Critical military training lands in coastal and estuarine settings are becoming increasingly scarce because of continued encroachment and requirements to comply with environmental regulations. These lands support realistic training and testing activities and are requisite in maintaining mission readiness. Successful ecosystem management reduces military training impacts to these and other environments and is the cornerstone of the Department of Defense’s (DoD) efforts to protect the wealth of natural resources found on its installations.

To expand its commitment to improving both military readiness and ecosystem management on DoD installations, SERDP is launching a new initiative, the Defense Coastal/Estuarine Research Program (DCERP). Through this initiative, SERDP will fund research and monitoring projects that support the long-term sustainability of military training and testing in coastal and estuarine environments. Marine Corps Base Camp Lejeune in North Carolina (Camp Lejeune) has been selected as the host site for the DCERP because it integrates many diverse habitats and provides an ideal platform for investigating a variety of coastal and estuarine conservation issues.

Within its boundaries are 14 miles of beach along the Atlantic Ocean, 5 miles of which are available for training; coastal dunes adjacent to the primary landing zone for amphibious assaults; and longleaf pine stands that house established red-cockaded woodpecker (RCW) clusters. Additionally, Camp Lejeune is home to eight federally listed threatened and endangered species (TES), including the green sea turtle, loggerhead sea turtle, piping plover, American alligator, American bald eagle, and several plants. There are also numerous state and federal species of concern. Camp Lejeune’s location, surrounding a large portion of the New River estuary and watershed, offers many research opportunities in hydrodynamics, water quality, TES, and invasive species. In leveraging these opportunities for research and monitoring projects, SERDP will make a long-term commitment (greater than 10 years) to the DCERP initiative.

Installation personnel at Camp Lejeune already have begun laying the groundwork for a comprehensive monitoring program, the Camp Lejeune Integrated Operations Network (CLION). The CLION system is intended to function as a fully integrated and operational network of security, safety, meteorological, oceanographic, and acoustic/seismic sensors. Therefore, CLION will assist in establishing the DCERP monitoring baselines and in managing individual ecosystem research efforts designed to answer specific questions. The DCERP initiative was conceived at a SERDP-sponsored workshop in Atlantic Beach, North Carolina, in February 2004. During this 3-day event, experts in ecosystem management participated in one of three “research” breakout
SERDP Projects Advance State-of-the-Science for Detecting Archaeological Sites

The Department of Defense administers approximately 25 million acres of public land containing some of the nation’s most significant historic and prehistoric cultural resources. By law, federal lands must be surveyed and all archaeological sites assessed for eligibility on the National Register of Historic Places (NRHP) or in support of the Native American Graves Protection and Repatriation Act (NAGPRA). Traditional field methods used to discover artifacts and architectural elements, such as surface survey and excavation, are time-consuming, expensive, and often unreliable. Three SERDP-funded projects are addressing these limitations by developing and modifying advanced techniques and methodologies to more accurately and efficiently detect archaeological sites, thereby decreasing the reliance on traditional and at times arbitrary excavations.

Under the direction of the National Aeronautics & Space Administration-Jet Propulsion Laboratory, the SERDP project Detection and Identification of Archaeological Sites and Features Using Radar Data (CS-1260) is establishing protocols for the use of Synthetic Aperture Radar (SAR) deployed from aircraft to locate and classify archaeological sites. Because of its variety of archaeological sites, San Clemente Island, off the coast of Southern California, has served as the test site. During the first year of this project, images were generated from flights over San Clemente Island and placed in a Geographic Information System (GIS) that contains detailed environmental information and precise locations of archaeological sites. More recently, as part of the post-processing phase, radar bands and polarizations were systematically tested to determine their ability to detect the locations of archaeological sites on San Clemente Island. Results indicate that the topographic SAR Digital Elevation Models (DEM) are highly accurate, allowing precise registration of the radar images to other information layers in the GIS database. The protocols developed in this project will help locate sites that are the most archaeologically significant and the most problematic from a management perspective.

A SERDP-funded project at the University of Denver, Developing an Efficient and Cost-Effective Ground-Penetrating Radar (GPR) for Archaeological Mapping of Cultural Resources on Public Lands (CS-1261), is collecting GPR data from two test sites located in Washington state and Illinois. Both sites have buried archaeological features at known depths and orientations that can be used for comparison to GPR maps and other images. The project’s goal is to determine which methods are best suited for locating and mapping buried cultural remains. The research team has conducted laboratory analyses of soil samples collected from each site to determine clay content and type, water saturation, and electrical and magnetic properties. Data indicate that water content most strongly impacts electrical properties that influence radar transmission and reflectance in the ground. As such, it appears to be the most crucial factor in the success of a GPR survey for archaeological mapping. Data collection and processing steps currently are being synthesized into a field and laboratory GPR protocol that will result in more accurate and efficient detection and mapping of buried cultural remains. The GPR technology developed in this project will be assessed as part of a suite of detection methods developed in SERDP project CS-1263 described below.

The SERDP project New Approaches to the Use and Integration of Multi-Sensor Remote Sensing for Historic Resources Identification and Evaluation (CS-1263), led by researchers at the University of Arkansas, is investigating the use of a suite of sensors to determine which combinations, data fusion techniques, and analytical approaches most accurately identify archaeological sites. During the first 2 years of this project, geophysical data from magnetometry, magnetic susceptibility, electrical resistivity/conductivity, GPR, terrestrial and aircraft thermal infrared, and satellite-based high resolution multispectral imagery were collected at Fort Benning (Georgia), Fort Bliss (Texas), Fort Riley (Kansas), and the Department of Energy’s Savannah River Site (South Carolina). Data fusion is used to apply a range of pattern/structure recognition approaches to evaluate the resource. Anomalies detected in the data fusion and analysis phase will be tested in the field using traditional excavation techniques to quantify prediction accuracy. The multisensor surveys enable the detection of archaeological features across large sites, improving the reliability of site assessments.

Collectively, the results of these three projects are on track to provide advanced tools and technologies to identify and evaluate cultural resources on DoD lands efficiently and cost-effectively.
SERDP Researcher Highlighted in CNN News Article

Dr. Joseph Szewczak from Humboldt State University in California recently was highlighted in a Cable News Network (CNN) article about “Bat Blitz 2004,” a 5-day event in central North Carolina where approximately 50 bat researchers from across the country converged to study these intriguing nocturnal mammals. Over the course of the event held in August, five different bat species were caught and later released after researchers recorded certain measurements (e.g., age, sex, and weight) and collected hair, skin, and fecal samples. Evaluation of these measurements and recordings of bat echolocation calls will help researchers like Dr. Szewczak learn new information about the more than 1,000 bat species.

Dr. Szewczak is being funded by SERDP through the project Automated Acoustic Identification of Bats (CS-1394) to develop a monitoring system that will automatically and continuously monitor bats for weeks or months at a time. Traditional inventory and monitoring methods necessary for managing rare threatened and endangered (T&E) bat species on DoD lands accrue high costs, making it a challenge for DoD to manage its lands for TES as required by the Endangered Species Act. These rare T&E bat species require more robust survey effort than common species to acquire reliable data. Automated acoustic monitoring and identification of these mammals will reduce the costs needed to monitor and manage rare T&E bat species. The system being developed by Dr. Szewczak will be able to operate in personnel-restricted areas and provide more reliable and consistent data from surveys to reveal long-term trends of species presence/absence and abundances as compared to traditional surveys. High-resolution acoustic data used by this system will increase the accuracy and consistency of species identification for better support of environmental management and operations planning on military lands. SERDP is pleased to note the national recognition that Dr. Szewczak has received for his efforts to further the state-of-the-science in species conservation.

Project Profiles: Noteworthy Efforts in Progress

Range Master Demonstrates Remote Excavation of Heavily Contaminated UXO Sites

Numerous Base Realignment and Closure (BRAC) sites, Formerly Used Defense Sites (FUDS), and active ranges include areas highly contaminated with unexploded ordnance (UXO) and range clutter. Depending on the site, remediation of these areas can be labor intensive, expensive, and hazardous. Many of the sites contain target impact areas too dense for effective digital geophysical mapping. The ability to remotely excavate and screen soil containing high-density UXO and range scrap will allow efficient and safe clearance of the vast majority of items in these areas, which would then be amenable to follow-up geophysical surveys.

ESTCP and the U.S. Army Engineering and Support Center, Huntsville (USAESCH) jointly funded development and demonstration of a remotely operated UXO excavation system called Range Master through the project Remote Excavation of Heavily Contaminated UXO Sites (UX-0327). The Range Master builds on a modified commercial Caterpillar 633D Scraper. The Range Master uses proven and mature technologies that are in commercial use today. Although it will not be applicable to all combinations of ordnance, terrain, vegetation, soil conditions, and weather, the Range Master has successfully demonstrated its ability to safely and cost-effectively excavate heavily contaminated sites with appropriate environmental conditions.

For further information about this technology, please contact Mr. Alan Crandall, USA Environmental, Inc., Tampa, FL, at (813) 884-5722 or via e-mail at ACrandall@usatampa.com.

The Range Master integrates an excavation and screening unit to optimize UXO removal operations that require soil sifting.

The Range Master uses proven and mature technologies that are in commercial use today. Although it will not be applicable to all combinations of ordnance, terrain, vegetation, soil conditions, and weather, the Range Master has successfully demonstrated its ability to safely and cost-effectively excavate heavily contaminated sites with appropriate environmental conditions.
Maximizing Sampling Efficiency and Minimizing Uncertainty in Presence/Absence Classification of Rare Salamander Populations (CS-1393)
Principal Investigator: Mark Bevelhimer/Oak Ridge National Laboratory
The amount of sampling necessary to conclude with reasonable confidence that the federally-listed flatwoods salamander (Ambystoma cingulatum) is absent from a particular location has not been determined. The overall objective of this research is to improve existing tools and develop innovative methods for efficiently surveying wetland habitats for rare salamanders (and other rare species), thus reducing the uncertainty in classifying a pond as absent of salamanders.

Automated Acoustic Identification of Bats (CS-1394)
Principal Investigator: Joseph Szweczkz/Humbolt State University
The inventory and monitoring necessary for managing threatened and endangered bat species accrues high costs because of the specialized skills required to perform this work. This project will develop a system to monitor bats automatically and continuously for weeks or months at a time by recording the vocalizations they produce. This project also will develop processing algorithms to identify bat species automatically from the field-collected data in assessing species presence/absence, population levels, temporal movements, and acoustically gleaned demographic information. (See Tech Notes page 3.)

Development and Application of a Physiological-Based Framework for Assessing the Biological Significance of Military Activities on Threatened and Endangered Animal Species (CS-1395)
Principal Investigator: S. Marshall Adams/Oak Ridge National Laboratory
Conventional population- or community-level surveys are the methods most commonly used to evaluate threatened and endangered species (TES). These techniques, however, can be expensive, time-consuming, and relatively insensitive to environmental stressors with long response times. The objective of this project is to develop and apply a bioassessment tool that can be used by natural resource managers across a wide variety of military installations to assess the fitness of TES populations by measuring a suite of sensitive and rapidly responding physiological indicators that are related to reproductive- and population-level fitness.

SERDP’s Defense Coastal/Estuarine Research Program (CS-1413)
The purpose of SERDP’s Defense Coastal/Estuarine Research Program (DCERP) is to expand ongoing efforts to improve military readiness and ecosystem management on DoD installations. The DCERP will encompass monitoring and research projects relevant to military training and testing in coastal and estuarine environments. Because of its integration of many diverse habitats and TES issues, Marine Corps Base Camp Lejeune in North Carolina was selected as the host site. SERDP has made a long-term commitment (greater than 10 years) to the DCERP initiative. (See front page article.)
ESTCP Releases Special Solicitations

Perchlorate Treatment in California

On July 21, 2004, U.S. Senator Dianne Feinstein (D-Calif.) announced that the proposed FY 2005 Defense Appropriations Bill approved by the House-Senate Conference Committee allocates $6.5 million to address perchlorate contamination in the Inland Empire. The Conference Committee report included spending for several perchlorate cleanup projects: $4 million requested by Senator Feinstein is directed to the Environmental Security Technology Certification Program to conduct research and demonstrate cleanup technologies in the Rialto-Colton Basin, and an additional $2.5 million requested by Senator Barbara Boxer (D-Calif.) is slated for wellhead treatment where perchlorate-contaminated water is pumped, treated, and then returned to the system.

In support of this funding appropriation, the Senate approved an amendment in June to the Department of Defense Authorization bill sponsored by Senator Feinstein, calling on the Pentagon to remediate perchlorate contamination on DoD sites. Exposure to perchlorate may adversely affect human health, especially in vulnerable and sensitive populations such as young children and newborns. To date, perchlorate has been identified as a contaminant of drinking water sources or in the environment in 34 states. It has been used or manufactured in 44 states. California has more than 350 affected water sources, including the Colorado River, which irrigates 1.4 million acres of farmland in Arizona and California.

In response to the $4 million in funding for ESTCP, a special solicitation was issued on October 12 for proposals to demonstrate perchlorate treatment technologies in California. Pre-proposals were due November 18. For more information, visit www.estcp.org under Opportunities or contact Dr. Andrea Leeson, ESTCP Program Manager for Cleanup, at (703) 696-2118 or via e-mail at Andrea.Leeson@osd.mil.

UXO Wide-Area Assessment

DoD faces a UXO cleanup liability estimated at tens of billions of dollars. The Defense Science Board (DSB) found in November 2003 that advanced technology can yield a dramatic reduction in this cost. One of the DSB’s recommendations specifically called for increased resources to demonstrate UXO wide-area assessment technologies under real-world conditions. The DSB estimated such an approach can safely eliminate approximately 80% of the land currently suspected of contamination. In response to the DSB recommendations, Congress directed $5M for demonstration/validation of innovative and cost-effective UXO wide-area assessment technologies. ESTCP released a special solicitation on November 18, 2004. For more information, visit www.estcp.org under Opportunities, or contact Dr. Anne Andrews, ESTCP Program Manager for UXO, at (703) 696-3826 or via e-mail at Anne.Andrews@osd.mil.

PROJECT AWARDS, from page 4

POLLUTION PREVENTION

Tropodegradability and Micellization: New Approaches to Achieving Ozone-Safe Solvents (PP-1407)
Principal Investigator: Bradley Williams/Naval Research Laboratory
Ozone-depleting solvents are used as cleaning agents for many critical applications that affect DoD’s operational capabilities. While these solvents are ideal cleaning agents, they are very harmful to the environment. This project will investigate two approaches to the development of non-ozone depleting solvents: (1) tropodegradable chlorinated or brominated fluorocarbons and (2) fluorocarbon/hydrocarbon emulsifiers to enhance hydrocarbon solubility.

Catalytic Nitration of Toluene (Elimination of Red Water) (PP-1409)
Principal Investigator: Reddy Damavarapu/U.S. Army Tank-Automotive and Armaments Command - Armament Research, Development and Engineering Center (TACOM-ARDEC)
Trinitrotoluene (TNT) is an important military explosive; however, its production leads to an environmentally harmful byproduct known as Red Water. The objective of this project is to develop a process for manufacturing TNT that avoids the creation of Red Water via the catalytic nitration of toluene, a chemical intermediate.

UNEXPLODED ORDNANCE

Determining the Properties and Capabilities of an Existing Experimental Large Loop EM61 Underwater UXO Detector (UX-1385)
Principal Investigator: Peeter Pehme/Dillon Consulting Limited
The objective of this project is to determine if the previously developed Large Loop Electromagnetic (EM)-61 Marine System prototype can be understood and improved upon for discriminatory mapping of UXO on the sea floor. The technology targets near shore environments encompassing very shallow (less than 15 feet) and shallow (16 to 60 feet) water depths.
Program Development Update

**SERDP**

Proposals selected in response to the FY 2005 solicitations were presented to the SERDP Scientific Advisory Board (SAB) for review at its September and October meetings. Proposals that required revisions will present at the March 2005 SAB meeting. On September 29, the SERDP Council met to approve the FY 2005 Program Plan and the FY 2006 investment guidance. Following the Council’s approval, Principal Investigators (PI) were notified and requested to submit their Project and Execution Plans. During each project’s kickoff conference call with the appropriate SERDP Program Manager, the PI will discuss these Plans for the upcoming year, as well as other pertinent project requirements. Projects under contract must negotiate their contracts with a government Contracting Officer prior to release of funding. As part of this negotiation, PIs should expect to prepare a subcontracting plan.

Prior to completion of the FY 2005 Program Plan, the SERDP staff began developing the FY 2006 Program. The FY 2006 Core and SERDP Exploratory Development (SEED) solicitations were released on November 10, 2004. Refer to the SERDP web site under the Funding & Opportunities link for information and details regarding the Statements of Need and schedule for submission.

**ESTCP**

On October 12, a special FY 2005 ESTCP solicitation was issued. (See article on page 5). This solicitation was released in response to congressional concern over the potential cost of remediation of perchlorate and congressional direction to conduct research and demonstrations of remediation technologies. Responses to this solicitation required that pre-proposals be submitted to ESTCP no later than November 18, 2004. Another special solicitation for demonstration of UXO wide-area assessment technologies was released on November 18, 2004. For additional information regarding these solicitations refer to the ESTCP web site under the Opportunities link.

The Defense Appropriations Bill approved the FY 2005 ESTCP budget request. ESTCP continues to grow in order to handle the significant number of technologies ready for demonstration. ESTCP’s Director and his staff have prepared a 2005 Program Plan that recently was approved by Mr. Alex Beehler, Assistant Deputy Under Secretary of Defense for Environment, Safety and Occupational Health. PIs will be contacted to submit Project Plans and Obligation/Expenditure Plans, as well as to schedule kickoff conference calls with the appropriate ESTCP Program Manager. These plans must be submitted prior to release of funding.

A solicitation for the FY 2006 Program is planned for release early in January 2005. Watch the ESTCP web site for details and updates on these funding opportunities.

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**DCERP, from page 1**

groups (Aquatic Habitats, Terrestrial Habitats, and Water Quality) and one of three “monitoring” breakout groups (Coastal Systems, Terrestrial Systems, and Estuarine Systems). These working groups were charged with determining the state of the science, as well as identifying and prioritizing current and near-future research and monitoring needs.

The workshop yielded a framework for addressing the diverse ecosystem research needs of Camp Lejeune and the New River estuary and watershed, as well as the development of a long-term monitoring strategy. “Research” breakout groups agreed that efforts should take more holistic approaches, such as investigating the effects of land use and military training on ecosystem disturbance; studying contaminants, their cycling, and their toxicology; and examining demography in TES habitat studies. The “monitoring” breakout groups also recognized the importance of holistic perspectives, suggesting the identification of landscape-, community-, and individual-level indicators and stressing the need for baseline data and data yielding comparisons over time (particularly after major storm events and management changes). General recommendations derived from the workshop for the design and direction of the DCERP initiative include: investigate spatial and temporal scales, develop ecosystem-level indicators and thresholds, address water quality issues, and improve understanding of the impacts of RCW management.

Proceedings from the workshop are available by searching the SERDP & ESTCP Online Library at http://docs.serdp-estcp.org/.

In establishing the DCERP, leaders from SERDP and Camp Lejeune continue to coordinate on logistical and personnel needs, soliciting for a program Directorate and developing research plans. Following selection of a DCERP Directorate, who will coordinate day-to-day operations and ensure the quality of science to be pursued, DCERP-related activity will increase exponentially as baseline data collection and research projects commence. The research and monitoring projects are expected not only to improve ecosystem management across DoD but also lead to sustained military training and testing activities in coastal and estuarine environments.

For additional information about the DCERP (CS-1413), please contact Ms. Leslie Karr, Naval Facilities Engineering Service Center, Port Hueneme, CA, at (805) 982-1618 or via e-mail at leslie.karr@nayo.mil.
SAB Member Honored for Breakthrough in Engine Emission Systems

Dr. Ron Heck, a member of SERDP’s Scientific Advisory Board, and two of his colleagues from Engelhard Corporation, Dr. Harold Rabinowitz and Dr. Zhicheng Hu, are the inventors of a novel technology that has enabled automakers to comply cost effectively with increasingly stringent engine-emission standards. As a result of their work, they were selected to receive a 2004 Thomas Alva Edison Patent Award. This prestigious award, presented by the Research & Development Council of New Jersey, recognizes dedication to research and development that leads to truly innovative breakthroughs. Dr. Heck and his colleagues developed a method to separate the oxidation of hydrocarbons from the oxidation of carbon monoxide and nitrogen oxides without compromising catalyst efficiency. “This invention is one of the critical enablers for a substantial increase in the efficiency of catalytic emission control without a significant increase in cost,” said Mikhail Rodkin, director of research and development at Environmental Technologies. “It’s also a good example of the ingenuity of Engelhard scientists in the face of a formidable technical challenge and market pressures.”

Dr. Heck, Dr. Rabinowitz, and Dr. Hu were honored at the R&D Council’s annual awards dinner earlier this month at New Jersey’s Liberty Science Center. SERDP is honored to have such a distinguished researcher on its Scientific Advisory Board and congratulates Dr. Heck on this recent achievement.

THE SOLICITATIONS FOR THE SERDP FY 2006 CORE PROGRAM AND SERDP EXPLORATORY DEVELOPMENT (SEED) PROGRAM were released on November 10. Visit the SERDP web site (under the Funding & Opportunities link) for specifics about the Statements of Need and schedules.

A FEDERAL CALL FOR PROPOSALS AND A BROAD AGENCY ANNOUNCEMENT FOR ESTCP FY 2006 PROJECT FUNDING are expected to be released on or about January 6, 2005. Watch the ESTCP web site (under the Opportunities link) for specifics about the solicitation and schedules.

NEW PUBLICATIONS ARE NOW AVAILABLE ON THE ESTCP WEB SITE (www.estcp.org under the Technologies link).

Cost and Performance Reports:

Clean up

- Integrated Field Screening for Rapid Sediment Characterization (CU-9717)
- Field Demonstration of Rhizosphere-Enhanced Treatment of Organics-Contaminated Soils on Native American Lands with Application of Northern FUD Sites (CU-1011)

Compliance

- An Alternative to EPA Method 9 – Field Validation of a Digital Opacity Compliance System (DOCS) (CP-0119)

UXO

- A Fast 4-D TEM System for UXO Characterization (UX-0105)
### Calendar for SERDP and ESTCP

#### January 2005
- **January 6**
  - Non-federal pre-proposals due in response to the SERDP FY 2006 Core Solicitation
- **January 6**
  - A federal Call for Proposals and a Broad Agency Announcement for ESTCP FY 2006 Project Funding to be released on or about this date (www.estcp.org)
- **January 15**
  - SERDP quarterly progress reports due for the first quarter of government FY 2005
- **January 15**
  - ESTCP quarterly progress reports due for the first quarter of government FY 2005

#### February 2005
- **February 3**
  - Full proposals requested from qualified proposers responding to the SERDP FY 2006 Core Solicitation Broad Agency Announcement

#### March 2005
- **March 10**
  - Proposals due in response to the SERDP FY 2006 SERDP Exploratory Development (SEED) Solicitation
- **March 10**
  - SERDP FY 2006 full Broad Agency Announcement and federal proposals due
- **March 10**
  - ESTCP FY 2006 Broad Agency Announcement pre-proposals due

#### Related Conferences & Events
- **January 10-13**
  - Fifteenth Annual International Workshop on Alternatives to Toxic Materials in Industrial Processes (formerly the International Workshop on Solvent Substitution)
    - Phoenix, Arizona
- **March 14-17**
  - The 15th Annual West Coast Conference on Soils, Sediments and Water
    - San Diego, California
    - For more information, visit [http://www.aehs.com/conferences/westcoast/](http://www.aehs.com/conferences/westcoast/)
- **April 3-7**
  - 18th Annual Meeting of SAGEEP
    - Symposium on the Application of Geophysics to Engineering and Environmental Problems
    - Atlanta, Georgia
    - Sponsored by SERDP and ESTCP
    - For more information, visit [http://www.eegs.org/sageep](http://www.eegs.org/sageep)