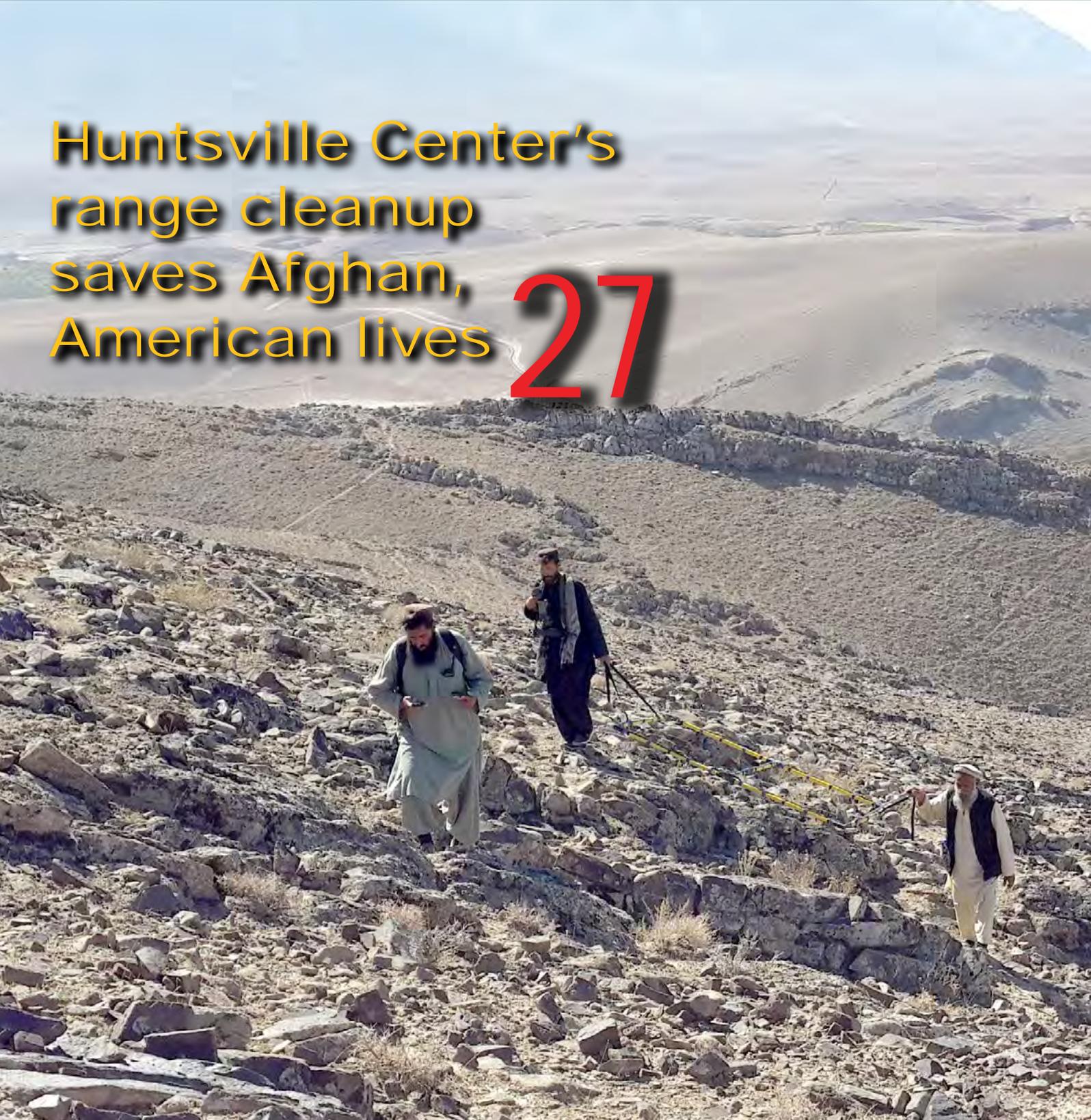


Huntsville Center's
range cleanup
saves Afghan,
American lives **27**



Environmental Operating Principle #2

Proactively considering environmental consequences and acting accordingly.



contents

4 EnviroPoints Environmental Infrastructure Essential to Army Readiness	21 Team studies river system's long-term navigation sustainability	39 Environmental quality achievements move Wisconsin Guard forward
6 State of the U.S. Army Corps of Engineers Environmental Program	22 Study identifies artificial turf benefits, costs	40 Investigation, removal activities continue at Camp Ellis Military Reserve
9 First USACE woman elected to National Academy of Engineering	24 Corps researchers investigate how to create resilient beach dunes	41 USACE, partners launch Seven Mile Island Living Lab
10 Volunteers celebrate Earth Day 2019 by collecting trash, debris	27 Huntsville Center's range cleanup saves Afghan, American lives	43 Arctic post seeks to eliminate fire retardant contaminants
11 Earth Day - Kandahar style	31 Aberdeen improves environment for maintainers	44 District, contractor complete repair work to Scituate Harbor Jetty
12 Regulatory office aims to accelerate permitting process	32 Environmental award recipient helps preserve Camp Shelby's history	45 Protecting water quality has positive trickle-down effect
13 Camp Blanding sets standard for natural resource conservation	33 Fort Drum moves toward 2020 environmental goal	47 Watershed system meets water needs of NYC millions
15 'If you build it, they will come'	34 District conducts pilot study at Camp Beale	48 Annual bird count event draws local bird enthusiasts
16 Wild burros, horses are longstanding denizens of Yuma Proving Ground	36 Fort Stewart/Hunter Army Airfield wins Army Environmental Sustainability Award	49 Los Angeles District, Tohono O'odham Nation join efforts to promote explosives safety
19 Corps helps Joint Base Andrews increase security, reduce pollution	38 Washington Guard balances mission, cultural resource preservation	50 2019 Army Earth Day poster



Environmental Infrastructure Essential to Army Readiness

“Combat-ready forces depend on successful stewardship of natural resources in order to simulate realistic maneuver areas, training environments and testing ranges.”

By Hon. Alex A. Beehler
Assistant Secretary of the Army
Installations, Energy and Environment

The Army is prioritizing modernization and readiness as we train to deploy, fight, and win our nation's wars. Readiness and modernization depend on environmental infrastructure and necessitate training operations in large-scale, realistic natural landscapes and environmental conditions expanding in scope and complexity.

Combat-ready forces depend on successful stewardship of natural resources in order to simulate realistic maneuver areas, training environments and testing ranges.

As such, the Army has a tremendous obligation to protect and conserve air and water resources, and ensure rare and vanishing ecosystems and habitats are conserved.

As Assistant Secretary of the Army for Installations, Energy and Environment, I am committed to changing the focus on how we view the environment. Rather than isolating and independently managing environmental factors, we are moving towards recognizing these resources as strategic assets critical to the Army's warfighting readiness.

Through collaboration with industry, local utilities and other stakeholders, the Army is exploring technology-agnostic solutions to enhance installation and operational energy and water resilience. Energy initiatives involve project teams assessing costs, long-term environmental impacts, resilience benefits and other factors to develop solutions independent from the commercial electrical grid. The Army relies on alternative and renewable energy generation, battery energy storage systems, and microgrids at installations to decrease grid dependence and infrastructure vulnerability. We are also reforming efforts to measure and implement utility resilience. During resilience exercises, we disconnect installations from commercial electric power to determine gaps in operational capability during utility outages. The results of these exercises highlight vital issues such as undefined critical building loads and improperly configured backup generation. Combining new assessment and implementation approaches allows the Army to reform processes and procedures to enhance Army resilience and support mission readiness.

In addition to energy and water initiatives, the Army partners with

resource conservation agencies, universities, and non-governmental organizations to gain valuable insight and help implement effective environmental programs. Partnering with stakeholders enhances cooperation, increases communication, and provides for informed decision-making crucial to the success of our environmental programs while increasing Army access to capable and realistic landscapes. Through these partnerships we manage threatened and endangered species to effectively balance warfighting readiness missions and regulatory requirements pertaining to endangered species. Our habitat conservation initiatives have played a major role in conserving and recovering endangered species including the American bald eagle, red-cockaded woodpecker, black-capped vireo, golden-cheeked warbler, and the lesser long-nosed bat.

The Army is a large and geographically-dispersed organization with 146 installations and more than 2,200 community-based National Guard and Reserve Centers, all of which are dependent on reliable and consistent supplies of energy and water resources. We are shifting our paradigm towards a more holistic view of environmental resources as crucial assets



Hon. Alex A. Beehler

in an increasingly complex training environment. Through successful partnerships with communities, experts and stakeholders, the Army is enhancing utility infrastructure resilience while conserving natural resources and protecting endangered species. The U.S. Army is committed to continuing to expand these efforts in order to maintain the readiness, lethality and adaptability of our Soldiers, installations and communities.

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The Corps Environment is an online quarterly publication produced by the U.S. Army Corps of Engineers as an unofficial news magazine under the provisions of AR 360-1.

The purpose of this publication is to provide information about USACE and U.S. Army environmental actions, issues, policies and technologies.

Opinions expressed are not necessarily those of the U.S. Army. Inquiries can be addressed to U.S. Army Engineering and Support Center, ATTN: CEHNC-PA, 5021 Bradford Drive East, Huntsville, AL 35816. Tele: (256) 895-1150.

Submissions

The Corps Environment's editorial staff welcomes submissions with an environmental, sustainability or energy focus from USACE and Army units worldwide. Send articles, photos, events, letters or questions to the editor at CEHNC-PA@usace.army.mil.

Beginning in FY2019, *The Corps Environment* will be published February 1, May 1, August 1 and November 1.

New deadlines:

Dec. 15 (February) Mar. 15 (May)

June 15 (August) Aug. 15 (November)

www.usace.army.mil/Missions/Environmental.aspx

State of the U.S. Army Corps of Engineers Environmental Program



Karen Baker

By Karen Baker
Regional Programs Manager
USACE North Atlantic Division

Over the course of the past five years, I've had the privilege of championing our environmental mission alongside the highly-skilled and capable workforce within the U.S. Army Corps of Engineers. As I transition from serving as the Environmental Programs Chief at Headquarters to the Regional Programs Manager at North Atlantic Division, I would be remiss if I did not take this opportunity to give a shout-out to our USACE-wide environmental team and the value-added results they continue to deliver.

One of the greatest strengths I have observed while serving as Environmental Programs Chief is our ability to embrace emerging issues as an opportunity. These unplanned initiatives have occupied a significant amount of our environmental team's time and added to already heavy workloads. Still, our team never wavered in providing engineering solutions to our military partners and our non-Department of Defense customers.

Whether it was conducting visual inspections of military housing for environmental hazards or providing technical support to our Air Force and Army partners in addressing per- and polyfluoroalkyl substances, or PFAS, we answered the call—because that is what we do. We provide solutions to the toughest environmental challenges. It is what we are known for and why we are asked to support so many initiatives.

Over the course of the past five years, I have seen our environmental program continue to grow and mature. I would like to highlight some of the achievements I have seen first-hand, as well as reflect on how we are positioned moving forward. First, let's start with some of the accomplishments within our programs:

Integrating innovative technologies into remediation activities

There is tremendous value in the partnerships we have developed through the years with federal, state and local organizations, industry and academia. It is through these partnerships and engagements that we are able to embrace innovative solutions and sync up the technology we need with the capabilities of industry. One such innovation is advanced geophysical classification.

Utilization of AGC at formerly used defense sites reduces the overall time and cost of remediation activities by enabling project teams to identify items buried under the ground to a greater level of specificity. The Department of Defense initiated the AGC accreditation process in April 2016, and as of March 2019, 12 firms have been accredited. The U.S. Army Corps of Engineers has been a DOD leader in utilizing accredited firms at 26 of our FUDS Military Munitions Response Program cleanup projects.

Leveraging value of partnerships, collaboration

We continue to leverage the strength and knowledge of academia through our Environmental Advisory Board. The EAB was created as a means for the Chief of Engineers to gain outside, expert and independent advice on environmental issues facing the U.S. Army Corps of Engineers. Although the EAB will transition into a sub-committee of the Army Science Board at the end of this fiscal year, we will continue to utilize this board to build partnerships, understanding and cooperation with the environmental community, and public at large as we work to address complex environmental issues.

We also continue to engage with state and regional decision makers through the **Army Regional Environmental and Energy Offices**. Our REEOs monitor emerging issues

and trends at state and regional levels, serving as the “eyes and ears” for the Army and DOD. They continue to support our districts and divisions in establishing relationships across the country, serving as a force multiplier through their engagements in environmental and energy initiatives that may affect military training, testing and readiness.

We need to continue to leverage and incorporate scientific, economic and social knowledge in all that we do. This is accomplished through our continued engagements with federal, state and local organizations, academia, and industry. It is through this active dialogue with industry that we communicate what our needs are to successfully execute our programs.

Additionally, it is through this active dialogue that we will continue to enhance our capabilities through innovation and collaboration with our federal partners. I am especially proud of the reinvigorated partnership we have forged with the Department of Energy's Legacy Management Program. Our ongoing collaboration, sharing of lessons learned and comprehensive planning enhanced our delivery of the Formerly Utilized Sites Remedial Action Program, while at the same time served as an entryway into other mission areas where our specialized expertise was needed at DOE. Last year, we signed a new Memorandum of Understanding that is already having an impact across the enterprise.

Fostering sustainability as a way of life

This past March, we celebrated the completion of the decommissioning and dismantling of the historic STURGIS vessel under our **Deactivated Nuclear Power Plant Program**. What makes this project truly noteworthy is not only did we successfully decommission and break down the world's first former floating nuclear power plant, but we also recycled a significant amount of materials as a result. As part of the radiological

decommissioning, we safely removed and shipped more than 1.5 million pounds of radioactive waste and recycled more than 600,000 pounds of lead. As part of the subsequent shipbreaking, an estimated 5,800 tons of steel and other assorted metal from the ship were recycled.

This is just one example of how we are fostering sustainability as a way of life within the U.S. Army Corps of Engineers. Often when we talk about sustainability, we hear discussions of “balance” or “trade-offs” between mission, environment and economic benefits. However, I have witnessed first-hand the Corps' transition from all red on its first Sustainability Scorecard in fiscal 2010 to mostly green in fiscal 2017. We moved from the lowest ranking agency in the government on its energy intensity scores to the current federal leader. This is huge. We are truly leveraging the concept of sustainability and not making decisions based on this “OR” that, but on this “AND” that, with respect to the environment and the mission.

Aligning guiding principles with mission completion

When it comes to the mission, we are always focused on completion, and in 2016, we turned this focus into a vision for our Formerly Used Defense Sites program. We called the vision: “Response Complete in Our Lifetime.” To accomplish this vision, we also adopted a new set of guiding principles for the FUDS program that focused on bringing our projects over the finish line.

Within my Headquarters team, and among the divisions and districts supporting our military programs environmental work, we recognize we can also achieve many of our other installation remediation goals “in our lifetime,” as we continue to draw down the list of sites on active installations and return acres of land back into use for training or other military activities.

Maximizing breadth of skills, knowledge within our environmental cadre

The strength of our reputation is built upon our talented workforce, the quality of service we deliver, and the breadth of technical expertise we possess in-house. This is the result of our focus on professional development and expertise.

While serving as the environmental representative on the CP-18 Career Program Planning Board for the U.S. Army, it was my responsibility to help develop and communicate opportunities within the career program. Over the past several years, the Army Environmental Community of Practice has been building the career maps for the Environmental Engineer (0819), Environmental Protection Specialist (0028) and the Natural Resources Manager (0400) series. These career maps serve as a guide to see what skills, experiences, and education our environmental professionals should be seeking to advance their careers and are readily available on **Army Career Tracker**.

Our highly-skilled professionals not only support our environmental cleanup programs across the country, but overseas as well. Our environmental teammates deploy all over the world as part of the **Environmental Support Team**, providing environmental support to combatant commands during war, contingency operations, and disaster relief operations. Not to mention our environmental experts have been on-the-ground in support of disaster response and recovery efforts prompted by the hurricanes and wildfires over the past few years.

So, where do we go from here? The answer is simple. We continue to move forward. Some of the key resources that we leveraged during my tenure will continue to set the pace for the way ahead:

See STATE, page 8

Living by our Environmental Operating Principles

Our environmental mission touches the lives of nearly every American and our team understands that every one of our projects and mission lines has an impact on the environment, the economy, and the well-being of the communities we serve. We will continue to march forward in these vital efforts by embracing our **Environmental Operating Principles**. The EOPs reinforce our role in, and responsibility for, sustainable use, stewardship, and restoration of natural resources and we will continue to incorporate them into all that we do, across all mission areas.

Embracing NEPA as a mission enabler

Sustainable practices and environmental stewardship can be a mission enabler. The National Environmental Policy Act is consistent and aligned with our EOPs and when done well can enhance the effectiveness and outcomes of our project delivery. We are changing the paradigm and encouraging our team to **think of NEPA as a tool** that helps us to identify and mitigate

risk — not just to the environment — but to the cost and schedule of a project.

Harnessing the strength of our Environmental Community of Practice

The role of our Environmental Community of Practice is to cut across all the different lanes our environmental mission crosses into throughout the Corps and bridge this gap. The ECOP serves as a steering committee where our senior leaders at Headquarters come together to discuss environmental-related activities across the U.S. Army Corps of Engineers, identify who is in the lead, and how the rest of our collective team can support. It removes the stovepipes often created within our different mission areas. Through this forum, we are able to leverage the full capacity of our technical competencies across the enterprise.

Across the enterprise, we celebrate our environmental accomplishments on Earth Day, which we celebrated on April 22. The Army's theme for Earth Day this year was "Sustaining the environment to secure the mission."

The one thing that has evolved— and that I try to stress every day— is that we now recognize environmental considerations can also be an enabler. It is about ensuring Soldiers and other service members have the air, water, land they need to train; It is about cleaning sites to a level that allows us to revitalize and develop infrastructure; It is recognizing that protecting an ecosystem may have economic benefits; and it is about learning how to use natural approaches as we continue to build infrastructure the nation needs.

Our workload and technical competencies continue to evolve and adapt in response to the needs of our customers and our nation. As we continue to evolve, the value proposition of our environmental program is known and is strong with our partners and we will continue to build off this in shaping our future. I have confidence in our environmental experts to lead this charge, and in doing so, continuing our efforts to sustain the environment and secure the mission moving forward.



(Photo courtesy of USACE, Sacramento District)

Advanced electromagnetic induction sensors are used to distinguish unexploded ordnance from scrap metal at a munitions response site at Fort Ord, California.

First USACE woman elected to National Academy of Engineering

By Carol C. Coleman

Engineer Research & Development Center

Dr. Jane McKee Smith, a senior research scientist with the Coastal and Hydraulics Laboratory at the U.S. Army Engineer Research and Development Center, has been elected to the National Academy of Engineering. Election to the academy is one of the highest professional distinctions bestowed upon an engineer.

“This is an impressive career accomplishment,” said Dr. David Pittman, ERDC Director. Only four other ERDC or Waterways Experiment Station professionals have served as distinguished members of the academy.

Smith was recognized for her research breakthroughs in hydrodynamic phenomena and her leadership in coastal engineering research and development resulting in improved infrastructure resilience. Her research focuses on nearshore waves and currents, wave-current interaction, shallow-water wave processes and storm surge.

“Jane also holds the distinction of being the first female academy member from the U.S. Army Corps of Engineers,” said Pittman.

Smith is the co-developer of the Steady-State Spectral Wave Model, a numerical model that is used throughout the world for coastal project planning and design. These wave models have been used by Smith on projects such as marsh restoration in the San Francisco Bay Area, an Engineering With Nature research project.

Smith, along with a team of researchers, developed and validated wave models that allowed for testing alternate designs of mounds versus berms to discover the optimal design for each individual marsh. She was the wave modeling lead investigator for the Interagency Performance Evaluation Task Force evaluation of Hurricane Katrina and also led development of a system to quickly forecast hurricane waves, storm surge and inundation for the Hawaiian Islands.

She has more than 200 professional publications to her credit, and serves as chair of the American Society of Civil Engineers Coastal Engineering Research Council and on the editorial boards of Coastal Engineering and the Journal of Waterway, Port, Coastal and Ocean Engineering.

She is an adjunct professor at Mississippi State University and serves on the PhD committees at MSU, the University of Florida, Louisiana State University and Texas A&M University.

“It is a great honor to be elected to the National Academy of Engineering,” said Smith. “I’m very thankful for the opportunities that ERDC has given me to research waves and coastal processes, solve engineering challenges, collaborate with the international community, and most of all, work with both great mentors and colleagues. Engineering is all about solving problems, and it is very rewarding to focus on solving problems with national and international impact as part of the Corps of Engineers team.”

The National Academy of Engineering is a private, independent, nonprofit institution that provides engineering leadership in service to the nation. It consists of more than 2,000 peer-elected members and foreign members, who are among the world’s most accomplished engineers. They provide the leadership and expertise for numerous projects focused on the relationships between engineering, technology and quality of life.

The ERDC helps solve the nation’s most challenging problems in civil and military engineering, geospatial sciences, water resources and environmental sciences. As one of the most diverse engineering and scientific research organizations in the world, ERDC conducts



(Photo courtesy of ERDC)

Dr. Jane McKee Smith is a senior research scientist with the Coastal and Hydraulics Laboratory and an elected member of the National Academy of Engineering.

research and development in support of the Soldier, military installations, and the Corps of Engineers’ civil works mission, as well as for other federal, state and municipal authorities. As part of the ERDC, the Coastal and Hydraulics Laboratory addresses an entire spectrum of water resource challenges in groundwater, watersheds, rivers, reservoirs, estuaries, harbors, coastal inlets and wetlands.



Punahou School Junior ROTC cadets pick-up trash in the Fort DeRussy beach park area as part of the Corps' Earth Day 2019 clean-up event.

Volunteers celebrate Earth Day 2019 by collecting trash, debris

Story & photo by Dino Buchanan
USACE, Honolulu District

The U.S. Army Corps of Engineers, Honolulu District and Pacific Ocean Division leadership, District and Tripler Army Medical Center employees joined forces with Punahou School Junior ROTC cadet volunteers to clean the Fort DeRussy area beach and beach berm April 27 for Earth Day 2019.

The 2019 U.S. Army Earth Day theme is “Sustain the Environment to Secure the Mission.”

“This a great opportunity for the Corps of Engineers employees to partner with local volunteers to sustain the beautiful environment of Hawaii we enjoy so much,” Lt. Col. Kathryn Sanborn, Honolulu District commander, told the more than 45 volunteers. Joining Sanborn at the cleanup was USACE Pacific Ocean Division Command Sgt. Major Patrickson Toussaint.

This was the 14th consecutive year the district hosted the Earth Day-focused event by the U.S. Army Corps of Engineers Pacific Regional Visitor Center at Battery Randolph on Fort DeRussy in Waikiki.

USACE Park Rangers Angela Jones

and Stephen Lawlor coordinated and led the beach sweep with assistance from the Punahou School Junior ROTC program commander Lt. Col. (retired) Robert Takao.

More than 25 cadets and the other volunteers scoured the beach area fronting and adjacent to the Fort DeRussy beach park collecting nearly 70 pounds of debris.

Takao said the Earth Day activity is one of several community support events the cadets participate in each year as part of their JROTC program.

“We had a great volunteer turnout and collected more trash this year,” Lawlor said. “Our Earth Day event shows the Corps’ commitment to protect and preserve the environment we live in.”

Each year, Earth Month and Earth Day activities increase awareness and support for ongoing education and efforts to build partnerships and grassroots involvement to keep the area clean year-round.

Earth Day was established March 21, 1970, as an annual event to deepen reverence and care for life on the planet.

Though Earth Day was originally designed to bring public awareness to environmental issues, the Army uses this day to highlight environmental successes

and help people understand how sound environmental stewardship not only supports the quality of Soldier training, but also the quality of life of families that live on Army installations and neighboring communities.

Having one of the largest federal environmental missions and being the nation’s environmental engineer, USACE is committed to taking care of the environment and creating mutually supporting economic and environmentally sustainable solutions. An umbrella concept, sustainability includes energy, climate change, and the environment to ensure today’s actions do not negatively impact tomorrow. Environmentally sustainable events held each year by Honolulu District align and supports the Corps commitment.

The regional visitor center first opened its doors at Battery Randolph in 1983. Its goal is to enhance the public’s understanding of the multidimensional role of the Army and USACE. Particular emphasis is on civil works and water resources development which affect the lives of all the residents of Hawaii and the people of the Pacific.

Earth Day- Kandahar style

By Cheryl A. Moore
USACE, Afghanistan District

In observance of Earth Day, the Kandahar Project Delivery Platform takes pride in the operation of the Wastewater Treatment Plant, which has been in operation for a few days now.

The Combined Security Transition Command-Afghanistan-funded Wastewater Treatment Plant supports 3,500 personnel at the Kandahar Air Wing and 360 personnel at the Special Mission Wing.

The official turnover of the completed project by the contractor to the customers, and ultimately those who will benefit from the use of this commercial wastewater treatment plant will take place in the near future.

Though the focus is on the treatment plant itself, additional work was done to include a new 15 kilovolts electrical feed to

the plant that was installed and supported by the Special Mission Wing power plant. There are also four lift stations that bring the waste from the Special Mission Wing and Kandahar Air Wing to the plant. And there was a new 300-meter-deep well installed with three new water tanks to also support the growth of the site. The first stage of treatment is the head works.

“This is like a trash rack that collects any heavy objects that may have been flushed to the plant, such as rocks,” said James Fielden, electrical engineering technician, USACE Kandahar. He went on to say that the aeration ponds are the second stage of treatment.

“They stir (aerate) the waste to allow the aerobic bacteria to break down the waste,” he said.

Each of these three ponds break the waste down even more. The first one having eight aerators, the second having four and

the third with two.

Fielden went on to describe that in between the aeration ponds and the settling ponds, there is a valve that can return any incomplete material back through the head works to be treated again. The heavy solids are sent to the drying beds where moisture will evaporate and the dried solids can be collected and disposed of.

And the third step in the process is the settling ponds. They are for separating the medium solids from liquids. Liquids flow over the top and are sent to the chlorine contact tank and the medium solids are sent back to the head works.

The process is cyclical and gets repeated until the liquid released from the contact tank is clear.

Not only does the treated water keep the environment clean but it is returned to the local farmers supporting them in their irrigation processes.



(Photo by Drasutis Maciunas)

James Fielden, electrical engineering technician, USACE Kandahar, points out the layout of the facility in front of the Settling Pond #2 to the Romanian Guardian Angels and the Train Advise Assist Command-Air customer.

Regulatory office aims to accelerate permitting process

Story & photo by Catalina Carrasco
USACE, Jacksonville District

Among the many missions that the U.S. Army Corps of Engineers has, one of their top responsibilities is to protect and maintain the waters of the United States, including navigable waterways, through its regulatory program.

Jacksonville District administers the largest regulatory permitting program in USACE, and the regulatory section at the Antilles office, headed by Section Chief Sindulfo Castillo, is responsible for the permitting efforts in Puerto Rico and the U.S. Virgin Islands.

Every year, the Antilles office receives dozens of requests for permits from individuals and businesses intending to either build infrastructure or implement innovations for issues affecting the islands' ecosystems.

To assist applicants through the permitting process, Castillo hosts interagency meetings that allow them the opportunity to present their proposals and to interact with federal and local representatives.

"These meetings are a pre-application step, where we explain the type of permits that are needed and the process for obtaining them," Castillo said. "We also introduce the different agencies that might be involved in each specific project."

The meetings, which were suspended temporarily due to Hurricanes Irma and Maria, are held monthly in Puerto Rico, and quarterly in the Virgin Islands.

The latest meeting was conducted in San Juan, Puerto Rico, Feb. 6, and was attended by representatives from the Environmental Protection Agency, the National Marine Fisheries Service's Protected Resources and Habitat Conservation divisions, the U.S. Department of Transportation, Federal Highway Administration, U.S. Coast Guard, U.S. Fish and Wildlife Service, Puerto Rico Environmental Quality Board, Puerto Rico Planning Board and Puerto Rico's State Historic Preservation Office.

"These interagency meetings are really important for local developers to get a preliminary idea of how federal agencies view their project and what requirements we are going to ask," said Felix Lopez, ecologist, U.S. Fish and Wildlife Service. "That way they can build that into their design so there are no surprises when they submit for a permit."

At the latest meeting, one of the proposals presented was a design for



Local and federal agency representatives listen to a presentation during a monthly regulatory program meeting, held by the Corps of Engineers to help applicants navigate through the permitting process.

preventive barriers meant to reduce seasonal sargassum, a brown algae species that typically forms into large floating masses on the ocean surface.

According to the presenter, the algae not only has a negative effect on tourism, as it is a nuisance for beachgoers, but it causes additional drawbacks such as making it complicated for sea turtles to nest on the beach and for their hatchlings to reach the ocean once they're hatched.

Another project presented by a non-profit organization in Puerto Rico involves restoration of sea grass harmed by the hurricanes that devastated the island in 2017. These flowering plants which grow in marine environments are considered a key component of the region's natural infrastructure and resilience.

Each applicant is given an hour to present their project, to ask and answer questions and to learn about potential hurdles they may need to overcome to be issued the appropriate permits.

Prior to the meetings, many applicants are not aware of all the necessary steps and requirements each agency might have in order for their proposed projects to be authorized.

Federal agencies have an obligation to ensure that all permits issued comply with all applicable laws such as the National Environmental Policy Act. The ultimate

goal of each permitting action is to prevent aquatic resources from being negatively impacted by the proposed projects.

The meetings are also beneficial for the participating agencies, not just the applicant.

According to U.S. Coast Guard Lt. Cmdr. David Otani, the meetings provide opportunities for local and federal agencies to learn each other's responsibilities.

"We are able to work together and decide what the applicant needs together and make sure that we are aligned," Otani said.

A consultation between the applicant and the Corps is a normal step of the permitting request, and while attending the interagency meeting is not required, it is highly encouraged as it may help expedite the process of obtaining the permits.

Eric Correa, a representative with the Puerto Rico Environmental Quality Board, agrees.

"These meetings are very important because they allow the regulatory agencies and the applicant to reach a point where we can understand each other," he said, adding that when it comes time for the agencies to evaluate the permit, an applicant that attended the meeting has had all their questions clarified, has an understanding of the process, and will turn in an application that is complete. "And we can accelerate the process."



Camp Blanding sets standard for natural resource conservation

By Rita Hess
U.S. Army Environmental Command

Camp Blanding Joint Training Center has a renowned natural resources conservation program. Its staff fosters pristine habitats and remarkable biodiversity to ensure

environmental conflicts never impede Florida Army National Guard's mission. The success of this premier training site earned it a 2019 Secretary of the Army Environmental Award for Natural Resources Conservation (Large Installation) recognition.

A major component of this success is the Candidate Conservation Agreement with Assurances, which waives NRC compliance and consulting processes for all federal and state threatened and endangered species based

on current habitat and land management practices. Simply put, due to their demonstrated exceptional management, the installation is exempt from future species mitigation requirements. The enormous scope of the agreement further shields the Florida Guard from species changes due to non-military causes, such as climate change.

"The CCAA is a game-changing accomplishment," said Paul Catlett, Camp Blanding's environmental program manager. "As climate change continues to impact habitats and species populations everywhere, the protection afforded by this agreement is enormous."



The Florida Guard, along with Florida Fish and Wildlife Conservation Commission and the U.S. Fish and Wildlife Service, developed this novel approach to integrate NRC activities from the perspective of land management, with a military-use component built into the land use design, rather than

attempting to protect one species at a time. This unique move is just one reason for the environmental award. Their effective, creative use of resources is another.

Through a partnership with the Longleaf Alliance, the training center works to restore longleaf pine stands, dedicating \$15,000 for pine restoration projects, provided annually by the alliance. Longleaf pine habitat remains a priority, as it supports the red-cockaded woodpeckers, but harvesting

has declined as pine stands mature and woodpecker clusters appear on their own.

In this shortfall, the NRC program identified a windfall. Camp Blanding's forests contain palmettos, and pharmaceutical manufacturers want the berries.

Working with state conservation offices to ensure no adverse impact, particularly to the red-cockaded woodpecker, the installation executed a palmetto berry harvest that generated approximately \$480,000 in revenue for a resource that naturally renews each year.

It occurred in conjunction with a honeybee propagation project, whereby honeybees were used to pollinate the palmettos and



The declining black creek crayfish (pictured at left) is found only in the clear streams of Camp Blanding and its immediate surrounding lands. One of the many species covered by the installation's Candidate Conservation Agreement with Assurances, the crayfish is surveyed yearly as part of ongoing surface water quality monitoring. This monitoring is also used to assess stream and wetland health as part of Camp Blanding's requirements under the CCAA. (Photos courtesy U.S. Army)

generate more berries. The center capitalized on this project, receiving a fee for hosting the beehives. This harvest will supplement declining forestry revenue, helping sustain environmental programs with a resource that requires no special restoration investment.

Camp Blanding further stretches resources from the fish and wildlife conservation commission, which provided \$80,000 to \$100,000 a year for the past half-decade in materials to reinforce road crossings along streams containing the state-listed Black Creek crayfish. This helps protect the species and preserves infrastructure used for military maneuver, resource management, and hunter access from hurricane and flood damage, when washout can cause sedimentation and turbidity.

A talented team works hand-in-hand to manage Camp Blanding's conservation activities, including biologists, foresters, a geographic information systems analyst, a conservation manager, environmental staff, trainers and many others on post, as well as local, state and national organizations.

Interagency collaboration on gopher tortoises, for example, allowed the training center to relocate tortoises to adjacent Army Compatible Use Buffer property if impacted by construction or training activities, saving the installation thousands of dollars in permitting every year. At present, the ACUB encompasses more than 25,000 acres and provides the Florida Guard with approximately \$9.6 million in wetlands mitigation credits.

"All those involved deserve the award and—more importantly—the respect of their partners," said Col. Frank Zenko, post commander.

Camp Blanding maintains healthy habitat for wildlife and helps control invasive plant encroachment that threatens training areas. NRC staff also participate in state-led working groups to keep the center's environmental goals at the forefront of operations.

The post is considered an engaged, trustworthy partner to the community, as reflected in its investments in local education from research opportunities and internships for college students and faculty to engagement with younger area students and educators. Camp Blanding also provides hunting and

fishing for Guard Soldiers, their families and the public on 50,000 acres administered by the Florida Fish and Wildlife Commission.

Without question, the habitat level of the conservation agreement is the NRC program's greatest contribution to the Florida Guard's training mission. It demonstrates military and natural resource conservation goals are compatible and, in fact, mutually reinforcing. Ensuring pristine training land created pristine habitat—a gold standard for landscape-level management.

Further, the agreement can serve as a model for other state Guards and military installations who wish to follow the approach, versus negotiating protections on a species-by-species basis.



(Photo by Alan Shirey)

Bethney Ward, biologist, stands in the excavator bucket that is used to dredge material, which will be used to build mitigation reefs.

'If you build it, they will come'

By Sara Corbett
USACE, Charleston District

There are several elements that need to be considered during any deepening project, which include how to dispose of the sediment and material that is dredged from depths of the sea.

During the feasibility study phase of the Charleston Harbor Post 45 Deepening Project, the U.S. Army Corps of Engineers, Charleston District researched several options to dispose of the dredged material, while also taking into consideration the most cost-effective method of disposal. The final solution included a mixture of disposal methods, including using inshore and offshore disposal sites; and, most creatively, building reefs.

"Building reefs using the limestone rock that is being dredged from the entrance channel of the harbor has several benefits," said Holly Carpenter, project manager for Post 45. "We are able to use the reefs as least-cost beneficial use as well as for mitigation for our impact to the deepening of the channel."

The least-cost beneficial use, also known

as beneficial use, is a win-win for any Corps project because it's an economical way to dispose of dredged material while also benefitting other projects.

The mitigation reefs are constructed using the Dredge New York, a mechanical excavator dredge, which digs into the limestone rock and loads approximately two dump trucks of material onto a scow that transports and drops the material into the area of reef construction.

"We are constructing 128 acres of reefs along the entrance channel," said Carpenter. "There are eight reefs, six are beneficial use and two are mitigation reefs and each reef has 16 acres. We started building the reefs in June and they were completed in November 2018. The beneficial use reefs should be completed by 2020."

During the project planning, engineering and design phase, the Corps conducted additional surveys to conceptualize, design and build the reefs. During this process, the engineers discovered existing hard-bottom reefs near where they wanted to build the new reefs.

We implemented a 100-foot buffer so that we wouldn't impact other reefs,

Carpenter said. The new reefs, however, are close enough to recruit new organisms.

Once constructed, the reefs will evolve to become fully functioning. First, the stationary organisms, such as algae, sponges and soft coral, will attach themselves to the hard bottom material. From there, marine animals, such as shrimp, crabs and starfish, will colonize the reefs and juvenile fish will seek them out for food and protection. Finally, larger fish, such as red drum and sea bass, will eventually come to spawn in these more established reefs.

"We are building the reefs in a three-dimensional structure," said Bethney Ward, biologist, USACE Charleston District. "This structure is even better for recruitment because it promotes quicker colonization of stationary organisms and there will be more diverse habitat."

It will take about three-and-a-half years for the reefs to reach full maturity and, if everything goes according to plan, the marine life will begin to flourish again.

"The reefs will provide new habitat, which will ultimately increase the fish and marine animals in the harbor," said Ward. "It's a win-win situation."

Wild burros, horses are longstanding denizens of Yuma Proving Ground

Story & photos by Mark Schauer
Yuma Proving Ground, Arizona

For most of its 76-year history, U.S. Army Yuma Proving Ground has seen itself as a natural laboratory, desiring to test equipment Soldiers use in the most realistic natural environment possible to ensure it works as it should wherever in the world they are called upon to serve.

As such, this Arizona-based installation has a deeply vested interest in being good stewards of the environment, and its record in this area shines.

The proving ground is home to one of the largest and most genetically diverse populations of bighorn sheep in Arizona. The Sonoran pronghorn, virtually extinct in the early 2000s, is now regenerating thanks in part to Arizona Game and Fish

officials who introduced the creature into YPG as a safe haven to help it regenerate. Other once-threatened species that are now thriving at the proving ground include the fringe-toed lizard and the Sonoran tortoise.

“We try to do proactive things to help the environment,” said Daniel Steward, YPG wildlife biologist. “That way, the range is always ready to be used for military testing.”

Among the multiple species found within YPG’s over 1,300 square miles of range space are wild horses and burros, well known to proving ground personnel who spend their days in the field testing equipment.

“There are a lot more burros than there are horses,” he said. “We track where they’re at for our safety.”

Though the burros are generally popular with the workforce, the creatures occasionally cause mischief. For example, several

years ago at least one enterprising burro managed to turn on a water spigot. He drank his fill, then departed with the tap still running.

“Food, water and shelter are what draw wildlife into our area,” Steward said. “When it gets really dry, horses and burros are looking for water. Landscaping and sprinkler systems provide water—we really try to watch out for pooling water that would attract burros.”

This past winter was relatively rainy by desert standards, which means range conditions are such that the creatures are far less likely to approach human-populated areas.

“All of the wildlife right now is disbursing. When there are really good range conditions, animals start spreading out—they’re going to areas where they didn’t have food before and now they do,” he said.

Though some installation personnel miss seeing the creatures as they traverse the range en route to far-flung gun positions, their relative reclusiveness has been a boon for motorists. Slow moving and with binocular vision, burros are incapable of moving out of the way of a vehicle moving at highway speeds in time to avoid a costly—and deadly—accident.

“In the past few months, we’re not seeing as many burros as before because they are staying away from the roads,” he added. “As things dry out, they are going to come back. They’ll be looking for forage and water and we’ll have to continue being vigilant when driving on Highway 95.”

See BURROS, page 18



Wildlife officials have done the best they can to mitigate the burro threat from Highway 95, the two-lane road with a higher traffic density than any other in Arizona. Aside from favorable weather and plenty to eat and drink, the creatures tend to live long lives due to their sheer size and wary pack mentality that deter desert predators.

Mitigating the burro threat from Highway 95, the two-lane road with a higher traffic density than any other in Arizona is no easy task. Wildlife officials have done the best they can.

“We’ve eliminated water sources near the roads to try to keep horses and burros as far away from Highway 95 as possible. It’s not healthy for the horses and burros to be exposed to high levels of traffic, for the animals or for the people.”

Officials also attempt to relocate burros by organizing gathers with the Bureau of Land Management.

Steward adds that individuals who sustain specific damage from the burros, whether it’s broken water lines or other

infrastructure damage, can and should report it to him.

“I can communicate that with BLM,” he said.

Aside from favorable weather and plenty to eat and drink, the creatures tend to live long lives due to their sheer size and wary pack mentality that deter desert predators.

“Horses and burros are big, strong, and have a herd to protect each other. A lot of times they are too dangerous for a predator to take down—it happens, but it is rare,” he said. “Mountain lions are typically associated with sheep, not horses or burros.”

The burros are probably helped by the goodwill of their human neighbors, too. “They’ve got a lot of personality. Burros are less likely to shy away from people than a deer,” he said. “They’re entertaining. People truly do enjoy seeing these animals around.”

Nonetheless, Steward cautions that burros are still wild animals that should be treated as such. In particular, feeding a wild burro should be strictly avoided.

“When people start feeding the burros, they become a real nuisance,” he said. “These are wild animals. One begging for food can be ornery. You want to keep a respectful distance from any wild animal.”



Yuma Proving Ground has a deeply vested interest in being good stewards of the environment, and its record in this area shines. Among the multiple species found within the post’s more than 1,300 square miles of range space are wild horses, well known to its proving ground personnel who spend their days in the field testing military equipment.

Corps helps Joint Base Andrews increase security, reduce pollution

By Sarah Lazo

USACE, Baltimore District

When considering security concerns on military installations, one might think of phishing scams or access control vulnerabilities; however, the U.S. Army Corps of Engineers is battling a different kind of breach—logs and pollution.

USACE, Baltimore District is assisting Joint Base Andrews, in Prince George's County, Maryland, in addressing potential security issues when drift and debris from local streams lodge swing gates open, providing access for people and pollution.

This multimillion-dollar design project will not only tackle base-perimeter security features, but also includes streambank stabilization and restoration, and stormwater outfall repairs to combat erosion and reduce pollution from getting into local waterways at seven targeted

locations on the installation.

"We are supporting base operations and benefitting the environment at the same time," said Vaso Karanikolis, program manager, USACE, Baltimore District.

The project will help the joint base comply with state-enforced Municipal Separate Stormwater Sewer System (MS4) permits, falling in line with the Environmental Protection Agency's Total Maximum Daily Load (TMDL) that caps harmful runoff into the Chesapeake Bay.

"For stormwater, we want to clean it up and slow it down," said Dan Cockerham, ecologist, USACE, Baltimore District.

"Through streambank stabilization and stream restoration, we are also cleaning up the waterways and bolstering the streams' ability to support life."

A concurrent \$235,000 pilot program is underway to reduce runoff through stormwater best management practices, or

BMPs, in select areas of concern on base. The final design is anticipated in summer 2019.

"We will choose a site that will be most impactful to meet TMDL requirements," said Karanikolis. "The aim is to temporarily store the stormwater and have it eventually flow in an efficient route and manner."

BMPs can include maintenance or construction activities for stormwater retrofits, bio-retention and filtration ponds, stormwater wetlands, swales or alternatives like replacing impervious areas with pervious areas, stream restoration and stormwater outfall stabilization.

In order to comply with the MS4 sewer system requirements, BMPs must be inspected every three years and routinely maintained. USACE also recommends an annual visual inspection.

See POLLUTION, page 20



(Photo courtesy of USACE, Baltimore District)

USACE, Baltimore District team members join representatives from Joint Base Andrews to review and discuss streambank stabilization and stream restoration.

In addition to in-the-ground projects, USACE has created and handed over several tools to assist in meeting the environmental standards on base.

Tools include a BMP database that maps and tracks all of the existing stormwater infrastructure on base; a maintenance plan and schedule; and inspection guidance, procedures and pass/fail criteria. USACE has held several trainings with JBA team members on how to successfully use and leverage these instruments.

“We have worked closely with the Corps of Engineers on several projects to ensure mission readiness, while responding to environmental challenges,” said Steve Richards, JBA environmental quality

chief. “Our aim is to improve and protect the environment that the Air Force has entrusted us with as good stewards of



District representatives will determine where to locate a site that will be most impactful to meet TMDL requirements.

the land, air and water that we serve and protect every day.”

JBA is providing USACE with direct funding for these efforts.

For the past decade, USACE has provided stormwater management planning support to many installations throughout the Chesapeake Bay watershed, including Forts Belvoir, Detrick and Meade, to help them address MS4 and the EPA’s TMDL compliance requirements.

“We have leveraged our experiences and established relationships to create a team of subject matter experts who are capable of providing full-service support from the planning of a stormwater management project, through to the design, construction and monitoring,” said Karanikolis.



(Photos courtesy of USACE, Baltimore District)

USACE, Baltimore District is assisting Joint Base Andrews in addressing potential security issues when drift and debris from local streams lodge swing gates open, providing access for people and pollution.



Team studies river system's long-term navigation sustainability

By Dana Coburn
USACE, Little Rock District

U.S. Army Corps of Engineers, Little Rock District, recently completed a wide-ranging, three-year Three Rivers Southeast Arkansas Feasibility Study.

The study was done at the request of the Arkansas Waterways Commission, and under authority of Section 216 of the Flood Control Act of 1970 (Public Law 91-611). The goal was to recommend modifications to the McClellan-Kerr Arkansas River Navigation System to ensure its long-term sustainability of reliable navigation.

The feasibility study was comprehensive, and embodied the newly developed tenets of USACE's Specific, Measurable, Attainable, Risk Informed, Timely, or SMART, planning.

Throughout the study, the project delivery team leveraged expertise throughout USACE including personnel from the Little Rock District,

Southwestern Division's Regional Planning and Environmental Center, Jacksonville District, and the Inland Navigation Planning Center of Expertise. The PDT also engaged other federal and state resource agencies such as the Arkansas Waterways Commission, Oklahoma Department of Transportation, the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission and local governments to ensure that the study used the best and most current data, and eliminated redundancy inherent in large-scale water resources planning studies. The SMART planning process aimed to save time and money; and most importantly, delivered solutions that are economically feasible and environmentally acceptable.

The PDT's challenge was to develop a long-term sustainable solution that would provide reliable navigation on the river system while promoting an environmentally acceptable alternative. This was all the more challenging because

the study area is located at the confluence of the Arkansas, Mississippi and White rivers.

A significant portion of the study area is owned and managed by the Fish and Wildlife Service via the Dale Bumpers National Wildlife Refuge. The study team engaged USFWS early on in the process as well as staff from the Arkansas Game and Fish Commission and Arkansas Natural Heritage Commission. Interagency coordination ensured stakeholder concerns were identified and considered throughout the study. As a result, the PDT identified one study-specific planning constraint, to avoid changes to project area hydrology to the extent practicable.

Through the three-year process, project alternatives were developed to meet navigation objectives and to provide ancillary ecosystem restoration benefits, or at a minimum, to not significantly alter forest hydrology in the study area without regard to ownership boundaries.

See RIVER STUDY, page 23



(Courtesy photo)

View of the Owens Lake Structure studied to ensure the long-term sustainability of the McClellan-Kerr Arkansas River Navigation System.



Study identifies artificial turf benefits, costs



Artificial turf can experience local wear requiring periodic repairs.

Story & Photo by Elisabeth Jenicke
Engineer Research and Development Center

Artificial turf, long in use on athletic fields in the civilian sector, is finding its way to military installations.

This technology can help to meet both training and aesthetic requirements without the irrigation footprint of natural turf fields.

The increased use of artificial turf, particularly in drought-plagued regions, emerge concerns about potential adverse effects. There is a need for additional information, both on technical performance and cost-benefit analysis, to support decisions about its use at Army installations.

Researchers at the Engineer Research and Development Center's Construction Engineering Research Laboratory in Champaign, Illinois, undertook work to evaluate costs and benefits of both artificial and natural turf materials to inform installation design decisions.

This study examined technical, financial and performance data. The study's report, *Evaluation of Turfgrass Replacement Options: Artificial Turf*, presents a current understanding of AT technology and evaluates its applicability as a natural turf retrofit option. Installation personnel should familiarize themselves with the variables related to turf selection before investing in either technology.

Artificial turf was developed in the 1960s to replicate natural grass for urban sports purposes. Its design has undergone changes over time to address concerns about flexibility and appearance. The current generation (3G), introduced in the mid-1990s, is currently the most widely used AT product. It is distinguished by its infill, a layer of crumb rubber over a layer of sand.

Studies have found 3G turf to be no more dangerous for athletic injuries, including ankle sprains, knee injuries and concussions, than turfgrass. However, AT is generally 35 to 55 degrees hotter than turf, with surface temperatures as high as 200 degrees on a 98 degree day in Provo, Utah, and 175 degrees in central Pennsylvania. While water may be used to cool the fields, the temperature will rise again within 20 minutes of 'watering.' This condition may render the fields unusable at hotter times of the day and year.

The presence of hazardous chemicals in recycled crumb rubber may also have environmental implications. Studies refer to chemical leaching potential as well as bioavailability.

See ARTIFICIAL TURF, page 23



Generally, crumb rubber sourced from used tires has been found to release more toxic leachate than non-recycled crumb.

In addition, concerns raised over health effects of the fields were addressed by

a multi-agency study on potential toxicity of crumb rubber. Led by the Environmental Protection Agency, this study is ongoing.

Environmental benefits of artificial turf include reduction in pesticides, fertilizer and herbicides required to maintain natural turf surfaces.

Whereas the re-purposing of recycled tires for AT crumb rubber has beneficial outcomes initially, these benefits may be outweighed at the end of life of the field when the material must be disposed of and replaced.

Artificial and natural turf fields require differing types of maintenance. Turfgrass requires mowing, watering, aeration, fertilizing, pest control and repair. A list of maintenance tasks for AT is shown in the table.

Both types of field surfaces have finite lifespans. In the case of turfgrass, highly

worn sections of a field may need more frequent replacement, rendering the field unusable while the new turf takes root. Likewise, sections of AT fields may need to be replaced before the field wears out. The

also be considered as these will correlate with expected life of the turf and, therefore, anticipate the requirement/cost to replace the system.

Although the purpose of this study

was to investigate the water saving potential of AT, the information garnered pointed to different motivations for utilizing the surface. Natural turf can be difficult to maintain in both areas of high and low rainfall. Large amounts of rain can leave natural turf fields

Maintenance requirements for artificial turf fields

Maintenance	Description
Vacuum	Vacuum collects debris, sorts out crumb rubber, redeposits crumb on field
Magnetic sweep	Magnetic sweeper collects nails and cleat spikes which pose a health hazard for athletes
UV disinfectant	Disinfects fields against bacteria build-up from biofluids; particularly important for indoor fields
Irrigation or rinsing of field	For the purpose of regulating temperatures, field aesthetics, infill, or rinsing away biofluids or spills
Deep clean grooming	Cleans and brushes blades to stand upright, cleans crumb rubber
Shock/compaction test	Tests impact absorption; typically done on a yearly basis
Crumb rubber replenishment	Typically done on an as-needed basis or every 1-2 years
Repairing rips/replacing patches	Repairs and replacement are typically done for portions under heavy use; done on an as-need basis
Drainage failures	Requires unstitching some or all portions of the carpet and the base soils to access and fix the drainage

lifespan of AT is about 8 years.

While reduced costs may not be the motivation for installing artificial turf, it is imperative to conduct a life-cycle cost analysis for comparing different options once the decision to install this technology has been made. It is important to consider the full life-cycle costs of a field, including installation, maintenance and disposal/replacement. Ensure that realistic available field time figures are incorporated in calculating a cost/hour of use for the technologies. Warranty provisions must

unusable due to puddling or the possibility of damage to the turf while waterlogged. Regions with little rain will draw heavily on irrigation. In both of these situations AT will offer increased access to fields. This access is important when fields are required for military training and as parade grounds. These functions can't easily be rescheduled or relocated.

AT remains a viable option for indoor applications, though users should follow the same recommendations provided in the report as for outdoor use.

RIVER STUDY

As noted previously, a portion of the refuge intersects existing containment structures and some construction resulting from this study would take place there.

The refuge contains 160,000 acres of prime bottomland hardwood habitat in the floodplain of the lower White River next to the navigation channel. The refuge is a small part of a larger expanse consisting of over 500,000 contiguous acres of bottomland hardwood forest ecosystem, of which over 250,000 acres have been recognized by the Convention on Wetlands of International Importance (Ramsar Convention).

Bottomland hardwood forests in the area flood frequently and are highly influenced by changes in land or water elevation.

The Fish and Wildlife Service manages the refuge, pursuant to the National Wildlife Refuge System

Improvement Act of 1997 (16 U.S.C. 668dd-6689ee), and reviews and issues compatible use permits for construction on refuge land. Because of the proximity of the forest ecosystem to the navigation channel and containment structures, modifications to the structures could impact the forest through changes in hydrology resulting from containment structure placement and function.

For this reason, plan formulation considered changes to hydrology that could result from a given measure; and, where practicable, provide environmental benefits to bottomland hardwoods, wetlands and oxbow lake functions in the isthmus and in the refuge while preserving the integrity and long-term dependability of the navigation entrance channel to the river system.

During the state and agency review period for the Three Rivers feasibility

study, multiple resource agencies voiced their support, including the USFWS. The PDT felt this was a notable accomplishment since similar studies had been adamantly opposed by the USFWS and other resource agencies in the past.

At the conclusion of the three-year study, the PDT recommended a selected plan and in going through the process, achieved a signed chief's report.

As of the signing of the Three Rivers Southeast Arkansas Feasibility Study Chief's Report, all resource agencies and stakeholders remain in support of the project. As plans and specifications are developed during Pre-Construction Engineering and Design phase, agency coordination will continue and USACE intends to obtain a compatibility use permit from the USFWS prior to construction of the Three Rivers Selected Plan.



The vegetation growing on top of the dune is visible and so are the exposed roots, demonstrating that natural dunes are not just sand with vegetation on top, but a system with vegetation, or biomass, distributed throughout. (Photo by Dr. Jeff King)



Corps researchers investigate how to create resilient beach dunes

By Holly Kuzmitski
Engineer Research & Development Center

Reducing flood risk: it's one of the U.S. Army Corps of Engineers' primary missions. When we consider coastal flooding, dunes are a primary line of defense for coastal communities.

Dr. Duncan Bryant and Mary Bryant, a husband-and-wife team of researchers at the Engineer Research and Development Center's Coastal and Hydraulics Laboratory in Vicksburg, Mississippi, asked the question: Would stakeholders be more inclined to plant dunes if it was shown that vegetation, or biomass, stabilizes dunes, making them more resilient to extreme weather events?

"The Corps has had over 250 beach nourishment projects in the past 10 years — dunes are certainly part of that, but we don't know how big a part," Dr. Bryant said. "If we can find a better way

to anchor dunes, we could build them smarter, so that they better protect both people and shoreline infrastructure and cause no environmental harm.

"Dunes are also sediment storage. During an erosion event — such as a hurricane or nor'easter — they release sediment; if they weren't there, the beach would be further degraded after powerful storms," he added. "When we're talking about making dunes out of dredged material, we don't want the dredged material to go back to the area we dredged it from. So from that standpoint as well, dune resilience is important."

Dr. Jeff King, deputy national lead for the Engineering With Nature, initiative, said that from an EWN perspective, dunes should be regarded as a valuable type of natural and nature-based feature. "Created dunes are nature-based landscape features that provide an engineering function. They help to mitigate flood risk

and storm damage," he said. "They also provide environmental benefits to wildlife and social benefits for those that recreate on beaches.

"We are always trying to improve coastal protection. The research engineering team sought to quantify how to add value to that success," he added. "This is just the beginning of the investigation into what can be done, but they did reach some conclusions that will likely influence the composition of dunes in the future."

The Bryants first considered how they would simulate a natural dune system in the laboratory. "A laboratory experiment allowed us to control all the variables," she said.

"When we started investigating the role that vegetation plays regarding dunes, we saw that a lot of research had been done on how biomass helps build dunes, but not as much on how biomass stabilizes dunes during erosive events," she said. "The data that did

exist were largely anecdotal and from post-storm observations. We wanted to be able to quantify the erosion of vegetated dunes with actual measurements."

The team reached out to Dr. Rusty Feagin at Texas A&M University for information on vegetation parameters to use for the study.

"Another thing we noticed was that no one had really looked into root structure — we expected roots would play a critical role in dune stabilization," she said. "We looked at above-ground vegetation and used dowels to represent the stems of plant material, and we used coconut fibers, or coir, to represent below-ground material, or the root matrix."

See BEACH DUNES, page 26

The entire study took about a year, from planning to conclusion. The team used the laboratory's wave flume, which is 1.5 meters wide and 63 meters long.

"We built a 1:15 scaled sand transport model to evaluate the beach and dune evolution," Dr. Bryant said. "We generated waves and recorded what happened to each dune, and we measured the change in each dune over time.

"We had a total of five hydrodynamic conditions—different water levels and waves to simulate different storm conditions experienced by natural dunes," he said. "We also tested five different vegetation covers.

"Some dunes had sand only, others had sand with below-ground material; some had sand with above-ground material,

and then some had both. We focused the second part of the investigation on seven different amounts of below-ground material to see at what point below-ground biomass influences dune erosion and to what degree," he said.

"We found that the control dunes that were just piled sand eroded much more quickly than the dunes with the above-ground dowels. When we incorporated the coconut fibers, the dunes were significantly sturdier and persisted longer, and we had a pretty impressive dune elevation left behind, as compared to the control dune that was nearly completely flattened," she added. "We found out there was a clear service provided by the vegetation in terms of reducing erosion. The use of dowels and coir created a

path forward for future laboratory and pilot studies."

Ultimately, the outcomes of the Bryants' continued research will help inform practitioners charged with designing and constructing future dune systems.

"Pursuing EWN-based research that yields more information about the dynamic interactions between vegetation and sand is incredibly important. Such knowledge supports the optimization of vegetation and sand composition, which will likely translate into reduced required maintenance and enhanced performance," said King. "Down the road, such optimization efforts could also equate to cost savings for future beach nourishment projects."



(Photo by Caitlin Hoch)

As part of the dune resilience study, Dr. Duncan Bryant, Mary Bryant and their team utilized the Coastal and Hydraulics Laboratory's wave flume. Waves are visible propagating over the model beach before impacting the dune.

Huntsville Center's range cleanup saves Afghan, American lives

By Stephen Baack
U.S. Army Engineering & Support Center,
Huntsville

The Ordnance and Explosives Directorate's Global Operations Division at the U.S. Army Engineering and Support Center in Huntsville, Alabama, has wrapped up work on a five-year, \$310 million multi-range cleanup project in Afghanistan.

The division managed the mission of clearing ordnance from 62 now-closed U.S.-operated ranges, most of which were part of

forward operating bases shut down in 2014 and 2015 as coalition troops consolidated into larger, more concentrated areas like Bagram and Kandahar.

According to Eduardo Granados, Global Operations division chief, a variety of unexploded ordnance and ammunition typically are still embedded both on the surface and in the subsurface of the ranges when U.S. forces shut down operations at these locations.

The situation poses a distinct danger that the project was designed to remedy:

unexploded ordnance that remained on the ranges afforded insurgents the opportunity to gather the explosive content to build improvised explosive devices and then target U.S. forces.

Another danger was to the Afghan civilian population, both to those trying to harvest scrap metal for its value, and to those who might happen upon the ordnance unintentionally while shepherding their animals or searching for firewood.

This included herders and children, Granados said.

The material included anything from small-arms ammunition to aerial munitions, but not all of it was from U.S. forces.

Adding a layer of complexity to the situation was the fact that many of these areas were tactically important and had been used as Soviet ranges before American forces first arrived in the early 2000s.

It was not uncommon that during a cleanup of these areas, field crews would uncover items from conflicts as far back as 1979 during the Soviet occupation, including landmines and other non-U.S. munitions.

"In the end, it was the right thing to do, and it was a good thing to do because it protected U.S. forces and it protected the civilian population," Granados said.

THE PROJECT

The project started in early 2014 when Huntsville Center partnered with Sterling Global Operations – now called Janus Global Operations – and together built a workforce of Afghan local nationals to carry out the onsite ordnance surveying and cleanup.

"We ensured they were trained appropriately, and the contractor was continuously doing quality control," said Robert Selfridge, chief geophysicist with Huntsville Center's Engineering Directorate who served as one of the project managers. "The Afghan government was actually performing the field verification portion of the quality assurance that we would typically do here in the states."

See RANGE CLEANUP, page 29



RANGE CLEANUP

Selfridge said the onsite teams used time-domain metal detectors and flux gate magnetometers approved by the Afghanistan Mine Action Standards Committee.

While a portion of the personnel had no experience before the training, he said many actually had decades of demining experience.

“We took experienced deminers and trained them using our detectors, which a lot of them had used previously,” he added. “We trained them using our approved procedures – approved not just through us but through Afghanistan’s Directorate of Mine Action Coordination. The detectors had to be approved, personnel had to be trained, and they had to be tested.”

DEFINING THE RANGES

One of the biggest challenges was locating the range boundaries, Selfridge said. Many of the closed ranges were only identified by a single latitude-longitude point, and no information could be found that defined the outer boundaries.

He said field teams had to collect a “vast amount” of data to identify the range boundaries.

Other sites presented the exact opposite problem. The information they received stated that the range was extremely large. After completing their characterization, it was determined that the range used was actually quite small, he said.

At one site, crews had to search more than 41 million square meters for one range that turned out to be only 2 million square meters in size, he said. That alone took months of work.

“We sent our field teams to talk to local tribesmen, did a surface visual reconnaissance of the area, completed a surface clearance of the area, then performed our digital geophysical transects to identify where the actual target areas existed that contained subsurface ordnance that we needed to remove,” Selfridge said.

The initial estimate was 533 square kilometers on 84 ranges, a figure that grew over the course of the five years to more than 1,000 square kilometers.

Only taking into account that initial estimate of 533 square kilometers, Selfridge said using a traditional 100 percent subsurface clearance method – called mag and dig – would have resulted in a cost of more than

continued from page 28

\$1 billion. As the area increased, so did the projected cost.

To stay within the bounds of the original \$310 million contract, the chief geophysicist initiated an ad hoc technical project delivery team that combined subject matter experts from Huntsville Center and Janus to evaluate all existing data to make determinations on the actual boundaries of the target ranges.

By completing Digital Geophysical Transects utilizing Visual Sampling Planning Software (a Department of Energy-developed statistical software program with an unexploded ordnance module) and overlaying that data with the results of the surface clearances, the technical PDT was able to eliminate all unnecessary subsurface work which resulted in a 90-percent reduction of the original area, he said.

“With this method, we were able to locate and concentrate on clearing the existing subsurface ordnance within the target areas that resulted in mission success,” Selfridge said.

Separate from this project, Granados added that there are approximately 20 still-active U.S.-operated ranges, and funding has just been approved for a project to ensure these areas are properly identified and prepared for clearance before they are closed.

CULTURAL COMPLEXITIES

Because Afghanistan is so culturally segmented, Granados said, it was important to hire and train workers from the local communities of each worksite.

“Otherwise, they would stand out and be harassed, or worse,” he said. Nevertheless, violence and kidnappings were still an unfortunate reality of the mission.

To combat these problems, and to help educate Afghans about why the crews were there and how they were helping their fellow citizens, Selfridge said he credits Janus with the idea for a program called Mine and Range Risk Education.

He said Janus enlisted locals who were friendly to the U.S. to lead these classes in which the instructors would go out to communities and talk about the dangers of unexploded ordnance and mines. This was a train-the-trainer strategy where the initial trainers handpicked additional trainers, and so on. As the pool of trainers expanded, so



Field personnel perform Digital Geophysical Transect surveying in Afghanistan, March 23, 2015, after a surface clearance had been completed. (Photos courtesy U.S. Army)

did the number of people Global Operations and Janus were confident they could trust.

From there, he said, they were able to develop stronger relationships and knew whom they could trust. Many of them became liaisons who would work with village elders and other key decision makers in their respective regions so the residents would more readily accept these crews into their communities to get their work done.

The process took months in most cases, Selfridge said, and in a few cases it took several years.

Utilizing these existing relationships, Janus hired “watchers” to surround the work sites to

protect the crews and warn them of thieves or potential kidnappers.

Nevertheless, though the original plan was to clean up 84 ranges, Granados and Selfridge said the mission stopped at 62 because it was simply too dangerous for the crews to finish work on all of them.

“We didn’t get to the remaining ranges because it was not a permissive environment and it was still too kinetic,” Granados said. “We did as much as we could.”

“If you get chased out of a site three or four times, and they’re shooting at you, I’m not going to put my contractors’ personnel at any further risk,” Selfridge said.

In the end, the team received closure certificates for 62 out of the 84 ranges, and they were able to do surface clearance on an additional eight ranges. Selfridge said he estimates that doing a surface clearance alone removes more than 98 percent of the danger to civilians.

“Then the only way they’re going to interact with the ordnance is if they’re actively digging in the area,” he said. “So, if we can complete the surface clearance, which we did on 70 of the sites, we tremendously reduce the potential of civilians coming into contact with live ordnance.”

RESULTS

Selfridge said it’s not easy to get definitive or consistent figures, but the estimated annual number of Afghan civilians killed by range ordnance throughout the country went from more than 130 annually before this mission started to zero casualties on the 62 U.S. ranges that have had clearance completed from this project.

“We had a major impact,” he said.

Granados agreed.

“Absolutely,” he said. “We left those ranges far safer than we found them.”

Aberdeen improves environment for maintainers

By Rita Hess

U.S. Army Environmental Command

The Army continuously strives to find environmentally sustainable maintenance practices to keep personnel safe. One example is the quest to replace hexavalent chromium, a human carcinogen, at depots.

While the chemical provides good corrosion protection, its use is not sustainable. In addition to the health risk, national and international organizations tightly regulate it.

Department of Defense leadership confirmed the need to develop more sustainable processes for component parts and targeted hexavalent chromium for elimination and/or reduction on all weapon systems. Potential regulatory action on hexavalent chromium would also place significant pressure on supply chains for it. A solution was needed.

A group at the Combat Capabilities Development Command Army Research Laboratory at Aberdeen Proving Ground, Maryland, dubbed the Tagnite Technical Working Group, were determined to find an acceptable alternative. Their success earned the group a 2019 Secretary of the Army Environmental Award for Environmental Excellence in Weapon System Acquisition - Small Program.

“One significant source of hexavalent chromium in the depot environment is in the surface treatment of magnesium components,” said Kyu Cho, materials engineer and lead for the Center for Agile Materials Manufacturing Science. “A joint effort among multiple organizations resulted in a process that allows application of immersion and brush applied Tagnite anodizing to legacy magnesium components at CCAD (Corpus Christi Army Depot).”

“Tagnite anodizing proved a more environmentally sustainable process for protecting magnesium and when combined with applicable organic coatings provided a more durable and corrosion-resistant surface than traditional surface finishes,” he said.

The Tagnite process does not use hexavalent chromium, alleviating future regulatory challenges and avoiding the health risk to users. The immersion and brush Tagnite anodize processes replace current magnesium dip processes and reduce or eliminate the use of chromic acid touch-up.

The Defense Department has thoroughly researched this alternative process protection of magnesium and even authorized its use by Boeing for the AH-64 Apache and Sikorsky for the UH-60 Blackhawk, as well as others.



As part of the ESTCP Demonstration, a UH-60 output housing is masked, Tagnite anodized and sealed with Rockhard. (Photo courtesy of U.S. Army)

Still, the process has drawbacks. It requires high voltages and use of some fluorides in the activator step. It also requires a specific formulation to treat QE-22 magnesium alloy, and the process requires tank chillers. However, the overall effect is beneficial: longer lasting components and environmental sustainability.

Traditionally, Tagnite anodize has only been available to original equipment manufacturers, who apply robust protection systems before combining with steel inserts and liners into assemblies.

Unfortunately, CCAD has mixed-metal assemblies they cannot disassemble, as well as corroded, fatigued and possibly battle-damaged components. They must use less robust protection systems mainly due to the mixed-metal applications. In addition, Tagnite anodizing can react violently with ferrous metals, resulting in rapid oxidation of the steel substrate and damage to the surrounding magnesium. The solution needed modification.

Industrial Base Innovation Fund demonstrated aluminum masking agents that protect dissimilar metals in the assembly and during the application of Tagnite. The process required more labor per part but potentially provides a better finish, which can drastically improve the life of parts, thereby lowering life-cycle costs.

The study team demonstrated the viability of that masking process in a depot environment. During a pilot-scale Tagnite process line at CCAD, parts considered beyond economical repair were processed as part of the demonstration. It was a success.

The next step is scaling up to full production capability and, ideally, alternatives to the current sealer, called Rockhard, that are free of hazardous air pollutants and contain low volatile organic compounds.

Using this process at CCAD will allow legacy magnesium castings to be retrofitted with Tagnite. Significant savings are expected due to fewer corrosion-related removals of magnesium castings. The effort will also improve the robustness of a depot-applied magnesium protection system and allow CCAD to phase out hexavalent chromium in magnesium finishing.

When all major weapons system platform program managers and original equipment manufacturers transition to Tagnite coatings, the resulting streamlining of maintenance processes throughout the lifecycle of the weapon systems will produce additional savings. CCAD employees will no longer have to remove the hexavalent chromium from the components when they arrive, saving time and money.

In addition, damaged magnesium components can be repaired and treated with Tagnite, allowing for recovery and reuse of housings that were previously discarded and considered beyond economical repair. This process will help ensure mission readiness by bringing parts back into service faster and with a tougher coating.

A joint effort among multiple organizations, funded by the Environmental Security Technology Certification Program, resulted in a process that allows application of immersion and brush applied Tagnite anodizing to legacy magnesium components at CCAD.



Environmental award recipient helps preserve Camp Shelby's history

By Rita Hess

U.S. Army Environmental Command

As cultural resources manager for Camp Shelby Joint Forces Training Center in Hattiesburg, Mississippi, Rita McCarty is charged with preserving the installation's rich cultural heritage, without impeding training of the Mississippi Army National Guard.

That is a big job, considering its approximately 132,000 acres are home to significant historical sites.

With more than 10 years of experience as cultural resources manager and specialties in archaeology, artifact conservation and analysis, cultural resources compliance, and Native American consultation, McCarty is perfect for the challenge. Her 2019 Secretary of the Army environmental award for individual cultural resources management is a testament to her dedication.

"It is important to show the public how we care for cultural resources so appreciation of that heritage continues to resonate throughout the community," said Col. Bobby Ginn, post commander. "If we set a great example for adaptive reuse of historic buildings, we can ensure their continued maintenance and preservation."

McCarty has exceeded conventional cultural resources management initiatives. Notably, she helped organize Camp Shelby's centennial celebration, a year-long event that began with a fundraiser and culminated in a public festival highlighting the post's contribution to Mississippi and the nation.

Founded in 1917, the installation contains extensive relics. She ensured the several thousand attendees at the July 2017 anniversary could see photos, documents, and artifacts that tracked Camp Shelby from World War I through the Vietnam War.

McCarty has worked diligently to renovate and reuse historic structures, in some cases as curation facilities for exhibits or cultural resources management operations. Another of her achievements is launching a ground penetrating radar survey project.

Camp Shelby encompasses approximately 300 archaeological sites eligible, or potentially eligible, for National Register of Historic Places listing, such as WWI training trenches scattered over roughly 250 acres.

One survey focused on areas associated with a 1917-1918 bakery. A subsequent ground penetrating radar investigation



McCarty was recently awarded the civilian meritorious service award, the highest honor awarded to a civilian employee of the Mississippi National Guard. (Courtesy photo)

focused on a WWI restaurant, pool hall, icehouse, post office, library and other facilities. The survey data will help expand the understanding and context of these sites.

Beyond Camp Shelby, McCarty initiated a survey effort for 23 armories throughout the state for National Register of Historic Places status. She is documenting the history of each as well as the genealogy of units that trained there, including media clippings related to important events. Many may have significance for the Cold War and the Civil Rights Movement.

A current project is converting the historic Mississippi Central Railway rail line to an exercise trail using grant funds.

The first phase connects the rebuilt train depot to the Mississippi Army National Guard museum and then will expand the trail around a lake and campground.

Key to her success is the ability to corral such funds, including \$6,200 for special cemetery restoration projects. She also worked with Camp Shelby's Directorate of Public Works on the Rails to Trails project, drafting the memorandum of agreement with the State Historic Preservation Office and providing historic research material for the project proposal. The project provided approximately \$28,000 for the rehabilitation of Rails to Trails.

University of Southern Mississippi faculty and students conduct research and internships, granting hands-on experience for graduate students, and subsequently saving the Guard thousands of dollars on fieldwork and administration.

McCarty also encourages archaeological opportunities for younger students.

After contractors uncovered a World War II-era trash pit containing hundreds of bottles and cans, newspapers and other refuse, there was simply too much material to recover and curate. Instead, she provided 180 campers and 40 counselors with real excavation experience without risk to significant artifacts.

Environmental staff and the geographic information system coordinator for the Guard collaborated with her to create maps and displays. She also works with the U.S. Forest Service and with National Environmental Policy Act staff to integrate cultural resource management goals, and maintains excellent relationships with tribal representatives, bringing six state Guards and their associated tribes together for a tribal consultation workshop.

Under her leadership, Camp Shelby's history will continue to be discovered, preserved and celebrated.





Fort Drum moves toward 2020 environmental goal

By Rita Hess

U.S. Army Environmental Command

Environmental cleanup continues in northern New York, where nestled between the Great Lakes and the Adirondack Mountains sits the Army's 108,000-acre training installation known as Fort Drum.

Home to the 10th Mountain Division (Light Infantry), the post supports nearly 15,000 military personnel and their families, more than 3,000 civilians, and another 800 or more contractors.

Expansions and investigations there revealed 72 contaminated sites, including petroleum fueling locations, sanitary landfills and hazardous waste storage points.

This broad variety of conditions and contaminants challenged the post's Installation Restoration Program team to find innovative, site-specific remediation solutions. After years of hard work, their accomplishments have earned them the 2019 Secretary of the Army Award for Environmental Restoration (Installation).

"During fiscal years 2017-2018, the team focused on accelerated cleanup, moving towards their goal of no additional remedial actions needed by 2020," said Jim Miller, Fort Drum's environmental division chief. "To succeed, the IRP has relied on some unconventional strategies that are flexible enough to respond to changing conditions in a timely and cost-effective manner."

For example, a chlorinated solvent called tetrachloroethylene, or PCE, was found in an aquifer in 2010. The IRP team recommended an in situ chemical oxidation injection, which was completed in 2017. Sampling in 2018 showed a sharp decrease in contaminants that resulted in the site's closure, allowing vehicle maintenance operations and the mission to continue; and using a single injection event, saved the Army more than \$750,000.

The remediation staff also addressed petroleum contamination from underground storage tanks and piping. Despite previous remediation efforts, five sites active at the beginning of this award cycle affected more than 66 acres and 414 million gallons of groundwater.

Army contractors installed additional remedial wells, resulting in decreased contaminant concentrations. Both sites closed in May 2018, ahead of the 2020 objective, thus saving more than \$300,000 in system operating and electrical costs, and reducing carbon dioxide emissions by over 100 tons.

The remaining three petroleum-contaminated sites saw significant progress as well, allowing the team to focus on persistent problem areas and expand use of solar and waste heat from remediation equipment to enhance biodegradation.

A big accomplishment has been cleanup of a roughly 500,000-gallon jet fuel spill that occurred in 2006 at Wheeler-Sack Army Airfield's Oasis refueling point, affecting groundwater. In 2018, the team recommended permanent shutdown of several components of this remediation system. The project is currently five years ahead of schedule, resulting in a savings of \$11.5 million. Completing the remediation project ahead of schedule enables the refueling point to be fully returned in support of all aviation missions.

The remediation team is rightfully proud of its success using innovative and green remediation efforts. As reported by the U.S. Army Corps of Engineers in the July 2018 issue of *The Corps Environment*, the team demonstrated the application of an inexpensive and environmentally sustainable technology called thermal in situ sustainable remediation that uses solar energy to remediate soil and groundwater via a closed-loop system.

Results are quicker, less costly and emit less carbon dioxide. Its reported success inspired the remediation team to test green technology using waste heat from equipment. Combined, the two new methods can shorten remediation time and save dramatically on electrical costs.

In addition, Fort Drum uses phytoremediation, a remediation technology process, using vegetation to soak up and metabolize contaminants. Plants deliver a self-sustaining, cost-effective, environmentally friendly method to restoring the environment. At a closed solid waste landfill, willow trees are being used to treat contamination. At another site, 2,700 experimental switch grass seedlings have been planted as part of research on the use of plants to treat range residuals.

The team is also involved in cutting-edge remediation for per- and polyfluoroalkyl substances (PFAS), chemicals found in fire-fighting foams that can adversely impact groundwater. The team is evaluating the effectiveness of using specialized microbes to enhance biodegradation of PFAS. Another effort, funded by the Department of Defense, used soil and groundwater during development of an aquifer testing facility. This facility is being used to better understand how PFAS moves through groundwater.

Beyond methodology and flexibility, smart management contributed to team success, i.e., ongoing communication with community members and leaders; evaluation and use of adaptive remedies as appropriate; partnerships with research-based organizations that provide innovative technology and knowledge; and performance-based contracts that accelerate cleanup timelines, save money, and bring together more expertise than otherwise possible.



District conducts pilot study at former Camp Beale

By Tim Crummett
USACE, Sacramento District

Like a shield, the majestic oaks cover the rolling hills of more than 62,000 acres in Northern California comprising the Formerly Used Defense Site known as Camp Beale.

In ages past, the Maidu Tribe found the land to be abundant in resources necessary for life – Native American grinding rocks can still be found today. Early settlers camped here and eventually built ranches and homes.

In the 1940s, the federal government established Camp Beale to help respond to the threat of World War II.

Troops and pilots needed training, and Camp Beale was selected for live fire exercises that included machine guns, grenades, rocket launchers, tanks, long-range artillery and even aerial bombing. Today, the government is no longer on Camp Beale, but there is still a risk that munitions may remain throughout the old training areas.

Protection of environmental and cultural resources during the investigation and remediation of a FUDS has long been a challenge. Collecting data within areas containing sensitive resources requires a balance between resource protection and the protection of human health.

To address this concern, the U.S. Army Corps of Engineers, Sacramento District developed a pilot study to assess the use of an Unmanned Aerial System in collecting data near sensitive resources.

The USACE Project Delivery Team of Tim Crummett, Jim Lukasko, John Jackson and Kyle Lindsay, along with a contractor team of Bristol Environmental Remediation Services, Maser Consulting, and InDepth Corporation, began implementing the pilot study at the former Camp Beale FUDS, near Marysville, California, a portion of which is located within the Spenceville Wildlife Area.

The primary goals for the pilot study are to determine if a UAS equipped with a magnetometer can detect a 37 millimeter projectile at a depth of one foot below ground surface, and to determine if the data collected by the UAS magnetometer survey are similar in quality and reliability to the data collected using an EM61 and ground-based magnetometer.

The geophysical equipment used for the



A demonstration of the UAS pilot study at the former Camp Beale was held on January 24, 2019. (Photo by J. Paul Bruton)

data acquisition is a GemSys GSMP-35U high-sensitivity magnetometer detector, hung from the underside of the UAS.

The sensor is mounted to a Pulse Aerospace Vapor 55 – a small UAS vertical takeoff and landing helicopter. The Vapor 55 is powered by lithium-ion batteries for a flight time of approximately 35 minutes.

The flight paths were flown with the magnetometer at an altitude of approximately two feet above ground level, in a north-south linear pattern. The height above ground was verified by an onboard laser altimeter, calibrated to the sensor location.

The pilot study fieldwork included UAS magnetometer coverage of predetermined transects in order to compare electromagnetic digital geophysical mapping data (collected with a Geonics EM61 MK2 high-sensitivity metal detector) and UAS magnetometer transect data.

In addition, 100-percent EM61 and ground-based magnetometer coverage was collected from three one-acre plots within the 40-acre study area in order to compare coverage with 100-percent UAS magnetometer coverage.

Lastly, EM61, ground-based

magnetometer and UAS magnetometer data were collected over a one-acre geophysical prove-out.

Preliminary review of the data provides some important lessons learned, including system limitations and ideas for improvement on the use of the UAS.

One limitation is the ability of magnetometers used during the study to accurately detect small subsurface items in a geology that has high metallic interference. This was the case for both the ground-based and UAS magnetometers.

Another limitation is the ability of the UAS to operate in conditions of wind and/or heavy rain, which can impact work schedules.

Areas for improvement include providing better spatial accuracy through an upgraded global positioning system on the UAS, creating a better harness in which to tow the magnetometer below the UAS to minimize swing and provide better spatial accuracy, and adapting the UAS to operate in windy and/or rainy weather conditions.

A demonstration of the pilot study was held on Jan. 24, 2019. The demonstration was attended by personnel from USACE

Headquarters, USACE Los Angeles District, Beale Air Force Base, and California Department of Toxic Substances Control.

The attendees observed the UAS in operation and were provided with a preliminary overview of the data collected.

The attendees showed enthusiasm for the operation and discussed ideas about sites where the technology would be useful.

The study made progress in finding methods to both protect environmental and cultural resources, and carry out the important mission of detecting buried military munitions.



This washrack is one of two on Fort Stewart that utilizes reclaimed water through the “Purple Pipe” system project. (U.S. Army courtesy photo)

Fort Stewart/Hunter Army Airfield wins Army Environmental Sustainability Award

By Rita Hess

U.S. Army Environmental Command

Fort Stewart/Hunter Army Airfield in Georgia is the largest Army installation east of the Mississippi River.

Home to the 3rd Infantry Division, the installation successfully supports readiness requirements and enhances quality of life.

By being proactive; planning for the future; and forging strong relationships throughout the installation, community and regulatory arena, its Sustainability Management System team has helped cement its reputation as an environmental leader and good neighbor. Its efforts helped give the program staying power that will outlive current employees and earned them the 2019 Secretary of the Army environmental award for sustainability in the team category.

The team’s strategy is akin to a “divide and conquer” approach, spreading out responsibilities among many.

Four process action teams, comprising representatives from installation directorates, track activities with potentially problematic environmental conditions and help disseminate sustainability requirements

across the installation. The four teams are 1) Infrastructure and Environment; 2) Regional Development; 3) Training Lands; and 4) Procurement, Materials and Resources. In fiscal 2017 through fiscal 2018, the process action teams tracked 135 actions.

“The successes of the sustainability program have been a team effort, culminating with achievements that always support mission readiness and enhance quality of life,” said Col. Jason Wolter, garrison commander.

The Sustainability Management System emphasizes the garrison in its entirety, rather than individual groups with competing interests. Such partnerships, which involve year-round planning and coordination, are effective for everyone and for the environment.

For example, high water sometimes washed out installation tank trails at stream crossings, impeding training and transferring sediment to streams. Normal streamflow and function was restored by implementing wetland restoration activities to include the removal of silts and sediments from waterways, watershed analysis and properly sized culverts. As an added benefit,

more than 28 miles of stream crossings were hardened over the last 10 years providing uninterrupted access to critical training and live-fire facilities.

The Sustainability Management System team nurtures strong partnerships with communities and municipalities. In 2010, the post collaborated with the nearby city of Hinesville to implement the “Purple Pipe” project, which distributes reuse water from the city’s wastewater treatment plant for its irrigation and industrial purposes.

In June 2017, this system was expanded to include an irrigation system in one of its housing areas. As a whole, it saved Fort Stewart more than 80 million gallons of potable water during the award period.

Partnerships with regulatory and environmental stakeholders instill trust in Fort Stewart and Hunter Army Airfield.

The installation worked with Georgia Power on a 250-acre photovoltaic power generating system capable of producing solar energy. Being one of three installations east of the Mississippi to have such a system moves the Army closer to its renewable energy commitment.

See FORT STEWART, page 37

Perhaps the most important message the team communicates is to “think locally and act globally.”

Fort Stewart’s environment extends beyond its borders, to the country and the planet. Fostering this mindset encourages the entire community to protect and preserve installation training lands—and the world—for future generations.

For example, from a fiscal 2007 baseline, the team achieved a 56-percent reduction of potable water consumption intensity in fiscal 2017 and a 61-percent reduction in fiscal 2018. The installation exceeded their 36-percent reduction goal well before their fiscal 2025 deadline.

The team also maintained a successful Hazardous Materials Mart Pharmacy to ensure customers have sufficient stock to conduct maintenance operations, while managing shelf life to ensure product use before expiration—thus eliminating waste.

Through the installation’s Army Compatible Use Buffer program, conservation easements help prevent encroachment from incompatible development. During the award period, the installation’s program protected more than 4,223 acres, increasing its total to more than 80,000 acres.

The installation has also increased the red-cockaded woodpecker population by installing 324 artificial cavities, conducting mid-story mowing operations, and translocating 41 woodpeckers to assist recovering other southeastern populations.

A robust outreach program on and off the installation relays the message that everyone has a role and responsibility toward sustaining the mission. The team ensures post personnel know about compliance and sustainability concerns, as well as best management practices through online training for Soldiers, civilians, and contract and tenant organization personnel.

Team activities, events, tours and presentations also support sustainability initiatives.

During the past two years, environmental program staff presented at forums and conferences; served on technical boards; participated in community meetings; celebrated Earth Day, America Recycles Day and Arbor Day; and publicized their efforts in print media and online outlets. They reached more than 50,000 people in fiscal 2017-18 by sponsoring or participating in approximately 160 events.

Especially noteworthy, its Qualified Recycling Program staff conducts recycling



Installation crews install artificial cavities in longleaf pine trees to assist in the management and continued growth of its red-cockaded woodpecker population. (U.S. Army courtesy photo)

training for newcomers, courses to help set up recycling programs, as well as training courses for Environmental Compliance and Recycling Compliance Officers. The QRP staff trained more than 11,700 people during fiscal 2017-18.

As a result of these efforts, the installation achieved an average diversion of

52 percent for municipal solid waste and an average of 77 percent for construction and demolition, exceeding goals and providing cost avoidance of over \$1.9 million during the award period. Continuing on this course, the installation will achieve a 22-year life-cycle cost savings of \$24 million.



Washington Guard balances mission, cultural resource preservation

By Rita Hess

U.S. Army Environmental Command

The Washington Army National Guard statewide installation is considered small, comprising the 240-acre Camp Murray plus 36 additional facilities to support up to 6,200 Soldiers.

Its cultural resources management program staff is small, comprising just two environmental specialists, with support and oversight from the environmental programs manager.

For the past two years, the Guard's program focused on managing 12 historic armories and storage buildings statewide, including 14 historic buildings and features located in two historic districts: Redmond and Camp Murray. Yet, despite its relative size, the program received a 2019 Secretary of the Army environmental award for cultural resources management at a small installation.

"One key to success was creating new maintenance and treatment plans, or MTPs, to streamline operations and proactively resolve historic building renovation and maintenance concerns," said Dr. Rowena Valencia-Gica, environmental program manager. "These documents help safeguard cultural resources when modernizing WAARNG structures, essentially balancing preservation with mission."

MTPs allowed successful completion of critical projects like roof repair, window and door replacement, Americans with Disabilities Act access provisions, and other upgrades. An effort to develop MTPs included four structures at Camp Murray eligible for National Register of Historic Places listing.

It addressed formal historic building conditions reports and comprehensive technical resource materials that help guide construction and facilities management office staff. It also helped facilitate a roof remodel and walls/windows replacement at Camp Murray, as well as preservation of a historic horse trough.

In fiscal 2018, the program staff contracted maintenance and treatment plans for the Longview and Centralia armories.

At the Centralia Armory, which sits on a hill overlooking the city of Centralia, local history and military presence collided. During construction, the staff learned the armory sits on a historic landmark tied to the city's founding — a Baptist seminary that was one of the first schools in the area.



Many historic artifacts, including several lithic scatters were recovered during an archaeological investigation at Centralia Armory site. (U.S. Army courtesy photo)

Additionally, Centralia is the only city in Washington founded by an African-American.

The seminary later became a hospital and was razed prior to armory construction. But when the armory parking lot construction began in 2017, historic artifacts were unearthed, including three Native American lithic fragments.

Balancing the Guard's operations with the cultural value of the find presented a challenge, but the maintenance and treatment plans allowed the cultural resources management program staff to respond proactively and quickly.

Initial consultation with the Advisory Council on Historic Preservation and close coordination with the State Historic Preservation Office helped the staff resolve preservation concerns, maintain the Guard's impeccable compliance record, and keep construction on track.

The cultural resources management staff included the construction facilities maintenance and operations staff when developing MTPs, capably demonstrating how modernization and preservation needs not be at odds. They also emphasized new training and awareness protocols for Soldiers and contractors.

Notably, the person responsible for the Centralia discovery was not a contractor but a Soldier, emphasizing the need for all personnel to understand cultural resource practices. Indeed, the program will soon

begin training all the Guard's contractors to ensure better understanding of a particular site's needs.

The staff updated the inadvertent discovery procedures for inclusion in the revised Integrated Cultural Resources Management Plan and updated training site protocols as a mitigation response to the events at Centralia Armory.

The staff is incorporating environmental guidance into deployment plans, new employee orientation briefings, and pertinent building manager training. Furthermore, it continually updates geographic information system maps about installation buildings, including aerial imagery, to help guide the Guard's decision making.

The staff consults with federally recognized tribes about proposed actions and ongoing projects, including some associated with two installations the Guard trains on, but does not oversee or own. Also, the staff develops posters, signage and brochures to teach others about cultural resources statewide.

Establishing MTPs for historic structures is keeping WAARNG's modernization plans on track. Hundreds of artifacts now preserve valuable information for future researchers at Centralia.

The inadvertent discovery at the armory provided the opportunity for the CRM staff to instill cultural awareness within the overall community and strengthened the post's relationship with local groups.

Environmental quality achievements move Wisconsin Guard forward

By Rita Hess

U.S. Army Environmental Command

The 7,200 Soldiers of the Wisconsin Army National Guard rely on the state's industrial installation to provide the highest quality maintenance and rehabilitation of the vehicles, aircraft and equipment that drive training and readiness.

The installation, encompassing 10 field maintenance shops, two Army aviation support facilities, a combined support maintenance shop and a maneuver area training equipment site, manages thousands of vehicles and equipment supporting 99 Wisconsin units.

To ensure its mission remains uninterrupted, the environmental office established a proactive environmental quality program with clear action-oriented goals to minimize liability and risk of environmental impact while enhancing organizational effectiveness.

Those efforts have garnered no notices of violation at any of the Guard's industrial facilities in more than a decade.

An extensive training program also helps ensure best practices and compliance in all shops. Efforts were successful enough to earn the 2019 Secretary of the Army environmental award for environmental quality in an industrial installation.

"In fiscal 2017 and fiscal 2018, the environmental quality program achieved several milestones for the industrial installation," said Chief Warrant Officer 3 Fred Gallatin, the guard's environmental program manager.

"They began replacing old fuel systems and underground storage tanks—specifically, tanks near the end of their 30-year lifecycle—with new underground or above ground tanks," he said.

Additionally, all 15 fueling systems' tank monitoring panels were linked into the federal network for efficient management and real-time tracking. Six were upgraded in 2017, three in 2018 and three more identified for 2019.

The program's effectiveness is enhanced by the Guard's involvement with the state's Department of Natural Resources Green Tier Program, resulting in a single point of contact to oversee all regulatory compliance.

That point of contact helps support internal processes, particularly achievement of Environmental Management System



Mobile fueler and M-Day Soldiers setting up for downloading fuel into underground storage tank fueling system. (U.S. Army courtesy photo)

goals and Environmental Performance Assessment System excellence.

The environmental program is achieving excellent results. A wastewater discharge compliance study of all seven industrial installation facilities is underway.

Drain locations and systems at all facilities are being incorporated into a geographic information system platform. A statewide air compliance assessment and air emissions inventory also ensure regulatory compliance.

Spill plans and handbooks are continually updated. In fact, updating the spill prevention plan in-house the past two years resulted in significant cost savings by licensing and/or certifying environmental quality staff to complete site inspections, site evaluations and assessments.

The environmental staff works hard to clearly link the environmental quality program and the Guard's mission. They conducted the first mobile refueler training for mobilizing Soldiers during annual training and another session during weekend drill, including a hands-on portion with the environmental staff and the state's top aviation fuelers to demonstrate spill control response.

The Environmental Performance Assessment System program for the industrial installation provides the tools to identify environmental shortfalls and

provide solutions. Environmental quality staff completes internal audits annually on at least 25 percent of the Guard's facilities.

The program targets waste reduction, waste diversion and recycling. The Guard contracts with a vendor that picks up and disposes of hazardous waste.

Hazardous waste that meets certain characteristics is blended and burned for energy recovery in cement kilns. In 2017, the installation recaptured and fuel blended 1,053 pounds of hazardous waste.

Due to deployments, recycled antifreeze volumes are low. Still, about 900 gallons of recycled antifreeze were purchased at a cost of only \$3,641.

Within the Guard's broader operations, more conventional items are tracked for recycling, such as metals, tires, cardboard, used toner and more. In 2017, some 21,305 pounds of batteries were recycled, along with 2,965 pounds of light bulbs.

The industrial facilities also have the Department of Natural Resources' permission to regulate light-emitting diode, or LED, military vehicle headlights as electronic waste.

Furthermore, to increase participation and effectiveness, the staff has developed an online spill training module, accessible to state and federal personnel that require operation-level spill refresher training.

Investigation, removal activities continue at Camp Ellis Military Reserve

By Valerie Doss
USACE, Louisville District



Established as a World War II training center in 1943, Camp Ellis in Fulton County, Illinois, served as a basic and advanced individual training installation for engineer, medical, signal and quartermaster troops.

Between 1954 and 1955, the General Services Administration sold the property at an auction back to private landowners.

Under the Formerly Used Defense Sites Program, the U. S. Army Corps of Engineers, Louisville District, conducted an investigation between 2000 and 2006 to confirm the presence of munitions and to characterize the extent of contamination.

The Corps included 23 sites in the investigation, and of the areas where rights of entry were obtained, munitions were found in two areas near Bernadotte.

The report recommended thorough munitions removal activities at these sites and public education for the community. Removal actions were completed in 2009.

Currently, there are seven projects underway for investigation and/or removal, with an approximate total acreage of 448 acres at the former Camp Ellis Military Reserve.

The field work that began in January 2018 continues in two areas. Rights of entry have since been obtained on two additional areas, and those contract options were awarded in late fiscal 2018.

A landowner of one of those sites recently delivered two M1 practice mines to the on-site project office. One of the practice mines was material potentially presenting an explosive hazard (MPPEH), and the other practice mine was scrap. MPPEH items require demolition before they can be identified definitively as munitions and explosives of concern (MEC). The Corps has completed various educational mailings to area residents, as well as conducted several public meetings.

One of the challenges the field team has encountered includes working around the farmers' planting and harvesting schedules. This requires the team to be in the field during the winter. The effects of extreme weather conditions, such as snow and frozen ground, have affected the field team's effectiveness, and at times, have shut down their operations.

See CAMP ELLIS, page 42

Craig Morris, unexploded ordnance technician, uses a hand-towed EM61 to locate potential munitions and explosives of concern at the former Camp Ellis Military Reserve.

(Photos courtesy of David Brown, Parsons Inc.)





(Courtesy photo)

USACE, Philadelphia District partnered with the state of New Jersey and the non-profit Wetlands Institute to launch the Seven Mile Island Living Laboratory designed to advance and improve dredging and marsh restoration techniques in coastal New Jersey through innovative research and collaboration.

USACE, partners launch Seven Mile Island Living Lab

By Stephen Rochette
USACE, Philadelphia District

The U.S. Army Corps of Engineers, Philadelphia District has announced the launch of the Seven Mile Island Living Laboratory, an initiative designed to advance and improve dredging and marsh restoration techniques in coastal New Jersey through innovative research, collaboration, knowledge sharing and practical application.

The district partnered with the state of New Jersey and the non-profit Wetlands Institute on the concept.

Seven Mile Island, located in Cape May County, New Jersey, is backed by 6,000 acres of state-owned marshland that provides critical habitat for birds, fish, shellfish and other wildlife, as well as coastal resilience for barrier island communities.

Marshes in the area, as well as throughout the region, are showing signs of degradation and are vulnerable to impacts from rising seas.

“The Living Lab initiative will help us continue to learn by enhancing the science behind projects, improve our methods using a systems approach, and evaluate innovative solutions that are based on Regional Sediment Management and Engineering With Nature principles,” said Monica Chasten, USACE project manager. “We modeled the laboratory on a concept used internationally – it provides a forum to advance technical knowledge, demonstrate novel approaches, develop new tools and technologies, and enhance collaborative efforts on new projects.”

Chasten said the lab will also provide information on the risks and benefits of

natural and nature-based feature projects.

The Living Lab extends between the inlet boundaries of Seven Mile Island and includes existing and historic dredged material placement sites, confined disposal facilities, federal and state channels including the New Jersey Intracoastal Waterway, extensive tidal marshes, a mixture of sandy and muddy sediments and, most importantly, a rich historic dataset to build upon.

Since Hurricane Sandy, USACE, the state of New Jersey, The Wetlands Institute, The Nature Conservancy and other partners jointly conducted four marsh restoration and habitat creation projects aimed at improving coastal resilience. The projects involve beneficially using dredged material from the intracoastal waterway to restore marsh and provide suitable habitat for wildlife on state-owned and managed land.

See LIVING LAB, page 42

This is a departure from the traditional practice of dredging and placing the material in confined disposal facilities cut off from coastal processes and the natural sediment system.

The newly created colonial nesting bird habitat at Ring Island, for example, has been successfully utilized by black skimmers, common and least terns, and American oystercatchers – all state endangered species or species of special concern. The successful nesting of least terns on Ring Island marks the first time they have nested in coastal marshes since the 1980s.

Project partners continue to monitor the demonstration projects, share project results, and develop “lessons learned” to apply to future projects.

One focus area for the Living Lab will be to build on the success of these demonstration projects and implement future projects with a more systematic

approach, establish a forum for experts to share knowledge, provide input and disseminate information to stakeholders.

The Wetlands Institute is located near the geographic center of the Seven Mile Island Living Lab study area and provides dock facilities, research labs and an environmental education center. The organization promotes the appreciation, understanding and stewardship of coastal and wetland ecosystems through programs in research, conservation and education.

Now celebrating its 50th anniversary, the Wetlands Institute was founded in 1969 by Herbert Mills, then executive director of the World Wildlife Fund, who acquired thousands of acres of marshland for conservation purposes. Today, these are part of the Cape May Wetlands Wildlife Management Area, owned and managed by the New Jersey Division of Fish and

Wildlife, and are at the heart of the Living Laboratory.

“Preserving marsh integrity in the face of sea level rise is the seminal issue of our time – how do we help marshes withstand the stresses caused by sea level rise to protect and preserve this resource?” asked Dr. Lenore Tedesco, executive director of the Wetlands Institute. “Sediment is the currency of these ecosystems and we know these marshes are sediment starved so we must work to find innovative ways to utilize the clean sediments that clog navigation channels to enhance marshes and offset sea level rise. The living laboratory provides an opportunity to advance these techniques.”

Tedesco expects the Living Lab will function as a think tank to develop and demonstrate new techniques so that these projects can gain more widespread application.

CAMP ELLIS

continued from page 40



A landowner delivered two M1 practice mines, one MPPEH and the other scrap, to the on-site project office. (Courtesy photo)

The Comprehensive Environmental Response, Compensation & Liability Act Remedial Action - Construction (RA-C) phase of the East Landfill project is nearing remedial action completion, and complete project closure is slated for early summer of 2019.

The CERCLA RA-C phase of the Wastewater Treatment Plant-Sludge Digesters removal is complete, and the project closure, with Illinois Environmental Protection Agency concurrence, was completed in April 2019.

The site investigation in compliance with Illinois Administrative Code at Facility Cluster Area 2 is in the early stages. The first of several quarterly sampling events of groundwater monitoring wells installed occurred March 2018.

Of the 17,995-acre Camp Ellis property, there remains approximately 341 acres for which the Corps still cannot obtain rights of entry. The ROE denials affect five project areas. These holdouts are longtime property owners.

Though such delays hamper the ability to complete necessary activities in a timely manner, the Corps continues to work toward closure of all areas at Camp Ellis, conducting public information meetings, providing newsletters and information mailings to area residents, as well as directly contacting and requesting rights of entry from those property owners.



The foam-free test trailer will be used to ensure that fire trucks and pumpers designed to respond to aviation fuel fires are functioning at their peak, while being protective of the environment.

(Photo by Brian Schlumbohm)

Arctic post seeks to eliminate fire retardant contaminants

By **Ida Petersen**

DPW Environmental Division
Fort Wainwright, Alaska

U.S. Army Garrison Alaska has a new trick up its sleeve in protecting public safety, health and the environment. A specialized foam-free test trailer has arrived at Fort Wainwright.

The trailer is designed to eliminate the discharge of chemical fire retardant containing per- and polyfluoroalkyl substances, or PFASs, during testing and training exercises.

Currently, several fire trucks and pumpers on the arctic post use aqueous film forming foam as a fire retardant because of its effectiveness in putting out fuel and aviation fires.

Though the foam helps save lives and protects mission-critical assets, it contains high concentrations of two compounds that are classified as emerging contaminants linked to multiple ill health effects: perfluorooctanoic acid and perfluorooctanesulfonic acid, known commonly as PFOA and PFOS.

These chemicals have been commonly used in a variety of industrial and consumer products because of their resistance to heat, water and other substances, notably in firefighting foams.

The historical use of the foam in firefighting and training activities has led to several PFAS-contaminated groundwater plumes in the Fairbanks area. Drinking

water on post, however, does not contain elevated levels of PFOA or PFOS and is routinely tested to ensure it is safe for the most sensitive populations, including nursing mothers and infants.

To prevent health and environmental impacts, the foam chemicals have not been discharged outside of emergency firefighting since 2016 per Department of the Army policy.

According to Chuck Tucker, installation fire chief, the department hasn't been able to conduct its annual testing for aircraft rescue and firefighting trucks to determine whether the metering system is working correctly.

"So now having the foam trailer, we'll be able to meet that annual requirement," he said.

The new foam-free test trailer, manufactured by NoFoam System in La Jolla, California, works by connecting to a fire truck's mixing system and measuring flow rates to determine if the correct proportion of chemical fire retardant is released.

Instead of mixing with water, the PFAS-containing solution is diverted into the trailer's tank and can be reused. This test ensures that all systems are working correctly and the mix is optimized to quickly put out fires while preventing any exposure to the environment.

Phasing out of production of the fire retardant began in 2000 and it is no longer available for purchase in the United States.

In the near term, the garrison will continue to keep the chemical in stock for

petroleum-based fires because of its superior fire-fighting capability, long shelf-life, and lack of a comparable product that is completely PFAS-free. Eventually though, it will need to be replaced by an alternative product.

Current alternative products, such as Phos-Chek, currently used at Fairbanks International Airport, still contain PFASs besides PFOS and PFOA. This product is generally considered safer, but health effects of the other PFASs in it are still being studied.

The Department of Defense is investing in research and development of a PFAS-free foam that can rival the effectiveness of the aqueous film forming foam.

This initiative resulted from a collaborative effort between the installation fire department and the Directorate of Public Works Environmental Division.

"It's always good—the collaboration of all the agencies on the garrison working together, helping out for the greater cause," Tucker said.

The DPW Environmental Division procured the trailer as their fiscal 2018 Pollution Prevention project with the intent that the trailer will be made available not only to the garrison fire departments, but all of the surrounding community fire departments that have PFAS-containing trucks requiring annual testing.

This technology is transferrable to all U.S. Army Installation Management Command posts.



The \$1.24 million project to repair the Scituate Harbor North Jetty in Scituate, Massachusetts, was completed January 16. (Courtesy photo)



District, contractor complete repair work to Scituate Harbor Jetty

By Ann Marie R. Harvie
USACE, New England District

After sustaining damage during Winter Storm Juno in 2015, the Scituate Harbor North Jetty in Scituate, Massachusetts, has been successfully repaired.

The U.S. Army Corps of Engineers, New England District team and its contractor, Classic Site Solutions of Springfield, Massachusetts, completed the \$1.24 million project, Jan. 16, 2019.

“The North Jetty at Scituate Harbor extends from Cedar Point on the north side of the entrance channel to the harbor and is an interlocked stone structure approximately 850-foot long,” said Eric Crockett, project engineer, New England District. “The jetty provides protection to the navigational channel and Scituate Harbor.”

Crockett said that the jetty experiences some of the most significant storm surges in the state, and the integrity of the structure is pivotal to its thriving fishing and boating industries.

Repair work on the jetty consisted of removing and replacing significant volumes of existing stone as well as installing 1,500 tons of new armor stone. The stones ranged in weight from four to eight tons. The Scituate Harbor Project Delivery Team identified critical areas of the jetty to be repaired, which resulted in the most reuse of the existing stones.

Repairing a jetty of such importance comes with its challenges. Not only is the structure an important protection to the federal channel and the harbor, it is also home to the historic, and heavily visited, Scituate Lighthouse. It was for that reason that construction was delayed until September 2018.

However, strong winds and waves during that time of year made working conditions difficult.

“It is a frequently visited area, so the construction window was scheduled primarily by the contractor to be during the winter months so the area could be closed off,” said Bill Kavanaugh, project manager. “Access was still available to the lighthouse. It was good for

recreational avoidance, but not that great for construction.”

Environmental considerations had to be made during construction as well.

“The harbor provides for an abundance of aquatic ecosystems, and the area directly surrounding the jetty needed to be avoided due to the presence of eelgrass,” said Crockett.

Every effort was made to protect the precious aquatic plants.

Kavanaugh explained that due to these ecological concerns, the stones used for the construction were barged in, off loaded onto the beach, and then transported along the top of the jetty to the primary repair area. All the actual stone placement into the jetty had to be done from the top of the structure.

The stone for the project arrived at the site in October. Construction of the jetty began in November and took about 60 days to complete. The New Bedford Resident office oversaw the construction. Team members included Kavanaugh, Crockett, Brendan Sprague and Michael DeGrazia.

Protecting water quality has positive trickle-down effect

By JoAnne Castagna, Ed.D.
USACE, New York District

A team of engineers gather along an empty country road in the Town of Harpersfield, New York. All that's heard is the steady drum of rain on their umbrellas.

They're looking over a new culvert—a large pipe—they constructed that runs under Odell Lake Road and transports Lake Brook from one side of the road to the other.

The rain—that's been going on for days—is a nuisance, but welcomed by the team from the U.S. Army Corps of Engineers because it's proving that the culvert is successfully performing its job.

If it were weeks earlier, the road would have been flooded because the previous culvert was damaged.

But the success of this project has much bigger implications. By controlling flooding,

the culvert is also improving the water quality of the brook for aquatic life as well as New York City's water supply.

After water from Lake Brook travels through the culvert, it eventually flows into the West Branch Delaware River which eventually streams into the Cannonsville Reservoir in Delaware County. This reservoir supplies almost 97 billion gallons of water to the New York City water system.

A damaged culvert can jeopardize the quality of this water.

The previous culvert was undersized and damaged through years of stormwater impacts.

During storm events, high water from Lake Brook streamed and plugged the undersized culvert which triggered the water to run over the top and flood the road.

This stormwater runoff sweeps road contaminants into the bodies of water, such as brooks, and adversely pollutes the water.

Stormwater runoff can also damage roads and accelerate streambank erosion.

When streambanks erode, soil and pollutants can be more easily carried off and contaminate bodies of water.

This pollution can damage the stream's health and affect the quality of the water that eventually makes its way to the water supply.

A new culvert was constructed and the culvert's streambank was restored as part of the Corps' New York City Watershed Environmental Assistance Program.

"This program funds projects that are protecting the water quality of New York state's watersheds that provide drinking water to millions of New York City residents and businesses," said Rifat Salim, project manager, USACE, New York District.

To perform this work, several agencies collaborated with the Corps, including the Delaware County Soil and Watershed Conservation District, New York State Department of Environmental Conservation, New York City Department of Environmental Protection, and the Town of Harpersfield.

The new culvert is larger, allowing a greater amount of water to flow through and reduce the chances of flooding during storm events.

According to Graydon Dutcher, stream program coordinator with the Delaware County Soil and Water Conservation District, the previous culvert was two circular pipes with a total diameter of 36 inches while the new culvert is almost seven times larger.

"The new culvert is designed to withstand a 100-year storm event, plus 20-percent

additional water flow," he said. Such a storm event is predicted to occur, on average, about once in 100 years.

Less flooding means a safer community.

"During storm events, the old undersized culvert would plug up with woody debris causing water to overtop the culvert and flood Odell Lake Road, making the road an unreliable access route in an emergency," Dutcher said.

Now when the West Branch of the Delaware River and its tributaries flood the lower valleys, the road will remain accessible for people and emergency responders traveling to and from Stamford and areas north of the county.

Less flooding also means less stormwater runoff, resulting in a healthier brook and cleaner water supply.

To further control stormwater runoff, the streambanks along the culvert were restored and stabilized.

Rock was placed along the banks to hold down the fine sediment from running into the brook.

With the previous culvert, the stormwater movement over time carved or scoured out a pool in the bed of the brook, further increasing the flow of sediment into the brook.

The rock placement is stabilizing the banks, preventing this from occurring in the future.

Providing additional stabilization, native vegetation was planted along the banks including willows, dogwoods and apple trees.

"Flood waters will drain from the road and filter through this vegetation before entering the brook," Dutcher said.

See WATER SUPPLY, page 47



(Photo by Graydon Dutcher)

The project team looks over the new culvert as it works successfully in torrential rain conditions.

The plants' roots stabilize the soil, and the vegetation traps and absorbs sediment and pollutants, like harmful phosphorus and nitrogen particles, from entering the brook.

This improves the quality of the water, maintains the brook's temperature and fosters the creation of fish and aquatic habitats. A healthy environment for aquatic life also includes the ability to migrate and breed.

"The old culvert did not allow for fish passage up stream of the culvert," he said. "The new culvert has a natural stream bottom and allows for all organisms to freely pass under the road."

This project also addresses the future threat of climate change.

"With the possibility of increasing storms events, climate resiliency knowledge like this is needed. This project serves as a

great reference on how to replace undersized structures," said Dutcher.

With the new road culvert in place, the sound of heavy rain is no longer a flood threat to the Harpersfield community.

Instead, it's a reminder that their new culvert is helping to keep their community safe, as well as improve the water quality of the brooks and streams for aquatic life and New York City's water supply.



The new culvert is designed to withstand a 100-year storm event, plus 20 percent additional water flow. Its natural stream bottom allows for all organisms to freely pass under the road. (Photo by JoAnne Castagna)

Watershed system meets water needs of NYC millions

By JoAnne Castagna, Ed.D.
USACE, New York District

The New York City watershed region encompasses approximately 2,000 square miles of land north of New York City.

The land includes three watershed systems – The Catskill, Delaware, and Croton Systems – that are located in the counties of Greene, Schoharie, Ulster, Sullivan, Westchester, Putnam, Dutchess and Delaware.

A watershed is an area of land that catches rain and snow that drains or seeps into a marsh, stream, river, lake or groundwater. This water eventually gets stored in reservoirs, a place where water is collected and kept for use when wanted, such as to supply a city.

The New York City Watershed System provides more than 90 percent of New York City's water supply. This comes to approximately 9.5 million people.

New York City makes sure that this water is safe by treating it at the source rather than building a costly filtration plant. The source is the land that surrounds the streams, rivers, lakes and reservoirs.

"In 1996, all of the municipalities in the New York City watershed region came to an agreement. They wanted to avoid the creation of a huge filtration plant. Instead of a plant they agreed to have small projects throughout the region to provide the public with clean water with minimal filtration.

"This is how our New York City Watershed Environmental Assistance Program came about," said Rifat Salim, project manager, U.S. Army Corps of Engineers, New York District.



(Photo courtesy of USACE, New England District)

Park Ranger Viola Bramel talks with bird watchers before their 1.5-mile hike. About 20 bird enthusiasts participated in West Hill Dam's Annual Backyard Bird Count.

Annual bird count event draws local bird enthusiasts

By Ann Marie R. Harvie
USACE, New England District

Local bird watchers descended upon West Hill Dam in Uxbridge, Massachusetts, armed with pen, paper and a few binoculars to participate in the West Hill Dam's annual Backyard Bird Count.

Co-hosted by the Cornell University Lab of Ornithology, the count has been a U.S. Army Corps of Engineers, New England District and West Hill Dam project for the past 20 years.

"The annual Backyard Bird Count is a nationwide program held every February," said park ranger and event organizer, Viola Bramel. "Worldwide hikers, visitors and even seniors at home by their own feeders share their observations."

Bramel said that the Cornell Lab plots the observations on global maps to show migration, population trends and environmental factors that impact birds. Cornell Lab says that scientists use information from the bird count, along with observations from other citizen-science projects to get the "big picture" about what is happening to bird populations.

This year, 20 participants kept a sharp eye out for West Hill's feathered residents during a 1.5-mile hike. Volunteers included scouts, advanced rangers and adult bird enthusiasts.

The group hiked to observe four habitats at West Hill – riparian-river, wetlands, grassland and open field with a forested edge.

"We followed protocol from Cornell, observing each habitat for 15 minutes," said Bramel.

Patience paid off for the bird lovers.

The group observed a flock of hooded mergansers, a black-eyed junco, an eastern bluebird, three ducks, a blue jay, a flock of chickadees, three Canadian geese and two bald eagles.

After a successful bird count, the scouts and junior rangers put their campfire skills to good use and built a fire. Volunteers provided hot chocolate and marshmallows for the adventurers to enjoy by the fire.

"We reviewed our observations while enjoying the campfire," said Bramel. "It was so nice to have so many people just spending a great day outside in the park and away from electronics."

Long-time volunteer, Linda Letha, assisted Bramel in running the event.

Launched in 1998 by the Cornell Lab of Ornithology and the National Audubon Society, the Great Backyard Bird Count was the first online citizen-science project to collect data on wild birds and to display results in near real-time.

According to their website, more than 160,000 people of all ages worldwide join the four-day count each February to create an annual snapshot of the distribution and abundance of birds.

In 2018, participants in more than 100 countries counted more than 6,400 species of birds on more than 180,000 checklists. Scientists and bird enthusiasts can learn a lot by knowing where the birds are. Bird populations are dynamic; they are constantly in flux. No single scientist or team of scientists could hope to document and understand the complex distribution and movements of so many species in such a short time.

The Backyard Bird Count is only one of many events West Hill Dam hosts. For more information on upcoming events, visit their website at <https://www.nae.usace.army.mil/Missions/Recreation/West-Hill-Dam/>.



Los Angeles District, Tohono O'odham Nation join efforts to promote explosives safety

By Monique Ostermann
USACE, South Pacific Division

The U.S. Army Corps of Engineers Los Angeles District partnered with the Environmental Protection Office of the Tohono O'odham Nation, a federally-recognized tribe, in November 2018 to plan age-appropriate 3Rs (Recognize, Retreat, Report) of Explosives Safety awareness information for schools on the nation located within the Sonoran Desert in south central Arizona.

The effort was part of the Formerly Used Defense Sites Interim Risk Management initiative, which informs government officials, property owners and community members about potential hazards at sites where Department of Defense is not expected to investigate or conduct removal or remediation activities for an extended period of time.

The Environmental Protection Office requested the awareness presentations for the schools since there are FUDS munitions response sites on the Tohono O'odham Nation.

The nation's involvement in planning the safety awareness resulted in elements of the tribe's culture being incorporated into the presentations, the community accepting the need for the 3Rs safety information, and the Corps identifying ways to assist the nation in providing outreach to its community.

When Robert Sixkiller, a compliance officer with EPO, learned that World War II-era FUDS with potential explosives hazards were located on the nation, he asked the Corps' Los Angeles District if safety information existed to help raise awareness within the community of the potential hazards.

Lloyd Godard, the district's FUDS project manager, discussed options with Sixkiller and determined DOD Environment, Safety and Occupational Health Network and Information Exchange 3Rs of Explosives Safety presentations could be provided to the schools. The materials given to the students were also designed to be shared with their families, furthering the reach of the safety information.

The collaboration came out of meeting with Arizona FUDS stakeholders, Godard said.

"The nation's EPO compliance officer was looking for educational material," he said. "That was the start of a very valuable partnership."

The Los Angeles District and EPO developed a preparation

"The addition of Tohono O'odham artwork and words to the coloring book makes them exceptionally more valuable when distributing to interested parties," Sixkiller said. "My gratitude extends to the Department of Defense and U.S. Army Corps of Engineers' openness and willingness to allow the modification of the materials."

"It helped the children connect with the material," Godard said. "The use of symbols, characters or mascots they are familiar with or look up to helps bring the presentation closer to them as a community, especially when dealing with young children."

The Los Angeles District and the nation presented safety awareness information to all schools on the nation Jan. 10-17, reaching approximately 1,480 students and 50 teachers and spurring introductions to resource officers from the nation's police department and school newspaper and radio club teachers.

The team also gave 3Rs of Explosives Safety coloring books to 350 pre-kindergarten and kindergarten students.

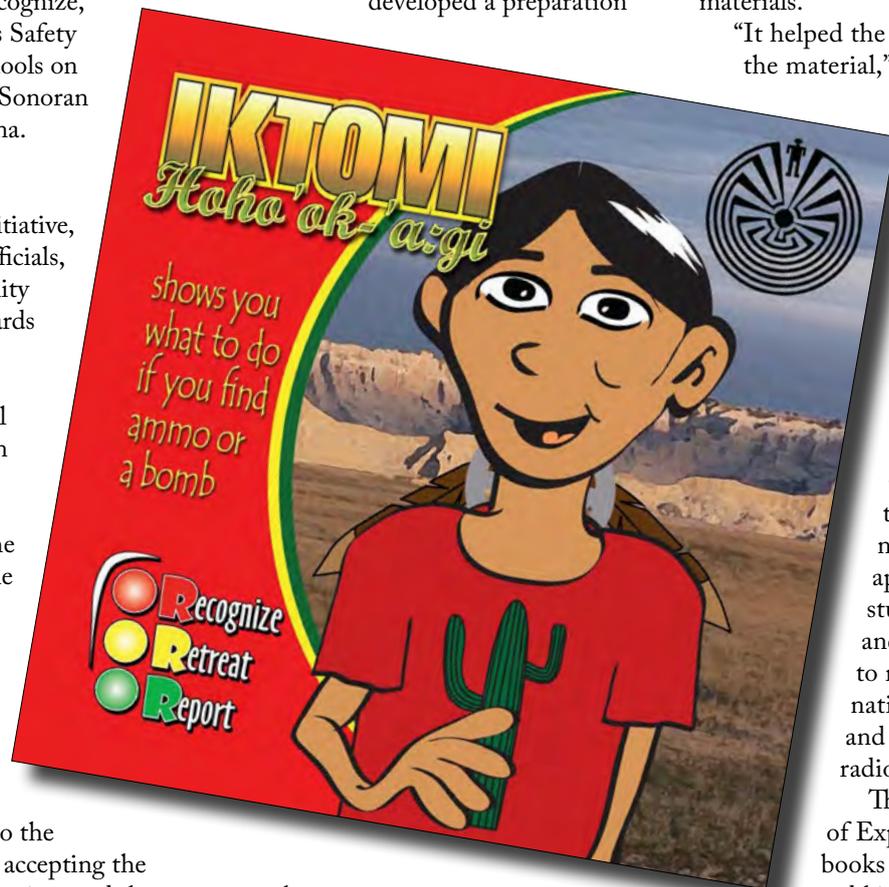
EPO and school staff encouraged the students to take the 3Rs materials home and discuss the safety practices with their parents or guardians, Sixkiller said.

"When all parties can communicate and work together like our team did, all things are possible," he said.

Sixkiller praised the proactive collaboration between the Corps and the nation for providing essential safety awareness information to children and their families.

"I hope all districts work as well as the Los Angeles District did with us to make for a successful safety outreach for all the children," Sixkiller said.

Additionally, the Los Angeles District provided EPO with 3Rs materials to distribute at the nation's annual rodeo and fair Feb. 1-3 in Sells, Arizona.



shows you
what to do
if you find
ammo or
a bomb

Recognize
Retreat
Report

process that encouraged input from the nation. EPO coordinated meetings with the schools so the district could become familiar with relevant cultural information, school location and presentation logistics. Conversations with the schools provided the necessary information to construct a thorough, yet flexible plan to meet each school's needs.

In addition, each school was asked to preview the presentation materials and provide input on how the information could be delivered in a manner suitable to each school.

EPO also coordinated a meeting with the curator of the Tohono O'odham Nation Cultural Center and Museum, which provided the district with information about the tribe's culture and history that were used, with the nation's permission, to augment standard presentation materials.



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