchlings, tagging and monitoring released animals.



Strategic Plan, continued from page 1

military. Strategies to protect the environment and benefit DoD are implemented to avoid mission conflicts. These strategies include encroachment avoidance, regulatory compliance, avoidance of species-level listings and their associated constraints, landscape continuity for wildland training exercises, aesthetic benefits, and public support for land use and operations. Strategic Plans also help raise public awareness; support habitat creation, restoration and preservation; and promote the protection and conservation of threatened and endangered species. The development of a DoD PARC Strategic Plan will provide a clear direction for action that DoD can take to improve and coordinate management of herpetofauna on its lands. For example, since the DoD Partners in Flight Strategic Plan was first published in 1994, public awareness of bird conservation and management has been heightened, habitats and bird species have been conserved, and critically endangered species have been brought back from the brink of extinction, while at the same time maintaining training opportunities and a high degree of operational freedom.

PARC was formed in 1998 in response to growing evidence of amphibian and reptile extirpations and declining populations. PARC is a recognized leader on the international conservation stage, and is widely respected for its award winning and science-based products and collaborations. PARC has also been instrumental in facilitating partnerships and stimulating communication and cooperation among governmental agencies, non-governmental conservation organizations, tribal nations, the forest products industry, the pet industry, private property owners, universities, foundations, commercial companies, and the public. PARC and DoD signed a Memorandum of Understanding in 2006; many PARC members represent DoD. The PARC network, comprised of additional concerned scientists, resource managers, and citizens, works together to achieve conservation of amphibians, reptiles, and their habitats on a local, state, regional, national, and global scale.

To develop the strategic plan, two workshops will be held in 2010, one on the east coast and another in the western United States. These workshops will gather essential DoD staff and other natural resource experts to develop the plan. The draft version of the plan will be made available for comment by the DoD natural resource community at large. It is essential that DoD natural resource personnel develop a sense of ownership in the plan, as its implementation will give all of DoD the chance to synthetically and programmatically manage and conserve herpetofauna for the first time in history.

The objective of the DoD PARC Strategic Plan is to better integrate amphibian and reptile conservation and management on the DoD landscape. The development of the strategic plan will involve the major conservation players: DoD, one of the largest shareholders in the protection and conservation of threatened and endangered species in the U.S., PARC, and other leading agencies, including the U.S. Fish and Wildlife Service, Bureau of Land Management, and U.S. Forest Service. With the comprehensive resources that PARC and these agencies brings to bear, it is anticipated that DoD will be better able to address the amphibian and reptile conservation issues while simultaneously supporting military readiness. This strategic plan will provide for enhanced conservation and management of natural resources on military installations throughout the U.S. and provide a framework for similar activities on installations throughout the world. The creation of this plan will focus on the much needed protection and conservation of this group of organisms that are disappearing faster than we can document, or in some cases comprehend.



Southern Toad. Photo: Layne Anderson

The DoD PARC Strategic Plan will be made widely available to DoD installations and personnel, with copies distributed both online as downloadable content, and as printed materials. Doing so will allow DoD natural resource staff and land managers to integrate the broad herpetological expertise of the PARC network with specific management actions, activities, and/or capacity-building opportunities on DoD installations. A comprehensive view of reptile and amphibian

conservation needs on DoD administered lands will be provided. This combination of guidance and expertise will help ensure that military readiness is not impacted as a result of degrading ecosystem health (amphibian and reptile population die-offs, declines, or extirpations).

In this time of disappearing natural resources, habitats, and species, the defenders of our great nation have the opportunity to lead herpetofaunal and landscape conservation. DoD PARC is proud to support the nation's military while accomplishing their goals of herpetofaunal conservation. We look forward to working with you to achieve the best possible outcome and implementation of this important program. *We are confident that the development of the DoD PARC Program and strategic plan will allow for enhanced training opportunities and mission readiness!*

Benefits to the military mission:

The following are some of the immediate benefits to the military mission from this proposed project:

1. Support the military mission while being a vital and supportive partner in benefiting herpetofauna.
2. Reduce population declines of common species, thus avoiding new regulatory restrictions on current mission.
3. Integrate herpetofaunal protection and conservation with existing natural resources and land management programs and Integrated Natural Resource Management Plans.
4. Improve long-term planning and efficiency and promote better integration of mission and resource requirements.
5. Provide sound scientific-based management and conservation guidelines, priorities, and objectives for reptiles and amphibians on DoD Installations.
6. Promote communication and coordination with national and local experts and working groups assisting with reptile and amphibian conservation and management.
7. Increase awareness, involvement and communication of natural resource specialists within DoD on herpetofaunal issues.



Eastern Fence Lizard. Photo: Layne Anderson

Environmental Security Technology Certification Program Demonstrates Novel Approach to Surveying Desert Tortoises Using Trained Dogs

By Mary Cablk¹, John Thigpen² and John A. Hall³

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The Mojave population of the desert tortoise (*Gopherus agassizii*) is both a federal- and state-listed threatened species. Numerous threats have been identified as contributing to the decline of the desert tortoise including disease, habitat loss, increased predation pressure, and anthropogenic stressors such as military activities. The tortoise is an icon of the Mojave Desert and as such, even though adults do not grow to much more than one foot in length and six inches in height, this southwestern desert native has the power to stop a tank.

DoD installations are challenged with conducting realistic training and testing activities while also adhering to federal and state regulations governing threatened, endangered, and at-risk species. Current practice upon encountering a desert tortoise is to halt training and testing activities until a permitted biologist moves the animal out of harm's way, this represents a sizeable expense to the military. Because of its broad range, the desert tortoise presents a significant management challenge to DoD to maintain training and testing activities at Edwards Air Force Base, Marine Corps Base Twentynine Palms, US Army Fort Irwin, Marine Corps Base China Lake, and Nellis Air Force Base while contributing to the recovery of the desert tortoise in the region.

To be able to avoid these animals, their locations must be known; yet locating tortoises, especially juveniles, is challenging. The current standard for conducting desert tortoise surveys involves visual methods in which trained surveyors traverse predetermined transects and look in burrows, probe shrubs, and follow up on other visual cues such as tracks and scat. Difficult as this is for adult tortoises, the smaller size classes (<180 mm midline carapace length [MCL]) are even more difficult to locate reliably using current surveying methods, thereby preventing a complete demographic representation of the local populations. This hampers efforts to accurately assess population status and trends.



Desert tortoise shell approximately 62 mm MCL. Ravens are known predators to small desert tortoises. This picture is taken of a carapace found in situ that shows sign of raven attack. Photo: M. Cablk.

Dr. Mary Cablk of the Desert Research Institute and Dr. Russell Harmon of the U.S. Army Research Office, in collaboration with U.S. Geological Survey researchers Dr. Ken Nussear and Dr.

Todd Esque, have demonstrated a novel and comprehensive desert tortoise survey methodology that captures the complete range of size classes through their ESTCP-funded project SI-0609: *Validation and Development of a Certification Program Using K9s to Survey Desert Tortoises*. Given that visual surveys can be problematic for finding small desert tortoises, the premise of this project was to use a dog's acute sense of smell as a mechanism for surveying, including the smaller size classes. Specific objectives of this technology demonstration project included: (1) demonstrating that desert tortoise survey dog teams (DTK9s) are effective and safe for finding juvenile tortoises in typical environmental conditions, juvenile tortoise densities, and juvenile tortoise locations; (2) assessing effects that seasonality may have on detectability; (3) demonstrating DTK9 survey efficacy under extreme high and low tortoise densities; (4) developing wildlife detection dog standards and a certification program recognized by the permitting agencies, the military, and other land managers; (5) quantifying deployment guidelines for surveying tortoises; and (6) demonstrating that the standards and certification program will yield effective, reliable, and safe DTK9s.



A desert tortoise detection dog sniffs into a small burrow not much larger than the dog's snout. The dog wears a GPS to record its track and works on-leash. The dogs do not dig at burrows. Photo: M. Cablk.

The ability of a DTK9 to detect a desert tortoise depends on two things: (1) that the odor is unique relative to all other odors in the environment and (2) that the dogs can be trained to detect the odor at the concentration levels existing in the ambient environment when the animal is present. Because the Mojave population is protected by its federal and state listing status, an additional detection criterion was introduced, namely, (3) that the dogs can detect a live animal without harming it.

Based on the results of several field deployments of DTK9 teams, refinements were made to the DTK9 Certification Standard until an acceptable performance threshold was met. DTK9 teams (both experienced and novice) were then put through the certification process and subsequently fielded to demonstrate the efficacy of the certification. The Certification Standard was shown to produce DTK9 teams that were both

effective and safe, and demonstrated that dogs can locate desert tortoises in each of their three primary locales: on the surface, under shrubs, and within burrows. In demonstration trials, certified teams found 78% of tortoises less than 110 mm MCL and more than 95% of tortoises larger than 110 mm MCL. Moreover, no 'take' incidents of a desert tortoise from harm by a dog occurred during the trials.

This project met robust performance objectives and associated success criteria, thus validating its improved cost and performance relative to traditional visual-based desert tortoise surveys. As a result, this effort has produced a verified protocol for testing the performance threshold of dog teams to be fielded for desert tortoise surveys, as well as associated strategies for maintaining dog team efficacy under low desert tortoise densities in which dog alerts may not be immediately verifiable. All of this information has been combined into a verified DTK9 Certification Standard that serves as a performance threshold for permitting individual DTK9 teams to conduct desert tortoise surveys.

A workshop is currently being planned to disseminate the findings of this project and outline deployment guidance for fielding DTK9 teams to agencies that harbor desert tortoises on their property.

This technology will allow DoD and other land managers to reduce the number of trained professionals needed to conduct desert tortoise surveys and therefore relieve much of the

monetary and staffing burdens experienced by the military under previous survey practices. Furthermore, this technology will enable accurate and complete population estimates, life tables, and demographic analyses needed to practice sound desert tortoise conservation. Ultimately, having a better desert tortoise inventory on installations will inform decisions that can minimize impacts to desert tortoises, as well as impacts to military training and testing activities.



A handler puts her dog down on an early morning break from searching for desert tortoises. The dogs wear booties on at least their front feet to minimize disturbance at burrows. Flagging is placed to mark tortoise locations and to assist in maintaining the search strategy that ensures coverage of the area.

Photo: M. Cablk.

Promoting Military Preparedness through PARC's Conservation Resources: Habitat Management Guidelines, and Inventory & Monitoring Handbook

By Ernesto Garcia¹, Priya Nanjappa², Rob Lovich³, and Chris Petersen⁴

¹ Friends of PARC

² Association of Fish & Wildlife Agencies

³ Naval Facilities Engineering Command Southwest

⁴ Naval Facilities Engineering Command Atlantic

It is widely known that amphibians and reptiles live in perilous times. Amphibians are facing an extinction crisis not rivaled since the end of the dinosaurs, and reptile populations face an equally uncertain fate with turtles in particular experiencing sharp declines. Together, amphibians and reptiles (herpetofauna) are integral components of natural ecosystems that contribute substantially towards biological diversity and ecosystem function worldwide. They also make up a significant portion of the high levels of diversity that characterize the 29 million acres of DoD landscapes. Habitat alteration, fragmentation and loss are among the major challenges facing the conservation of these species. The decline of herpetofaunal populations in the United States is likely to continue, as human populations expand, and as habitats continue to be modified. Complicating the problem of reduced and deteriorating amphibian and reptile populations, is our imperfect understanding of the complex variables related to their population status, habitat requirements, vulnerability to management activities, and responsiveness to the measures we apply to conserve them. Thus, Partners in Amphibian and Reptile Conservation (PARC) has recognized the need to provide both proactive guidance for improving the compatibility of land management practices with these animals, and survey techniques to better assess the health of their populations.

PARC's 5-book series of regionally specific management recommendations, or Habitat Management Guidelines (HMGs), uses the best science available to produce guidance that is easily understood and practical for land managers and private landowners, with specific considerations for situations in which managing for herpetofauna may not be the primary objective. The area covered by each HMG roughly follows the boundaries of PARC's five geographic regions, but is designed to apply to ecoregions that extend beyond political boundaries.

Copies of HMGs for the Southeast, Northeast, and Northwest regions of the United States were acquired under DoD Legacy Project # 09-424, and distributed to military installations within the respective regions. The Midwest and Southwest Guidelines will be available in summer and winter, 2010, respectively.

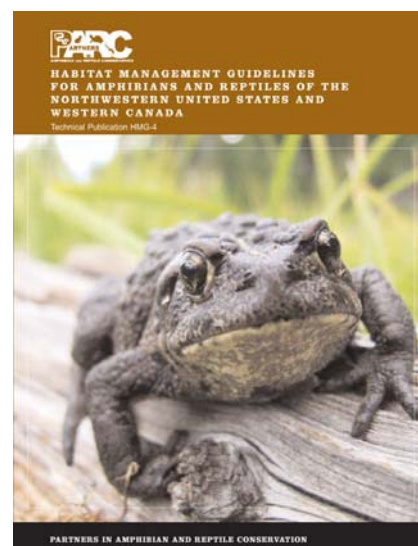
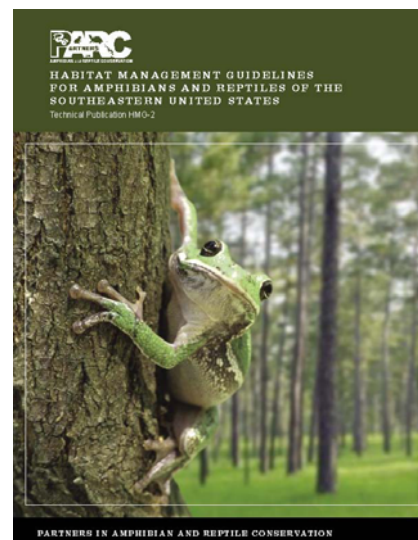
Objectives of these guidelines are highly compatible with DoD biodiversity and military preparedness objectives:

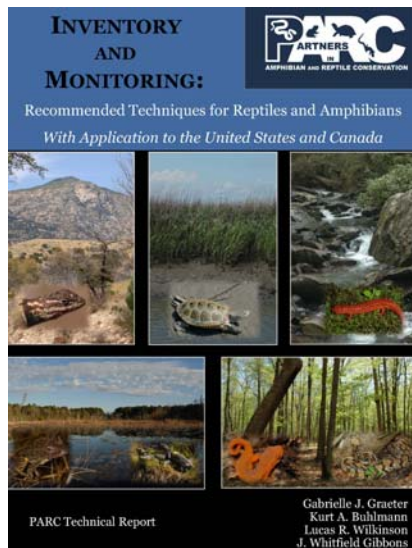
- to keep common species common
- to stem the decline of imperiled species
- to provide guidance on the management and restoration of amphibian and reptile habitats while benefiting many other wildlife species
- to reduce the likelihood of species becoming listed as threatened or endangered.

Featured in each of the HMGs are three major components: 1) a complete list and description of amphibian and reptile habitats found in a given region and the species associated with them; 2) a description of threats to habitats and species; and 3) conservation recommendations. Recommendations include measures for "Maximizing Compatibility" with existing land management objectives, and alternately, measures for creating "Ideal" conditions for reptiles and amphibians when optimal herpetofaunal diversity and abundance is the primary objective. The application of this guidance by natural resource specialists on DoD installations will be increasingly relevant as they revise and implement integrated natural resource management plans, and integrate their conservation activities with the DoD PARC Strategic Plan currently under development.

Equally important to conserving amphibian and reptile habitats is an understanding of their occurrence, distribution, and population status. PARC has addressed the need for this information by developing the handbook "Inventory and Monitoring: Recommended Techniques for Amphibians and Reptiles with Application to the United States and Canada" (I&M handbook). The 400-page handbook is a user-friendly compilation of peer-recommended survey techniques for every species of amphibian and reptile in the continental U.S and Canada. It will provide land and resource managers, biologists, and others on installations across the country with the skills needed to determine what species of amphibians and reptiles occur on their lands, and to establish amphibian and reptile inventory and monitoring survey programs, if so desired. It offers rapid vs. comprehensive assessment alternatives, and provides a quick-reference "species-by-techniques" table showing all U.S. species in each row, and with columns for each technique, such that people can determine which techniques are applicable to which species and life history stage. The I&M handbook will help managers to determine baseline information and trends in abundance and distribution, to identify species or populations in need of conservation intervention, and to improve their ability to measure the success of their conservation efforts. Ultimately, it may help reduce the need for protecting species as threatened or endangered, thus promoting their persistence while supporting military readiness and the DoD mission.

Completion of the I&M handbook is expected by late summer, 2010. Funding provided by Legacy project # 09-424, has ensured that 500 copies will be provided to DoD for wide dissemination to military installations.





To further assist in the implementation and understanding of the Habitat Management Guidelines, and the I&M Handbook, PARC has developed and piloted companion training modules. These modules will provide “train-the-trainer” instruction and will facilitate the communication and implementation of regionally-specific recommendations and techniques to those who wish to benefit amphibians and reptiles on the lands they manage.

For additional information about these and other PARC conservation resources, contact Ms. Priya Nanjappa, Amphibian & Reptile Coordinator, and State Liaison to PARC, or visit <http://www.parcplace.org>.

Benefits to the Military Mission:

PARC’s Habitat Management Guidelines and Inventory & Monitoring Handbook will be relevant to DoD installations by:

1. Promoting an ecosystem approach that will ultimately help define and maintain installation-specific biodiversity and the sustainable use of land and water resources for mission and other uses.
2. Offering herpetofaunal habitat and population assessment methodologies and techniques which would benefit wildlife and habitat resource initiatives.
3. Encouraging greater awareness and involvement by both the military and the public in helping determine amphibian and reptile presence, status, and trends.
4. Supporting broad applicability within resource management initiatives in regional context (e.g., the five PARC regions covering the United States), and promoting partnerships.
5. Providing the means of improving or restoring habitats, and acquiring data that would facilitate compliance requirements under specific environmental regulations, as well as promoting more efficient and effective management, reducing the need for listing.

DoD Amphibian Disease Survey: Do Frogs Still Get Their Kicks on Route 66?

By Chris Petersen¹, Rob Lovich², Michael Lannoo³, Priya Nanjappa⁴, and Ernesto Garcia⁵

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Despite having survived for the last 300 million years, amphibian populations are experiencing precipitous declines worldwide. Extinctions and extirpations are occurring at an unprecedented rate. In fact, some biologists feel we may be at the start of a major extinction cycle for frogs, toads, salamanders and caecilians. The present decline in amphibians is the result of a number of factors, including habitat loss, habitat fragmentation, competition and predation from non-native species, increased ultraviolet radiation, climate change, and emerging diseases.



Chytridiomycosis (caused by the fungus *Batrachochytrium dendrobatidis*, or Bd) has been a major factor contributing to many amphibian population declines and extinctions. Bd was originally thought to have originated in South Africa, where the earliest record occurs in a museum specimen from the 1930s, and initially spread by the commercial trade in clawed frogs (*Xenopus*) used for pregnancy testing up until the 1960's. Recent research indicates that other mechanisms may be responsible, but one thing remains clear, and that is that Bd is having a profound impact on amphibian populations while science attempts to understand many unanswered questions. Once introduced to a site, Bd spreads through water courses, amphibian-to-amphibian contact and likely by other mechanisms that also are not yet fully understood.

Partners in Amphibian and Reptile Conservation (PARC) held the first international Amphibian Disease conference in November 2007 to share their efforts in research and management related to amphibian declines and emerging amphibian diseases including chytridiomycosis. A worldwide mapping effort began as a result of this conference, (<http://www.spatialepidemiology.net/bd/>). As this mapping effort progressed, it became apparent that little sampling had occurred on Department of Defense (DoD) installations. DoD lands (nearly 30 million acres) provide an impressive array of herpetofaunal diversity, and terrestrial and aquatic habitats. These habitats are managed using an ecosystem approach to maintain and/or restore biological diversity and sustain use of land and water resources. Testing DoD sites for Bd was identified as an important component to the North America mapping effort and equally important to evaluating the general health of amphibians on DoD lands.



PARC is a partnership of federal, state, university, industry, NGO and private sector representatives who work towards conserving amphibians, reptiles and their habitats as integral parts of our ecosystem and culture through proactive and coordinated public/private partnerships



Installations participating in the study along Route 64/66.

Three wetland habitats on each of the fifteen DoD sites were sampled three times in 2009 during the following seasons: 1) mid-spring; 2) mid-summer; 3) mid-fall. Surveys were opportunistic and included both common and protected species. A team of over 15 people comprised of PARC members, DoD biologists/environmental managers and volunteers conducted the field work for this project. A non-invasive protocol for capturing and swabbing amphibians was followed to ensure consistency in data collection and to prevent the transfer of Bd, if present, from one amphibian to another and from one DoD installation to another.

In 2009, the DoD Legacy Program funded the authors to conduct an emerging disease survey for Bd across North America. Amphibians on fifteen DoD installations located along historic Routes 64 and 66 (Virginia to California; Fig. 1) were sampled for the presence of Bd. Routes 64 and 66 were selected as a transect for this study because they bisect twelve states, 19 ecoregions (including a diversity of habitat types), and provide a coast-to-coast sampling distribution.



Amphibians were captured by hand or net, measured, swabbed and released at the site of capture. Field collected swabs were sent to a qualified lab for detection of Bd using modern polymerase chain reaction (PCR) methods to test for the molecular “signature” of the disease on all samples.

We have collected data on approximately 900 individuals of 15 amphibian species. Preliminary results (Table 1, below) show chytrid present at 9 of the 11 bases where we have results. Chytrid-positive installations include bases in Arizona (Camp Navajo), New Mexico (Kirtland and Cannon AFBs), Oklahoma (Ft. Sill and Camp Gruber), and Virginia (Radford Army Ammunitions Plant, Ft. Belvoir, NAS Oceana, and Ft. Lee). Camp Pendleton (California) and Fort A.P. Hill (Virginia) were negative for this fungus. While this may seem to be bad news, chytrid fungus may be present in populations but not pathological—there have been no reports of chytrid outbreaks to date at these bases, and amphibian populations seem to be robust despite the presence of Bd.

Table 1. Bases sampled for chytrid fungus and preliminary results.

Base Sampled	Chytrid Present	Species Sampled
Camp Pendleton, CA	No	California Treefrog, Pacific Chorus frog, Bullfrog
Camp Navajo, AZ	Yes	Tiger Salamander, Western Chorus Frog
Naval Observatory Flagstaff Station	Samples to be Processed	None detected
Kirtland AFB/Sandia Military Reservation, NM	Yes	Spotted Salamander, Tiger Salamander, Red-spotted Toad, Woodhouse’s Toad
Cannon AFB/Melrose BR, NM	Yes	Woodhouse’s Toad, Red-spotted Toad
Fort Sill, OK	Yes	Southern Toad, Bullfrog, Southern Leopard Frog, Plains Leopard Frog
Camp Gruber, OK	Yes	American Toad, Cope’s Gray Treefrog, Bullfrog, Southern Leopard Frog
Fort Leonard Wood, MO	Samples to be Processed	
Crane NWC, IN	Samples to be Processed	
Fort Knox, KY	Samples to be Processed	
Radford Army Ammunitions Plant, VA	Yes	Gray Treefrog, Spring Peeper, Green Frog, Bull Frog, Northern Dusky Salamander, Southern Two-lined Salamander, Long-tailed Salamander, Northern Red Salamander
Ft. Belvoir	Yes	Northern Cricket Frog, Fowler’s Toad, Cope’s Gray Treefrog, Green Treefrog, Bullfrog, Green Frog
Fort AP Hill, VA	No	Northern Cricket Frog, Bullfrog, Pickerel Frog, Fowler’s Toad, Southern Leopard Frog, American Toad, Green Frog, Eastern Newt
NAS Oceana, VA	Yes	Southern Leopard Frog, American Toad, Bullfrog, Squirrel Treefrog, Green Treefrog, Pine Woods Treefrog, Narrow-mouthed Toad, Green Frog, Southern Toad, Green Frog
Ft. Lee, VA	Yes	Green Frog, Cope’s Gray Treefrog, Pine Woods Treefrog, Bullfrog, Fowler’s Toad, Northern Cricket Frog, Southern Leopard Frog

With the completion of this project we anticipate answers or insight to the following questions:

- What DoD sites surveyed showed Bd present?
- Was Bd present at all three of the surveyed wetlands on each DoD site?
- Is there seasonal variation to the detection of Bd fungus?
- What species showed positive for Bd?
- Is a particular species more susceptible to Bd fungus?
- Do all Bd positive amphibians show signs of the disease?



The results of this investigation are important for many reasons. Data will directly support the efforts of DoD natural resource managers and environmental specialists by providing baseline data on the health of amphibian populations (and general health status of the ecosystem), and potentially aid in preventing population declines (thus avoiding new restrictions on current missions). The results of this investigation will also be incorporated into the ongoing emerging disease mapping project and will help researchers look at national patterns and trends of surveyed sites, die-offs and spread of this disease.

The authors would like to acknowledge this effort would not be possible without the support and assistance of many individuals across DoD.

Diversity Abounds at MCB Camp Pendleton

By Jim Asmus¹, Beth Forbus¹, and Rob Lovich²

¹ AC/S Environmental Security Office, MCB Camp Pendleton

² Naval Facilities Engineering Command

Marine Corps Base Camp Pendleton is widely renowned for its rich and diverse training environment, but the natural setting for this remarkable military training facility is equally famous for its biodiversity. The base is located on the Pacific Ocean and extends about 15 miles east which allows it to support plant communities adapted to both cooler coastal weather and the warm, dry conditions found further inland. The diversity of plant communities and geologic formations found on base, in turn, promotes the diversity of reptiles and amphibians. This 125,000-acre installation is home to 39 species of reptiles and amphibians, nine of which are California Species of Special Concern and one listed as federally endangered. Fifteen additional plant and animal species listed as federally threatened or endangered keep the Environmental Security Office busy with compliance and consultation work, yet the wildlife staff still maintains a substantial stewardship program to monitor reptiles and amphibians.

Historically, Camp Pendleton was poorly sampled for amphibians and reptiles, it was privately owned land until the 1940's, when the USMC acquired it. It was not until 1995 that a basewide monitoring program for reptiles and amphibians was initiated using established survey techniques that included pitfall trapping, cover board surveys, eye-shine surveys, and turtle trapping. The results of that work have documented 39 native herptile species composed of 9 amphibians, one freshwater turtle, 10 lizards, and 19 snakes. Some of the more common species include Red Coachwhip, San Diego Gopher Snake, San Diego Ring-necked Snake, Coronado Skink, Belding's Orange-throated Whiptail, Granite Spiny Lizard, Baja California Treefrog, California



California kingsnake, *Lampropeltis californiae*. This species is common in wildlands, and even urban areas throughout southern California. It is polymorphic, and can be found in striped and banded phases. This is a coastal banded phase, like those found aboard MCBCP.

Toad, Garden Slender Salamander, Monterey Ensatina, and Coast Range Newt. Although not initially confirmed on base, the presence of the San Diego Banded Gecko was confirmed several years later. It is likely that the California Legless Lizard also occurs on base, but they are secretive and spend so much time under the soil that their presence has never been confirmed. The California Red-legged Frog was historically found on the base, but it has been extirpated from all of southern California south of the San Gabriel Mountains.

The base hosts three species of rattlesnake. People regularly report encounters with the two most common species, the Southern Pacific and Red Diamond Rattlesnakes. However, the Southwestern Speckled Rattlesnake is much less common on base and prefers habitats with granite rock outcroppings or scattered boulders.

The heavy rains that have fallen on base this winter are a boon to animals that depend on vernal pools for breeding. Thanks to the rain, amphibians such as Western Spadefoot should have good breeding conditions this spring. Some amphibians such as spadefoots rely on ephemeral pools for breeding to avoid predation from fish and other predators commonly found in perennial bodies of water.



Blainville's horned lizard. Found on the dune systems immediately adjacent to Naval Outlying Field (NOLF) Imperial Beach, this species of horned lizard has been eliminated from much of its formerly occupied coastal sage scrub habitat by suburban development, and loss of its primary food source of native ants. Invasive Argentine Ants (*Linepithema humile*) form the largest single ant colony in the world, stretching from southern Oregon to northern Baja California, and have out competed and removed native ant species.

Pendleton in 1972. Those snakes generally are not found in the cooler waters off California, but that was an El Niño year; warmer currents traveled farther north and likely brought warmer water species with them. Furthermore, the Yellow-bellied Sea Snake does not frequent shoreline habitats anywhere in its range.

The management of reptiles and amphibians on Camp Pendleton is not limited to monitoring. When it was learned that Southern Pacific Pond Turtles inhabited several percolation ponds that were scheduled to be permanently drained, base staff trapped the turtles and relocated them to a different pond for their safety. Contracted biologists capture and remove non-native American Bullfrogs that are found on base to help reduce their populations. Other species, including federally endangered Arroyo Toads, benefit from the control of bullfrogs because the large frogs will eat almost any animal that they can capture and swallow. Camp Pendleton also contributes to herpetile research by cooperating with nearby universities and allowing researchers to study herpetiles aboard the base.

Keeping this valuable tract of southern California land in the hands of the Marine Corps has undoubtedly benefitted the native wildlife. The biodiversity that exists on Camp Pendleton, as shown by the diversity of its reptile and amphibian communities, is no accident. The Marine Corps works hard to satisfy its legal compliance obligations for natural resources laws and goes further by maintaining a vigorous natural resource stewardship program.

Camp Pendleton has implemented focused monitoring programs for two California Species of Special Concern, the Blainville's Horned Lizard and the Southern Pacific Pond Turtle. Over the last two years, biologists conducting pitfall and transect surveys have begun to estimate the abundance and distribution of horned lizards on Base. Challenges in detection of these species make for slow going, but the base is leading the region in understanding this species. Future plans include radio tagging horned lizards to determine their home ranges and movement patterns. Monitoring for the Southern Pacific Pond Turtle includes mark-recapture surveys to estimate abundance and survival.

The base has 17 miles of coastline along the Pacific Ocean which has produced several records of marine reptiles uncommon to southern California's coastal waters and not included in the tally above. Recent and historical records have confirmed four species of sea turtles that have stranded on Camp Pendleton's beaches: Green, Olive Ridley, Loggerhead, and Leatherback Sea Turtles. The sea turtles, however, do not nest on the base. An even rarer visitor, a Yellow-bellied Sea Snake, was stranded on a public beach just north of Camp

Sorry Miss Jackson, I am For Real...

By Amanda Hardman
O'ahu Army Natural Resources Program

You are officially no longer welcomed on O'ahu! Jackson's chameleons, undeniably charismatic critters native to Kenya and Tanzania in East Africa, have perhaps laid their final straw.

Last year, Oahu Army Natural Resources Program (OANRP) staff Vincent Costello and Michael Walker collected two Jackson's chameleons on Pu'u Kumakali'i directly behind Schofield Barracks' west range on the island of O'ahu, Hawaii'i, after a day spent surveying the many native Kahuli snails located there.

The final straw? These two Jackson's were found to have feasted on one of Oahu's own charismatic critters: the endangered Kahuli tree snails.

For years, Brenden Holland, director of the endangered Hawaiian tree snail captive breeding and conservation genetics lab at the University of Hawaii, has been collecting Jackson's chameleons to dissect, based on the belief that they may enjoy endangered Kahuli tree snails as part of their diverse diet. More than 400 Jackson's have been dissected with no sign of ingested Kahuli. That is until the two chameleons found at Pu'u Kumakali'i were studied.

Although the Kumakali'i population of Kahuli snails is not specifically managed by the OANRP, it is very closely monitored by staff. For nearly a decade, the snails' population has remained constant. Signs of rat predation are minimal, and the non-native carnivorous rosy wolf snail, another predator of Kahuli, has yet to be seen at Kumakali'i.

The staff at OANRP noted abundant young snails with each visit to Pu'u Kumakali'i, and there is still native vegetation for the Kahuli snails to enjoy at this site. In fact, Kumakali'i is one of the few places on O'ahu where threats to the Kahuli snails were thought to be minimal. That is until the recent discovery of a Kahuli shell in a Jackson's belly, along with two other types of native Hawaiian snails.



Native to East Africa, Jackson's chameleons were initially introduced to the Hawaiian Islands in the 1970s, as pets. Male chameleon pictured here. Photo: Phil Taylor, OANRP



Fragments of endangered Kahuli tree snail shells recovered from the stomach of one of the Kumakali'i Jackson's chameleons. Photo: Anita Manning

With this new-found information, there is reason for concern. Therefore, approximately two weeks after the discovery, two more OANRP staff joined Costello, known to his colleagues as "snail man," to revisit Kumakali'i, and investigate the Jackson's density around the Kahuli snail population. After an intense two-day and one-night search, four more Jackson's chameleons were discovered and removed from the mountain.

Fortunately, none of the Jackson's contained Kahuli shells; however, OANRP staff remains concerned about the potential threat Jackson's chameleons have to the endangered Kahuli. The public is urged not to release any pets, especially Jackson's chameleons, into the wild because of this potential to threaten the fragile and rare ecosystems remaining on the Hawaiian Islands.

OANRP staff will continue to survey the neighboring areas in order to get a better idea of the Jackson's chameleons' extent and dietary preferences. If Jackson's are thought to be a large enough threat to the Kahuli snail, OANRP staff will look to innovative management strategies to control for Jackson's chameleons in snail territories.

Cold-Stunned Sea Turtles

By Martha M. Carroll
Biologist, 45th Space Wing
Cape Canaveral Air Force Station

East Central Florida, January 2010, Cape Canaveral Air Force Station (CCAFS), Patrick Air Force Base (PAFB). Average high and low temperatures for this time of year are between 50 and 70° F, but Mother Nature will take the helm and air temperatures will fall into the low 30's. Subsequently, the water temperature has been decreasing in the northern Indian River Lagoon system that includes estuary waters of the Indian River, Banana River, Mosquito Lagoon and associated coves, canals, inlets and locks. Average water temperatures in the shallow water lagoon system vary by depth and location but they will drop to a low of 4°Celsius (~40° F). Cold water events are not unusual for this area, having been observed a few times over the last century; however, the magnitude of this event was certainly unusual, if not unprecedented. CCAFS and PAFB share the lagoon shoreline with the United States Fish & Wildlife Service (USFWS) at the Merritt Island National Wildlife Refuge (MINWR), the National Aeronautics and Space Administration (NASA) at the Kennedy Space Center, the National Park Service (NPS) at Canaveral National Seashore (CNS) and many local municipalities in Brevard County, FL. Biologists from CCAFS, PAFB, MINWR and NASA contractors anticipated impacts to wildlife species and were on the lookout by land and water for threatened and endangered sea turtles affected by the cold water temperatures in the lagoon. When exposed to cold water for an extended period of time, cold blooded sea turtles exhibit signs of hypothermic cold-stunning, becoming lethargic, unable to swim freely to dive to deeper warmer water or even lift their heads to breathe. Hence they usually float to the surface and often are carried by currents to a shoreline, now vulnerable to predators and most certainly death from cold air exposure.

On day 1, January 6, the water temperature is now 6.7° C (~44° F), and rescue operations of cold-stunned sea turtles have started in the back waters of the lagoon. Other turtles are seen struggling at the surface. More than 25 turtles are collected and relocated to an indoor storage facility at MINWR that serves as the command and triage center until the water temperatures warm to a safe level. The Florida Fish and Wildlife Conservation Commission (FWC), the agency responsible for marine turtle strandings and salvage, has responded and are overseeing the rescues and data collection efforts, including arranging transportation to various sea turtle rehabilitation facilities across the state. The National Marine Fisheries Service (NMFS) is providing funds to support FWC in this effort. While at the MINWR facility, the turtles are documented, measured and given a unique identification number before they are transported to a rehabilitation facility or released. MINWR officials implement the Incident Command System (ICS) to facilitate management of this multi-agency event.

By January 8, MINWR, NASA and CNS deploy watercraft and helicopters to search the lagoon, while others assist in the transfer of sea turtles from watercraft to van or truck and on to the MINWR facility. Additional assistance is requested from additional agencies including biologists from the 45th Space Wing at CCAFS, the St. Johns River Water Management District, NASA contractors and local conservation organizations. 45th SW biologists initiate shoreline surveys, rescue and transport over 10 turtles to the MINWR facility and provide containment tubs to be used as turtle holding pens. By this time the running total is over 260 sea turtles rescued, mostly green sea turtles. After documentation, many are transported to rehabilitation facilities throughout Florida and Georgia. These facilities are filling up fast as sea turtles from the Florida Panhandle are experiencing similar cold weather impacts.



Jim Lyon, MINWR biologist and Shannon Gann, contract biologist with NASA, processing incoming turtles.

January 9 and 10, the weather continues to deteriorate; rain, cold and wind limit safe rescue operations on land and water. The conditions are nasty for turtles and people alike. The 45th SW provides a temporary shelter for 35 turtles in a heated storage facility at CCAFS – the Ready Building at former Launch Complex 21/22. There is barely enough room to walk amongst the turtles that range in size from 10 pounds to upwards of 500 pounds. With the window unit heater on full blast, towels, blankets and field jackets are placed over the turtles in a feeble attempt to warm them. Most of the rescued are green turtles with a few exhibiting signs of fibropapilloma tumors, a viral disease that commonly afflicts green turtles inhabiting the lagoon.

Because of this contagious affliction, any turtles exhibiting these tumors are segregated from other turtles during the staging and documentation process through release. Even with frigid weather and water temperatures at 4° C, over 100 turtles are rescued from lagoon waters and delivered to the MINWR facility. Efforts at the MINWR facility are manageable and by day's end the grand total is close to 400 sea turtles.

January 11, 45th SW biologists and their contractor *SpecPro* quickly devise a plan to transport the turtles kept overnight from CCAFS to the MINWR facility. 45th SW Security Forces offers two enclosed trailers for turtle transportation and *SpecPro* offers two heavy duty trucks with drivers to haul the turtle filled trailers to MINWR. Meanwhile, IOMS, another contractor at CCAFS empties their box van of all its contents to make room for dozens of turtles to be transported. Who would know at this point in time that these vehicles and drivers would be turtle life-savers? Arriving at the MINWR facility, a six-bay equipment shop, 45th SW biologists discover the floor completely covered with sea turtles, containment bins, tarps and people moving in all directions. Turtles are coming in one door and, over time, moving out the opposite door for rehabilitation or release elsewhere. Three 45th SW biologists, Angy Chambers, Martha Carroll and Don George, jump into the organized chaos and begin assisting with turtle lifting, processing and whatever needs to be done. As Florida Marine Turtle Permit holders, 45th SW biologists are permitted and qualified to handle sick, injured or deceased sea turtles, so turtle processing is the duty for the day.

All day, more and more turtles are delivered to the facility by FWS, FWC, turtle advocacy groups, volunteers and ordinary citizens. The MINWR facility is filling up. Since day one and without pause, FWC is diligently coordinating with various aquaria facilities that are able to take the turtles in for rehab; subsequently, healthy turtles that appear ready for release are transported to warmer South Florida waters. On the shoreline of Patrick Air Force Base, 20 miles south of CCAFS, concerned *FamCamp* residents and 45th SW biologist Keitha Dattilo-Bain collect over 49 turtles and arrange for their transport to MINWR. A large number of the turtles at the MINWR facility exhibit signs of fibropapilloma tumors so segregation is difficult but imperative. In addition, finding a rehab facility equipped to accept one fibropapilloma turtle, let alone hundreds, is even more difficult. Meanwhile, the MINWR facility processes over 350 turtles, bringing the grand total to approximately 800.

January 12, more turtles are rescued from the CCAFS and PAFB shoreline. 45th SW biologists continue to process turtles at the MINWR shop. Every turtle is processed upon arrival and departure. A makeshift "ICU" is delineated, where heating pads and heavy blankets are draped over the frigid turtles, awaiting examinations from veterinarians. Turtles that don't survive are segregated and taken to the makeshift "morgue", prepared for tissue sample collection and properly disposed. Using the 45 SW Security Forces trailers, 45th SW contractor *SpecPro* is transporting turtles to warmer water or various rehab facilities in Florida. Turtle convoys ranging up to six hours round trip are ongoing all day and into the night. Other trucks, vans, boats and trailers seem to show up out of nowhere; they're either delivering newly rescued turtles or transporting turtles to their rehab destinations. Hundreds of turtles are flipper tagged and Passive Integrated Transponder (PIT) tagged; once the water



45 SW biologists Angy Chambers and Martha Carroll Transporting cold-stunned sea turtles from the shoreline of Cape Canaveral Air Force Station, January 2010.

temperatures warm, plans are in the making to place sonic tags onto any turtles released locally into the lagoon. Because of the enormous rescue effort, the number of turtles, and the urgency to return them to water, many of the released turtles are taken to warmer waters far from their original location. Tagging will be used to track movement within the lagoon and near shore waters of the Atlantic Ocean and may provide insight into the long-term outcome of the releases. A record 500 new turtles are processed today, bringing the grand total to approximately 1300.

January 13, 45th SW biologists are again processing turtles at MINWR along with the team. Another 500 or so turtles arrive while others are on their way to rehab facilities or released into warm south Florida waters. Hundreds of turtles are PIT tagged. Data sheet management for each turtle is an overwhelming challenge but is remaining well organized. Volunteers are assigned housekeeping detail, changing out the soiled cardboard, cleaning the tarps and mopping up the mess on the floors. Others are continually washing out the kiddie pools and bins used for turtle containment. The water temperatures in the lagoon have increased to approximately 8° C (~46° F); this may be a good sign of things to come. The grand total of rescued sea turtles now stands at approximately 1800.

January 14, rescue efforts continue at MINWR. The 45 SW again provides support with processing, delivery and transport of incoming and outgoing turtles. Lagoon waters continue warming and weather forecasts are good. This results in a criteria shift for processing – turtle releases will be concentrated to their areas of origin, rapid processing and sonic tagging of the hardier turtles begin. By afternoon, the workers notice a sudden drop in activity. Aside from the volume of outgoing turtles, new rescues are now arriving at a trickle, copy machines are idling, and the volunteers are able to catch up during the lull. Grand total of turtles rescued reaches approximately 1850.

January 15, lagoon temperatures have risen to a range of 11-15° C (~52-59° F). The 45 SW is back at MINWR again, processing remaining turtles, assisting with housekeeping and transporting outgoing turtles to their carefully coordinated destinations. A remarkable sight, we can see the floor now; the tarps and pools are more empty than full. The activity in the area designated for incoming turtles has slowed to a relieving crawl. We start to catch our breaths and think about what just happened these last 10 or so days.

By January 16, lagoon waters temperatures are upwards of 14° C (~57° F). It appears the crisis is over but there is still work to be done. More and more releases are occurring, including on the shoreline of CCAFS. The 45 SW ends their support of this event with biologists and leadership participating in the release of green sea turtles, bringing the rescue effort full circle. As the last days go by, the MINWR shop has been cleaned up, supplies and other items are returned to their owners and the number crunching accelerates.



45SW biologists Angy Chambers and Don George help carry a cold-stunned adult green sea turtle into a transport vehicle at Cape Canaveral Air Force Station, January 2010.

In February, the month following the cold stun event, an After Action Review meeting is held and attended by all of the participating agencies. The meeting provides a forum for discussing what really happened, lessons learned, pros and cons and suggested improvements for the next time.

As a result, agency protocols are under revision, contact lists updated and logistical needs for future events proposed. For the State of Florida, preliminary numbers are showing a fatality rate of 20% for all rescues. With up to 2000 sea turtles rescued in the Indian River Lagoon alone, one could say with confidence that the outcome was a good one and very much worth the effort.

Looking back there were a number of lessons learned from this unprecedented event. Besides observing the impact of cold waters on sea turtles and other aquatic species, a relatively large population of adult sea turtles was discovered

in the lagoon and we witnessed the dedication of many agencies and volunteers eager to help. In addition, the 45 SW participated in an interagency event that was deftly orchestrated and clearly successful. The enormity of the cold stun

event was the catalyst that brought the agencies together. There was a desperate need for support, a common cause to unite behind, and hope for a positive outcome for a creature that is very much a part of the wildlife scene in the Brevard County area. As the agencies stepped up or were called in, the Incident Command System was at work; behind the scenes, but in place. Directions and information flowed from the incident commander down to team leaders and then to team members; subsequent information flowed up to the commander. Participants were given the power to offer suggestions, ask questions and provide assistance where needed; appreciation was always apparent, no one was turned away. As the volume of turtles increased, leaders were given more constraints and predicaments to work through, but amazingly enough, additional assistance was asked for and received. Additional supplies were needed and in no time they appeared. It seemed that as the number of turtles grew, so did the number of qualified leaders and volunteers, ready to carry the load. Through the incident command system, there were no power struggles, no distracting disagreements or disruptive behaviors from any of the parties involved, at least not from my vantage point. A tremendous amount of professionalism was conveyed from all agencies, all participants and all volunteers, no matter their duties. There were so many teams and individuals working numerous facets of the event that no one person or agency could have handled the effort alone; and we all knew it.

Prominent Herpetologists from the United States Armed Services

By Joseph C. Mitchell¹ and Robert E. Lovich²

¹ Mitchell Ecological Research Service, LLC.

² Naval Facilities Engineering Command Southwest

The American military has had many distinguished members who have gone on to become leaders in the fields of science and technology. Whether they were scientists before or after their service to America, there are many who had careers in the biological sciences after having served their tour of duty. Several living and late herpetologists were members in the United States Armed Forces over the past century. Some of these individuals survived the rigors of armed combat. And many have served as civil servants, academics, resource managers, etc., and as professional herpetologists either through their publications or via direct participation with natural resource managers. Herein, we highlight six of these veteran herpetologists to show that their contributions have aided the United States in the dual roles as active duty service members and professional herpetologists. Those we include here are veterans who have contributed in a variety of ways to amphibian and reptile conservation, research, and management.

Justin D. Congdon served in the Navy from 1959 to 1962 and spent most of his tour aboard the anti-submarine aircraft carrier the *USS Lake Champlain* (The Champ). He was assigned to Fox Division (Gun Fire Control) and obtained his training at Fire Control A and B Schools in Bainbridge and Dam Neck Maryland. He noted that “We made circles in the Atlantic, then more circles, visited Guantanamo, Cuba, St. Thomas Virgin Islands, Puerto Rico, and Quebec, Canada. Our very big deal was picking up Alan Sheppard at the end of his sub-orbital space flight.” Congdon received an honorable discharge as a Petty Officer Second Class.

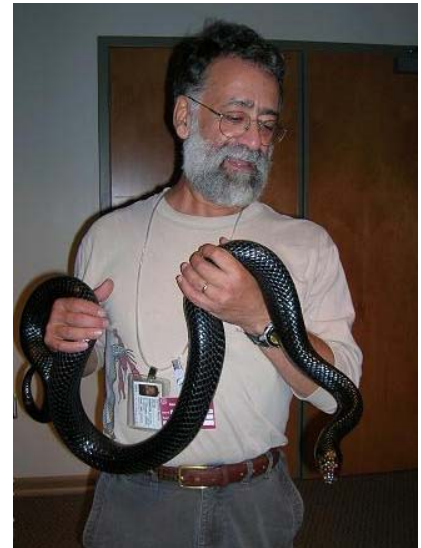
Congdon first obtained an Associate in Art degree from Victor Valley College, Victorville, California, in 1966. His Bachelor in Science degree was from California State Polytechnic University, San Luis Obispo, California, in 1969. He received his Master’s degree from California State Polytechnic University, San Luis Obispo, California, in 1971 and his Ph.D. in Zoology from Arizona State University, Tempe, Arizona, in 1977. He was a Post-doctoral Scholar at the Museum of Zoology, University of Michigan, during 1977-1980. The late Donald Tinkle was his advisor. It was during this time that Congdon became involved in the long-term research project on the freshwater turtles in the E.S. George Reserve in Michigan begun by Owen Sexton in 1956. The many papers



Justin Congdon at the George Reserve in Michigan holding a Snapping Turtle, *Chelydra serpentina*.

published and those yet to come provide considerable insight into the life history and ecology of three primary species (*Chelydra serpentina*, *Chrysemys picta*, and *Emydoidea blandingi*), many of which have important implications for the conservation and management of long-lived turtles and other vertebrates. This project ran continuously each summer from 1975 to 2007 under his direction. Congdon spent much of his professional career as a Senior Research Ecologist at the Savannah River Ecology Laboratory near Aiken, South Carolina. He graduated three Masters and 12 Ph.D. students under his supervision and served on numerous committees at other institutions. His research centers on theoretical and conceptual aspects of physiological and ecological processes that combine to shape reproductive, demographic, and life history strategies in natural and contaminated environments. He has conducted field and laboratory investigations of bio-energetics, growth, demography, reproductive biology, and aging of vertebrates. He retired in 2002 to a ranch in southeastern Arizona where he continues his long-term research on the Sonoran Mud Turtle.

Ernesto Garcia began his active military career in 1965 serving as a U.S. Navy corpsman attending babies on a pediatric ward at the Key West Naval Hospital in Florida. When the first war casualties began coming in from SE Asia, he volunteered for the Fleet Marine Force operating in Vietnam. After completing field medical school, he requested assignment and was selected to serve as a corpsman (medic) in a U.S. Marine rifle platoon in Vietnam for 13 months between 1966 and 1967. Attached to Fox Co, 2nd Battalion 7th Marines, 1st Marine Division, he operated mostly in the far northern part of South Vietnam, but spent some time way down south in what was later to become Army country - an area called Duc Pho in Quang Ngai Province. His medals and ribbons include a Purple Heart for wounds received in combat, the Bronze Star Medal with V for valor in combat, the Vietnam Service Medal, the Vietnam Campaign Medal, a Combat Action Ribbon, a Presidential Unit Citation, and the National Defense Medal. Following his tour in Vietnam, he was assigned to a Marine Corps Reserve Unit for the remainder of his 6-year enlistment. He was honorably discharged on August 3, 1970 at the rank of Petty Officer Second Class.



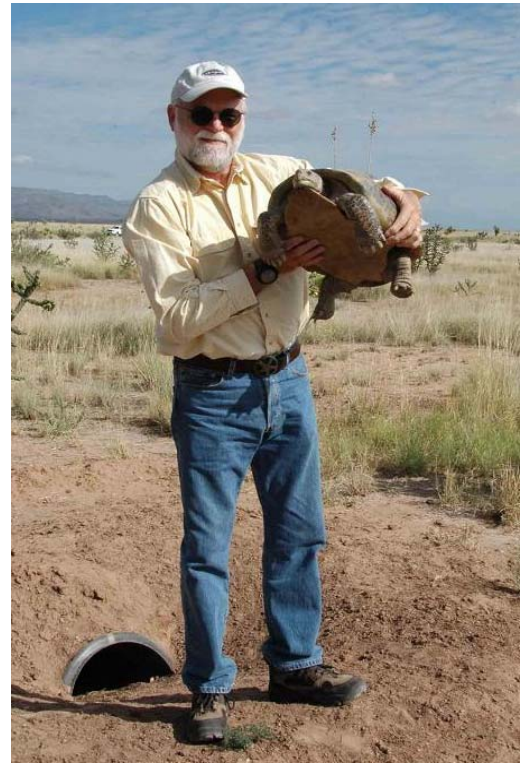
Ernie Garcia holding an Indigo Snake, *Drymarchon corais*, at a PARC workshop in South Carolina.

Ernie Garcia was trained as a wildlife biologist and spent most of his professional career working for the U.S. Forest Service. He obtained his Bachelor of Science in Wildlife Management from Humboldt State University in 1975, and a Master of Science in Wildlife Biology from the University of Michigan in 1977. He worked as a Wildlife Biologist on several National Forests in Washington, Montana, and California, before moving to the Caribbean where he served as Forest Biologist on the Caribbean National Forest for over a decade. His specialties over the course of his career have included working with bighorn sheep and other large ungulates, grizzly bears, spotted owls, endangered Amazon parrots, tropical freshwater migratory shrimp and fish, Africanized honey bees, and *Eleutherodactylan* frogs. His last position with the Forest Service was as Wildlife Program Leader for the agency's Southern Region, stationed in Atlanta, Georgia and covering forestlands in the 14 Southern states, the Virgin Islands and Puerto Rico. There he became interested in amphibians and reptiles and has contributed significantly to Partners in Amphibian and Reptile Conservation (PARC) since its inception in 1999. He transferred to the US Fish and Wildlife Service where he was appointed PARC National Federal Agencies Coordinator in 2005 and continues to help PARC mature. He retired from federal service in 2009, and continues to serve PARC as Executive Director of their non-profit conservation organization, Friends of PARC.

Harry W. Greene was drafted eight days after graduating with a Bachelor of Science from Texas Wesleyan College in the spring of 1968. Because he had already worked almost three years as an ambulance driver, he enlisted for an extra year in return for the Army's "guarantee" that he would be a medic. Basic was at Ft. Bliss, medic training at Ft. Sam Houston, and following this he was first stationed in El Paso at William Beaumont General Hospital. In the summer of 1969, nine medics in his unit picked up orders in one week, seven to Vietnam and one other lucky guy to

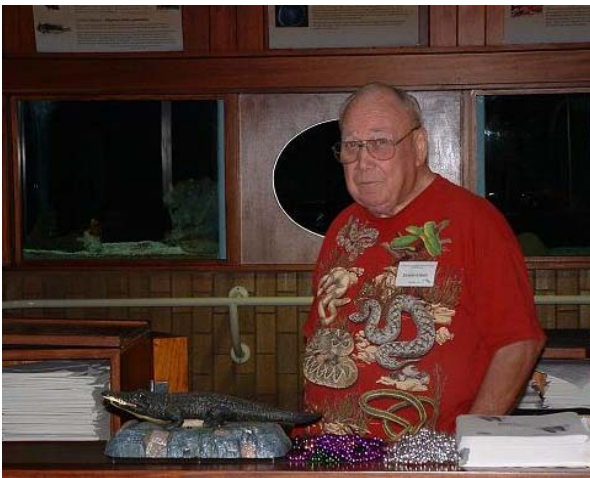
Germany. Harry was later stationed in Frankfurt, Germany, and spent off- time working on herpetology projects in the Senckenberg and other European natural history museums. Harry Greene was a Spec 5 when discharged at Ft. Dix in May 1971.

Following his release from military duty, Harry completed his education by receiving a Bachelor of Science from Texas Wesleyan College, a Masters of Art in biology from the University of Texas at Arlington in 1973, and a Ph.D. from the University of Tennessee in 1977. He landed a position as Professor of Zoology and Associate Curator of Herpetology at the Museum of Vertebrate Zoology, University of California Berkeley. He became full professor in 1992. In 1999, he moved to Cornell University in Ithaca, New York, to be Professor of Ecology and Evolutionary Biology. He is the recipient of numerous awards, including the Henry S. Fitch Award for Excellence in Herpetology from the American Society of Ichthyologists and Herpetologists. His research interests focus on evolutionary biology, behavioral and community ecology; herpetology; feeding and defense in tetrapods, especially lizards and snakes, and conservation of vertebrates, especially in deserts and tropical rainforests. He has numerous publications mostly in herpetology with his first one appearing in 1961. His extremely popular book, *Snakes, the Evolution of Mystery in Nature*, (University of California Press, Berkeley) demonstrated his depth of knowledge of these vertebrates. This book has been instrumental in making resource managers and the public aware of snakes as research subjects and objects of conservation efforts.



Harry Greene holding a Bolson Tortoise, *Gopherus flavomarginatus*, in New Mexico. Photo: Cynthia Prado.

Ernest A. Liner joined the U.S. Marine Corps 13 days after graduating from high school in 1943. He was trained as an explosives expert and was the leader of a demolition squad that saw combat with the Japanese in the south Pacific theater. He participated in action on Roi-Namur in the Marshall Islands, on Saipan and Tinian in the Mariana Islands, and on Iwo Jima in the Volcano Islands. He was wounded a total of seven times on Saipan and Iwo Jima. Liner and his squad were instructed on Iwo Jima to take out sniper pillboxes and rid the caves of Japanese soldiers. He was 19 years old when an enemy bullet passed through his dog tags a centimeter from his chest and smashed his left elbow. After several months and surgeries, he was honorably discharged in New Orleans just as World War II ended.



Ernie Liner, a renowned Cajun cook, at his home in Louisiana. Photo: Brad Moon.

Liner is one of those rare individuals who worked an unrelated full-time job while pursuing his avocation of herpetology. He completed his BS in Biology at Southwestern Louisiana Institute (now the University of Southwestern Louisiana) in 1951 and became a pharmaceutical salesman. He became interested in the herps of northeastern Mexico before obtaining his undergraduate degree and has spent much of his life studying the amphibians and reptiles of that region and in his native state of Louisiana. Liner has written over 125 papers on the systematics, distribution, natural history, and ecology of these animals. He has written two editions of the common names of Mexican amphibians and reptiles, and recently completed two books. *Culinary Herpetology* (published in 2005) is a global compilation of recipes for cooking amphibians and reptiles. Volume 22 of the series *Biology of the*

Reptilia, Comprehensive Literature of the Reptilia, was completed single-handedly by Liner. It is the last in the series and is a 1400-page book that lists all the corrected literature and provides a subject index for all 21 books in the series. This is quite a feat for an 83 year-old veteran. Liner's avocation as a practicing herpetologist and local celebrity has educated many local and regional citizens about amphibians and reptiles.



Joe Mitchell holding a Chamberlain's Dwarf Salamander, *Eurycea chamberlaini*, in North Carolina.
Photo: Jeff Hall

Joseph C. Mitchell joined the U.S. Marine Corps on his 18th birthday and was on active duty October 1966 – September 1970. He was trained in Aviation Ordnance, served with the Second Marine Air Wing at Cherry Point, NC, 1967-1969, and picked up orders for Vietnam in April 1969. However, an accident prevented his deployment to the war zone. He was stationed with the helicopter squadron at Camp Pendleton, CA, from July until December 1969, then with the Third Marine Air Wing at Kaneohe Bay, Hawaii, January – September 1970. He was Corporal when released from active duty to attend college, and received an honorable discharge.

Mitchell had a herpetological/biological epiphany while serving in the USMC and decided to pursue a career in the study of reptiles and amphibians. He obtained his Bachelor of Science in Biology at Virginia Commonwealth University, Richmond, his hometown, in 1974. His Masters of Science in Zoology was obtained at Arizona State University, Tempe, in 1976 and his Ph.D. at the University of Tennessee in 1982. He taught part-time at the University of Richmond for nearly 20 years and otherwise lived on contracts and consulting where he focused mostly on herpetology. He is a successful businessman, owning and operating his private company. His experience working with resource managers at the state and federal levels gave him a crash course in natural resource management. As the co-chair with Dr. Kurt Buhlmann of the Management Working Group for Partners in Amphibian and Reptile Conservation (PARC), he helped to spearhead the widely-used publications on habitat management for five regions in the United States. He co-wrote the guide for the Southeast region and was lead author for the Northeast guide. He has numerous publications on the ecology and natural history of amphibians and reptiles, including *The Reptiles of Virginia* (Smithsonian Institution Press, 1994) and the *Salamanders of the Southeast* (University of Georgia Press, Athens, with Dr. Whit Gibbons—in press). He was the lead co-editor with Robin Jung-Brown and Breck Bartholomew for the book *Urban Herpetology*, published in 2008 by the Society for the Study of Amphibians and Reptiles. His private company offers field research and writing services to state and federal agencies, including military bases, on the ecology and conservation of amphibians and reptiles.

Raymond D. Semlitsch served with the U.S. Marine Corps July 1968- May 1972. He was stationed in Vietnam with the 2nd Battalion, 4th Regiment, 3rd Marine Division from the summer of 1969 until the spring of 1970. There he saw combat in Quang Tri Province out of Vandergiff Combat Base. Following his tour in Vietnam, he served at Marine Barracks 8th & I, Washington, D.C. during 1971-1972. He received an Honorable Discharge and reached the rank of Sergeant.

Semlitsch holds a Bachelor of Arts in Biology, State University College at Buffalo, New York (1975), a Master of Science in Zoology, University of Maryland, College Park, Maryland (1979) and a Doctor of Philosophy in Zoology, University of Georgia, Athens, Georgia (1985). He was awarded the National Wetlands Award for Science Research in 2008 and was elected a Fellow of the American Association for the Advancement of Science in 2009. His research focuses on understanding the persistence of amphibian populations in altered landscapes. He and his students ask questions about: 1) the spatial and temporal dynamics of local populations, 2) connectivity in metapopulations, 3) habitat selection and use, and 4) the basic principles used to manage and conserve



Ray Semlitsch holding a Snapping Turtle, *Chelydra serpentina*. Photo: Steve Morreale.

amphibians. His ultimate goal is to establish biologically-based principles for amphibian management and conservation, and wetland preservation. Semlitsch has had 40 graduate students, most of whom have done their research on various aspects of the conservation biology of amphibians. He has published two books, including *Amphibian Conservation* (Smithsonian Institution Press, Washington, DC), on which he was the primary editor. Semlitsch continues to support research in conservation biology through his teaching and research.

Several other herpetologists both living and deceased who have served in the U.S. military have worked with many species on and off military installations. Some of these individuals worked closely with natural resource personnel on a wide variety of management issues. Their continued service to the United States and its natural resources demonstrates their life-long dedication to both of these entities. Space does not allow covering them all here.

The American military services have fostered excellence both on and off the battlefield since its earliest beginnings. The same drive and excellence can be witnessed in how service members have gone on to long and fruitful careers beyond the military realm. Herpetology and resource management has benefited as a result, and we see only a small cadre of those luminaries who have become leaders in their respective disciplines of herpetology. We can only hope that as natural resources dwindle and species become increasingly imperiled, the military will solve these global dilemmas by raising a new crop of experts in science and technology who focus on amphibians and reptiles.

We would first like to thank all of those who have served in the defense of our great nation's freedoms, and gone on to become herpetologists. This article is dedicated to those persons. We also thank the herpetologists highlighted here in responding to our requests for information on very short notice.

Monitoring Endangered Arroyo Toads

By Jim Asmus

AC/S Environmental Security Resource Enforcement and Compliance Branch, Camp Pendleton

Arroyo toads (*Bufo californicus*) are endemic to central and southern California and northwestern Baja California, Mexico. These small, warty habitat specialists prefer slow-moving streams with sandy soils, side terracing, and seasonal flood activity. Shallow side pools are required for breeding, egg-laying, and tadpole development. An estimated 75% loss of this preferred habitat combined with the introduction of several non-native species led to the listing of the arroyo toad as endangered by the U.S. Fish and Wildlife Service in 1994. Three of the remaining watersheds occupied by arroyo toads are located on Camp Pendleton, and the base began annual monitoring of the listed toads in 1996. Over the next 15 years, protocols were evaluated, adjusted, analyzed, and re-adjusted several times attempting to assess a species with high annual variability in abundance and densities. Its nocturnal habits and tendency to bury itself in the sand only adds to the difficulty in studying populations!



Arroyo Toad, *Bufo californicus*, a federally endangered species.

In 2003, Camp Pendleton implemented a spatial and temporal approach with a new monitoring protocol focused on Proportion Area Occupied. The new protocol focuses on monitoring egg masses and tadpoles instead of adult toads. Eggs and tadpoles can be found during the day, have a high detectability, and signify the presence of breeding adults in the watershed. Models designed using this data can incorporate other variables like water, weather, and the presence of non-native predators like bullfrogs. Non-native predators have been shown to be strong indicators in the model, with arroyo toads less likely to be detected in those habitats occupied by non-natives. A bullfrog eradication program was initiated following the discovery of surprising numbers of adult arroyo toads in the stomachs of collected bullfrogs. The base has eradicated over 600 acres of *Arundo donax*, a non-native reed dominating the lower Santa Margarita River. *Arundo* removal has started to improve hydrology, promote sandbar formation, and allow recolonization of natives, all of which benefits the toads. The Wildlife Management Branch continues to adjust its programs and protocols with new data collected and each new lesson learned. Camp Pendleton's arroyo toad monitoring program is a definitive example of adaptive management at its best.

Training, Announcements & Events of Interest

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



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 and 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>.

Endangered Species Day, Celebrating America's Wildlife Legacy: May 21, 2010, Nationwide. Endangered Species Day is an opportunity for people young and old to learn about the importance of protecting endangered species and everyday actions that people can take to help protect our nation's disappearing wildlife and last remaining open space. Protecting America's wildlife and plants today is a legacy we leave to our children and grandchildren, so that all Americans can experience the rich variety of native species that help to define our nation. For details visit: <http://www.stopextinction.org/esd.html>

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.

Ecosystem Services Conference A New Generation in Restoration: Strategies for Managing Corporate and Public Land: June 24-25, 2010, Crowne Plaza Hotel, Silver Spring, Maryland. The conference aims to educate WHC members and other corporate and conservation partners on the connections between habitat management, biodiversity conservation, and sustainability with ecosystem service-based strategies. The conference will provide a forum for sharing the latest developments on using ecosystem services to restore and manage land, as well as a forum to generate opportunities for road test projects. This conference is the second in a series using member expertise and partner collaboration to incorporate ecosystem services in to existing WHC programs. For details visit: <http://www.wildlifehc.org/events/ecosystems-services.cfm>

SAVE THE DATE! 2010 Biennial Cooperative Ecosystem Studies Units (CESU) Network National Meeting: June 23-24, 2010, at Howard University School of Law, Washington, DC. Visit: <http://www.cesu.psu.edu/news/news.htm>

Bat Conservation International Acoustic Monitoring Workshop: August 4-6, 2010 Hawai'i Convention Center, Honolulu, HI. The 2010 HCC will highlight success stories from Hawai'i, New Zealand, Micronesia, and other Pacific Islands. Join us in an exploration of this emerging trend in ecosystem management and restoration through formal presentations, informal discussions, and other opportunities to talk story with scientists and citizens, cultural practitioners and researchers. For details visit: <http://hawaii-conservation.org/2010hcc.asp>

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/>.

ACES, A Community on Ecosystem Services: December 6 - 9, 2010, Sheraton Wild Horse Pass, Chandler, Arizona. This conference brings together government, non-governmental organization, academia, tribal, and private sector leaders to advance the use of ecosystem services and related science in conservation, restoration, resource management, and development decisions. The primary objective of ACES is to provide an open forum to discuss the latest and most innovative methods, tools, and processes for assessing ecosystem services while facilitating their effective use in planning and decision making. For more information visit <http://conference.ifas.ufl.edu/ACES/>.

Did You Know?

There are over 8,200 species of reptiles in the world, inhabiting every continent except Antarctica. Hundreds of millions of years ago, amphibians became the first vertebrates to live on land. Reptiles and amphibians are cold-blooded or "ectothermic" animals, which mean that they depend on external sources, such as the sun, to maintain their body temperatures. Since they don't burn energy to heat their bodies, reptiles eat 30 to 50 times less food than do birds and mammals (warm-blooded animals) of similar sizes. Some turtles and tortoises, including the Eastern box turtle, can live for more than a century.

Did You Know?



ROC AROUND THE CLOCK

**Surrender
unwanted
Reptiles of
Concern
24/7
No penalties!**

Unwanted **R**eptiles of **C**oncern may be donated to licensed recipients at any time with no penalties. Licensed recipients can be contacted:

MyFWC.com/ROC

Florida Fish and Wildlife Conservation Commission

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>.

Chiricahua Leopard Frog (*Lithobates [Rana] chiricahuensis*) Considerations For Making Effects

Determinations And Recommendations For Reducing And Avoiding Adverse Effects: (Legacy 05-258) the Chiricahua Leopard Frog CMED provides considerations in determining if the species may be in the action area of the proposed activity and, if so, possible ways in which Federal activities may affect various aspects of the species and its habitat. <https://www.denix.osd.mil/portal/page/portal/NaturalResources/ThreatenedEndangeredandAtRiskSpecies/CandidateSpeciesandSpeciesatRisk>

Utah Bat Conservation Plan 2008 – 2013: (Legacy 08-346) The purpose of this document is (1) to identify deficiencies in the understanding of the biology of the bats that inhabit Utah, (2) to identify anthropogenic threats to the bats of this state, (3) to direct research efforts to acquire needed knowledge, and (4) thus to guide management of Utah's bat species to ensure the viability of bat populations in the state. It is intended not to be static but instead to be a dynamic or a "living" document that will be updated and expanded in future editions.

<https://www.denix.osd.mil/portal/page/portal/NaturalResources/FishandWildlife/TerrestrialAnimals>

Status of Utah Bats-Final Report: (Legacy 08-346) Bat populations and communities have been monitored in Utah for over 100 years, on 12 land owner types including department of defense (DoD) lands. This project enabled a consolidation of all known bat data in the State of Utah. This report analyses the data across space and time within the state within 6 objectives (survey effort, occurrence, diversity, abundance, roosting and breeding locations and environmental associations), across 6 scales (ecoregion, physiographic province, land cover, Utah Division of Wildlife Resources (UDWR) regions, land owner type, and county).

<https://www.denix.osd.mil/portal/page/portal/NaturalResources/Bats>

Fact Sheet: Revision of the DoD Biodiversity Conservation Handbook and Commander's Guide: (Legacy 07-247) [https://www.denix.osd.mil/portal/page/portal/NaturalResources/OtherConservationTopics\(A-H\)/Biodiversity](https://www.denix.osd.mil/portal/page/portal/NaturalResources/OtherConservationTopics(A-H)/Biodiversity)

Avian Response to Grassland Management Around Military Airfields in the Mid-Atlantic and Northeast-

Interim Report December 2009: (Legacy 07-381) this study examined the effects of vegetation structure and management regimes on the abundance and distribution of birds on military airfields. It focused on how airfield mowing practices affect habitat use by both high-risk species and species of conservation concern. This first year of the study included; 1) How are birds distributed across each site during the migratory and breeding periods? 2) How are avian relative density or species-specific occupancy related to vegetation characteristics on each site? 3) How are avian relative density or species-specific occupancy related to past management practices? 4) Are patterns of avian activity near runways and approach zones nonrandom with respect season or time of day? and 5) are there avian activity "hot spots" on individual bases that could pose higher risk?. The report contains detailed maps.

Report and factsheet at: <https://www.denix.osd.mil/portal/page/portal/NaturalResources/FishandWildlife/Birds>

Assessing the Value of Department of Defense Lands in Alaska to a Declining Species, the Rusty Blackbird-

Final Report: (Legacy # 08-337): this study evaluated the value of military installations in Alaska to breeding Rusty Blackbirds in terms of providing breeding habitats associated with high nesting abundance, reproductive success, and adult survival, and low incidence of diseases and contaminants. Report and factsheet at:

<https://www.denix.osd.mil/portal/page/portal/NaturalResources/FishandWildlife/Birds>

Photo of the Month

Capturing the beauty of our natural resources



April 2010 Photo of the Month Winner!

Scarlet Kingsnake, Submitted by *Natural Selections* reader: Layne Anderson,
Natural Resource Manager, SCARNG McCrady Training Center



Did You Know?

Little Did You Know Conservation Could Be So Much Fun!



Find the hidden herps!

J	E	F	F	E	R	S	O	N	S	A	L	A	M	A	N	D	E	R	I
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Blanding's turtle
Bufo
Caiman
Coal skink
Copperhead Snake
Cricket frogs
Diamondback
Fowlers Toad
Gila monster

Glass Lizard
Hellbender
Hognose snake
Horned lizard
Island Night Lizard
Iguana
Jefferson Salamander
Marbled Salamander
Massasauga

Milk snake
Mink Frog
Mudpuppy
Plectrohyla _____?
Red-eared slider
Spotted Turtle
Stinkpot
Tiger salamander
Wood turtle



Photo: Andrew M. Snyder

Who am I? I am endemic to Honduras, and hang out by the *Parque Nacional El Cusuco*. My genus is *Plectrohyla*, but you need to find my scientific name above. I am a species of frog in the Hylidae family. My natural habitats are subtropical or tropical moist montanes, and rivers, and I am critically endangered because of habitat loss. I come in two color forms known as Parrot Green and Buff (which is actually a tan color). Both forms are known to sometimes have dorsal spots as well. I am one of the largest frogs in Honduras and I am sometimes referred to as a Spikethumb frog.

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.nbio.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 NMFVA 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](#).