



Introduction

Welcome to the first issue of the Threatened and Endangered Species (T&E species) newsletter! The purpose of this newsletter is to communicate *ongoing* T&E species research conducted by the Engineer Research and Development Center (ERDC) and the potential applications of these various technologies for other T&E species.

◆ How is this newsletter different from most others?

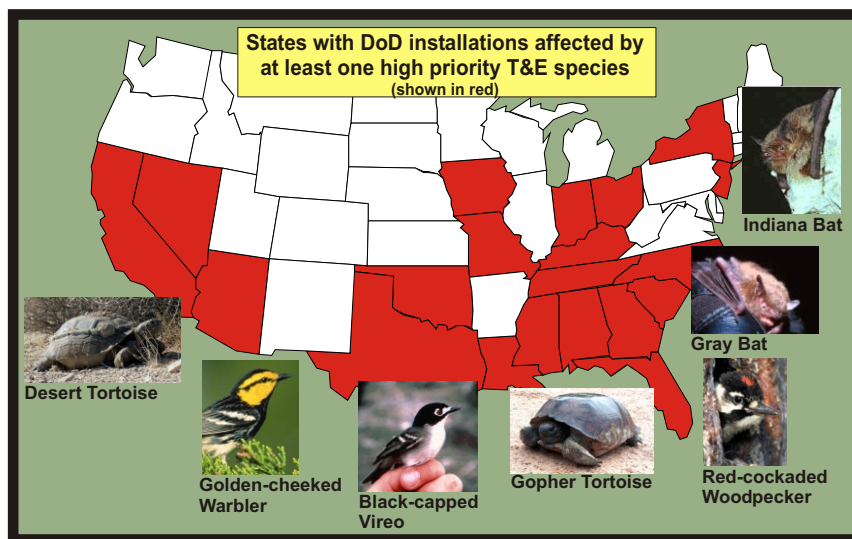
The traditional approach to provide users with information regarding research is through technical reports and peer-reviewed journal articles. In addition, the Army Environmental Center (AEC) publishes a newsletter of research ready for technology transfer. However, there's often a lag time between when research ends and when technical reports and journal articles are published. In contrast, this newsletter will focus on emerging technologies and disseminating knowledge *early* in the research process. This approach provides installation personnel and other interested parties access to this information on a more timely basis. This newsletter will also provide a forum to share information regarding ongoing projects and new starts for which technical reports, journal articles, etc. are not yet complete.

Background on the Seven Priority Species

Beginning in the late 1990's, the Army undertook a review and revision of its conservation research requirements. The top two conservation research requirements that emerged from this review were:

- reducing impacts of T&E species on military readiness, and
- maintaining readiness by improving T&E species monitoring capabilities.

Current T&E species research is focused on addressing the several specific user needs identified within each of these requirements.



In 2002, the Army T&E Species Advisory Group (representing the user community) selected species that pose the greatest potential for impeding training, testing, and combat readiness. The seven priority T&E species identified were the red-cockaded woodpecker, golden-cheeked warbler, black-capped vireo, gopher tortoise, desert tortoise, Indiana bat, and gray bat.

Also in 2002, the Army designated this research as a Strategic Technical Objective (now Army Technical Objective) and funded the applied research, defined in each of the above requirements over the period of FY03 through FY08. Work is being accomplished by a combination of Army

Research and Development funding, reimbursable funding (primarily for installation customers), and funding from the Department of Defense's Strategic Environmental Research and Development Program (SERDP).

In order to comply with statutory requirements contained in the Endangered Species Act (ESA), military activities continually face potential constraints (spatial and temporal, as well as type and intensity of training) that can result in reduced training capacity of military lands. Proposed listings for additional species, increased land requirements to support the future combat system, and habitat loss in the vicinity of many installations suggest that these constraints will only increase if not properly addressed.

In addition, the Army spent over \$30 million on T&E species management in FY03, representing a 67% increase in costs from FY01 (AEC, 2004 and 2002). T&E species management costs for the red-cockaded woodpecker alone totaled nearly \$5 million in FY03 (AEC, 2004). Thus, training constraints coupled with substantial and escalating costs of T&E species management create the need to devise more cost-effective and efficient methods and technologies to adequately inventory and monitor, assess impacts and risks, and manage T&E species.

◆ ***What benefit will I get from this newsletter if I don't have any of the seven priority species on my installation?***

According to the Nov/Dec 2004 Public Works Digest, "Army lands are occupied by 175 threatened or endangered species on 96 installations. Critical habitat for 13 species has been designated on 15 installations." In addition, 75 court-ordered listings of new species and designations of critical habitat are currently pending review by the US Fish & Wildlife Service. Therefore, the seven priority species represent only the "tip of the (*T&E species*) iceberg." However, the technologies and methodologies used in conducting research on these seven species have potential cross-applications to other T&E species.

Current Research Highlights

The research outlined in this newsletter directly supports the top two conservation research requirements of reducing impacts of T&E species on military readiness and maintaining readiness by improving T&E species monitoring capabilities. To this end, ERDC's T&E species research spans all seven priority species and involves three major thrusts:

- inventory and monitoring,
- impact and risk assessment, and
- impact avoidance and management.

Each issue of the newsletter will highlight several ongoing T&E species projects.

◆ ***How can this research help me if it's not yet completed?***

Increasing your awareness of ongoing research provides you with knowledge that may help determine if the methodologies and/or technologies are potentially applicable to your situation. In addition, your particular circumstances may provide insights to researchers on building flexibility and adaptability into their finished products, thereby resulting in more useful end products.

Research on Effects of Army Smokes and Obscurants on Avian Species

Generation of smokes and obscurants for tactical concealment purposes represents a potential T&E species stressor that is DoD-unique. Until recently, the toxic effects of fog oil aerosols on avian species could only be inferred from research regarding the effects on birds resulting from oil spills. In the absence of any data, biological opinions restricting the use of fog oil both temporally and spatially have been issued to ensure protection of endangered avian species.

A series of studies have now been completed and published that examine the actual effects of fog oil on birds. These various studies have separately examined:

- the acute inhalation toxicity of fog oil, including fog oil mixed with graphite, on adult birds,
- the effects of fog oil on the hatchability and fledgling survival, and
- the effects of fog oil on the immune response system.

In each case, the research found no measurable toxicological effects on birds at typical field concentrations. The surrogate species, approved by the Fish and Wildlife Service, used in these studies were the red-winged blackbird, the house sparrow and the brown-headed cowbird. However, the results of this research have applicability to other similar-sized altricial species, including the many listed species that fall in the 40 to 60 gram class. Based on the results of these studies, training restrictions on use of fog oil in red-cockaded woodpecker habitat are being reviewed. (POC: Dr. Hal Balbach, hal.e.balbach@erdc.usace.army.mil).



Innovative Techniques for Monitoring Indiana Bat Maternity Populations



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Bat Conservation International

Despite many recent technological advances and decades of survey effort, basic measurement of Indiana bat abundance and population dynamics at summer maternity colonies on military installations or other Federal properties is not currently possible. This lack of fundamental information prevents informed decisions about species management and mitigation efforts on the eight Army installations where the species is known to occur.

The research objectives of this project are to develop and test an innovative approach for monitoring local Indiana bat populations within the species' maternity range. The technological approach includes development and application of novel technologies such as artificial roosting structures, fecal genetic identification, and electronic detection. Automated infrared detectors are being integrated with artificial roosts to allow accurate concurrent counts of bats at multiple roosts. Development of species-specific polymerase chain reaction (PCR) probes and microarray analysis now allows fecal genetic identification of

roost occupants and estimation of species proportional composition at roosts. Radio frequency identification (e.g., by passive integrated transponder [PIT] tags) of individually marked bats will provide an opportunity to use mark-recapture methods to estimate population size, survival rates, and to implement long-term population monitoring programs.

This accurate, data rich, cost effective, standardized and easily implemented method of monitoring local Indiana bat populations will allow installations to better plan management actions, document conservation successes, and assess potential training impacts. (POC: Matthew Hohmann, matthew.g.hohmann@erdc.usace.army.mil).



Using Automated Radio Telemetry to Monitor Desert Tortoise Activity and Movement Patterns

It is important that natural resource managers on DoD and non-DoD lands have access to detailed behavioral data on desert tortoises to improve management capabilities. Existing monitoring protocols of desert tortoises are extremely costly and provide limited information for only a small sample population. There is insufficient baseline data on desert tortoise activity and movement rates against which to measure potential natural and human based disturbances. New technology was needed to effectively monitor a large population of tortoises across multiple years.

The research objectives of this project are to obtain a continuous record of diel and cyclical activity patterns across years, correlate desert tortoise activity with meteorological-, topographical-, and habitat-based parameters, refine seasonal and yearly home range estimates, monitor burrow, cover site, and habitat use, and provide natural resource managers detailed temporal and spatial information on tortoises.

The technical approach includes using automated activity and radio-telemetry units (AARTUs) for continuous remote monitoring of tortoises 24 hours/day year-round. AARTUs enable monitoring of activity of many animals regardless of weather or darkness, in inaccessible or dangerous areas. Automated signal processing reduces data analysis labor, enhances objectivity, reduces observer



error and observer effect on animals, and enables the correlation of activity with environmental parameters. In addition, this research provides detailed life history information to aid recovery, management, and mitigation efforts, improve understanding of how environmental factors influence tortoise activity, and has the capability to aid in future translocation projects. (POC: David Delaney, david.delaney@erdc.usace.army.mil).

“Save the Date” Reminder

Don't forget to mark your calendar and register for the *Technical Symposium & Workshop: Threatened, Endangered, and At-Risk Species (TER-S) on DoD and Adjacent Lands*, June 7-9, 2005 in Baltimore, MD. For more information, please visit www.serdp.org/TESSWorkshop.

List of Currently Available Products

The complete text of any T&E species technical report can be accessed through the ERDC-CERL website (<http://www.cecer.army.mil/td/tips/browse/publications.cfm?AREA=10>).

Red-cockaded Woodpecker

Acute Inhalation Toxicity of Fog Oil Smoke in the Red-winged Blackbird, a Size-specific Inhalation Surrogate for the Red-cockaded Woodpecker. Crystal Driver, Michael Ligothke, Heather Galloway-Gorby, Gary Dennis, Keturah Reinbold, and Harold Balbach, Report Number ERDC/CERL TR-02-6 (2002).

Assessment of Training Noise Impacts on the Red-cockaded Woodpecker: 1998-2000. David K. Delaney, Larry L. Pater, Robert J. Dooling, Bernard Lohr, Beth F. Brittan-Powell, Linton L. Swindell, Tim A. Beaty, Larry D. Carlile, Eric W. Spadgenske, Bruce A. MacAllister, and Robert H. Melton, Report Number ERDC/CERL TR-02-32 (2002).

Effects of maneuver training activities on red-cockaded woodpecker populations on Fort Stewart, Georgia. Hayden, T.J., R.H. Melton, B. Willis, L.B. Martin III, and T. Beaty, Report Number ERDC/CERL TR-02-17 (2003).

Effects of Fog Oil Smoke on the Hatchability and Fledgling Survival of the House Sparrow (*Passer domesticus*), a Nestling Surrogate for the Red-cockaded Woodpecker. Crystal Driver, Jennifer Ollero, Yin Fong Su, Robert Fulton, Gary Dennis, Brent Tiller, Harold Balbach, and Keturah Reinbold, Report Number ERDC/CERL TR-02-34 (2003).

Success of the Army's 1996 Red-Cockaded Woodpecker Management Guidelines. Timothy A. Beaty, Albert E. Bivings, Theodore Reid, Terence L. Myers, Stephen D. Parris, Ralph Costa, Timothy J. Hayden, Thomas E. Ayers, Scott M. Farley, and William E. Woodson, *Federal Facilities Environmental Journal* (Spring 2003).

Effects of Fog Oil Smoke on Immune Responses in the House Sparrow (*Passer domesticus*) and Red-winged blackbird (*Agelaius phoeniceus*). Crystal Driver, Anne Jarrell, Jennifer Ollero, Brett Tiler, Robert Fulton, Gary Dennis, Harold E. Balbach, and Keturah Reinbold, Report Number ERDC/CERL TR-04-13 (2004).

Ecological Risk Assessment of the Effects of Military Fog Oil Obscurant Smoke on the Red-cockaded Woodpecker. Thomas Smith, Matthew G. Hohmann, and Robert H. Melton, Report Number ERDC/CERL TR-05-4 (2005).

Inhalation Toxicity of Cogenerated Graphite Flake and Fog Oil Smoke in the Brown-headed Cowbird and the Red-winged Blackbird, Size-specific Inhalation Surrogates for the Red-cockaded Woodpecker. Crystal Driver, Robert Fulton, Jennifer Ollero, Mark Clark, Gary Dennis, Brett Tiller and Harold E. Balbach, Report Number ERDC/CERL TR-05-5 (2005).

Black-capped Vireo

Impact of Red Imported Fire Ants on the Black-capped Vireo, an Endangered Species. Steven J. Taylor, Chris J. Whelan, Jennifer E. Smith, Michael L. Denight, and Mike Stake, Technical Publications Series, No. 377, Illinois Natural History Survey, University of Illinois at Urbana-Champaign, IL (Autumn 2003).

Behavioral Interactions Between Red Imported Fire Ants (*Solenopsis invicta*) and Vertebrate Nest Predators of the Black-capped Vireo (*Vireo atricapillus*). Jennifer E. Smith, Steven J. Taylor, Christopher J. Whelan, Michael L. Denight and Mike M. Stake, *Wilson Bulletin*, Vol. 116, No. 2, University of Michigan, Ann Arbor, MI (2004).

Various Species/Other

Prioritization of Threatened and Endangered Species Sound Research on Army Installations. David K. Delaney, Report Number ERDC/CERL TR-02-30 (2002).

A Survey of *Plethodon* sp. (*Plethodontidae*) Salamander Populations in Caves and Sinkholes at Fort Hood, Texas. Steven J. Taylor and Christopher A. Phillips, Report Number ERDC/CERL CR-03-2 (2003).

Monitoring of Federally Threatened and Endangered Species on U.S. Army Installations. Robert H. Melton, Harold E. Balbach, and Michael Ward, Report Number ERDC/CERL TR-04-27 (2004).

Methods for Field Studies of the Effects of Military Smokes, Obscurants, and Riot-control Agents on Threatened and Endangered Species, Vol 1: Background, Overview, Issues and Recommendations. Thomas Smith, Report Number ERDC/CERL TR-04-5 (2004).

Agave palmeri Inflorescence Production on Fort Huachuca, Arizona. Jeffrey S. Fehmi, Shelley Danzer, and Joanne Roberts, Report Number ERDC/CERL TR-04-16 (2004).

Pending Reports (In editing)

- Analysis of Gopher Tortoise Population Estimation Techniques, William Meyer (william.d.meyer@erdc.usace.army.mil)
- Training Restrictions Due to Presence of Indiana and Gray Bats on Army lands, Matthew Hohmann (matthew.g.hohmann@erdc.usace.army.mil)
- Military Smokes and Obscurants Fate and Effects: A Literature Review Relative to Threatened and Endangered Species, Thomas Smith (thomas.smith@erdc.usace.army.mil)
- Fate and Effects of Military Munitions Related Compounds, Thomas Smith (thomas.smith@erdc.usace.army.mil)
- Screening Level Ecological Risk Assessments for Selected Threatened and Endangered Species, Thomas Smith (thomas.smith@erdc.usace.army.mil)
- Potential Ambient Light Encroachment Effects on Military Training and Endangered Species, Steve Hodapp (stephen.e.hodapp@erdc.usace.army.mil)
- Remote Sensing for Threatened and Endangered Species Habitat Assessment on Military Lands, Scott Tweddale (scott.a.tweddale@erdc.usace.army.mil)
- Corridor Tool Input Procedure and Initial Results in Support of Threatened and Endangered Species Habitat Fragmentation, James Westervelt (james.d.westervelt@erdc.usace.army.mil)
- Delisting Process for Endangered Species and Relevance to Populations on Army Lands, Timothy Hayden (timothy.j.hayden@erdc.usace.army.mil)
- Emerging Species of Concern in the Perimeters of Military Installations Due to Urbanization Encroachment by 2020, Daniel MacDonald (daniel.p.macdonald@erdc.usace.army.mil)
- Training Restrictions on Army Lands Due to High Priority Endangered Species, Patrick Guertin (patrick.j.guertin@erdc.usace.army.mil)

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