



The Corps

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# Environment



Protecting, preserving  
environment improves  
Army readiness

4





## Cover Shot

*In the EnviroPoint commentary, Col. Tim Greenhaw, commander, U.S. Army Environmental Command, says everyone plays a part in balancing military operations and reducing the negative impact on the environment. (U.S. Army photo)*

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# Everyone plays a part

**By Col. Tim Greenhaw**

*Commander, U.S. Army Environmental Command*

This summer I depart San Antonio and the U.S. Army Environmental Command. As I prepare for my next assignment, I am amazed by how much I have learned over the past 19 months from both the technical experts and support staff at the Army Environmental Command.

It is very clear to me how important it is to continue to educate and inform the rest of the Army on what the Army Environmental Program is and how important program successes are to the readiness of our military force.

*We have had many successes in proactively identifying and managing threatened and endangered species that reside on our installations, sometimes to the point where a species is de-listed or a candidate species no longer needs to be listed thanks to Army efforts to protect the species and its habitat.*

According to the fiscal 2017 demographics, the total Army includes about a million people. Add to that another three-quarters of a million family members of Soldiers, and probably close to as many family members of our civilian workforce, and you can envision the huge force capable of impacting the environment in either a positive or negative way.

Compliance with environmental laws, as well as proactive conservation and preservation of our natural and cultural resources, can help minimize the risks to Army training and testing from environmental requirements.

On Army installations, impacts to land, air and water can hamper or even halt military operations. We must continue to educate the entire Army on best practices to balance military operations and minimize negative impacts on the environment.

Our environmental staffs have done a lot of work protecting our natural resources and preserving our cultural resources. We have had many successes in proactively identifying and managing threatened and endangered species that reside on our installations, sometimes to the point where a species is de-listed or a candidate species no longer needs to be listed thanks to Army efforts to protect the species and its habitat. Using programmatic agreements we are able to ensure our history and heritage are preserved on Army installations without having limitations placed on our training and testing lands.

The Army Environmental Command regularly assesses how Army installation environmental programs comply with Army policy and legal requirements. AEC teams assist installation environmental staffs by letting them know where their operations are near or already out of tolerance with federal and state legal requirements and provide suggestions and support to maximize improvements.

Army Environmental Performance Assessment and Assistance System teams have seen some recurring and possibly systemic problems that we must all work together on to minimize not only the Army's impact on the environment, but the impact on Army readiness. Loss of funds needed to pay fines and penalties due to noncompliance can reduce resources needed for readiness.

The environmental areas with the largest number of noncompliance findings in the last three years have been petroleum, oils and lubricants or POL, hazardous waste and wastewater. These three areas represent 53 percent of all findings.

Sometimes the problems with POL are easily corrected, like poor housekeeping and incorrect or missing information in the spill prevention plan. Sometimes the issues are more substantial like leaking POL storage tanks, missing or defective secondary containment systems, and storage tank and alarm systems requiring maintenance and repair.

With hazardous waste, we often find improper storage problems, where hazardous waste is kept outside the 90-day storage area, incompatible wastes are maintained next to each other, and liquids are stored without secondary containment. Another common issue is missing labels or signs, wastes stored longer than permitted, and capacities of accumulation points exceeded. All of these problems are easily corrected.

Wastewater findings often include wastewater and stormwater permit discharge issues, erosion controls not implemented, oil spills not cleaned up, and sediment control going into storm drains. There are some operational practice issues and illicit discharge issues, as well.

More training on federal and state environmental laws and regulations and training/enforcement of environmental plans, policies and procedures at the installation level can eliminate the root causes to the majority of the issues found.

Garrison commanders have the opportunity to guide their installations toward more sustainable operations and through environmental stewardship can ensure Army installations have the "missionscape" needed to support Army readiness and prepare our Soldiers to face the lethal battlefield of tomorrow.

The AEC Commander's Guide and the environmental briefing provided at the garrison pre-command course help ensure incoming commanders and command sergeants major know which environmental



**Col. Timothy Greenhaw**

*Commander*

*U.S. Army Environmental Command*

areas they need to keep close watch on and help them understand the environmental requirements and liabilities inherent with running an installation. That publication is available on the AEC website and may be useful to others: [https://aec.army.mil/application/files/2715/0843/3456/Commanders\\_Guide\\_FINAL\\_online\\_version.pdf](https://aec.army.mil/application/files/2715/0843/3456/Commanders_Guide_FINAL_online_version.pdf).

An installation is similar to a small city and with more than 100 environmental laws, statutes and policies relating to the environment, maintaining compliance can seem a daunting task. Environmental staff on the installation, environmental lawyers at all levels and the Army Environmental Command staff are all available to help.

Additionally, if we educate the entire community living and working on the installation so they know how they can help, there will be plenty of resources to go around. When the Army community works together, and everyone does their part, no problem is too big.



**The Corps  
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**Lt. Gen. Todd T. Semonite**  
Commanding General  
Publisher

**W. Curry Graham**  
Director of Public Affairs

**Karen J. Baker**  
Executive Editor

**Gene Pawlik**  
Managing Editor

**David San Miguel**  
Editor

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## 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](mailto:CEHNC-PA@usace.army.mil).

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*Lt. Gen. Edward M. Daly, deputy commanding general, U.S. Army Materiel Command and senior commander, Redstone Arsenal, addresses the crowd during the Redstone Arsenal Solar and Battery Project ribbon-cutting, Feb. 23.*

*(Photo by U.S. Army photo)*

# Solar energy, storage system project enhances Redstone Arsenal's readiness

**By William S. Farrow**  
USACE, Huntsville Center

**HUNTSVILLE, Alabama** – More than 60 people attended the Redstone Arsenal Solar and Battery Project ribbon-cutting Feb. 23, marking full operation of the renewable energy and battery storage system.

The 114-acre, solar energy complex generates about 10 megawatts of fuel-free power for use on the installation and its tenants, including a 2 MW storage system.

Redstone Arsenal's Directorate of Public Works, the Army Office of Energy Initiatives and the U.S. Army Engineering and Support Center, Huntsville's Energy Division developed the project.

Huntsville Center awarded the contract to SunPower Corp., of San Jose, California, in 2016 and managed the project throughout construction.

Through its Power Purchase Agreement program, the Huntsville Center develops and provides life cycle-project management for large (10 megawatts or greater) and small scale (less than 10 megawatts) renewable energy projects that leverage private sector (third party) financing.

Financing for the project was provided

by Regions Bank of Birmingham, Alabama.

SunPower designed, built and will operate and maintain the system that brings energy diversity and cost avoidance to the installation.

Redstone Arsenal purchases electricity produced by the project at a rate less than current and projected utility cost, and is expected to save about \$80,000 per year, or \$1.5 million over the term of the purchase agreement, which is 27 years.

Lt. Gen. Edward M. Daly, deputy commanding general, U.S. Army Materiel Command and senior commander, Redstone Arsenal, said the project is a tremendous step forward in support of Army readiness as well as energy resiliency.

"Redstone Arsenal is at the forefront of Army transformation, leveraging science and technology to produce new capabilities in support of the nation's objectives," Daly said. "Today, we celebrate a significant achievement; the Army's first privately funded and economically viable source of energy generation and storage."

During the ceremony, Jordan Gillis, acting assistant secretary of the Army (Installations, Energy & Environment), said the Army established a requirement in

2017 for its installations to become capable of providing necessary energy and water to sustain critical missions for 14 days in the event of major disruption.

He said currently the network of Army installations depend on a commercial power grid that's vulnerable to disruption due to aging infrastructure, physical or cyberattacks, and severe weather.

"The garrison here at Redstone needs no reminding of devastating consequences of extreme weather events like the series of storms and tornadoes that knocked out power at this installation for a week in 2011," Gillis said.

Through diligent energy management, he said, installations will become robust and resilient platforms to support the warfighter and save taxpayers money.

Energy resilience, he added, enables Army readiness while it continues working toward the goals of achieving energy and water resilience on its installations.

"I'm confident projects like this one will help Army installations meet the high standard of resilience," Gillis said. "The solar array coupled with the battery storage system provides increased energy diversity and cost avoidance to team Redstone."



# War munitions removal continues

**Story & photo by Stephen Baack**  
USACE, Huntsville Center

The mission to investigate and remove World War II-era chemical warfare materiel suspected to be buried in 17 sites at Redstone Arsenal has reached a new milestone as the U.S. Army Engineering and Support Center, Huntsville prepares to lead fieldwork at the post's 10th such site.

In 2010, the sites were identified by Alabama's regulatory authority for remediation as part of the federal government's Resource Conservation and Recovery Act. This remediation includes investigating and, as a required interim measure, removing any discovered chemical warfare materiel.

As the Army's executing agency for chemical warfare materiel responses, Huntsville's Chemical

Warfare Design Center has since 2010 supported the Garrison Installation Restoration Program by managing the mission at these sites. To date, the center and contractor APTIM have investigated 262 test pits; and recovered more than 2,200 conventional munition remains and more than 15,000 pounds of munition debris.

Munitions from the U.S., Great Britain, Germany and Japan were shipped and stored at Redstone for reworking and demilitarization. When the war ended, the goal of these operations shifted to ordnance disposal.

"After World War II, the approved practice for disposal of munitions and items like this was to bury them or to create trenches and pits and blow them up and then bury the remains – and it was an approved practice then," said Ashley Roeske, project manager with Huntsville's Chemical/Biological Warfare Materiel Division.

"I think they were following the best science that they knew at the time," Col. John Hurley, Huntsville Center commander, said. "Now that we've got better analytical tools and better knowledge about how these things work, we understand how we've left things isn't necessarily as sustainable as it could be."

Starting in the late 1960s, there was a renewed concern about the risk these

disposal methods posed to the environment and to public health and safety.

Since the 1990s, the U.S.'s policy on chemical weapons has been to eliminate all recovered chemical warfare materiel, according to a 2012 report from the Committee on Review of the Conduct of Operations for Remediation of Recovered

possibly think of," she said. "So if we find something, that's what we're there to do, and we do have the contingencies in place to handle that."

The safety measures in place are numerous, Roeske said, including continuous air monitoring for chemical agents, the full-time presence of an

ordnance and explosives safety specialist, daily safety briefings, regular status updates to the site's command post and strict accountability procedures.

In addition to site setup, teams mark the exclusion zones and check to ensure that only those individuals essential to the mission are allowed within those marked exclusion zones, Roeske said. "They constantly check them throughout the work day. Along with that, they coordinate with the



*Col. John Hurley, commander, Huntsville Center, and several members of his staff tour the remediation site at Redstone Arsenal.*

Chemical Warfare Materiel from Burial Sites.

According to that same report, the Army has safely destroyed more than 90 percent of its legacy chemical weapons and chemical warfare materiel from the World War II and Cold War eras.

Hurley, joined by Huntsville Center Programs Director Albert "Chip" Marin, took a tour of the site Jan. 19 to observe operations on the 7-acre site at Test Area 1. These operations occur at night to minimize disruption to normal installation operations, including daytime range tests.

The leaders' visit included site-specific training that teams are required to undergo before embarking on intrusive fieldwork. The two weeks of training included practicing with remote-controlled excavators on a nearby site mockup and running through a variety of scenarios and decontamination procedures.

At this site, as with the other 16, teams are subject to finding both conventional munitions, such as mortars and artillery, as well as chemical agents, such as nitrogen mustard blister agent and tabun nerve agent. Since fieldwork began in 2016, teams have not encountered any chemical warfare materiel.

If and when they do find something, Roeske says the teams are well prepared.

"We've been very proactive about considering every situation that we can

installation's emergency operation center."

The next step for this site is the pre-operational survey.

"That's a team of inspectors who come out and check our readiness: 'Are we doing everything in accordance with our plans?'" Roeske said.

After the survey and its approval, intrusive investigations begin. During this interim-measures phase, teams must safely assess and remove munitions.

Fieldwork on the sites under the current contract is projected to last through fiscal 2019, and fieldwork on the remaining sites for this entire interim-measures phase is projected to last through fiscal 2042.

The timeline for the corrective-measures phase is much longer, but Hurley said he is already happy with the center's success.

"It's fantastic that the Corps of Engineers – Huntsville Center – can be part of that mission," he said.

"I've done environmental remediation in different places for about 12 years now, and folks are truly satisfied and fulfilled when they get to work on and see the results of an environmental remediation project. It's great to build a building and see a finished product, and there's a certain happiness in an engineer in that, but when you know there's an area that's not safe for people – and you go in and remediate that area, and that area can then be reused – there's a tremendous satisfaction from that."



# Restoration, Recovery

## Celebrating completion of Camp Cronin project

Story & photo by Ann Marie R. Harvie  
USACE, New England District

**C**ol. William Conde, New England District commander, joined Sen. Jack Reed and Sen. Sheldon Whitehouse, and partners Rhode Island Department of Environmental Management and Housing and Urban Development, in celebrating the completion of the Camp Cronin Restoration Project during a ceremony Nov. 6 at Point Judith, Rhode Island.

Hurricane Sandy damaged portions of the Point Judith Harbor of Refuge Project. Funds provided in the Disaster Relief Appropriations Act of 2013 were used to make necessary repairs to the East Jetty, the Camp Cronin fishing area shoreline and the East Shore Arm Breakwater.

"This is a special place, and I am pleased to have secured federal funding to enhance safety, restore public access and better protect the shoreline," Reed said. "Superstorm Sandy did significant

damage. As we celebrate the completion of this recovery project, we must be mindful of the steps we need to take to promote pre-disaster mitigation and resilience to ensure that the next hurricane or flood doesn't lead to as much damage."

According to Conde, the \$5.4 million contract was awarded in August 2014 to protect the federal portion of the shoreline with the construction of stone revetment at the Camp Cronin Fishing Area and to perform repairs to the East Shore Arm breakwater due to Hurricane Sandy damage.

"In October of that same year, an option to repair the state portion of the stone revetment at the fishing area was awarded with Rhode Island DEM funds via a HUD grant in the amount of \$3 million," he added.

Work on the project was protracted to accommodate specific circumstances and was suspended during the summer to avoid any impacts to public recreation.

Construction commenced in late October 2014 and was expected to take about 19 months to complete, over three construction seasons, Conde said.

The ocean shoreline stone revetment at the Camp Cronin fishing area was completed in May 2015, and by mid-October 2015 the contractor mobilized onsite to begin constructing emergency repairs to the adjacent East Shore Arm breakwater.

The contractor, RC&D, Inc., remobilized to the site in October 2016 and completed the work in June 2017.

In his remarks, Conde said the shoreline revetment work involved hauling in the needed stone materials, excavating and placing a stone revetment made up of seven layers of different sized rock designed to protect the shoreline from wave action.

"We also performed some parking lot improvements and reset existing boulders currently at the site," he said. "Repairs to the breakwater required the hauling in and placing new armor stone (up to 15 tons per stone) to replace stones displaced during

Hurricane Sandy. We also filled in existing gaps and low points along the breakwater."

The repairs restored the breakwater to the original profile and cross-section. Repairs required substantial moving and manipulation of both new and existing stones to achieve both the required interlocking between stones and design grades.

"Camp Cronin is an iconic and cherished place – one of Rhode Island's gems," said Janet Coit, director, DEM. "We're so proud to have worked with our congressional delegation, the Army Corps of Engineers and other partners to preserve it for the public's enjoyment."

Conde praised the district's partners in the success of the Camp Cronin Restoration.

"This project would not have been possible without the combined efforts of all the partners involved, especially the Rhode Island DEM and our congressional support," he said. "I thank you for your support and dedication."





*Soldiers from the 62nd ESB, 11th TTSB, recycle unserviceable military equipment, which will generate revenues for the installation's recycle program.*

## Fort Hood makes Texas-sized environmental impact

**Story & photo by Rita Hess**  
U.S. Army Environmental Command

Located on 218,823 acres in south-central Texas, Fort Hood is home to more than 36,046 active and 22,000 Reserve Soldiers, and boasts an annual economic impact of \$35.4 billion.

Units stationed there include III Corps Headquarters, 1st Cavalry Division, 1st Armored Division West, the 13th Sustainment Command (Expeditionary) and a multitude of other brigades and tenant organizations.

Notably, its impact to the environment is huge. Yet despite the challenges, the installation has earned a 2017 Secretary of the Army Award for Environmental Quality for a non-industrial installation.

"Fort Hood is leading the way in environmental quality," Brian Dosa, director of Public Works, said. "Personnel work tirelessly with internal and external stakeholders on projects from beginning to end, ensuring inclusion of environmental considerations for virtually every project."

One example of Fort Hood's success is its Net Zero Waste goal – eliminating landfill waste by 2020. Aiding this effort, its dining facilities and commissaries donated or composted millions of pounds of food during the past two years.

The overall recycling program is among the best, collecting more than 10 million pounds of saleable recyclable materials from the installation and keeping it out of landfills. Recent renovations to its recycling center nearly doubled processing capacity

– from 1.4 million to 3 million pounds a month.

Fort Hood recycling generated gross revenues of \$1.699 million in fiscal 2017 by selling recyclable materials. Proceeds helped sponsor family and Soldier events and activities.

Other milestones include achieving an approximately 55-percent reduction in average annual water use and finishing a solar photovoltaic array and wind power generation project. The 63,000 solar panels and 21 wind turbines, which represent the Army's first hybrid renewable energy project, will provide more than 40 percent of the installation's annual energy usage.

A fiscal 2017 "surge event" collected more than 1 million pounds of excess equipment. Fort Hood Recycle is working with other military installations to replicate this successful recycling event.

Another program allowed personnel and family members to drop off household hazardous waste for reuse, recycling or disposal.

In 2017 alone, this effort collected 5,080 pounds of household hazardous waste, of which 1,445 pounds were recycled and 1,400 pounds were reused.

A successful pollution prevention initiative is an on-post area called the Environmental Corner that includes a mobile kitchen trailer, containerized kitchen wash bay and tanker purge facility. During 2016 and 2017, the wash bay saved more than a million gallons of polluted water from entering the sanitary sewer, and the tanker purge facility avoided

discharge of more than 2 million gallons of contaminated water.

Each contributor to Fort Hood's environmental efforts brings uniquely relevant strengths. The Environmental Compliance Assessment Team, for example, conducts assessments and training that helps Soldiers, civilians and contractors understand how the installation's environmental policies and regulations apply to them.

The Carl R. Darnall Army Medical Center does its share too.

The medical center implemented a significant number of programs to lessen its environmental impact, such as reducing plastics in the operating room (e.g., skin prep solution bottles, trays, urinals) and reprocessing medical devices, and subsequently saved several hundred thousand dollars in waste disposal costs.

Throughout the year, Fort Hood staff communicates with employees, stakeholders, and external communities via social media, electronic newsletters, the post newspaper, briefings, and school and community events. Such efforts announce environmental programs, services, accomplishments and special events.

In addition to the Secretary of the Army award, the U.S. Forest Service recognized the installation for the 12th consecutive year. The U.S. Fish and Wildlife Service recognized Fort Hood for balancing training and conservation, specifically efforts to improve conditions for two endangered songbirds, the golden-cheeked warbler and the black-capped vireo.

# Camp Ravenna burning grounds repurposed for training ranges

**Story & photo by Katie Newton**

*USACE, Louisville District*

The Ravenna Army Ammunition Plant Environmental Restoration Team has earned high honors from the Secretary of the Army for cleanup efforts at Camp Ravenna in Ohio, allowing for construction of two critical National Guard training ranges.

The environmental restoration team, composed of the Ohio Army National Guard, Army National Guard and the U.S. Army Corps of Engineers, has the critical mission of investigating and remediating more than 80 contamination sites across the installation.

According to Craig Coombs, project manager, USACE Louisville District, the team worked with the Ohio Environmental Protection Agency to resolve a long-standing cleanup obstacle and to create two critical training resources on the installation.

The team targeted a key cleanup challenge at the 200-acre Winklepeck Burning Grounds, a former open-burning area used for munitions disposal from the 1940s to the 1990s. There, bulk explosives, munitions debris and ash were left onsite, and restrictions hindered the construction and functionality of new ranges.

The more-than-21,000-acre Camp Ravenna Joint Military Training Center in northeast Ohio is the primary training

resource for its Army National Guard, but its historical contamination issues necessitated an environmental cleanup before military training operations could expand.

The original Base Closure and Realignment Commission, or BRAC, cleanup action placed digging and use restrictions on the site, restricted future development of the site, and required quarterly monitoring of the 30-mile perimeter fence around the installation.

In order to repurpose the Winklepeck Burning Grounds into two functioning training ranges – one for grenade training and another for a multi-purpose machine gun range – the environmental restoration team had to come up with a comprehensive site solution.

“As a team, we had to come up with a result that would lift the existing restrictions on the MK-19 grenade range and allow for construction of the newly proposed Multi-Purpose Machine Gun range,” Coombs said. “We had to do additional investigations and remediation that would achieve that less restrictive end use.”

Part of that process involved negotiating risk assessment parameters with the Ohio EPA to allow for a more flexible reuse of the site.

Ultimately, the Ohio EPA agreed to a Commercial/Industrial designation for the site, meaning only one Land Use Control

pertaining to soil contamination would remain: non-residential use only. Due to the potential presence of munitions-related items, explosives safety restrictions would also remain in place.

“This was essential to proceeding with the additional cleanup action for Winklepeck Burning Grounds and the construction of the Multi-Purpose Machine Gun Range,” said Coombs. “The process of working through this has helped our team improve our relationship with the Ohio EPA in order to complete other remedial actions at the facility.”

Soils contaminated with explosives and polyaromatic hydrocarbons were removed in 2017. The removal included excavation and disposal of 5,250 cubic yards of soil, demolition of 26 munitions, recycling of 700 pounds of scrap metal and site restoration with native grasses.

The machine gun range will be constructed in fiscal 2019; and, with the remedial action complete, crews will have full ability to build and configure the range as designed.

“The new training range will benefit all training Soldiers in the coming decades, and reaffirms the compatibility of training with environmental stewardship,” Coombs said. “We are happy to have played a part and are honored to have received the Secretary of the Army Environmental Award for the project.”



*An up-armored excavator moves sifted soils for final munitions clearance prior to shipment for off-site disposal during the latest remedial action at Winklepeck Burning Grounds. The grounds are located at the former Ravenna Army Ammunition Plant in Ohio.*



# Microgrids power Puerto Rico's hardest hit areas

**Story & photo by Gerald Rogers**  
*USACE, Los Angeles District*

**SAN JUAN, Puerto Rico** — In a continuing mission to restore critical electrical power to Puerto Rico, Task Force Power Restoration, U.S. Army Corps of Engineers, is harnessing microgrid technology to power areas hardest hit by Hurricane Maria.

Capt. Aaron Anderson, TF Power Restoration, is the operations officer leading the effort, alongside the Federal Emergency Management Agency, USACE Recovery Field Office's temporary emergency power mission and the Puerto Rico Electric Power Authority.

"A microgrid can take many forms," Anderson explained. "We are taking one or more 1,850 kilowatt generators, the huge ones you find powering hospitals and big box stores, and with the use of transformers, set up at a site."

He explained that these generators hook up directly into the PREPA infrastructure through a substation or directly into the main grid and push power to a variety of facilities on lines that haven't been damaged and that can accept it.

To date, Anderson's team has set up microgrids in five locations, starting with Culebra Island. The next four were placed in the Southeast, which was ground zero, sustaining tremendous damage when Hurricane Maria made landfall. Those microgrids are operating in Patillas, Maunabo, Naguabo and Yabucoa.

"We are now looking more into the central portions of the island and potentially for some of those mountain villages," said Anderson.

The team assesses those areas that aren't going to see power immediately.

Once these assessments are completed and the team identifies what types of facilities are on that system, "we then go out and install these semi-trailer-sized generators," Anderson said. This helps us do multiple things: get power quickly and more efficiently to a lot of homes, businesses and critical facilities, but it also allows us to look at those facilities down range that already employ smaller generators.

"We can get those generators back and put them where needed," he said. "With two large generators on a microgrid configuration, I may be able to get back 8, 9 or 10 smaller ones for use elsewhere."

This mission may not have taken root, if not for an administrative oversight.

Originally slated to be a battle captain for South Atlantic Division (Forward), Anderson, a civil works project manager with the Portland District, arrived a week after Thanksgiving, on Nov. 28, 2017.

"Someone had arrived and taken that position three hours before me," he said. "So I was technically excess."

A 2008 West Point graduate, the new arrival boasted two master's, one for Engineering Management from Missouri

University of Science and Technology, and another in Civil Engineering from the University of Michigan.

His academic, project management, overseas field operations experience and versatility, including a tour in Afghanistan as a forward operating base mayor, drew the commander's interests.

The Task Force Commander, Col. John P. Lloyd, was ecstatic and did not hesitate to recruit Anderson as his operations officer.

"During our first sit-down, he looked at me and said, 'Hey, we've been talking about this microgrid effort; go do microgrids,'" Anderson said.

As fortune would have it, at a meeting later that afternoon, he and the commander were introduced to several FEMA representatives familiar with microgrids.

"We performed a mind meld and the mission took off like wildfire," Anderson said.

It wasn't long before the team realized that as the power grid restoration was ramping up, there were some gaps.

Though the team had installed smaller generators at several critical facilities, we knew there were some areas of the island that weren't going to see power restoration for quite some time, he said.

"Throughout this mission, PREPA has been a great partner. They're 110 percent behind this initiative," Anderson said. "It's their system. We put the microgrid in place, install the transformers and when we go from our system into theirs, PREPA performs those connections. So they are fully on board."

According to the operations officer, generator placement determinations are decided by FEMA.

"FEMA is the final authority. So when we meet with the local government, we get our rights of entry and other required legal documents," Anderson said. "FEMA then helps us prioritize each system and identify where it should go next."

It's hard to determine the exact amount of people who have their power restored through microgrids, he said. Microgrids take time to develop because PREPA does a lot of switching, and they have to find the faults in the system.

Looking at the population of the five towns where we've installed the microgrids, we are serving about 95,000 citizens, said Anderson. "That doesn't mean 95,000 people necessarily have power, but that their town has power. The aim is that the grocery store has power and that its town emergency center can now issue them assistance."

Now that the team has more systems on the ground, they are getting more recommendations for future systems.

"At first, it was an unknown capability; people didn't realize we could bring it to Puerto Rico," Anderson said. Once we began putting in systems, word got out and a lot more mayors started requesting support.

He adds that the team scrutinizes each request.

The team must ensure that the right systems are in place to meet the needs, Anderson said. It draws upon

knowledge from the folks on the ground, FEMA's liaison officers and their ties to the local community. They talk to mayors and find out where are the best places to put these systems.

"We want to find the towns that have the greatest need. Who's going to be without power the longest. Who needs critical facilities brought back online," Anderson said. "From there, we bring those recommendations to PREPA who then comes back with theirs. We look at all of them and decide what the priority order will be as a group. From there, we go out and conduct assessments."

An assessment doesn't mean the team is going to install a microgrid system. Instead, an assessment determines whether it's still a viable candidate. It's bounced off the main grid restoration master plan to see when power is due to come up in that location. If it meets all of the team's criteria, then they move forward.

"If it doesn't fit our criteria, maybe we can refer the candidate to non-governmental organizations or private industry groups that may have alternate solutions, such as smaller generators, solar or wind," said Anderson. "The microgrid systems we install are very costly and in limited supply."

"Microgrids are a great tool to help us service areas where main grid restoration is not projected to be complete in the near term," said Lloyd. "Microgrids allow us to proof a distribution system in an area prior to main grid restoration so that when grid power is restored, there is less time spent having to diagnose the lines. The system is very versatile and may be a future capability that can be used when the storms target the region."

Chief Warrant Officer 5 Thomas Black, U.S. Army Pacific Command, Hawaii, provides subject matter expertise in the planning, installation and management of the microgrid operations on the island.

Here since Dec. 9, 2017, the 37-year Army veteran wishes we had started earlier because this temporary power initiative is paying huge dividends.

"Not having power at your house does not stop it from being your home. But, when you lose power in a town, the town starts to fade, and if it goes on for too long it may never go back to what it was," said Black. Bringing power to these towns gives them a chance to rebuild before they lose even more.

Though Anderson has since returned home, he shared some thoughts about this mission.

"Departing is always bittersweet," he said. "You've made an investment into this mission, but you're so excited to see family, to reconnect and to get back to life back home. I've been blessed with the opportunity to turn lights on and help people; especially citizens who haven't had power for 90, maybe 100 days and longer. That's something that lasts a lifetime; something you never, ever forget."



*Col. John P. Lloyd (center), commander, USACE Task Force Power Restoration, and Capt. Aaron Anderson (right), operations officer, converse with a local resident to discuss how the microgrid will provide much-needed electricity to the Maunabo, Puerto Rico, community.*



# Engineers slated to receive rapid data collecting tool kits

By Sean Kimmons  
Army News Service

**FORT BELVOIR, Virginia** – Digital surveying gear that recently proved valuable during hurricane recovery operations in Puerto Rico will soon make its way into the hands of civilians at the Army Corps of Engineers.

The reconnaissance and surveying equipment instrument set, commonly referred to as ENFIRE, is a digital tool set that replaces older analog survey and military field sketching kits.

ENFIRE tools allow users to better manage construction projects, facilities and inventory, plus they can assist with obstacle planning, surveying, reconnaissance and other field tasks for combat engineers.

Because many of the ENFIRE tools are actually commercial off-the-shelf products, the kits can be easily modernized and upgraded over time.

"Each district will have one of these kits so they can address [an operation], whether it's humanitarian aid or a natural disaster," said George Ohanian, a product director at the Army Engineer Research and Development Center who helped develop the kits.

The kits come with an array of portable equipment, including laser range finders with a reach of nearly 4 miles, a defense advanced GPS receiver, cameras, a throat mic, and a ruggedized portable computing device and printer, among other gear.

Roughly 1,600 of a total 2,800 kits have already been fielded in the Army, which are mainly used by brigade engineer battalions. The Marine Corps also uses them for route reconnaissance in combat, while the Federal Emergency Management Agency and other government entities have pushed them out to disaster areas.

By the end of this fiscal year, USACE

expects to field the kits to 42 districts to help civilian engineers share findings with others during operations.

"What we've tried to really do is not only be better stewards of the resources we get, but also build a tool [set] that integrates

included in the kits. The IMU box captures information on a vehicle's movement as it drives down a road. Those measurements determine the conditions of the road that can then be layered on top of a map.

Cameras mounted on a vehicle also

provide video of a specific road that engineers can share.

"It's kind of like Google [street view], but it's a little cruder," he said. "But, in essence, you've captured information about the route. You can go back and replay it."

In underwater operations, components of the kit have also proved useful. During hydrosurveys, for instance, Army divers have taken an ENFIRE



*Pictured are the main components of the reconnaissance and surveying equipment instrument set, commonly referred to as ENFIRE. (Courtesy graphic)*

across our user community so they don't have to go buy another box or buy another piece of software to figure out how to solve different problems," Ohanian said.

Each kit costs about \$40,000 or more, depending on the commercial software that is required, he added.

Ohanian believes civilian engineers, who are likely to use the kits differently than uniformed personnel, will be able provide valuable insight on how to enhance the kits over time.

"We think they will actually help us improve the overall capabilities that we're going to deliver to the warfighter because they'll experience different challenges," Ohanian said.

Once new software is released, it is sent out to kit users who can then download it from CDs to ensure computers are up to date. Computer hardware also has a five-year refresh cycle and is under warranty.

"So if these things break, even if a unit runs over and crushes it ... they'll replace it," he said.

Small black boxes that measure inertial measurement units, or IMU, are also

laptop with them inside a zodiac boat to view integrated data collected from sonar and GPS-Survey equipment.

This has helped with the position location of divers while out on the water during missions such as underwater recon, demolition or salvage.

"Those data sets created by the GPS-S can be processed in near-real time," said Cory Baron, the government technical lead for the ENFIRE program. "Those products will be captured on the ENFIRE laptop, where analysis and visualization can occur in the field."

Corps officials continue to seek new gear in the science and technology community that could benefit engineering operations and advance future versions of the kit.

"We go around and look at various S&T efforts to harvest [and] add to this box," Ohanian said. "It's worked out really well and we get to take advantage of [research and development] investments that increase [return on investment] for ENFIRE and our end users. We've done a lot of technology transition and we're looking at a lot more in the future."



# Historic site cleanup transforms once abandoned New England mine

**Story & photo by Ann Marie R. Harvie**  
*USACE, New England District*

The Elizabeth Mine in South Strafford, Vermont, has transformed from a detriment to aquatic life to an award-winning environmental project much to the credit of the New England District and its contractors who continue to improve the site.

The district awarded a \$25 million Indefinite Delivery Indefinite Quantity contract to Nobis Engineering, Inc. Dec. 19, 2017, for that purpose.

This Concord, New Hampshire-based small-business firm had previously installed the tailing pile cap in 2011 and 2012 and performed wetland mitigation in 2013.

Funded by the Environmental Protection Agency, efforts under the new IDIQ will include cleanup in the Lord Brook Source Area, including an open-pit lake closure, closure of mine entrances, and long-term passive treatment of any remaining contaminated discharge.

Elizabeth Mine is one of the largest and most intact historic mining sites in New England.

“The Elizabeth Mine Superfund Site is located in Strafford, Vermont,” said Stephen Dunbar, project manager. “It’s an abandoned copper and iron-sulfate mine that operated from 1806 until 1958.

“The operations started as open-cut type mining with underground mining starting in 1886,” he said. “Between 1830 and 1930, about 250,000 tons of ore were mined, from which about 10.5 million pounds of copper were produced. From 1943 to 1958, 3 million tons of ore were mined, producing more than 90 million pounds of copper.”

By February 1958, mining operations there ceased and the mine was closed and abandoned without any measures to restrict access or to prevent run-off from entering the mine.

In addition, there were 40 acres of exposed tailing piles which were still producing acid mine drainage, Dunbar added. “The acid run-off was causing water quality problems at Copperas Brook and downstream in the west branch of the Ompompanoosuc River.”

In 1999, the EPA approached the New England District for assistance, beginning a long and massive cleanup effort.

“Starting in 2005, EPA Region 1 retained the New England District to design and clean up the Superfund site,” said Dunbar.

“The New England District project delivery team initially focused their efforts on constructing surface water and groundwater diversion structures, stabilizing the steep slopes of the tailing piles, and capturing and treating the contaminated discharge,” he said.

Nobis completed building demolition/abatement compliant with historic preservation requirements, re-graded the 43-acre site, constructed an engineered cap over 3 million cubic yards of waste, and treated millions of gallons of acid rock drainage and iron-impacted water.

Green remediation strategies implemented during construction received the Chief of Engineer’s Green Dream Team Award in 2014.

The 43-acre cap has been re-utilized by a private firm for a solar array providing enough electricity for about 1,200 homes annually.

Work on the Lord Brook Source Area has already begun and will continue through the 2019 construction season.



*A solar array now sits on what once was an open-cut copper and iron-sulfate mine. Much to the credit of USACE, New England District, the historic Elizabeth Mine has been transformed from detriment to an environmental award-winning project.*





### Storm damage reduction project underway

## Nantasket Beach fortification to stabilize seawall

**Story & photo by Ann Marie R. Harvie**  
USACE, New England District

A seawall at Nantasket Beach will have its center section fortified as part of the Nantasket Beach Hurricane and Storm Damage Reduction project in Hull, Massachusetts.

George R. Cairns & Sons, Inc., of Windham, New Hampshire, will do the work under a \$2,696,200 contract.

"The project consists of installing an approximately 2,200-linear-foot stone toe revetment along the seawall at Nantasket Beach Reservation on Hull Shore Drive," said Michael Riccio, project manager.

The Nantasket Beach seawall was built in 1915 and is owned and maintained by the Massachusetts Department of Conservation and Recreation.

Although the seawall has been relatively stable and well-maintained since its construction, undermining of the seawall footing caused by long-term erosion over the last 25 years has resulted in several partial failures along the northern and southern sections.

Damaged sections have since been rebuilt and shored up by the DCR through emergency actions but the remaining 2,200 feet of undamaged seawall has remained unprotected and is still vulnerable to erosion and future undermining. This project will shore up the remaining 2,200 linear feet, resulting in stabilization along the entire length of the Nantasket Beach seawall.

The New England District and the DCR executed a Project Partnership Agreement in April 2016 for the final

design and construction of the project.

According to Riccio, work on the revetment will include shoreline excavation of about 27,000 cubic yards of beach material and placement of approximately 4,000 square yards of geotextile fabric; 1,600 cubic yards of ground and crushed stone; 4,000 cubic yards of 350-pound stone; 10,000 cubic yards of 2-3 ton armor stone; 30, 6-foot-by 3-foot-by-2-foot granite slabs; and backfilling of the revetment with excavated beach material.

The Massachusetts Department of Conservation and Recreation manages the beach and is the project sponsor. Construction has already begun and is expected to be completed by the end of May.



# Dredging project ensures clear navigation

**Story & photo by Craig Martin**

*USACE, New England District*

As one of the predominant small harbors at the mouth of the Connecticut River in the early 1900s, the North Cove Federal Navigation Project in Old Saybrook, Connecticut, has seen its use slowly change.

Once just a harbor of refuge for light commercial vessels, today it hosts a fleet almost entirely comprised of small- to medium-sized recreational vessels used mainly from the spring through fall months.

The project has been maintained since it was authorized with the most recent dredging in 2008. At that time, 175,000 cubic yards of sediment were removed. Due to funding constraints, however, the authorized dimensions of the project were not obtained.

The current cycle of maintenance was initiated by the town of Old Saybrook

when availability of the project began to be impacted during low tide.

Dredging areas include the 11-foot-deep entrance channel, 11-foot-deep anchorage and 6-foot-deep anchorage. DonJon Marine Company, Inc., of Hillside, New Jersey, is performing the work under a \$4.28 million contract awarded Sept. 20, 2017.

The company began dredging activities on Nov. 14, 2017, and has removed about 230,000 cubic yards of material from the project so far.

Approximately 286,000 cubic yards of predominantly silty sediment will be removed by mechanical dredge and an estimated 56,000 cubic yards of material will be dredged from the 6-foot anchorage area.

With the extensive number of shallow-draft projects nationwide competing for limited federal funding, the dredging project was made possible through the financial support of the state of Connecticut and the Port Authority.

The state bonded \$7.5 million in 2015 for permitting, design and construction of the maintenance dredging project, ensuring that it moved forward.

Unique for the district, the project employs a second trans-loading dredge to transfer shoal material from small hopper scows used to access shallow portions of the project to large-capacity dump scows.

After the trans-loading process is complete the large dump scows are hauled to the Central Long Island Sound Disposal Site, about 35 miles away from the project, and placed at predesignated coordinates.

Additionally, the project will deploy a turbidity curtain during the latter stages of the project to allow dredging to continue through time-of-year restrictions to protect sensitive species.

Despite equipment breakdowns, harsh wintry weather and several inches of ice, the contractor expects to complete the project this dredging season.



*A dredge excavates material from the North Cove Federal Navigation project in Old Saybrook, Connecticut.*





*New facilities, such as this 48-person dormitory at Thule Air Force Base, Greenland, will provide airmen stationed there relief and comfort from the extreme weather conditions. (USACE courtesy photo)*

### Installation receives much-needed update

## District modernizes base to endure Arctic climate

**By JoAnne Castagna**

*USACE, New York District*

Recent missile threats to the nation have the U.S. military looking up to its northern most installation, Thule Air Base, Greenland.

It's there that the Air Force monitors the skies against such threats from its arctic location strategically positioned at the halfway point between the U.S. Capital and Moscow.

"Thule's unique location makes it a key asset to the United States, however its unique environment makes it a difficult asset to maintain," said Dan Rodriguez, acting deputy base civil engineer, Peterson Air Force Base.

To address these concerns, the U.S. Army Corps of Engineers, New York District, is executing a major base consolidation that will save energy, taxpayer money, and most importantly, improve Air Force readiness.

Located in the northwestern corner of Greenland, Thule (pronounced "Two Lee") lies in a coastal valley 700 miles north of the Arctic Circle and 950 miles south of the North Pole.

For more than half a century, it's been home to active-duty airmen who live and work in this remote and harsh environment.

Despite extreme arctic weather conditions, USACE has consistently helped the base fulfill that mission by constructing many varied structures, including several dormitories, an aircraft runway, taxiways and aprons, and a medical facility. Now, it's

consolidating and modernizing the base.

In the early 1950s, the base served as an aircraft refueling stop and was home to 10,000 airmen spread throughout its many buildings.

During the Cold War-era, the base's mission changed and it now performs missile warning and space surveillance for the United States.

Today, the base houses 650 personnel, 200 of which are American military personnel and the rest are Danish and Greenlandic residents.

Though the original buildings are still in use, many are severely weatherworn and not very energy efficient. A good distance from the base's central heat plant, these buildings require long pipes to transport and maintain their heat.

The Air Force, as the rest of the U.S. military, has been on a mission to save energy. Because of this, they decided to call on USACE to consolidate the base.

"Much energy and money will be saved by not heating those archaic facilities," said Stella Marco, project manager, USACE New York District.

This consolidation will reduce the base footprint by 40 percent. To accomplish this, USACE is demolishing 31 old buildings and constructing new facilities in the central area of the base where essential services are located, including the airfield and hangars, dining facility, hospital and dormitories for noncommissioned officers visiting or on temporary duty at Thule.

Presently, USACE is working on five

such dormitory projects. This includes constructing flattop and high-rise dormitories and renovating 636 existing dorm rooms.

USACE is also constructing a base supply and civil engineering shop and a vehicle maintenance and pavements and grounds facility. Other possible projects include expanding the air passenger and air freight terminals.

The new and renovated buildings will be heated by an upgraded heating system. The installation's heating plant is receiving new, more energy-efficient exhaust gas heat recovery boilers and engines.

Consolidation is always good as a way to save energy and money, but it is even more important in the Arctic. "At such a remote and cold location, construction, maintenance and utility costs are very high," said Markus Tyboroski, site support engineer, Thule Air Base.

"For example, it costs three times as much to build a new facility at Thule as compared to an average location in the United States, and annual fuel costs for power and heating are \$12 million."

This consolidation, "will result in reduced base operation and maintenance costs and will provide energy savings," Rodriguez said. "It's estimated that there will be an energy reduction of 35 percent. Since 2009, when the consolidation was starting up, the base has saved almost \$37 million in energy savings and in base operating costs."

Ultimately, the consolidation effort will benefit the airmen protecting our nation.





# Focus on the environment

**Sustainable Rivers Project enhances plant, wildlife habitats dependent on downstream river flows**

By Lisa A. Parker  
USACE, Wilmington District

*(Photos by Hank Heusinkveld)*

*Kevin Dedad of the John H. Kerr Dam and Reservoir powerhouse helps navigate down a tributary of the Lower Roanoke River just east of the dam.*



**I**n 2002, the U.S. Army Corps of Engineers and The Nature Conservancy formed a partnership and established the Sustainable Rivers Project.

The SRP focuses on modifying water operations at USACE dams to enhance the habitat conditions for plants and animals who depend on downstream river flows.

SRP activities are occurring in numerous river basins throughout the nation, making it the largest coordinated effort of its kind in the world.

Currently, the Roanoke River is one of the basins focusing on defining environmental strategies as part of a water management plan. At SRP sites, scientists gather data on the river flows and work with water managers to modify dam and reservoir operations within existing water control policies and manuals for each reservoir.

During the National Sustainable Rivers Program meeting in Raleigh, North Carolina, last October, Wilmington District representatives, along with officials from The Nature Conservancy, U.S. Fish and Wildlife and other non-governmental organizations, discussed expansion, policy, budgets and the future of SRP. The goal was to learn from the successes and challenges experienced by others through project development and implementation.

Conference attendees discussed program expansion and what is required to reach the Environmental Advisory Board goal of 20 rivers by 2020. Main topics included developing a common repository of information, mentoring new project site staff, need for additional funding sources and reminders to ensure existing sites complete the incorporation cycle.

During a field trip to the Roanoke River, the group received examples of how altering the flows of dams such as John H. Kerr Dam and Reservoir can have benefits to the recovery of an ecosystem.

According to many attendees, dialogue with outside agencies is key to understanding and collaborating shared information.

When scientists, biologists, hunters or homeowners join together and add their input into finding factual and creative solutions to problems, they agreed, it's easier to pass along information that could help other rivers in the Sustainable River Program.



*In 2016, representatives from the U.S. Army Corps of Engineers and various state and federal agencies toured the Lower Roanoke River for an up-close look at the shoreline of the river.*



# Researchers develop, implement plan to resuscitate historic Dallas-area spring

By Holly Kuzmitski & Stacy Tennison  
Engineer Research and Development Center

**VICKSBURG, Mississippi** – South Dallas is home to one of the last remaining urban springs in the metro area. Big Spring and its ponds, grasslands and forest were likely inhabited 1,200 years ago by Native Americans, and eventually by the city's first European settlers.

"The spring's crystal-clear water serves as a year-round water supply and aquatic habitat for local wildlife," said Aaron Schad, a research biologist with the Lewisville Aquatic Ecosystem Research Facility located in Lewisville, Texas. "However, invasive plant species and lack of native plants have led to low biodiversity, erosion, sedimentation and eutrophication in some areas."

Since 2013, the LAERF, through a cooperative research and development agreement with the University of North Texas, has developed, implemented and supervised an adaptive management plan that strategically utilizes vegetation to combat the problems affecting the spring and its environment. LAERF is part of the U.S. Army Engineer Research and Development Center's Environmental Laboratory.

"The long-term goal is to protect the spring from urban and invasive species disturbances as well as to promote a diversity of habitat types to support a sustainable, healthy and preserved ecosystem so we can keep this historic landmark viable," Schad said.

"Our adaptive management approach means managing the vegetation in an experimental way; for example, when we planted 20 plant species the first time, we monitored them in the environment, and 10 thrived but 10 did not. The next year, we focused on those that worked well and monitored them again."

Schad said the approach also involves both invasive species management and native species establishment.

"Watercress is one aquatic invasive species that we are currently battling – we're continually managing it," he said.

LAERF works with volunteers to implement the adaptive management plan, advertising volunteer workdays locally.

Schad said the community volunteers are excited to take part in the workdays, which typically draw 50-100 people from the Dallas metro area.



*Personnel from the Lewisville Aquatic Ecosystem Research Facility and the University of North Texas, master naturalists and other interested stakeholders rescue native vegetation – primarily green milkweed – to be relocated to Big Spring Preserve near Dallas, Texas. (Photo by Aaron Schad)*

"We get a lot of volunteers from the Master Naturalist Program; that's the most prominent volunteer group, although we get other citizens, too," he said. "Master naturalists have some training with vegetation."

"The volunteers physically remove the invasives," Schad said. "In the case of annual and biennial invasives, such as hedge parsley and nodding thistle, respectively, if the removal of the flower is timed correctly, fewer plants will appear next year."

He explained that it's possible to use a mower to shred down the invasives, but then in some cases, the desirable native plants would be killed off as well.

Instead, LAERF operates according to the "many hands make light work" philosophy, mobilizing the enthusiasm of the local citizenry for preserving this natural and historical asset.

"The volunteers also promote the native species, such as woody plants, grasses and wildflowers by planting them," he said. The volunteers engage in both aquatic and terrestrial plantings, but their main focus is terrestrial plantings.

The spring is located on Big Spring Preserve, a 5-acre area that isn't currently accessible to the public. Big Spring sits

on a slope overlooking what is commonly known in Dallas as the Great Trinity Forest – bottomland hardwood forest or a forested area in a river floodplain. Great Trinity Forest is not federally protected.

"This spring is so unique; usually other aquatic ecosystems go through water temperature changes with the seasons and these changes coincide with the varying lifecycles of aquatic invertebrates and fish," Schad said. "This spring's water is thermally constant; the temperature of the spring's water is between 60-70 degrees Fahrenheit, so you might have unique lifecycle dynamics, because the environmental signal that tells insects when to emerge, for example, is different."

The spring has some historical significance.

According to local legend, Sam Houston, president of the Texas Republic, and his men camped at Big Spring in 1842 on their way to Grapevine Springs for peace talks with the chiefs of nine Indian tribes.

Close to the Big Spring Preserve is the Trinity River Audubon Center.

"Once our work is complete, we're hoping the City of Dallas and the Audubon Society will partner so students and others can have limited access to it," Schad said.





*Robert Nagy, environmental engineer with the 71st Forward Engineer Support Team-Advance, inspects the tracks for a 350-meter Mobile Armored Target in Zagan, Poland. (Photo by Ian Swisher)*

# Team supports European exercise

**By Kimberly Wintrich**  
USACE, Europe District

## W

hen the U.S. Army Europe deployed in August 2017 for Resolute Castle, a large annual training exercise, U.S. Army Corps of Engineers Forward Engineer Support Team-Advance deployed for six months as well.

USAREUR determined the projects it needed for the upcoming exercise and then called on the engineers to begin the design phase.

"We completed 35 different design projects based on USAREUR's needs during the exercise," said Maj. Terrence Harrington, commander, 71st FEST-A. Resolute Castle is an annual field training exercise in which stateside Reserve and national guard engineers execute various construction projects throughout Eastern Europe. "It's all part of the readiness exercise."

The FEST-A is just one of eight active duty teams that rotate in and out of theater on average every three years.

"It all depends on what is going on (in) the world," Harrington said.

As part of this rotation, the 542nd FEST-A from Savannah, Georgia, relieved the 553rd FEST-A out of New York.

Teams are here to help USAREUR accomplish its mission. The designs make it all the way through construction, though in most cases, teams don't get to see that happen, until now.

"One project, as we were putting the design together, the unit was actually constructing it," Harrington said. "We worked with the unit the entire time, so if they had questions we went back and answered them."

Often construction begins only after the team has left the theater.

"It was kind of neat that we got to run through the entire process. If there were any construction [requests for information], they got routed right back to us, and we were able to answer questions on the construction issues. We were able to solve problems but stay within the design plan," said Wayne Chmielewski, civil (structural) engineer.

He has served in Afghanistan and Germany for four tours total. He said he loves the experience.

"It's a much faster-paced environment, much more responsibility and you play a larger role in the projects when you're deployed," Chmielewski said. "You generally have to make due with less, which leads to some expanded opportunities."

Ninety-nine percent of the designs this deployment were new builds, to include a 350-meter moving armored target, tank turning pads, multipurpose facilities, overhead covers, and power distribution plans for the various ranges.

"I don't really have a favorite project on this deployment. They've all been pretty good," Chmielewski said. "We got to mix around a little [on several different projects] and deal with several challenges. There were a few other projects where we got to deal with the garrisons. They're all interesting and they all have their challenges."

A helicopter pad in Powidz, Poland, was unique and had the fastest turnaround for the team. This was because of a well-balanced team, which is very important especially on a small team, Harrington said.

The overall purpose of the teams is to assist the U.S. and coalition forces in getting facilities up to U.S. standards in order for troops to train.

"Everyone has a role, and we need everyone to do their part to support the team," said Harrington.



# Enhancing military training

**Bustling forestry program supports habitat, generates post revenue**

Story & photos by Rashida Banks  
USACE, Savannah District





**T**here's a saying that money doesn't grow on trees, but foresters at the U.S. Army Corps of Engineers Forestry Resources Office at Fort Stewart, Georgia, may beg to differ. They generate thousands of dollars every year from something that grows on trees: pine cones.

Next to timber, pine cones are one of the biggest generators of revenue on the installation, accounting for roughly \$80,000 last year, according to resident forester Josh O'Neal, who is responsible for managing the land, timber harvesting and forestry program at Fort Stewart.

The installation is heavily populated by longleaf pine trees, which are native to the southern United States. These trees are typically sought out by farmers for their pine cone seeds.

"The cones do not look like your typical pine cones used for holiday decorations," O'Neal said. "Instead they resemble a long green banana. The seeds are used to grow young long leaf pine trees, which are ultimately planted all throughout the Southeast United States and on Fort Stewart."

### Self-sustaining

Pine cones are not the only revenue generator. There's also pine straw, timber, pine stumps, palmetto berries, willow stakes and pine resin.

"When you think of a tree, you just think of wood products, but there's all these other resources they extract from a tree that can be used in products like cough syrup, bubble gum and medicines," he said. "I don't think people realize that we try to utilize and harvest almost every portion of the tree."

Combined, O'Neal said these resources generate more than \$3.5 million annually at Fort Stewart, which helps support the forestry program.

Corpswide, the Savannah District has the largest program in terms of staffing and revenue produced.

According to Ean Jones, supervisory district forester, in fiscal 2017, the district program generated \$7.2 million, which includes sales from Fort Stewart and the district's two other field offices at Fort Bragg, North Carolina, and at the J. Strom Thurmond Dam and Lake at the border of South Carolina and Georgia.

"The most responsible thing in a land manager's eyes is to make sure the land is productive," Jones said. "We try to manage our lands in a way that promotes forest health. Having our lands sit idle and allowing Mother Nature to manage

it on our behalf, for the most part, is counterproductive to the Army's needs."

The district hosts approximately 100 product sales throughout the course of an average year at forts Stewart, Jackson, Gordon, Benning and Bragg, and at civil works projects to include Thurmond Dam and the John H. Kerr Reservoir, where forestry products are widely advertised and sold competitively to the highest bidder.

In addition to routine sales, Jones said the district also hosts emergency sales due to pine beetle outbreaks, storm damage and to remove trees from construction sites that have severe time constraints.

"The revenue goes back into sustaining the program," O'Neal said. "We generate enough money to pay our salaries and improve the land, to build new roads, perform prescribed burns, etc."

Because the USACE's primary real estate mission at Fort Stewart and other installations and civil works projects is to support military training lands, O'Neal and his team strive to be good stewards of the land.

"When we harvest these products, our goal is not to cut down a bunch of trees to make money," O'Neal said. "We make money, but it's just a byproduct of what we do. We are really just managing the forest to meet the Army installation's training needs

and to help facilitate the betterment and restoration of any identified threatened and endangered species population located on the installation."

### Habitat management

The extensive piney woods acreage at Fort Stewart is also critical habitat for endangered species such as the red-cockaded woodpecker, a bird species that lives in cavities inside longleaf pines.

"It's unique, because the two can't survive without each other. That's why we keep replanting longleaf pines, so that in 50 or 60 years the area will have grown up so the woodpecker can continue to have viable habitat," he said. "Without foresters, the forest would decline and endangered species would be extinct, so we are trying to make sure they are around and thriving for generations to come."

"In addition to enhancing military training lands," O'Neal said, "most of the timber sales are for the purpose of restoring habitat to support the red cockaded woodpecker."

Money may not grow on trees, but when trees are managed to support military installations and endangered species, money is a happy byproduct that sustains responsible land stewardship.



*USACE, Savannah District harvested 7,500 bushels of pine cones at Fort Stewart, Georgia, in fiscal 2017, generating about \$80,000 in revenue.*



# Army recognizes environmental success

By U.S. Army Environmental Command

Each year the Army accepts nominations in nine categories and selects those installations and organizations who have excelled in program management, technical merit, supporting the military mission, transferring lessons learned and involving installation personnel, residents and local community in their environmental program.

The Secretary of the Army Environmental Awards Program winners recognized for their successes during fiscal years 2016-2017 are:

Hawaii Army National Guard - Natural Resources Conservation, Small Installation – for their efforts in reducing invasive species and returning land for Army use.

Pennsylvania Army National Guard Fort Indiantown Gap's Natural Resources Conservation Team - Natural Resources Conservation, Individual/Team – for endangered species and habitat protection, while protecting the Army's ability to train.

Fort Hood - Environmental Quality, Non-industrial Installation – for reducing waste, ensuring environmental compliance, implementing an effective environmental

management system, promoting community relations and streamlining environmental analyses.

Fort Hood's Qualified Recycle Program - Environmental Quality, Individual/Team – for improvements in their program that increased capacity, made recycling easier, increased community partnerships and enabled them to collect more than 25 million pounds of recyclables that generated more than \$2.5 million during the award period.

North Carolina Army National Guard - Sustainability, Industrial Installation – for green operations at their Field Maintenance Shop #1, including significant reductions in both hazardous and universal waste, the implementation and hosting of new environmental training, and material inventory innovations.

Utah Army National Guard Former Wood Hollow Training Area - Environmental Restoration, Installation – for pioneering an alternative detection methodology to assist in military munitions cleanup of the transferred former training area that enables future residential and commercial development.

Ohio Army National Guard Restoration Program Team - Environmental

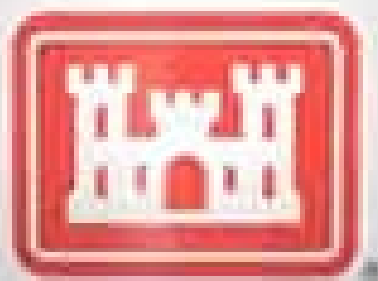
Restoration, Individual/Team – for the resolution of a long-standing cleanup program obstacle and creation of two critical training resources on an aggressive schedule.

Minnesota Army National Guard's Camp Ripley - Cultural Resources Management, Large Installation – for protecting more than 300 historic and prehistoric sites along the Mississippi and a frontier cavalry fort listed on the National Register of Historic Places, as well as other cultural resources, while minimizing the impact on Army training.

Program Executive Office for Aviation's Cargo Helicopter System Safety Environmental Working Group - Environmental Excellence in Weapons System Acquisition, Large Program – for eliminating hexavalent chromium, improving the rotor system to eliminate chromium plating, replacing ozone-depleting substances, and minimizing the use of other hazardous material on cargo helicopter aircraft and equipment.

These Army winners will compete against other military services in the Secretary of Defense competition. Department of Defense winners will be announced later this month.

## What is the U.S. Army Corps of Engineers?



What is the U.S. Army Corps of Engineers?



# Preserving, protecting the environment

## Projects secure resources for nation's future generations



### New Jersey Intracoastal Waterway Dredging & Marsh Restoration

*USACE, Philadelphia District reestablished navigation on the New Jersey Intracoastal Waterway and restored the northern side of Mordecai Island, a 45-acre uninhabited coastal salt marsh located west of Beach Haven, New Jersey.*

<http://themilitaryengineer.com/index.php/tme-articles/tme-magazine-online/item/539-engineering-with-nature-advancing-system-resilience-and-sustainable-development>



### Laredo Riverbend Section 206 Aquatic Ecosystem Restoration

*ERDC-EL Lewisville Aquatic Ecosystem Research Facility supports the USACE Fort Worth District with aquatic and riparian vegetation establishment efforts, biological monitoring and invasive species management strategies.*

<http://www.swf.usace.army.mil/Media/News-Releases/Article/885476/us-army-corps-of-engineers-city-of-laredo-break-ground-on-77-acre-project-wild/>



### Lower Colorado River Basin (Onion Creek), Flood Risk Management

*USACE, Fort Worth District along with the Lewisville Aquatic Ecosystem Research Facility, develops and cares for approximately 190 acres of riparian woodlands, including nuisance species mapping, vegetation community composition development and active establishment of native plants in suitable, non-biodiverse areas.*

<http://www.austintexas.gov/page/onion-creek-corps-project>



### Mill Creek Ecosystem Restoration

*USACE, Seattle District awarded an American Recovery and Reinvestment Act contract to fund the design phase of the Mill Creek Ecosystem Restoration Project. The goal of the \$469,049 project is to restore the stream to its natural channel, provide shading with new plantings and remove non-native invasive species.*

<http://www.nws.usace.army.mil/Missions/Civil-Works/Programs-and-Projects/Projects/Green-Duwamish-River-Ecosystem-Restoration/Mill-Creek/>



### Homer Park Section 206 Aquatic Ecosystem Restoration

*USACE, Chicago District provides riparian habitat to the Chicago River system through the Horner Park Section 206 Aquatic Ecosystem Restoration Project. This project benefits pollinating insects, migratory song birds, waterfowl, birds of prey, wading birds, largemouth bass and mink.*

<http://www.lrc.usace.army.mil/Missions/Civil-Works-Projects/Horner-Park/>

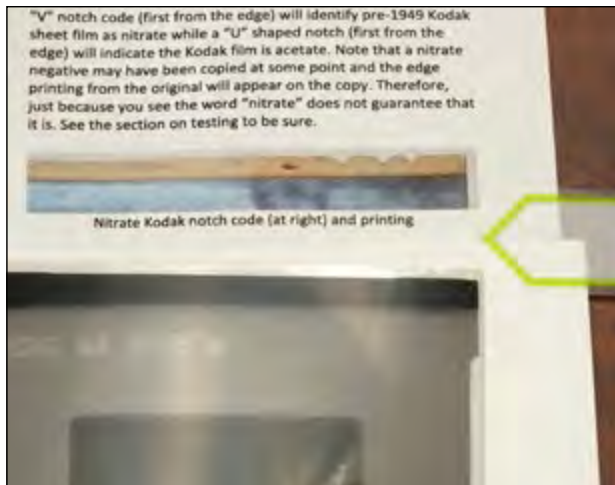


### Meridian Valley Creek Realignment

*The Meridian Valley Creek Realignment is the first project constructed under USACE, Seattle District's Green/Duwamish River Ecosystem Restoration Project. The project involves the restoration of wildlife habitats to benefit coho salmon, native trout and other species.*

<http://www.nws.usace.army.mil/Missions/Civil-Works/Programs-and-Projects/Projects/Green-Duwamish-River-Ecosystem-Restoration/Meridian-Valley-Creek/>





### Historical Research Materials Digitization and Preservation Project

*In 2017, the Engineer Research and Development Center was tasked to scan and then digitize toxic and highly flammable, nitrate film from the 1940s–1980s. This project not only made it a safer environment for the ERDC library staff, but also reduced the cost of completing current research by negating the need to repeat already completed research.*



### Lower Boulder Creek Section 206 Ecosystem Restoration Project

*USACE, Omaha District realigned a 1-mile section of Lower Boulder Creek to restore natural meanders, in-stream habitat and the creek's floodplain; and, planting native riparian, wetland and upland grasses, forbs, trees and shrubs along the stream and within the floodplain to greatly improve international migratory bird, wetland and aquatic stream habitat.*

<http://www.nwo.usace.army.mil/Media/News-Releases/Article/719766/tree-planting-ceremony-to-mark-end-of-ecosystem-restoration-project-construction/>



### Mud Mountain Dam Fish Passage Facility and Barrier Replacement

*This USACE, Seattle District project will rebuild the 103-year-old barrier dam and the 71-year-old fish trap to improve fish passage around Mud Mountain Dam. The new facility will allow for passage of up to 60,000 fish per day, mainly pink salmon and improve passage conditions for Endangered Species Act-listed chinook, steelhead and bulltrout species.*

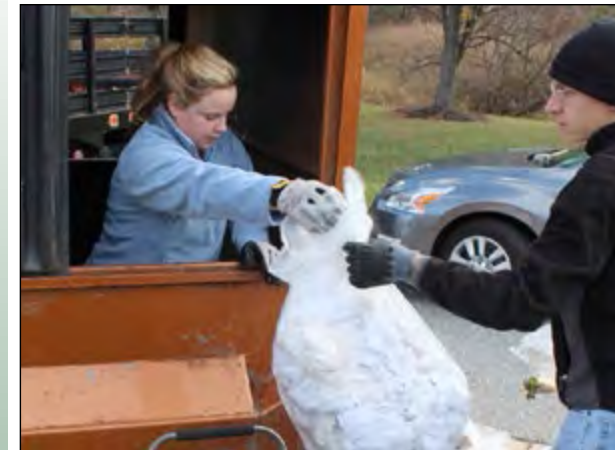
<http://www.nws.usace.army.mil/Missions/Civil-Works/Programs-and-Projects/Projects/Mud-Mountain-Dam-Fish-Passage/>



### Hamilton City Flood Damage Reduction & Ecosystem Restoration

*This USACE, Sacramento District project consists of removing an existing non-federal levee and constructing a new one to improve the level and reliability of flood risk management to the community, reconnect the river to the floodplain and restore 1,500 acres of native riparian habitat along the Sacramento River.*

<http://www.spk.usace.army.mil/Missions/Civil-Works/Hamilton-City/>



### Waste characterizations at Army installations

*The ERDC-CERL Waste Team focuses sustainability efforts on the development of Net Zero waste at its installations. A Net Zero waste installation reduces, reuses and recovers waste streams, converting them to resource values with zero landfill over the course of a year.*

*This project is essential to determining better courses of action for material diversion and improvement of installation recycling programs.*

[www.erdcc.usace.army.mil/Locations/CERL.aspx](http://www.erdcc.usace.army.mil/Locations/CERL.aspx)



### St. Louis District clears Coldwater Creek of contamination, protects community

*In 2014, the St. Louis District FUSRAP Program discovered MED/AEC contamination in two parks located in North County, Missouri. These parks are adjacent to Coldwater Creek and were contaminated as a result of the creek flooding. In 2015, USACE completed remediation of St. Cin Park. Again in 2017, USACE completed remedial activities at Duchesne Park.*

<http://www.mvs.usace.army.mil/Missions/Centers-of-Expertise/Formerly-Utilized-Sites-Remedial-Action-Program/>



### Kissimmee River Restoration Project

*This Everglades restoration project will return flow to 44 miles of the historic river channel and will restore approximately 40 square miles of river/floodplain ecosystem. Seasonal rains and flows now inundate the floodplain in the restored area and monitoring has documented increases in dissolved oxygen levels essential for aquatic life, recovery of wetlands and increased populations of waterfowl, wading birds, and bass and other sunfishes.*

<http://www.saj.usace.army.mil/Missions/Environmental/Ecosystem-Restoration/Kissimmee-River-Restoration/>



### Whooping Crane initiative and national memorandum of understanding

*USACE operates and maintains 101 water resources development projects within the migration range of the Aransas - Wood Buffalo population of whooping cranes. Our partner Friends of the Wild Whoopers will provide projects with habitat assessments and reports documenting available habitat and potential habitat improvement projects.*

<http://friendsofthewildwhoopers.org/>



# Maintenance shop lauded for proactive sustainment, recycling efforts

**Story & photo by Rita Hess**

*U.S. Army Environmental Command*

The Field Maintenance Shop #1 in Asheville, North Carolina, is a critical component of the state's military mission. It supports seven locations in six counties and maintains more than 900 pieces of equipment that are integral to its National Guard training.

Located adjacent to the French Broad River, shop personnel maintain strict compliance with local and federal regulations to prevent spills or contamination of groundwater, including passing annual inspections by Buncombe County to ensure no discharges occur that would contaminate water supplies due to stormwater run-off.

These restrictions also extend to controlling noise pollution inherent to maintenance operations.

Through a proactive philosophy of environmental protection, the maintenance facility earned the 2017 Secretary of Defense Environmental Award for Sustainability, and exceeded the Guard's objectives for reductions in water and increases in recyclables over the last two years.

Since the facility opened in 2008, it has consistently met or exceeded Army-established goals, including current and anticipated regulatory mandates. In fact, the shop has consistently set an environmental standard for other facilities to emulate and has been recognized with numerous Army National Guard environmental awards in fiscal years 2009, 2010 and 2011.

"Despite changing regulations, manning shortages and fiscal challenges, FMS #1 exceeded environmental expectations, continuing vital support of National Guard training and readiness mission," said 1st Sgt. Todd Lingerfelt, shop supervisor. "This shop remains an environmental leader based on its dedication to sustainability, pollution prevention and environmental training."

The maintenance facility is manned with a staff of nine people, three of which oversee day-to-day compliance and quality issues. They coordinate with supported guard units for equipment rehabilitation, hazardous and non-regulated material management and disposal, and training. They also serve as dedicated liaisons to



*Petroleum, oil and lubricant products and drain pan contents are collected, segregated and stored in appropriate containers each day. Empty containers are cleaned and collected as scrap. Used vehicle seal parts are cleaned in a parts washer and stored in leak-proof designed containers until collected with other scrap metal.*

the guard's Environmental Office and command staff. The sustainability aspects of FMS #1 begin outside the building with a landscape of native plants and grass that control weeds, prevent soil erosion and help protect native aquatic life in the river nearby.

To help accomplish this feat, the shop utilizes spill control systems, such as 55-gallon petroleum drums equipped with secondary containers that prevent fluid leakage should the primary container fail as a result of rupture or breakage.

Partnering with Duke Power Company, the shop replaced outdated light fixtures with cost-effective LED lights and slashed their operation costs nearly in half.

Indeed, energy-efficient features for new construction, renovation and retrofitting throughout the state have been approved based on this shop's success.

FMS #1 recycles oil, rubber, plastic, metal, paper, cardboard, antifreeze, batteries and wood pallets, diverting from landfills more than 15 tons, or 39,173 pounds of this material each year.

Add to that the more than 675 gallons of coolant and 10,000 pounds of lead-acid batteries collected, this facility

helps sustain itself by investing some recycling revenues into operational and environmental equipment.

These recycling efforts save money by significantly reducing waste stream and chemical inventory disposal costs.

In addition, shop personnel use a self-contained, water-based brake cleaner machine that reduces their exposure to harmful brake dust.

The search for and use of new technologies like these saves the state time, resources and money that are redirected into other Guard areas, while making the shop safer and easier for its staff.

Beyond its boundaries, the FMS staff fosters environmental awareness by communicating and coordinating with North Carolina environmental agencies and hosting visits for county emergency management officials, city fire marshals and regional environmental coordinators.

This outreach not only supports the military mission, but also upholds the National Guard's reputation for environmental protection and enhancement.





*All bundled up and ready for adventure, these animal trekkers prepare to head out in search of animal tracks.*

# West Hill rangers host animal trek

**By Ann Marie R. Harvie**  
USACE, New England District

Several families, scouts from Douglas, Massachusetts, advanced junior rangers and volunteers joined the West Hill Dam team for an animal trek held at the project site in Uxbridge, Massachusetts, Jan. 14.

The Animal Trek is one of West Hill Dam's many interpretive programs the team sponsors throughout the year.

Participants young and old grabbed their rulers and footprint charts and headed out with park rangers for a family-friendly hike to find animal tracks.

"We located deer and dog tracks mostly," said Viola Bramel, park ranger. "There were no birds near the open water on the West

River. We found several scat piles (animal excrement) on our track."

Interestingly enough, there was a young girl who brought her field journal with her and kept notes for the group.

"Natalie recorded the weather with symbols she drew in her journal," said Bramel. "For example, she drew a sun to signify it was sunny out."

As they walked, the park rangers discussed the importance of ice safety.

"It was eye-opening when some of the kids jumped on an ice-covered puddle to measure the ice," the park ranger said. "They measured the thickness, which was only half an inch."

The park rangers warned the trek participants that ice had to be at least four inches thick for a person to walk on it safely.

"They took out their rulers and visualized the safe measurements for ice," said Bramel.

Continuing with the ice theme and as trekkers took measurements of the animal tracks they found, park ranger Mark Larson discussed the weekend operations at the Woonsocket and West Hill dams. There were reported incidents of ice jams and other related weather condition hazards.

Andy LeBonte, a park ranger now working in Human Resources, and USACE volunteer Linda Martin assisted with the event.

West Hill Dam has recreational opportunities and free family friendly events year-round.

For a copy of the 2018 special events calendar, please go to [http://www.nae.usace.army.mil/Portals/74/docs/Recreation/WHD/West\\_Hill\\_Dam\\_Events\\_2018.pdf](http://www.nae.usace.army.mil/Portals/74/docs/Recreation/WHD/West_Hill_Dam_Events_2018.pdf).





*Nesting brown pelicans prefer grassy, wooded areas on former Wilmington District dredge material placement islands to rear their young.*



*Fledging brown pelicans and a brown pelican chick await the return of their mother who is foraging for food in the Cape Fear River. It's not uncommon for eggs to hatch at different times.*

Photographers capture some of the various wildlife and plant species rescued and protected by the U.S. Army Corps of Engineers.  
(Photos by Hank Heusinkveld & Brian Stewart)



*A green heron searches for food along the Philpott Reservoir shores near Bassett, Virginia.  
(Photo by Brian Stewart)*

# NATURE!



*This stream in the mountains of western North Carolina is prime habitat for brown trout. Wilmington District regulatory project managers ensure that the stream is a consistent cool temperature that the trout prefer.*



*A loggerhead sea turtle nests and lays her eggs on a North Carolina beach. Wilmington District project managers must follow strict environmental guidelines during Coastal Storm Risk Reduction projects, ensuring the projects are completed prior to the nesting season.*



*Venus flytraps, carnivorous plants native to areas in and around Wilmington, North Carolina, are protected plants and district regulatory project managers must consider its habitat when making permitting decisions.*



# ARMY EARTH DAY

2018



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THE MISSION



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