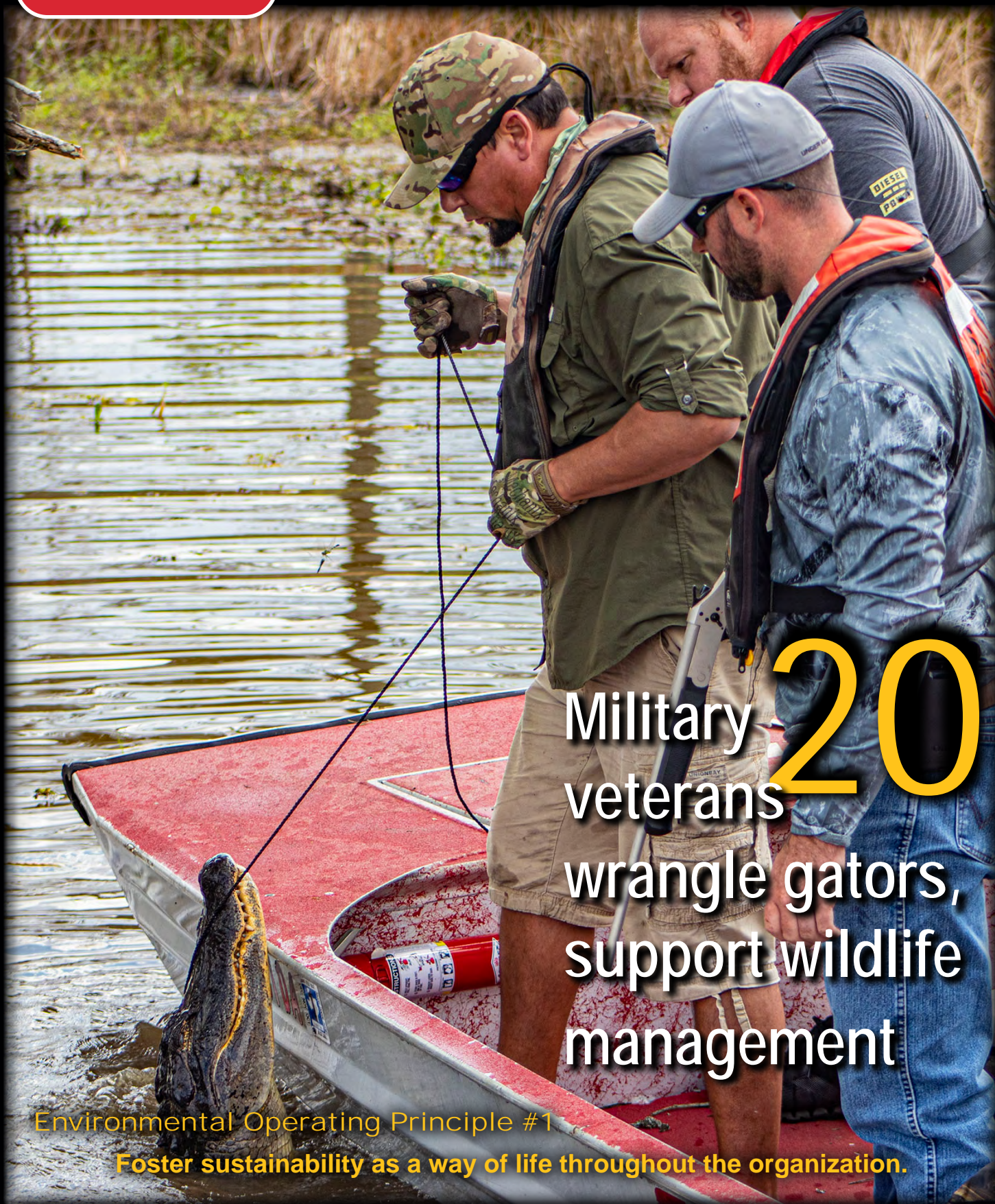


The Corps

Volume 22, Issue 4
February 2022

Environment



Military
veterans
wrangle gators,
support wildlife
management

Environmental Operating Principle #1

Foster sustainability as a way of life throughout the organization.

The Corps Environment



Contents

The Corps Environment

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Opinions expressed herein are not necessarily those of the U.S. Army Corps of Engineers, the U.S. Army or the Department of Defense.

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 Corps-Environment-Magazine@usace.army.mil.

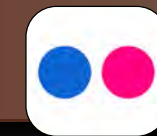
Submission deadlines are indicated in red:

December 15	February
March 15	May
June 15	August
September 15	November

Editor's Note: This issue combines content for the November 2021 and February 2022 issue. As such, content also highlights collaboration and partnership, in support of EOP #6.

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ENVIROPOINTS

Building resilience through collective climate change adaptation and mitigation efforts

Climate change has far-reaching implications across the globe — in the present and in the years to come. Here at the U.S. Army Corps of Engineers, climate change will have an enduring effect on how we do business across our programs. Climate change does not discriminate between business lines; it touches on everything we do and impacts the environment, the economy, and the well-being of the communities we serve. Much like how our Environmental Operating Principles serve as the backbone for all that we do, climate change considerations have been — and will continue to be — embedded in how we plan, design, build, and operate projects and facilities.

We are taking proactive measures across the enterprise to address climate change. These activities focus on climate change adaptation and mitigation efforts. Both these activities are critically important. Adaptation efforts center around addressing impacts posed by current or expected effects of climate change on new and existing infrastructure and operations, whereas mitigation efforts center around lessening the impacts of existing projects on the Earth's climate.

Many business lines within USACE's Civil Works, Military Programs, and Research and Development directorates are engaged in adaptation and mitigation activities. All these efforts ultimately serve the same overarching goal — to provide sustainable solutions that support our environment and the communities we serve across the globe.

Leveraging Technical Competencies Across the Enterprise

Climate change is a complex problem that requires a multi-disciplinary solution. Here at USACE, we have more than 36,000 dedicated professionals supporting our military, civil works, and research and development programs. More than 10% of our workforce specializes in environmental disciplines. We also have more than 200 teammates serving as members of the [Climate Preparedness and Resilience Community of Practice](#) who are working to deliver projects that are prepared for the climate of the future. This includes planning and designing projects for climate preparedness, assessing climate vulnerabilities, and translating actionable climate science into policy, technical guidance, tools, and training.

There is tremendous strength in our collective expertise across the enterprise. To best leverage our capabilities, we are developing an integrated strategy to synchronize climate change adaptation and mitigation efforts across USACE. Through this strategy, we will be able to optimize our resources to fulfill the current and future needs of our stakeholders as well as fulfill administration requirements. We are also building climate change activities into our strategic objectives and priorities outlined in our USACE Campaign Plan to ensure we are able to achieve our federal objectives, operate our infrastructure, and advance our efforts in delivering engineering solutions to our stakeholders across the globe under changing climate conditions.

You may be wondering where you fit within this massive effort to address climate change. When it comes to our climate change-related activities here at USACE, our activities can be characterized by four broad categories: 1) optimizing our internal operations; 2) planning for future conditions; 3) providing technical services to our partners and stakeholders; and 4) driving innovation through research and development.

Optimizing Our Internal Operations

Within USACE, we serve as a reported agency. What this means is that we report to the Office of Management and Budget (OMB) and the White House Council on Environmental Quality as a separate agency from the Department of Defense (DOD) on matters related to our sustainability program, which focuses on climate change mitigation.

Under our sustainability program, we implement federal sustainability requirements within our own operations and facilities. Two key communication products are publicly available to ensure transparency in our sustainability activities: USACE's Sustainability Plan and OMB's Scorecard for Efficient Federal Operations/Management, both of which are published on [sustainability.gov](#).

USACE's Sustainability Plan serves as the roadmap to mitigate climate change, reduce waste, decrease costs, and enhance resilience of our infrastructure and operations. Focus areas include facility energy efficiency; renewable energy; water efficiency; transportation/fleet management (with the goal to increase electric vehicles); sustainable acquisition/procurement; and greenhouse gas reductions in support of reducing climate change impacts. OMB's Scorecard for Efficient Federal Operations/Management tracks USACE's progress along with the scorecards of other federal agencies.

In accordance with Executive Order 14057, we are transforming our electric vehicle fleet across the enterprise. Our actions support the whole-of-government effort to achieve net-zero emissions economy-wide by no later than 2050 and center around acquiring more electric vehicles and installing additional charging stations at our facilities to transition to 100% zero-emission vehicle acquisitions by 2035.

We will also continue to build off past progress regarding energy-efficiency. Since fiscal 2008, we have more than tripled our renewable energy consumption at our own facilities, increasing from 16,269 megawatt hours in fiscal 2008 to more than 62,700 megawatt hours in fiscal 2020. This renewable energy was generated from solar, hydropower, wind, and green energy purchase projects and assets, replacing energy that would have otherwise been consumed through less environmentally friendly sources.

Most of this power stemmed from hydropower facilities. USACE's Hydropower Program is the largest generator of hydropower in the United States, accounting for approximately 25% of the



Dr. Christine T. Altendorf
Director of Military Programs
U.S. Army Corps of Engineers



Mr. Alvin (Al) B. Lee
Director of Civil Works
U.S. Army Corps of Engineers

nation's hydropower. Not only is it used to provide incremental renewable energy to our own facilities, but our 75 hydropower projects generated more than 77-million megawatt hours of clean energy for use across the nation in fiscal 2020.

For acquisition activities, we developed the Sustainable Acquisition Clause Selection and Compliance Assessment Tool to institutionalize sustainable procurement practices and streamline reporting. This tool helps contracting officers ensure all necessary sustainability clauses are included in contracts, to include the use of materials with recycled content, bio-based products, water-efficient and energy-efficient products.

We are also optimizing our knowledge base for climate change considerations. This includes providing design guidance to the engineering community on how to incorporate climate change into planning and design efforts.

See ENVIROPOINTS, page 5

For example, [Engineer Regulation 1100-2-8162](#) prescribes the multiple future-scenario approach to sea level adaptation, and [Engineer Pamphlet 1100-2-1](#) provides best practices for incorporating relative sea level change into projects by business line. Additionally, [Engineering and Construction Bulletin 2018-14](#) provides guidance for assessing climate impacts to inland hydrology by testing observed data for past changes and analyzing projections of future conditions.

Planning for Future Conditions

Climate change will continue as the Earth's climate responds to emissions from the past. As a result, we must be prepared for climate changes that are already occurring and are reasonably foreseeable. Climate change preparedness and resilience are therefore mainstreamed throughout USACE's project planning process. This is not new. The first USACE guidance on incorporating climate change into design and construction was issued in 1986, directing that sea level change be included in coastal storm risk management practices. Since 2009, we have used a multiple-scenario approach to address uncertainty in future sea level conditions, leveraging interagency and international partnerships to put the latest actionable sea level science into the hands of our project delivery teams. And since 2014, we have incorporated potential project vulnerabilities resulting from climate-changed hydrology into planning studies to increase the resilience of our water resource projects.

Climate resilience is a key trait in what we do, and adaptation is an action we take to ensure we are developing resilient systems. As defined in the [USACE Resilience Initiative Roadmap](#), resilient systems are prepared for extreme events, can absorb the impacts of extreme events, can recover quickly from extreme events, and furthermore, can adapt to changing conditions.

When it comes to adaptation, we use the adaptation pathways approach, which involves making adjustments to natural or human systems in anticipation of, or in response to, a changing environment. Climate change adaptation is considered at every step in the project life cycle for all USACE projects — both existing and planned. This ensures we are developing practical, nationally consistent, and cost-effective adaptation measures (including structural, nonstructural, and natural or nature-based features) that reduce vulnerabilities and enhance the resilience of our water resource projects.

For example, when planning and designing coastal projects, we include future sea level change in our designs. This ensures that USACE-built projects are prepared to perform well into the future despite uncertainty about the climate of the future. We are also conducting vulnerability assessments at existing projects for exposure to climate change impacts and prioritizing them for further detailed study, including reevaluation, if appropriate. We have also invested in web-based tools to put climate science into practice, to include the [Sea Level Calculator](#), the [Sea Level Tracker](#), and the [Climate Hydrology Assessment Tool](#). These tools were designed to help prepare USACE projects for any reasonable future conditions and are also publicly accessible to improve the adaptive capacity of local sponsors, as well as other federal agencies, partners and stakeholders.

In October 2021, our [USACE Climate Action Plan](#) was released alongside the climate adaptation and

resilience plans from more than 20 major federal agencies. These plans were released in accordance with Executive Order 14008, requiring agencies to develop focused and streamlined plans outlining actions we will take to execute climate preparedness adaptation and resilience as well as address agency vulnerabilities to the impacts of climate change.

Our plan builds on prior adaptation plans to create a streamlined strategy consisting of five adaptation actions: modernizing USACE programs and policies to support climate resilient investments; managing our lands and waters for climate preparedness and resilience; enabling state, local, and tribal government preparedness; providing actionable climate information tools and projections; and planning for climate change-related risks to missions and operations. This is all about planning ahead and being prepared.

The plan also addresses three additional topic areas: assessments of agency vulnerabilities to climate change; actions to enhance the climate resilience of USACE sites, facilities, and supply chains; as well as enhancing the climate literacy in our workforce. We want everyone to be climate literate and for this literacy to be mainstreamed into our business processes and, ultimately, part of our culture.

Providing Technical Services to Our Partners and Stakeholders

As a service provider to the Army, Air Force, Navy, and other agencies, it is imperative that the services and products we provide support the sustainability goals and targets of our partners and stakeholders. To ensure the projects we design for our partners address energy efficiency and master planning for climate change, we have developed design guidance for the engineering community that has been reviewed and approved by the Army, Air Force, and Navy. These criteria are utilized across many of our business lines, to include military construction, real estate, installation readiness, environmental support, and interagency and international services.

The services we provide also support military readiness and modernization. Two of our key deliverables on this front are the Army Climate Assessment Tool and [DOD Climate Assessment Tool](#). These web-based climate tools were developed and fielded to facilitate understanding of climate change impacts at DOD facilities. They help identify climate-related threats that could degrade mission readiness and incorporate the latest actionable data and model results regarding climate change and extreme weather as prescribed by the scientific community.

For environmental cleanup activities we perform under the Defense Environmental Restoration Program, we are utilizing green and sustainable remediation to incorporate options that minimize the environmental footprint of cleanup actions, including reducing climate-changing greenhouse gas emissions. This involves employing environmental remediation strategies that use natural resources and energy efficiently; reduce negative impacts on the environment; minimize or eliminate pollution at its source; and reduce waste to the greatest extent possible.

Our teams are also supporting federal energy initiatives through contracting and technical support. This includes providing enterprise contract solutions, such as energy-savings performance contracts and utility energy-savings contracts, as well as assisting resource efficiency managers in meeting energy

goals within government energy programs. We also support the Office of Energy Initiatives (OEI) on large-scale energy projects that are focused on achieving resiliency on Army installations to include negotiating and executing leases for grid-facing energy assets. Additionally, we are executing the design and construction of energy resilience and conservation projects for the Army and Air Force.

Driving Innovation Through Research and Development

Innovation is key to future program and project delivery for our partners and stakeholders. Much like we take into account future conditions within our planning processes, research and development looks toward the future in order to discover and develop innovative and new approaches for resilient and adaptable project implementation. Indeed, one of the top-10 USACE research and development priorities is to mitigate and adapt to climate change. Examples of solutions being investigated include preventing and reducing the generation of greenhouse gases at the source; mitigating the release of CO2 emissions; smart and resilient installations; and decision support tools for mitigation technologies.

We are also exploring the application of natural and nature-based features. Natural features are those created by nature, while nature-based features are engineered by people to mimic natural conditions. Examples include living shorelines, oyster reefs, and beach/dune systems. Such features possess the potential to provide multi-purpose functions related to flood and storm damage reduction and ecosystem restoration. In some cases, these features may also support climate change initiatives by providing opportunities to increase the functional performance of traditional structural solutions; increasing the resilience and sustainability of water infrastructure systems; providing biosequestration of atmospheric carbon; and reducing maintenance and repair costs, while creating additional social and environmental value for communities. However, we are also working to understand what we still need to know to ensure the long-term performance of living features, which may face unique challenges in a changing climate, such as changing water quality and quantity, increasingly extreme heat and wildfire, and invasive species.

Furthermore, we are working to understand synergies that may exist between adaptation and mitigation efforts. For example, when a facility uses less water and generates lower emissions, it is made more resilient to extreme droughts. At other times there may be tradeoffs between the two, such as when increasing the size of a concrete floodwall to maximize resilience against larger floods leads to increased emissions associated with concrete production. These complex interrelationships mean that climate change adaptation actions and mitigation investments must be considered together.

When it comes to our climate change activities, there is value in every action that is taken. There is tremendous strength in our collective efforts and our whole-of-USACE approach will serve as a force multiplier to address current and future challenges posed by climate change. It is through this unification across the enterprise that we will plan, design, build and operate resilient infrastructure and ecosystems that support the economy and provide a healthier environment for the nation and the world.

A new way of doing business: Sustainable uses for automated fee machines

By **Eric Haskell**
USACE, Mobile District
Mike Tietz
USACE, Headquarters

Both solar and hardwired automated fee machines are expanding throughout U.S. Army Corps of Engineers' (USACE) recreational areas as a result of a successful pilot program conducted by USACE Mobile District at Carters Lake in Georgia. Rather than keep the success to themselves, the project team has promoted automated fee machines wherever possible as a best practice.

Under this pilot program, Mobile District led the way in replacing energy-intensive staffed fee collection booths with automated fee machines. Each automated machine has an estimated 1.7-year payback and has improved the mission by reducing fleet fuel usage, allowing greater customer access and improving site resiliency where implemented.

Four solar and three hardwired automated fee machines were initially installed in 2016. At a cost of \$10,000 per machine, automated fee machines provided Carters Lake an estimated savings of \$6,000 in annual costs through a combination of electricity, labor, and fuel reductions. The automated machines also provide more accurate customer data as well as the capability of supporting customers 24 hours a day, 7 days a week.

Allen Earhart, chief ranger, spearheaded the design choice, procurement and implementation, as well as trained site staff and volunteers. After the success at Carters Lake, Earhart provided recommendations for machines to be installed at additional locations including Lake Lanier outside metropolitan Atlanta, one of the busiest USACE facilities in the nation.

The automated fee machines can be configured to match existing infrastructure, including either hardwired or solar power supply options. The solar version is self-sustaining and is procured from the vendor with a 10-year warranty. In areas where electricity was not available, but there were clear views to the southeast, the solar

machines were installed with the panels raised 3-8 feet above the machine to deter damage. The maximum electricity draw of a hardwired fee machine is 2.5 amps, totaling less than 100 kilowatt-hours per year, or less than one day of gatehouse operation. Additionally, 20-amp outlets on the machines allow heaters for machines that experience freezing conditions.

As a result of automating the fee machines, it reduced the requirement for staff to manually collect fees each day. Data from Carters Lake indicated the machines reduced weekly mileage by over 160 miles per machine, which equates to around 1.4 metric tons of carbon dioxide.

Data also indicated that the automated fee machines provided an annual reduction of 8,320 miles, which in mountain terrain reduced approximately 925 gallons of gasoline use for standard pickup trucks operated by staff. This is equivalent to 8.2 metric tons of carbon dioxide. Automating the fee machines at Lanier provided additional savings due to the distance required to travel to more remote facilities.



(USACE courtesy photo)

Automated fee machines provided an estimated savings of \$6,000 in annual costs at Mobile District's Carters Lake in Georgia, through a combination of electricity, labor, and fuel reductions.

By the end of fiscal 2020, USACE's South Atlantic Division had installed 75 machines, of which 36 were solar. All installed fee machines provide a secure, contact-free transaction that enabled the continuation of recreation at many day-use and campground facilities, even during the COVID-19 pandemic. Since fee machines accept credit cards and many customers



(USACE courtesy photo)

Mobile District is leading the way in replacing energy-intensive staffed fee collection booths with automated fee machines at its recreation sites to include Lake Lanier, Georgia.

Each automated machine has an estimated 1.7-year payback and has improved the mission by reducing fleet fuel usage, allowing greater customer access, and improving site resiliency where implemented.

may not carry correct amounts of cash, initial data indicates user fees collected have increased since installation. In fiscal 2021, \$2.5 million was allocated nationally to purchase an additional 100-125 machines, and approximately 325 have already been installed.

Earhart shared his data and success with other recreational projects in the Mobile District, South Atlantic Division, and ultimately at a national level. The project successes were recently briefed at the USACE Strategic Sustainability Committee, which is led by the Assistant Secretary of the Army for Civil Works and USACE's Deputy Commanding General to drive improved sustainability performance.

The Mobile District project team has demonstrated that automated fee machines can be used throughout USACE in a variety of conditions, meeting the mission requirements in a more secure, convenient, accurate, resilient, and sustainable way. The durability and proven longevity of machines promise to make a lasting impact within USACE and other government organizations.

2021 SECRETARY OF THE ARMY ENERGY & WATER MANAGEMENT AWARD RECIPIENT

Construction Engineering Research Laboratory team members recognized for energy and water resilience program

By Jessica Delaney

Engineer Research and Development

Three mechanical engineers in the U.S. Army Engineer Research and Development Center's (ERDC) Construction Engineering Research Laboratory (CERL) have been awarded a 2021 Secretary of the Army Energy and Water Management Award.

Mr. Jay Tulley, Mr. Christopher Battisti and Mr. Brian Clark's Energy and Water Resilience Program Effectiveness category award recognized their efforts with the Army Installation Management Command RCx Academy, a comprehensive, 10-month training program for energy managers, mechanical engineers and

HVAC technicians. The unique initiative blends online education and hands-on practice of RCx field skills and included more than 150 hours of instructional support through webinars and office hours.

The academy combined the fundamentals of mechanical engineering and HVAC systems with real-world energy management principles, including energy auditing, project scoping, functional testing, and others. The training also addressed building maintenance to improve their health, comfort and mission assurance.

"We are incredibly proud of Jay, Christopher and Brian's outstanding efforts to develop and

execute the IMCOM RCx Academy," said ERDC CERL Director Dr. Andrew Nelson. "Initiatives like the academy move USACE and the Army forward in building commissioning, energy efficiency and controls modernization. The Secretary of the Army Energy and Water Management Award is a fantastic achievement and directly reflects the importance and impact of the team's efforts."

Tulley, Battisti and Clark accepted their award from Acting Principal Deputy Assistant Secretary of the Army (Installations, Energy & Environment), Mr. J.E. "Jack" Surash, and Deputy Chief of Staff, G-9, Lt. Gen. Jason T. Evans, during a virtual ceremony, October 29.

USACE 2021 Sustainability and Environmental Award Recipients

Each year, the U.S. Army Corps of Engineers Sustainability and Environmental Awards Program recognizes USACE teams for their significant contributions in the sustainability fields of energy efficiency, sustainable solutions, reduced impacts to the natural environment, and preserving and enhancing our natural resources. Congratulations to this year's winners:

Green Innovation Sustainability Award

Energy and Sustainability Analysis for Operational Readiness Training complexes in Germany

Paul McCarty and Team – Huntsville Engineering and Support Center

Huntsville Center's Paul McCarty, Sandy Wood and Richard Olmedo prepared a detailed Energy and Sustainability Analysis for Operational Readiness Training complexes at U.S. Army Garrison Bavaria Grafenwohr, Germany, and Hohenfels Camp Albertshof, Germany. Over 200 new buildings are planned, including 56 four-story barracks. Detailed computer modeling of building energy consumption on an hourly basis over a one-year period was developed to compare natural gas-fired district heating vs. all-electric ground source heat pumps (GSHP). Detailed results for each building type showed that all electric GSHP's will use less energy and have a lower annual energy cost than district heat. Rooftop solar photovoltaic (PV) with battery energy storage system (BESS) was also included in the analysis. It indicated that 99.95% of the annual electrical energy requirements estimated by the energy model could be provided using PV and BESS.

Environmental Quality Award

Rio Chama Habitat Improvement Project

Abiquiu Project Office – USACE, Albuquerque District

The Rio Chama Habitat Improvement project aims to improve the overall riparian habitat, in

stream conditions, and recreational opportunities on the Rio Chama below Abiquiu Dam in New Mexico. The project is about 61.7 acres through 2.7 miles of lands managed by USACE, Bureau of Land Management, U.S. Fish and Wildlife Service, and the New Mexico Land Office. Several types of features were used to create different types of fish habitat, including cross vane drop structures, pools, riffles, boulder clusters, and riparian vegetation. These features are designed to provide fish velocity refuge habitat at discharges between 50 and 1,800 cubic feet per second.

Environmental Cleanup Award

Fort Ord, California, Base Realignment and Closure Act (BRAC) Cleanup

Fort Ord BRAC Cleanup Project Delivery Team – USACE, Sacramento District

The Fort Ord project delivery team (PDT) worked tirelessly to accomplish the cleanup of all units in the Bureau of Land Management (BLM) Area B (scheduled to be conveyed to the BLM except for a final prescribed burn and



munitions and explosives of concern (MEC) removal in a single parcel). During the same period, the PDT completed construction of the new groundwater treatment plant for Operable Unit 2 (OU-2), allowing for greater groundwater treatment capacity. The PDT also has been very successful in the execution of habitat restoration in response to areas of the MEC cleanup that required removal of contaminants as well as biological monitoring. The PDT's recent and historic efforts were recognized by the U.S. Environmental Protection Agency with a [National Award for Excellence in Site Reuse](#).

Environmental Support Team Spotlight: Cory Koger

By Jenn Miller
USACE, Headquarters

Cory Koger, water quality program manager and chemist with the U.S. Army Corps of Engineers (USACE) Sacramento District, is a member of USACE's Environmental Support Team (EnvST). This expeditionary team of environmental engineers and specialists provides support to the combatant command and its components during war, contingency operations, and disaster relief operations. Provided below is insight into Koger's experiences serving on EnvST and how these skills have afforded him additional opportunities within USACE:

1. How long have you worked for USACE?

I have been with USACE for 20 years this November.

2. How long have you been a member of EnvST?

I have been a member since March 2020.

3. How did you hear about EnvST?

Other EnvST members from the Sacramento District recommended EnvST as a great opportunity, and I felt that my skill set and previous emergency response deployments tracked with the duties and responsibilities of an EnvST team member.

4. How many mission assignments have you been on?

I haven't deployed as an EnvST member but have deployed for emergency response three times since becoming a member. I deployed to Puerto Rico for Hurricane Isaias in July 2020. I also deployed to the Oregon wildfires from September 2020 to June 2021 and recently deployed for the 2021 California wildfires.

5. What opportunities has EnvST afforded you?

With my limited EnvST experience, the greatest opportunity I've had has been networking with other team members, especially the group that trained together in 2020. We stay in touch and I've collaborated with two team members on projects for my regular duty.



Cory Koger, water quality program manager and chemist with USACE, Sacramento District, is a member of USACE's Environmental Support Team. (File photo)

6. What is the most memorable experience from one of your recent deployments?

I have yet to deploy as an EnvST team member on mission assignment, but from an environmental deployment perspective, my most memorable experience was during the 2020 Oregon wildfires. During this deployment, I engaged with state regulators to demonstrate that x-ray fluorescence (XRF) field data can be used definitively, if collected and calibrated properly. To expedite the analyses, USACE contracted 24-hour results from a fixed-lab to confirm that three mobile home parks met the cleanup goals for the fire event. The collected data allowed the Federal Emergency Management Agency (FEMA) to lease the sites for the Temporary Housing Mission to house fire survivors until their homes are rebuilt.

7. What are some of the key skills you have learned being on this team?

Team building during training was extensive, and I applied that training during emergency response.

8. Have you been able to utilize your EnvST training for other opportunities?

I've been able to utilize skills learned during EnvST training to assist other team members with projects this past year. I was also able to leverage some of the training during emergency response operations. Additionally, as a result of the support I provided during the 2020 wildfires, I was able to provide technical feedback on the capabilities of XRF to support sampling requirements for fires and support FEMA's Temporary Housing Mission.

9. Would you encourage others to deploy?

I certainly would. The experiences of deploying are so rewarding, and every deployment will offer new and interesting opportunities.

10. Any words of advice for those getting ready to deploy for mission assignments?

Deploying during the COVID-19 pandemic was a particular challenge. As with all deployments, I recommend researching the rules and regulations for the state, country, or region well before you plan to travel if you have the time. I deployed to Puerto Rico within 24 hours of assignment and wouldn't have been able to leave the airport without showing a negative COVID-19 test.



PRE-Fire



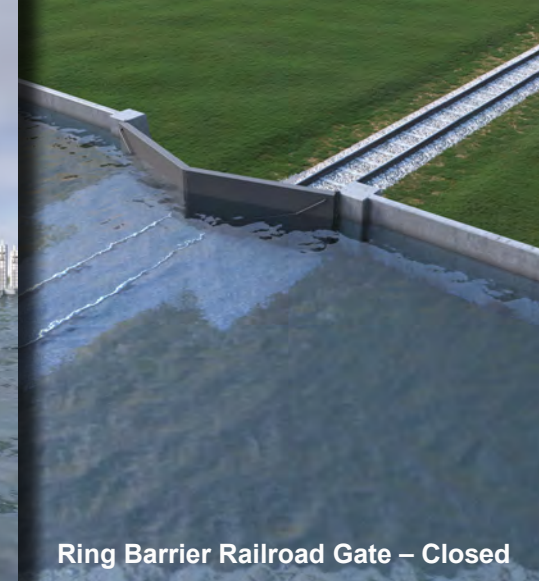
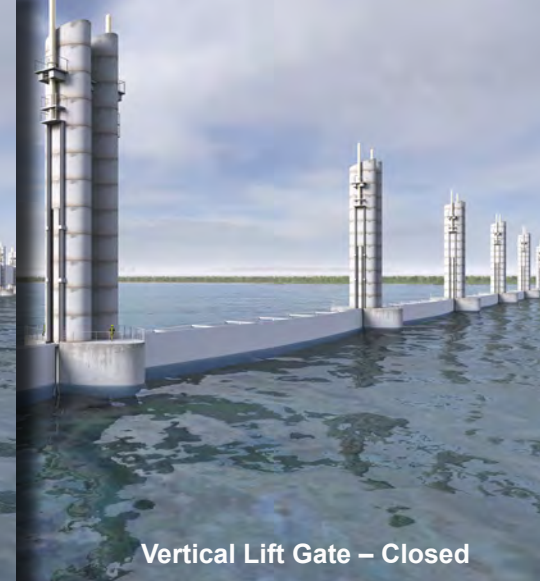
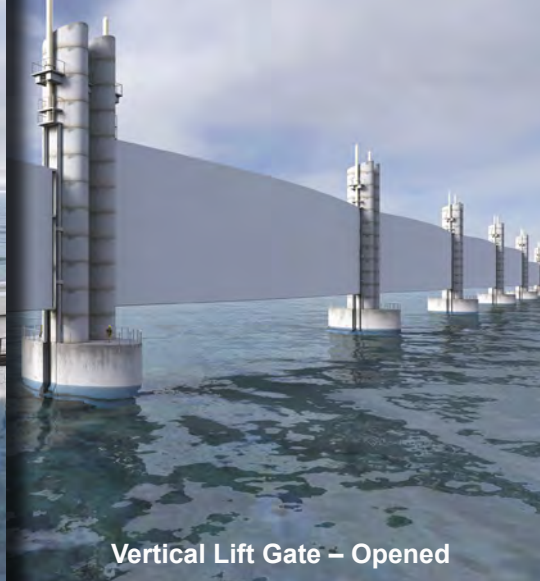
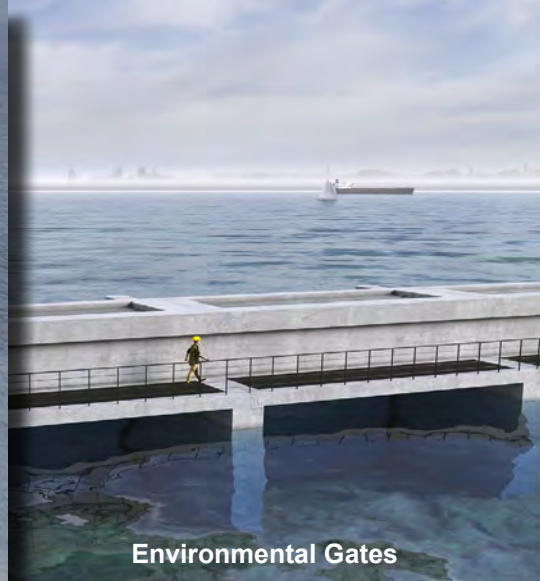
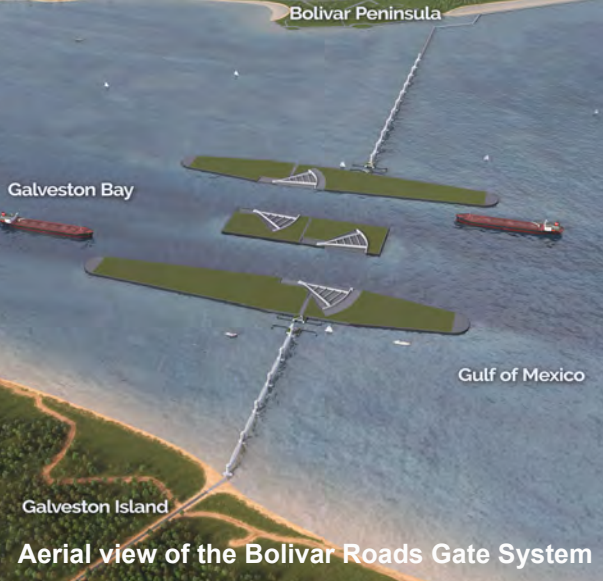
POST-Fire

During Cory Koger's recent deployment for the 2020 Oregon wildfires, he helped expedite sampling analyses to confirm three mobile home parks met the cleanup goals for the fire event. To accomplish this, each lot had to be sampled to meet the residential cleanup goals for the project, and a No Further Action designation had to be obtained from state regulators. This work is similar to a Phase II Environmental Site Assessment that might be performed during an EnvST deployment. (File image)

For additional information on EnvST, visit:

<https://www.usace.army.mil/Missions/Environmental/Environmental-Support-Team/>





Chief's Report signed for long-awaited Coastal Texas Study

(Project renderings courtesy of USACE)

“This is one of the largest projects in the history of the Corps of Engineers.”
– Col. Tim Vail, USACE Galveston District Commander

By USACE, Galveston District Public Affairs

Lt. Gen. Scott Spellmon, U.S. Army Corps of Engineers Commanding General and 55th U.S. Army Chief of Engineers, signed the Chief's Report for the Coastal Texas Protection and Restoration Study (The Coastal Texas Study) Sept. 16.

The signed report can be found on the Galveston District website [here](https://www.swg.usace.army.mil/Business-With-Us/Planning-Environmental-Branch/Documents-for-Public-Review/).

The Coastal Texas Study is a six-year, \$20.63 million comprehensive study led

by USACE in partnership with the non-federal cost-share sponsor, the Texas General Land Office. The purpose of the study was to identify feasible projects that reduce risks to public health and the economy, restore critical ecosystems, and advance coastal resiliency.

The results of the engineering, economic and environmental examinations have resulted in a final recommended plan that consists of multiple coastal storm risk management and ecosystem restoration features that together form a resilient Texas coast.

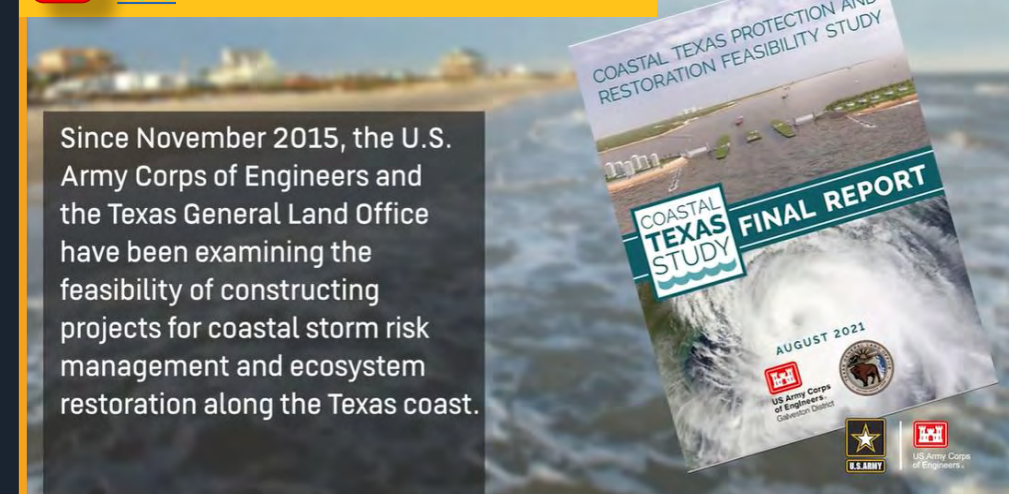
“This is one of the largest projects in the history of the Corps of Engineers,” said USACE Galveston districts Commander Col. Tim Vail. “More than 300 individuals from across 11 USACE districts and two USACE labs – including the best scientists and engineers – worked with four contracting firms, 12 different colleges and universities, multiple community working groups, and experts from countries around the world to build the framework for this project. The signing of the Chief's Report is the culmination of their hard work and dedication.”

The signing of the report progresses the project to Congress for authorization and funding.

The final feasibility report and final environmental impact statement can be found on Galveston District's website at: <https://www.swg.usace.army.mil/Business-With-Us/Planning-Environmental-Branch/Documents-for-Public-Review/>

For more information about the Coastal Texas Study, visit the study's website at: <https://coastalstudy.texas.gov/>.

 Watch a short video about the project [here](https://www.youtube.com/watch?v=...).



Since November 2015, the U.S. Army Corps of Engineers and the Texas General Land Office have been examining the feasibility of constructing projects for coastal storm risk management and ecosystem restoration along the Texas coast.

Army Civil Works releases U.S. Army Corps of Engineers' Climate Adaptation and Resilience Plan

By Douglas Massie

Office of the Assistant Secretary of the Army
(Civil Works)

As part of President Biden's whole-of-government approach to confronting the climate crisis, Army Civil Works released its climate adaptation and resilience plan for the U.S. Army Corps of Engineers (USACE) Oct. 7 to ensure its Civil Works projects and operations adapt and are increasingly resilient to climate change impacts.

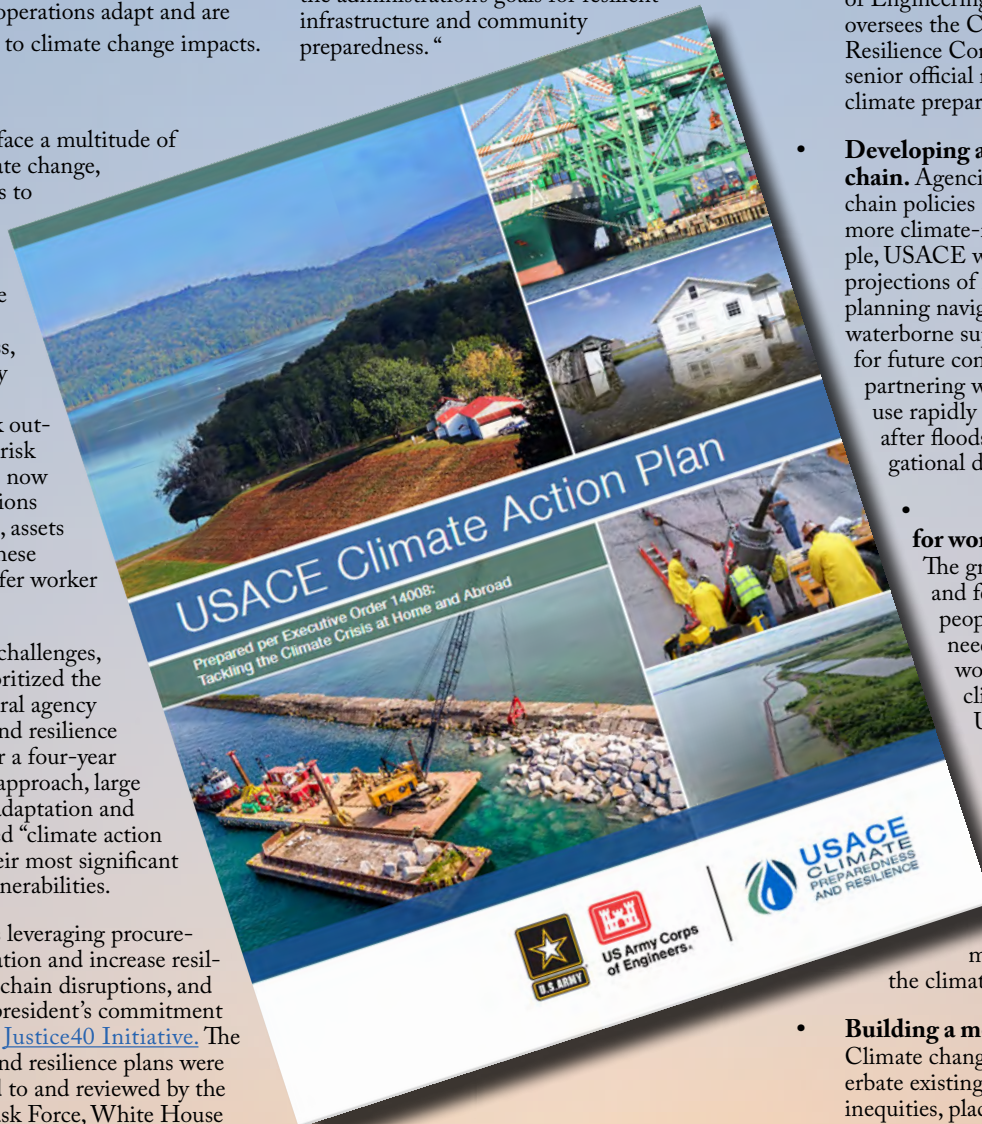
Federal agencies face a multitude of risks caused by climate change, including rising costs to maintain and repair damaged infrastructure from more frequent and extreme weather events, program effectiveness, and health and safety challenges to federal employees who work outside. Taking climate risk management actions now will mitigate disruptions to federal operations, assets and programs, and these actions will create safer worker conditions.

To address these challenges, President Biden prioritized the revitalization of federal agency climate adaptation and resilience planning efforts after a four-year pause. Through this approach, large agencies developed adaptation and resilience plans, called "climate action plans," to address their most significant climate risks and vulnerabilities.

The plans address leveraging procurement to drive innovation and increase resilience against supply chain disruptions, and are in line with the president's commitment to implementing his [Justice40 Initiative](#). The climate adaptation and resilience plans were previously submitted to and reviewed by the National Climate Task Force, White House Council on Environmental Quality's Federal Chief Sustainability Officer and the Office of Management and Budget (OMB) in response to President Biden's [Executive Order on Tackling the Climate Crisis at Home and Abroad](#).

As part of these efforts, agencies will embed adaptation and resilience planning and implementation throughout their operations and programs, and will continually update their adaptation plans. In addition to these plans, President Biden's Build Back Better Agenda and the [Bipartisan Infrastructure Deal](#) include bold, historic, and transformational investments to strengthen our nation's resilience to climate change and extreme weather events, including upgrading power infrastructure, rebuilding America's roads and bridges, and more.

"The U.S. Army Corps of Engineers' Climate Action Plan provides actions that demonstrate how the Corps continues to further their efforts to address climate adaptation and resilience in all aspects of Civil Works projects and operations," said Acting Assistant Secretary of the Army for Civil Works Jaime A. Pinkham. "This is a vital component of identifying the contribution of the Corps to the administration's goals for resilient infrastructure and community preparedness."



Highlights from [USACE's plan](#):

- **Safeguarding federal investments.** Agencies identified which programs and missions are most at risk from climate change. This first step is critical to ensuring the best use of taxpayer dollars in response to changing climatic conditions. For example, USACE will perform an initial screening of their existing Civil Works projects for exposure to climate change impacts, based on projections of future climate conditions and project-specific indicator metrics, to prioritize projects for further detailed study.

- **Identifying leadership and accountability.** For the first time, agencies identified senior leadership and created new accountability structures so that adaptation and resilience is led from the top. For example, USACE has identified the Assistant Secretary of the Army for Civil Works as the senior point of contact for climate preparedness and resilience, and the Chief of Engineering and Construction, who oversees the Climate Preparedness and Resilience Community of Practice, as the senior official responsible for executing climate preparedness and resilience.

- **Developing a more resilient supply chain.** Agencies are revamping supply chain policies and operations to create a more climate-resilient system. For example, USACE will continue to integrate projections of future sea-level change into planning navigation projects to ensure waterborne supply chains are prepared for future conditions and will investigate partnering with the U.S. Coast Guard to use rapidly deployable channel markers after floods and storms to reduce navigational downtime.

- **Enhancing protections for workers and communities.** The greatest asset to our country and federal government is our people. Agencies recognize the need to better support America's workers from the impacts of climate change. For example, USACE will explore new mechanisms for contracting with hotels and other properties to provide safe, comfortable temporary housing for workers responding to emergencies and extreme weather events, which may become more common as the climate continues to change.

- **Building a more equitable future.** Climate change and its impacts may exacerbate existing health and socioeconomic inequities, placing certain populations at particular risk. To tackle this challenge, agencies outlined their actions in support of this administration's environmental justice objectives. For example, USACE will continue to leverage programs and assets, such as the Silver Jackets teams, Floodplain Management Services Program, and district tribal liaisons to build the adaptation capacity of disproportionately affected communities and help USACE gain better understanding of their capacity to adapt to climate change.

USACE's Climate Adaptation and Resilience Plan is available at:

www.sustainability.gov/adaptation and
www.usace.army.mil/corpsclimate/Climate



Research project explores using unmanned systems to detect naturally occurring hazards for Soldiers

By Holly Kuzmitski

Engineer Research and Development Center

If you're a Soldier entering a cave on a military operation overseas, a venomous snake or a rabid bat can really ruin your day.

A multidisciplinary team at the U.S. Army Engineer Research and Development Center-Environmental Laboratory (ERDC-EL) is currently cataloguing the naturally occurring threats that Soldiers encounter in such situations, with the goal of eventually developing an unmanned solution.

"We're developing sensors that will eventually be attached to unmanned vehicles that enter subterranean environments ahead of forces to detect the biological threats and provide our Soldiers some stand-off detection," said Maj. Derrek Hopper, team lead. "And we're talking about naturally occurring biological threats, because the chemical, biological, radiological, nuclear and explosives community already focuses on the weaponized stuff like anthrax. Right now, we're looking at caves or tunnel systems and exploring what we can detect that grows there naturally or that has moved in."

"It's a \$14.1 million dollar project over the next five years, and it just started in fiscal year 2021; the first task was getting the sensors we ordered, developing other sensors and doing laboratory assessments for them all," Hopper said.

Hopper described how military operations are starting to move underground.

"We're starting to see this in Syria, all over the world, really – anytime one group fights another group that has superior sensing technologies, especially optical sensing technologies that are overhead, something that's satellite- or air-based, it's easier just to move underground and hide," he said.

The naturally occurring threats in these subterranean environments can be divided into those that are either macroscopic, like arachnids,

reptiles or mammals; or microscopic, such as the threat agents that spread between animals and people and are bacterial, fungal or viral in origin. COVID-19 would be an example of a viral microscopic threat agent.

Dr. Eric Britzke, an ERDC-EL research wildlife biologist and the lead for the macroscopic team, will soon be traveling to subterranean locations around the U.S. with team members to document the presence of both types of natural threats in these environments.

"We're sampling for everything, and what we're trying to do from a macroscopic standpoint is use thermal cameras as our first line of detection; we're basically looking and saying 'what can we detect with a thermal camera?'" Britzke said. "Our project is also designed so there will be additional multiple sensor options, so the users can choose what they're interested in detecting and pick the appropriate sensor package."

The team will be sampling natural cave systems representing different microclimates, including the Mammoth Cave system in Kentucky and a dry cave system out west. They will also be collecting samples in a variety of engineered subterranean environments, such as old mining caves located near 29 Palms in California. As the research project

progresses, the team will assess how the detection system performs at various subterranean locations outside the U.S.

"Natural cave systems are especially challenging to sample due to their complex 3D-structure, significant surface area, microhabitats and variable environmental conditions," said Dr. Karl Indest, a research microbiologist with ERDC-EL and lead for the microscopic team.

"We're looking for macroscopic species that we know may transmit some diseases: bats and rats, for example," Hopper said. "Obviously, there are some inherent threats with reptiles like snakes, which can interfere with military operations, especially if you're trying to be quiet about something and there's a snake — should you just shoot it and move on, or do you have to turn around and go back?"

Indest's team is now evaluating commercial off-the-shelf technologies for rapid detection of a variety of microscopic species. Once team members determine they can detect these species with the sensors, they will use the data the macroscopic team collects to narrow the focus and integrate the two lines of research.

Britzke said it's important to understand that the project team is striving to make one holistic effort, rather than one project with two different parts. That way, the sensors can eventually do things like detect certain macroscopic species groups that can help narrow down the microscopic species list.

"If we don't find bats in a cave, let's say, we can just ignore all the microscopic threat species that bats are vectors, or carriers, for," Britzke said.

"In a subterranean environment, you don't own it, so it's contested in a conflict-type scenario — this is why the unmanned platform is incredibly important to this particular type of research; the idea is we don't want to send a person in there with a sensor to determine what may be around," Hopper said.



(USACE courtesy photo)

Bats can be vectors for diseases, such as rabies, and can be classified as a naturally occurring threat to the Soldier entering a subterranean environment in an overseas military operation. Team members from ERDC are currently investigating how to develop sensors that would eventually be fitted to unmanned vehicles to detect naturally occurring threats.

Deactivated Nuclear Power Plant Program decommissions Army reactors

By: Christopher Fincham
USACE, Baltimore District

The U.S. Army Corps of Engineers (USACE), Baltimore District is home to the North Atlantic Division's Regional Radiological Health Physics Regional (RHPR) Center of Expertise, which has successfully completed Army reactor decommissioning projects and is leading the decommissioning on Army reactors.

From 1956 to 1976, the Army Nuclear Power Plant Program operated several small nuclear reactors to confirm their feasibility to meet military power needs on land. Three Army reactors were deactivated in the 1970s and placed into safe storage awaiting future decommissioning.

MH-1A STURGIS | Mobile, High Power Model 1A

In 2019, the U.S. Army Corps of Engineers celebrated the completion of the decommissioning and dismantling of the historic STURGIS barge which was formerly the world's first floating nuclear power plant. The completion of the project was achieved when the final section of the former vessel was brought ashore for processing and recycling at the International Shipbreaking facility in the Port of Brownsville, Texas.



The STURGIS is towed from the Galveston pier to the shipping channel Sept. 25, 2018, as it heads toward Brownsville, Texas, for final shipbreaking and recycling. (File photo)

BACKGROUND

STURGIS had a unique life since first being built in the 1940s as a World War II Liberty Ship, the SS Charles H. Cugle. After serving in World War II, the ship was converted into the world's first floating nuclear plant in the 1960s, housing the MH-1A nuclear reactor. The MH-1A was used to generate electricity in the Panama Canal Zone from 1968 to 1976.

In 2012, its formal decommissioning effort began as part of a broader effort to decommission the Army's retired nuclear reactors through the DNPPP. After award of the decommissioning project contract, the STURGIS was towed 1,750 miles from Virginia to Galveston, Texas, in April 2015 for its final decommissioning.



The U.S. Army Corps of Engineers' Nuclear Power Plant STURGIS enters the Panama Canal (1968). (National Archives and Records Administration)

That decommissioning effort was completed in summer 2018 with the safe removal of all components of the deactivated nuclear reactor and associated radioactive waste, in close coordination with Galveston District, the Marine Design Center, and APTIM Federal Services. The vessel was towed to Brownsville, Texas, for final traditional shipbreaking, which was completed in March 2019.



The Reactor Pressure Vessel aboard the STURGIS, the Army's now-decommissioned floating nuclear power plant, is carefully lifted in order to be placed in the specially designed shielded shipping container to its left. Once in the container, it was then loaded onto a transport vehicle to be delivered to the Waste Control Specialists' disposal facility, in Andrews County, Texas for disposal. (File photo)

The U.S. Army regulates the Army Reactor Program, and the Army Reactor Office issues deactivated nuclear power plant permits to USACE to manage the decommissioning of these plants, which is done by the Deactivated Nuclear Power Plant Program (DNPPP). Within the DNPPP, Baltimore District's team is managing the decommissioning of the Army's two remaining deactivated nuclear reactors — the SM-1 at Fort Belvoir, Virginia, and the SM-1A at Fort Greely, Alaska. The team also recently completed the decommissioning of STURGIS.

“Our team of experts has a combined total of over 60 years of experience in radiological project support and management,”

SM-1 | Stationary, Medium Power Model 1

On the western shore of the Potomac River within the boundaries of Fort Belvoir in Fairfax County, Virginia, is the Stationary, Medium Power Model 1 Nuclear Power Plant (SM-1), which is the Army's first nuclear reactor and first in the country to provide nuclear-generated power for a sustained period to the commercial grid. In 2020, Baltimore District awarded a \$71.7 million contract to joint venture APTIM AECOM Decommissioning LLC (A2D) for the decommissioning, dismantling, and disposal of SM-1.

The team successfully performed the initial entry into the Vapor Containment (VC) structure in June 2021, which allowed them to perform initial safety and structural inspections to facilitate crews mobilizing to the site in fall 2021. The remainder of 2021 and a majority of 2022 will focus on site preparation, in close coordination with Fort Belvoir and the local communities. The early stages of decommissioning are scheduled to begin in 2022 and continue for two to three years. From there, the work will focus on site restoration and final documentation, with an estimated project completion in 2025.

“The team is really excited to build on our record of success and safety with the STURGIS decommissioning project, as decommissioning moves forward for the SM-1,” said Rebecca Yahiel, project manager.

BACKGROUND

The construction of SM-1 at Fort Belvoir was completed in March 1957. The reactor achieved criticality in April 1957 and was operational until March 1973. The SM-1 was a single-loop, 10-megawatt-thermal pressurized water reactor delivering a net 1,750 kilowatts of electrical power. Developed by the Army as part of a movement to harness atomic energy for power generation, SM-1 was the Army's first functioning nuclear power plant and served as a basis for the development of more reactor facilities in the years following.

Over the next several years, SM-1 provided partial power to Fort Belvoir, but was primarily a training facility for approximately 800 nuclear power plant technicians from all military branches before being deactivated in 1973 and partially decommissioned.



Aerial view of the former SM-1 nuclear power plant on Fort Belvoir in the 1960s. The facility provided limited power to Fort Belvoir and served as a training facility before being deactivated in 1973. (File photo)

The partial decommissioning consisted of the removal of the majority of the site's radioactivity, including the removal of nuclear fuel and control rods, minor decontamination, shipment of radioactive waste, sealing of the Reactor Pressure Vessel, and installing appropriate warning signs and monitoring devices. The majority of SM-1's remaining low-level radioactivity is within activated metals and components of the reactor system, which are all secured within the walls of the facility's containment vessel — greatly reducing any potential risks to human health or the environment.

“With the fuel and radioactive waste all removed in the 1970s, at this point our team will be dismantling and removing activated metals and components, so this is likely not what people think of when they think of radiological work. There are no drums of liquid waste, no control rods, or anything like that,” explained Yahiel. “With the activated metals and large pieces of the old reactor, there's also minimal risk of any sort of a ‘release’ into the air or a ‘spill’ of waste during the project. We will be working in a containment area to carefully dismantle, securely package and remove large components of the old system that have low-level residual radioactivity.”



U.S. Army, Air Force and Navy personnel in the control room of the former SM-1 nuclear power plant at Fort Belvoir. In addition to providing power to Fort Belvoir while active, the facility also served as a training facility for nuclear technicians from all branches before being deactivated in 1973 and partially decommissioned. (File photo)

said Dave Watters, chief of the RHPR Center of Expertise. “We have demonstrated our experience at a variety of sites throughout the United States and internationally; our team can provide all types of radiological services to our various stakeholders.”

Decommissioning includes all aspects of the project, including the removal of all reactor components; transportation and disposal of material; site cleanup; and restoration. The USACE team works hand in hand with the decommissioning contractor to ensure all aspects of the project are done with safety as the top priority.

SM-1A | Stationary, Medium Power Model 1A

Located at Fort Greely, Alaska, approximately 100 miles southeast of Fairbanks and 225 miles northeast of Anchorage, the Stationary, Medium Power Model 1A Nuclear Power Plant (SM-1A) was designed based on the concept of SM-1. The “1A” moniker designated it as the first field plant of its type.

The team is nearing completion on the decommissioning planning and in July 2021, the project team finalized the Environmental Assessment (EA) and Finding of No Significant Impact (FNSI) for the decommissioning and dismantlement of the deactivated SM-1A. Also, in a joint effort, USACE, the Alaska State Historic Preservation Office, the city of Delta Junction, and Nuke Digest finalized a National Historic Preservation Act Section 106 Memorandum of Agreement (MOA) for SM-1A that outlines how the history of SM-1A and its unique arctic mission will be preserved.

The project team is working towards the completion of the decommissioning planning documents while focusing on the decommissioning contract acquisition to support an award in 2022. In late 2021, the team will begin working with the Defense Logistics Agency, Fort Greely staff, and Doyon Utilities to implement the separation of utilities between the north and south end of the facility that houses the reactor systems, which will allow for safe implementation of future decommissioning activities.

BACKGROUND

Based on the design of SM-1, construction of the SM-1A Reactor Facility at Fort Greely began in 1958 and was completed in 1962 with first criticality achieved March 13, 1962. SM-1A was a single-loop, 20.2 megawatt-thermal pressurized water reactor that used highly enriched uranium dioxide fuel to generate 2,000 kilowatts of electrical power and 37,850 pounds of extraction steam per hour. SM-1A's primary mission was to supply electrical power and heating steam for on-post buildings and facilities at Fort Greely. It was also used as an in-service test facility to understand how the equipment would function in an arctic environment. The secondary mission was to study the economics of operating a nuclear electric power plant as compared to a conventional oil-fired system in a remote setting where fuel costs are high and refueling logistics challenging.



A plaque signifying the SAFESTOR of the containment vessel of the SM-1A Deactivated Nuclear Power Plant is featured during a site tour April 24, 2019. Located at Fort Greely, the SM-1A Deactivated Nuclear Power Plant is in the planning stage of being decommissioned and dismantled. (File photo)

In 1970, the Chief of Engineers, Lt. Gen. Frederick J. Clarke, decided the SM-1A reactor would be shut down for the last time following the normal end-of-life after its fourth core. The final shutdown, which included deactivation and initial decommissioning of the SM-1A reactor, was performed in March 1972, when the facility was effectively placed into SAFSTOR (safe storage). Much of the reactor's primary system components was dismantled, and components inside the VC were encased in concrete and a grout-sand-soil mixture. Waste generated during the initial deactivation activities was placed in the spent fuel pit and waste tanks pit. These pits were then filled and capped with reinforced concrete.

“This will be the third and final reactor that our team will be decommissioning. We will be bringing a wide variety of expertise and lessons learned from MH-1A and SM-1 to this project to ensure success. Additionally, we are partnering with our counterparts at Alaska District to gain their expertise on working in this remote, interior Alaska location,” said Jeffrey Hillebrand, project manager.



Located at Fort Greely, Alaska, the SM-1A Deactivated Nuclear Power Plant is in the planning stage of being decommissioned and dismantled. (File photo)

Both remaining decommissioning efforts are slated to be complete by 2028.

USACE collaborates to inoculate trees against Dutch elm disease



A Forest Service employee drills an inoculation hole into an American elm tree at 12-18 inches above the soil line.

understand the heritability of DED resistance and develop new sources of American elm that are more tolerant to DED. The seeds of the trees that are most resistant to DED will be used in habitat restoration plantings along the Upper Mississippi River and throughout the eastern United States.

large elms in the wild. The long-term solution to DED in the natural environment is the development of disease-tolerant elms.

While no elm is completely immune to DED, tolerant elms can block the spread of the disease and survive to a larger size.

“The loss of American elm and green ash as viable tree species in the Upper Mississippi

River floodplain has had a significant

The study is located at a 1.75-acre wetland mitigation site owned by USACE near Ellsworth, Wisconsin. In 2014, the district helped the Forest Service plant 640 young trees at the site. The planting includes the “enriched” saplings of elms descended from crosses between clones with known DED tolerance. The wild elm population is represented by saplings grown from wild American elm seed collected from USACE sites near Spring Valley, Wisconsin, and La Crescent, Minnesota, and a Forest Service site near White Lake, Wisconsin.

USACE and Forest Service employees recently returned to the site to inoculate around 200 saplings against DED. On a hot summer day in early June, the Forest Service’s Charlie Flower, Melanie Moore, Linda

Haugen and Milcah Pulyelil began inoculating trees.

The researchers drilled a hole about one inch into each tree to penetrate the xylem, the water-conducting tissue of a tree. They then inoculated each tree with 60,000 spores of a local isolate of the DED fungus, dabbed petroleum jelly over the hole and tied a flag around it. Researchers only inoculated trees one inch or more in diameter to ensure they could survive

standard inoculation methods and DED infection and still have enough canopy to show leaf variation in response to DED.

The Forest Service returned to the site four weeks after inoculation and again at eight weeks to perform crown ratings, a process that evaluates the amount of dieback in the crowns of DED-treated trees. They will return for a final crown rating in one year. The data from the crown ratings will help researchers determine differences in response and survival between the wild saplings and the enriched saplings with DED-resistant parents. The researchers plan to return to the site in a few years to complete a second round of inoculations on trees that were not at the right stage for inoculation this year.

Story & Photos by Nayelli Guerrero

USACE, St. Paul District

The American elm (*Ulmus americana*) was once a common sight on the Upper Mississippi River, but Dutch elm disease, or DED, has killed many trees.

DED is an invasive fungal pathogen that is spread by elm bark beetles and root grafts between healthy and infected trees. When DED infects an elm, it prevents water from reaching the tree’s leaves, causing it to wilt and die. DED affects many species of elm trees, but American elms are particularly susceptible due to their low disease resistance.

The abundance of American elms on the river floodplain has meant that DED has disproportionately impacted these forests. Although there are still some American elms left on the Upper Mississippi River, DED kills most elms before they can grow larger than 12 inches in diameter.

Over the years, DED transformed forests composed of maple, elm, and ash into forests dominated by maple and ash. The arrival of the invasive insect emerald ash borer has only increased the urgency of finding ways to combat DED. Emerald ash borer has decimated the ash trees in the Upper Mississippi’s maple-ash dominated forests. Without American elms to replace the dying ash trees, the gaps in the Upper Mississippi’s floodplain forest canopy are converting to areas dominated by invasive reed canary grass and other herbaceous species.

For high-value trees in urban landscapes, preventive fungicide treatments can be used to preserve susceptible elms; however, there are not many options to protect



U.S. Forest Service staff, Charlie Flower and Linda Haug, measure the diameter of a tree near River Falls, Wisconsin, June 8.

impact on forest composition,” said Andy Meier, U.S. Army Corps of Engineers, St. Paul District forester. “The breeding and selection of disease-resistant elm varieties could provide a critical component of forest restoration, giving us the potential to restore one species that has been lost.”

The St. Paul District and the U.S. Forest Service are part of the effort to identify American elm specimens that are DED-tolerant. The two agencies are collaborating on a study to compare DED resistance in wild American elm populations to a disease tolerant population. Data from the study will help researchers

ERDC builds robust research portfolio of harmful algal bloom solutions for USACE, nation

By **Holly Kuzmitski**
Engineer Research and
Development Center

Owing to their growing frequency and severity, harmful algal blooms, or HABs, have been featured increasingly in the news over the past few years. From 2016 through 2018 alone, 18 states reported 421 HAB events.

The Water Resources Development Act of 2018 authorized the U.S. Army Engineer Research and Development Center (ERDC) under the Aquatic Nuisance Species Research Program to conduct a five-year HAB demonstration and technology development program, with the focus on scalable technologies related to HAB prevention, detection and management. ERDC has developed a portfolio of strategies to get HABs and cyanobacteria, the nuisance species that cause these events, under control for the nation.

“The U.S. Army Corps of Engineers (USACE) manages over 400 lake and river projects across the U.S., so there is a plethora of reasons of why we have been engaged in this topic,” said Dr. Jennifer Seiter-Moser, technical director, Civil Works Environmental Engineering and Sciences, ERDC-Environmental Laboratory (EL). “We created a research and development (R&D) program called USACE Freshwater Harmful Algal Bloom Research and Development Initiatives that will provide effective solutions at every stage of this complex problem.”

Seiter-Moser said that once fiscal 2020 funding was received, the technical director’s office at the ERDC-EL issued an ERDC-wide request for research proposals on scalable technologies — meaning tools that not only clean a small

lake, but that can be scaled up to an area as vast as one of the Great lakes and be applied on a nationwide scale.

Dr. Mandy Michalsen, strategic initiatives program manager within the Office of the Technical Director, Civil Works Environmental Engineering and Sciences, said that ERDC is now leading more than 20 separate multidisciplinary prevention, detection and management research efforts to deliver solutions to HAB problems affecting the nation. ERDC is also partnering with universities and other federal agencies to combat this problem.

ERDC-EL research biologist Dr. Andrew McQueen and his team are investigating a prevention technology using U.S. Environmental Protection Agency registered algaecides to treat the toxic algae where they overwinter in waterbody sediments.

“Algaecides have been a very effective short-term treatment for HABs for many decades, but they are not without their risks,” McQueen said. “With this project, ERDC will evaluate a preventative treatment strategy to optimize algaecide use. The idea is to reduce the likelihood of algal cells seeding future bloom events.”

ERDC-EL research geographer Molly Reif and her team are leading advancements in HAB detection with a variety of specialized software tools that can be used to monitor water quality indicators of the cyanobacteria.

The tools use regularly collected and freely available satellite images that are detailed enough to show where HABs are likely occurring. “Many satellites have sophisticated sensors that take images in which algae pigments can be identified; these pigments would otherwise be

undetectable by the human eye,” she said.

The technology improves detection because field-based sampling may not show conditions across an entire lake and labor-intensive. In contrast, the software can provide water operations managers with a full picture to better monitor conditions across an entire waterbody using computer-based mapping software that rapidly utilizes Geographic Information Systems, helping users prioritize where field sampling may be needed.

“The primary benefits of the software to USACE water resources managers are more rapid detection and less-costly methods to detect water quality indicators of HABs,” Reif said.

Dr. Victor Medina, an ERDC-EL research environmental engineer, is leading a team in an HAB management effort. The team is investigating the design, construction and testing of a cavitation system for the rapid destruction of cyanobacteria.

Medina’s system utilizes controlled hydrodynamic cavitation, which is rapid pressurization/depressurization of a flowing liquid through a structure, such as a nozzle. Cavitation results in microbubbles; the collapse of the microbubbles creates pressure changes that destroy the cyanobacteria.

“Cavitation is something manufacturers usually seek to avoid because it’s destructive,” Medina said. “The bubble collapse generates chemical reactions that form reactive oxygen species, including superoxides and hydroxyl radicals that can destroy the toxins produced by the cyanobacteria. Within hours the reactive oxygen species react with organic material in the water and disintegrate, so the technology’s

impact on the environment is minor.”

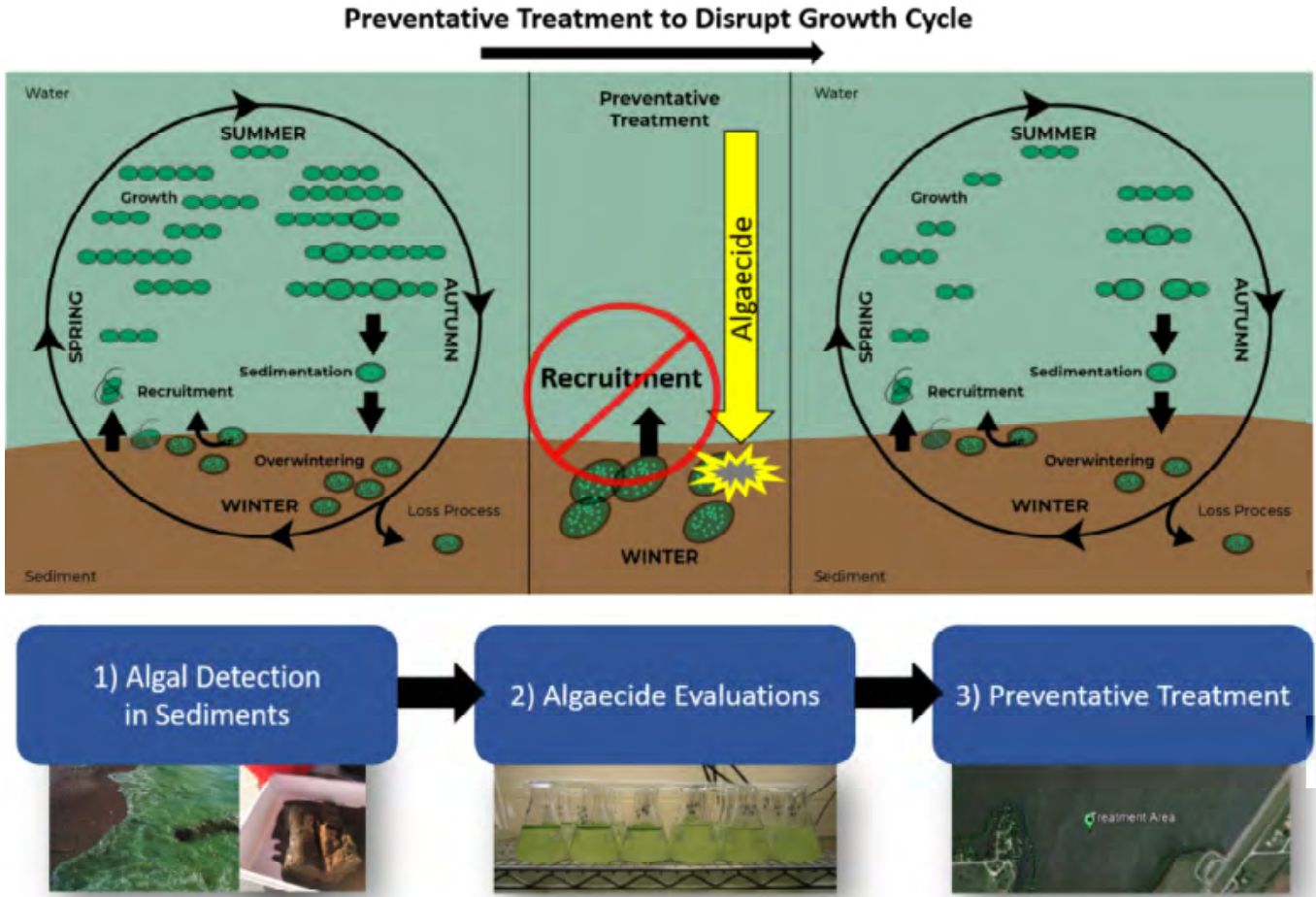
Seiter-Moser believes the HAB R&D portfolio of multidisciplinary and multipartner solutions is a strategic model for future complex challenges that USACE will face.

“ERDC leveraged the HAB research funds to build a program that delivers a diverse portfolio of scalable tools for USACE and the nation, and I’m really proud of that,” Seiter-Moser said. “The research is so multifaceted, and we have so many interested stakeholders and partners, it’s a very significant achievement.”



(USACE courtesy photo)

The Laboratory Cavitation Algae Treatment System is one of several management strategies under development and is used for the rapid destruction of cyanobacteria, the building block of harmful algal blooms, a problem plaguing the nation’s water resources.



(U.S. Army Corps of Engineers image)

ERDC is investigating using EPA-registered algaecides to treat harmful algal cells where they overwinter in waterbody sediments. The goal is to maximize these products’ efficiency and safety as well as prevent large bloom events from occurring.



NDCEE funds novel bioaugmented adsorption treatment system for contaminated groundwater

By Jennifer Rawlings,
U.S. Army Environmental Command
Jovan Popovic, Naval Facilities
Engineering and Expeditionary Warfare Center

The National Defense Center for Energy and Environment (NDCEE) funded a demonstration/validation of novel bioaugmented sorption treatment technology for chlorinated volatile organic compounds (CVOCs) and 1,4-dioxane with the Department of the Navy in 2019.

The purpose of the project is to reduce the Department of Defense's environmental restoration liabilities by developing sustainable, cost-effective technologies for expedited site cleanup and closure.

This novel approach could limit the cost associated with existing pump and treat technologies, and stakeholders will achieve contaminant removal allowing for faster groundwater and site remediation.

1,4-dioxane and chlorinated solvents are persistent groundwater contaminants that are difficult to treat simultaneously. While conventional water treatment technologies, such as air stripping, granular activated carbon filtration, and direct UV photolysis, are effective against treating many volatile organic solvents, these technologies are inefficient against 1,4-dioxane removal due to its chemical stability and high aqueous solubility.

More costly, energy-intensive treatment strategies are generally required to remove 1,4-dioxane from water due to its chemical nature. As such, this project seeks to treat 1,4-dioxane and chlorinated solvent-contaminated groundwater using a novel bioaugmented adsorption treatment system that combines microbiological and physicochemical treatment approaches, allowing for the simultaneous capture and degradation of these contaminants.

Reactor operational conditions were first optimized through laboratory-scale treatability studies using site-specific groundwater containing both 1,4-dioxane and CVOCs prior to process scale up and commencing the pilot demonstration/validation. Both biotic and abiotic reaction vessels were constructed to examine the



(Courtesy photo)

Shaily Mahendra, a professor of civil and environmental engineering at the University of California, Los Angeles, retrieves a water sample for downstream analysis at her UCLA laboratory. The NDCEE is funding a demonstration/validation of a new technology that will allow faster removal of environmental contaminants from groundwater.

effectiveness of bioaugmented adsorbents with respect to their ability to treat contaminated site groundwater.

Biological degradation of 1,4-dioxane was once considered unlikely due to its chemical stability. However, recent evidence has suggested that 1,4-dioxane may be degraded using a variety of different biological and combined biotic/abiotic mechanisms, and this has led to the development of novel bioprocesses surrounding the remediation of this chemical.

During the early stages of this demonstration, initial studies were conducted to better understand the viability of using either a metabolic or co-metabolic treatment strategy in an engineered system, and 1,4-dioxane removal performance with *Pseudonocardia dioxanivorans* CB1190 and *Mycobacterium austroafricanum* JOB5 was compared using site-specific groundwater. Data from these initial studies indicated that *P. dioxanivorans* CB1190's metabolic degradation capabilities would be better suited for reactor and site conditions.

The NDCEE program manager, Jennifer Rawlings, participated in a project demonstration/validation on June 20, at Naval Air Station North Island to witness the great work being done by the project team lead Jovan Popovic and Professor Shaily Mahendra from UCLA. The project team has successfully demonstrated that *P. dioxanivorans* CB1190 bacteria can degrade 1,4-dioxane by 80% while commingled with *cis*-1,2-dichloroethene and vinyl chloride using a mixed granular activated carbon (GAC) and sand filter aerobic bioreactor.

The major takeaway is the bacteria can improve removal by five times under non-optimized conditions, with greater performance under optimized conditions, and only uses 3% GAC to 97%, showing significant cost savings for cleanup sites with multiple contaminants in groundwater.

Similar to per- and polyfluoroalkyl substances (PFAS), 1,4-dioxane has seen pervasive use across many industries over the past several decades. It is present in many commercially available goods, such as paint strippers, dyes, greases, antifreeze, solvent stabilizers, aircraft deicing fluids, deodorants, shampoos, and cosmetics, and it has been widely used in pharmaceutical and plastics manufacturing.

The overall extent of 1,4-dioxane's environmental presence has yet to be determined, but as of 2015, it has been detected in over 1,000 U.S. public water systems, and this number is expected to grow as investigations are expanded. This, in addition to 1,4-dioxane's perceived toxicity, exacerbates potential public health concerns associated with its exposure. Therefore, it is imperative that effective 1,4-dioxane treatment strategies be developed and implemented to address the ever-increasing state and federal regulatory thresholds.

The NDCEE serves as a national resource for advancing technologies and processes that address high-priority environmental, safety, occupational health, and energy challenges. Created by congressional mandate in 1991, the NDCEE works to integrate environmental, safety, occupational health, and energy (ESOHE) impact decisions into the life cycle planning of DOD activities through technology insertion.

ERDC honored with Federal Laboratory Consortium technology transfer award

By Holly Kuzmitski

Engineer Research and Development Center

A U.S. Army Engineer Research and Development Center's Environmental Laboratory (ERDC-EL) team led by research engineer Dr. Victor Medina has been recognized by the Federal Laboratory Consortium (FLC) Southeast Region for accomplishing outstanding work in the process of transferring federally developed technology.

Medina and his team members —Scott Waisner, Charles Ellison, Jose Mattei-Sosa, Jacob Lalley, and Dr. Christopher Griggs — developed the PFAS Effluent Treatment System (PETS), a stand-alone, trailer-mounted mobile water-treatment system designed to treat water containing per- and polyfluoroalkyl substances known as PFAS. PETS is similar to the PFAS Water Treatment Research Reactor (PWTRR), which uses the same treatment technology but is designed for stationary applications.

"I am absolutely delighted about the award and proud of my project team," Medina said. "We're so excited about the technology; the

PETS is up to 90 times less expensive over a five-year period than traditional cleanup efforts. For a particularly challenging overseas installation, costs were approximately \$2.9 million annually. First-year costs with PETS are approximately \$95,000, with follow-on operational costs at \$15,000 per year."

The team transferred the technology to the U.S. Department of Defense, successfully completing proof-of-concept testing of the technology at three U.S. military sites storing PFAS-containing aqueous film forming foam, which has been widely used to control petroleum fires since the 1970s.

"PFAS is an emerging chemical of concern, because the same properties that made it so attractive as a material in products such as firefighting foams and Teflon also make it a persistent pollutant in the environment," Medina said.

According to the U.S. Environmental Protection Agency, PFAS are persistent, they bioaccumulate in organisms, and they are toxic at very low levels.

Since the technology transfer effort was undertaken during COVID-19 restrictions, team members developed innovative approaches to test the project, training base personnel to

take on the team's roles in two different remote areas. The team created training materials, conducted training sessions and provided troubleshooting support via Microsoft Teams.

"Even in its testing phase, PETS/PWTRR has already made a positive impact on achieving the Department of Defense's sustainability goals," Medina said.

The team successfully treated three sites, resulting in water discharge free from PFAS. "We treated 150,000 gallons, or 95% of stored water containing PFAS at the Air Force's Hurlburt Field in Florida," Medina said. "In the Pacific, two storage tanks totaling 50,000 gallons at a Marine Corps installation were remediated, and about 156,000 gallons in a run-off collection pond at an Air Force base was treated during the technology testing phase."

"This is a huge honor for the ERDC-EL and for the researchers," said ERDC-EL Director Dr. Edmond Russo. "We expect that lower costs and portability mean the technology will play a critical role in remediating PFAS impacts and protecting the environment for current and future generations."

This technology can be used to support future PFAS remediation efforts in the U.S. and throughout the world.



(USACE courtesy photo)

U.S. Army Engineer Research and Development Center-Environmental Laboratory Research Environmental Engineer Scott Waisner tests the PFAS Effluent Treatment System (PETS) at Hurlburt Field, a U.S. Air Force installation located in Okaloosa County, Florida, September 2019.

U.S. Armed Forces veterans wrangle gators at annual alligator hunt

Story & Photos By Trevor Welsh

USACE, Fort Worth District

The Pineywoods Service Association (PWSA), with cooperation from Texas Parks and Wildlife (TPWD) and U.S. Army Corps of Engineers (USACE), Fort Worth District's Town Bluff project staff, hosted their Annual Veteran Alligator Hunt at Walnut Ridge Unit, Martin Dies Jr. State Park on B. A. Steinhagen Lake, affectionately known as "Dam B," Sept. 9-12.

TPWD has been hosting a public alligator hunt since the mid-1990s at the lake. They worked with the Town Bluff project office to provide four tags for veterans to use starting in 2012, in addition to the normal adult and youth tags they have been making available for the last 25 years.

According to Town Bluff project manager Floyd Boyett, the purpose of the hunt is to honor the veterans, give them a fun event where they can see that folks appreciate what they have done for the country, create a time where they can visit with other vets in similar circumstances, and of course help manage the resource.

"I am not a vet, so it gives me a chance to say thanks," Boyett said. "I get to contribute my presence in an official capacity as lake manager, work with the sponsors and volunteers, cooperate with TPWD Wildlife and State Park folks, et cetera. But mostly I do it because it's fun. I get to scout throughout the year, then drive an airboat around watching the guys have a great experience. Makes the job more fulfilling and gives me something to look forward to throughout the year."

This year's veterans included James Garrigus, Staff Sergeant, U.S. Air Force; Daniel Juracek, Specialist, U.S. Army; Mike Harper, Sergeant, U.S. Marine Corps; and David Sadler, Petty Officer 2nd Class, U.S. Navy.

Juracek, who is a Fort Worth District teammate and who has been involved with the hunt for 10 years as the safety specialist, says he enjoys meeting fellow veterans and the thrill of the hunt.

"The camaraderie during this weekend is unforgettable, no matter what branch of service you served in, that feeling of family always rises to the top," Juracek said. "I really appreciate everything the volunteers do for this hunt."

To prepare for the hunt, multiple people went out to various areas of the lake and rivers to scout alligators. As the event got closer, final scouting was done in the evening when alligators are most active. Then the "best" locations were determined.

Bryan Heffernan, Town Bluff project natural resources specialist/park ranger and a U.S. Marine Corps veteran who has been involved with this hunt for five years (including two years ago when he was selected as a hunter), was a guide this year in one of the air boats. This role included helping

two veterans set up their hook and line sets, as well as making sure they knew how to handle the line if an alligator was on and how to dispatch it.

"There is a lot of coordination with all parties involved with the hunt including the Piney Woods Service Association, who selected the veterans and provided food and activities; and Texas Parks and Wildlife, who graciously donated campsites for volunteers, cabins for the hunters and use of the dining hall for the duration of the event," Heffernan said. "It is very rewarding to be able to be a part of allowing veterans who may not have an opportunity to hunt alligators get a chance. It also means a lot to me to be able to hang out and talk with the veterans about our shared experiences which is not something that happens a lot."

The weekend of camaraderie and hunting started Friday afternoon. Veterans, lake staff, PWSA, and other volunteers spent time getting to know each other over a dinner provided and prepared by PWSA. After another meal provided by PWSA Saturday morning, the hunters and volunteers gathered for a safety brief and instructional session presented by TPWD. After the safety brief, the hunt officially began!

Four airboats left the state park in search of the perfect places to hang their sets: a chicken leg quarter placed on a four-inch hook, attached to 300-pound test line leader and nylon rope, tied to a cypress tree, and suspended about 10 inches over the water on a cane pole.

As the midday sun was high above Dam B, hunters, their guides and the air boat captains sped across the glassy water, busy canvassing the shoreline and sloughs of the lake, and setting hook and line sets for the Annual Veteran Alligator Hunt.

These sets would remain in place until 6 p.m. when the hunters would go check for possible catches. None were caught Saturday evening. The evening ended with another meal provided by PWSA and more camaraderie.

After another early-morning PWSA breakfast, the crews hit the water again at 9 a.m. None were caught yet. The veterans and their guides reset the lines to place them closer to the water for a higher chance of hooking a gator. The crews made their way back to shore. At about 11 a.m., they went out again teeming with anticipation of catching an alligator; and they were successful!

The excitement was on as the crews pulled on the lines to reveal large green bodies rolling and thrashing in the water. After fighting the gators for some time, then getting them close to the boat and safely dispatching them, they taped their mouths shut and arms behind their backs, then finally pulled them in the air boats.

Two veterans caught alligators: Mike Harper with a female that was 8 feet 1 inch long and weighed in at 108 pounds; and David Sadler with a female that was 7 feet 6 inches and 76 pounds.

After being measured, weighed and tagged by TPWD, the veterans and their teams spent the rest of Sunday evening cleaning the gators to harvest their skin and meat.

Spray Co, who provided three of the four airboats used, is contracted by Lower Neches Valley Authority (LNVA) to apply aquatic herbicide via airboat at Town Bluff and Sam Rayburn lakes under a memorandum of understanding between USACE, LNVA and TPWD to manage invasive aquatic vegetation.

"Since SprayCo spends so much time on the lake as LNVA's contractor and sees the gators during the year, they recently have volunteered their airboats and operators as the hunt boats for the event," Boyett said.

The individuals that make up the PWSA got together as a group of volunteers in 2010, but the PWSA did not officially form until 2016.

Mitchell W. Holland, local business owner and president of PWSA, says he became tired of watching other organizations taking 50-70% of everything for themselves, and decided to start a 501c3 non-profit organization.

"None of our board members receive any compensation for what we do; 100% of everything goes back to our nation's heroes," Mitch said. "As long as I am a part of PWSA you have my word it will stay that way. I have had many family members who have served this great country in the armed forces. I, however, never had the honor of doing so. I deeply respect those who have served this country and believe they should be honored. PWSA gives me a way to do just that, to give back to those who have given so much of themselves."

PWSA uses various outdoors activities to improve the quality of life for veterans.

According to their website, their mission is to empower veterans, wounded warriors, and warriors in transition with self-reliance to choose and enjoy the outdoor sport of their interest. Their vision is to create a network that links veterans with volunteers through an online community, that all veterans become self-sufficient to enjoy hunting, fishing and other outdoor activities, and to build on the camaraderie that military service members enjoy by creating a "net" for veterans to connect with other patriotic persons: retired, former military, active/reserve military, and dedicated citizens. Learn more at <https://thepepsa.net>.

The Town Bluff project is located midway between Jasper and Woodville, Texas, in the heart of the East Texas Pineywoods. Its mission is to assist Sam Rayburn Reservoir in providing flood control to the Angelina and Neches River basins in Southeast Texas; supply water to the LNVA and the Beaumont area; produce a clean source of electric generation; and to offer some of the best fishing, camping, and birding in Texas, all at just a little slower pace. Learn more at <https://www.swf-wc.usace.army.mil/townbluff/>



Daniel Juracek, U.S. Army veteran and safety specialist with USACE, Fort Worth District, waves at another airboat while canvassing for potential alligators during the PWSA Annual Veteran Alligator Hunt on B. A. Steinhagen Lake.

David Sadler, U.S. Navy veteran, wrangles a 7-foot-6, 76-pound female alligator during the PWSA Annual Veteran Alligator Hunt on B. A. Steinhagen Lake.

Mike Harper, U.S. Marine Corps veteran, wrangles an 8-foot-1, 108-pound female alligator during the PWSA Annual Veteran Alligator Hunt on B. A. Steinhagen Lake. The hunt started in 2012 and is hosted by PWSA with cooperation from Texas Parks and Wildlife and USACE, Fort Worth District.

Army engineers promote sustainable construction practices on Last Frontier

By Rachel Napolitan
USACE, Alaska District

Each year, the U.S. Army Corps of Engineers, Alaska District constructs projects for the military valued in the millions of dollars to support readiness, training and quality-of-life initiatives for service members in Alaska. For each of these endeavors, the agency works to meet sustainability goals by ensuring the construction practices and new facilities are as energy efficient as possible.

“It’s a good practice,” said Jerry Ouzts, sustainable program engineer at the district. “It’s good for us, it’s good for the military community and it’s good for the environment.”

Since 2006, the Army has mandated that its facilities meet the environmentally friendly standards of the U.S. Green Building Council’s Leadership in Energy and Environmental Design (LEED) rating system. The third-party certification program provides a framework and validates compliance with specific requirements for sustainability from design to construction to operation of new facilities or the remodeling of older buildings. Over the last 10 years, the district has certified 42 buildings through the model.

“We were already doing a lot of these practices, but the formal program simplifies and documents it now,” said Monica Velasco, chief of the Construction Branch. “When we first started, it was a new system and large effort to really make sure we implemented it correctly. As the years have progressed, it has become part of what we do naturally.”

The U.S. Green Building Council recognizes the degree of achievement in sustainable design and construction practices by assigning a LEED rating to



(Ryan Dahl)

The U.S. Green Building Council’s Leadership in Energy and Environmental Design plaque is displayed in the entryway of the F-35 Flight Simulator Center on Eielson Air Force Base in Alaska.

each facility. Projects are categorized into four levels: certified, silver, gold and platinum. For new construction, USACE buildings must at least meet the silver level.

“Programs like LEED help us do the right thing from day one of a project and ensure the new facility meets energy and sustainability requirements,” Ouzts said.

This practice is no more evident than in the district’s delivery of the F-35A beddown program at Eielson Air Force Base.



(USACE courtesy photo) USACE, Alaska District achieved the U.S. Green Building Council’s Leadership in Energy and Environmental Design gold rating on the 354th Operations Support Squadron’s F-35A weapons intelligence facility at Eielson Air Force Base in Alaska.

Construction began in 2017 to support the arrival of two new F-35A aircraft squadrons along with assigned airmen and their families.

So far, one project achieved LEED gold, nine earned silver and one, a remodel of an existing facility, secured a certified rating. Another three buildings accomplished certification under

the Green Building Initiative’s Guiding Principles, which is the Air Force’s new preferred model for authenticating environmentally friendly building practices.

Velasco highlighted the effort of the Alaska District to simplify the requirements for contractors to make it a part of standard operations.

“We have embedded the requirements into our process, so it is something our contractors just do now,” she said.

Strong working relationships with the construction industry and shared expectations for project delivery are critical to the successful execution of sustainable building practices. Velasco also pointed to the importance of including the need for a LEED accredited professional, someone with expertise in green building and the rating system, in the initial contract. In addition, the project delivery team must ensure the facility earns certification credits in key areas like site selection and waste management.

The Alaska District uses sustainable practices to avoid the depletion of natural resources and

minimize the impact on future generations, while meeting the needs of today’s military. From the beginning of a project, site selection ensures that a green approach is factored into construction.

“We need to be smart about where we are building buildings,” Ouzts said.

See ARMY ENGINEERS, page 23





(USACE courtesy photo)

Workers engage in construction activities for a satellite dining facility Sept. 20, 2019, at Eielson Air Force Base in Alaska. USACE, Alaska District delivered the project in support of the installation's F-35A aircraft beddown program.

To do this, the district looks at the full life cycle cost of using land, minimizing the footprint of buildings and leveraging existing space in previously developed areas.

"Waste management stands out because people ask how we are going to decrease waste," Velasco said. "If you need a stud, we encourage contractors to buy the right length instead of cutting a larger piece of wood and having the excess go in the landfill."

They also try to minimize negative impacts on air quality by preventing the accumulation of dust inside facilities during construction.

"A lot of the dust prevention has to do with ventilation systems in the new buildings," Ouzts said. "If dust from the construction work gets into the system initially, it blows all over and into the air. Keeping sites clean as we go prevents the issue."

Additionally, they address air quality concerns by incorporating low-emitting materials like paint and composite wood to further ensure LEED

certification for the facility. And it is easy to tell if a site is using low-emitting products.

"Anytime there's a strong smell of paint or solvent, it's not low-emitting," Ouzts said.

Materials used for construction are sourced locally whenever possible. Insulation, concrete and gravel are often acquired from local companies to cut down on the emissions used to transport the supplies by barge, plane or truck from the lower 48 states. Contractors also use recycled building products like sheetrock and metal when feasible.

Every aspect of the decision-making process for design choices and product selection is based on sustainable standards. Examples include everything from separate light switches that conserve energy to enclosed janitor closets that prevent fumes from entering the building to low-flow toilets that save water to energy-efficient windows that retain heat. This focus reflects the district's

commitment to investing in enduring solutions that benefit both people and the environment.

"The more we reduce our energy consumption, the less we have to use; the less we have to use, the less we need," Ouzts said.

Though implementing this in construction can be more expensive up front, it helps with the long-term costs of maintaining a building by keeping energy costs down and operations efficient.

"LEED is specific to construction, but sustainability touches everything we do," Ouzts said. "Even in our everyday lives, we can support some piece of it in ways like choosing to use duplex (double-sided) printing and participating in recycling programs."

Other suggestions from him include turning off the lights, adding a recycle bin to your office or house, and finding small elements across everything you do to be a little more environmentally conscience.

ERDC partners with The University of Southern Mississippi and others in effort to re-establish Gulf oyster habitat

By Jason Scott
Engineer Research and
Development Center

The U.S. Army Engineer Research and Development Center (ERDC), The University of Southern Mississippi (USM), the University of Kentucky and the Mississippi Department of Marine Resources (MDMR) are working on a three-year collaboration to create oyster reef habitat in the northern Gulf of Mexico for experimental purposes.

The project's primary objective is to investigate methods for optimizing oyster habitat restoration in the area which would ultimately lead to oyster population recovery and enhancement of ecosystem services in coastal waters. A secondary objective is to evaluate whether the creation of oyster reefs as part of coastal restoration activities has any impacts on the use of critical habitat by Gulf sturgeon, a federally protected species.

A robust oyster population is vital to the ecology and the economy of the region. In early 2021, the research team began evaluating potential reef sites off the coast of Mississippi. Specifically, they were looking for areas that offer favorable environmental conditions for oysters within the footprint of Gulf sturgeon habitat.

"The plan is to create oyster structures at two sites. Each site will have two 50-acre leases, with each lease having eight one-acre reef plots," said Dr. Safra Altman, a research ecologist with ERDC's Environmental Laboratory and ERDC's technical lead for the project. "We believe we have now identified two sites that will allow us to best fulfill both project objectives."

Currently, all of Mississippi's waters within the Mississippi Sound are federally designated critical habitat for Gulf sturgeon. However, exactly how the fish use and interact with the various habitat subtypes — like open bottom or oyster reef — within the Mississippi Sound is unknown.

The project aims to determine what positive and negative impacts, if any, occur to Gulf sturgeon critical habitat by quantifying changes in use by acoustic telemetry tagging studies, sediment characteristics and Gulf sturgeon prey density in response to oyster reef creation. This data will allow resource managers to make informed decisions on how to best achieve restoration while simultaneously conserving Gulf sturgeon.

The research team submitted permit applications for the proposed reef sites earlier this year. The MDMR held a public comment period in November 2021 and the U.S. Army Corps of Engineers (USACE) will accept public

comments soon to give people the opportunity to provide feedback on the proposed reef site locations before construction begins.

"Getting the permits reviewed and approved is the next major step of this project," said Dr. Read Hendon, director of the Gulf Coast Research Laboratory and USM project lead. "However, our researchers have already started data collection in and around the proposed reef sites so that we have baseline information on ecological conditions before the reefs are created."

Dr. Mike Andres, assistant research professor at USM, and graduate students from his lab are taking the lead on the Gulf sturgeon component of the project. The USM and ERDC researchers are currently tagging juvenile and subadult Gulf sturgeon in the Pearl and Pascagoula rivers in expectation of using these various habitats.

"Dr. Andres' lab, along with ERDC researchers and collaborators from the University of Kentucky sampled sediments and potential Gulf sturgeon prey species in Mississippi Sound during August to gather preliminary data for these regions," Altman said. "An acoustic telemetry array over open-bottom habitats where oyster lease sites are expected to be

created and over oyster reef habitats was deployed to quantify habitat characteristics — sediment composition and prey items — and Gulf sturgeon use prior to creation of the oyster reef treatments."

Gulf sturgeon are not the only species to be influenced by reef creation. The USM team will also be tagging finfish species known to feed on oyster reefs, such as black drum and sheepshead. The acoustic

receiver arrays established over different habitats are expected to yield additional data from other USM and DMR collaborators tagging other recreational fish species within the Mississippi Sound, including red drum, southern flounder and Atlantic tripletail.

The project is being funded through the U.S. Army Corps of Engineers' Ecosystem Management and Restoration Research Program.



(Michael Andres, The University of Southern Mississippi)
The University of Southern Mississippi graduate students and research technicians hold an adult Gulf Sturgeon captured in the Pascagoula River. Pictured from left: Elizabeth Greenheck, Alfonso Cohuo, Austin Draper, Kasea Price, and Kati Wright.



(Michael Andres, The University of Southern Mississippi)
Benthic infaunal sample.

Crab Bank Seabird Sanctuary: A landmark legacy

By Glenn Jeffries
USACE, Charleston District

A dredge, appropriately named Dredge Charleston, a daily crew of 53 workers, and heavy earthmoving equipment worked 24 hours a day for seven weeks constructing a landmark legacy of the Charleston Harbor Post 45 Deepening project: the restoration of Crab Bank. Crab Bank is a bird sanctuary located in the Charleston Harbor near the shoreline of the Old Village in Mount Pleasant, South Carolina.

The project is a landmark legacy of Post 45 because the rest of the \$550 million deepening project is underwater, and that massive investment is not visible to the public. In the case of Crab Bank, it has now become a feature of the Charleston Harbor that can

easily be seen and noticed from as far as the Arthur Ravenel Jr. Bridge. Beneficially using material from the deepened channel restored 32 acres of prime nesting grounds, giving shorebirds and seabirds much-needed habitat for increasing their populations this spring and those to follow.

Because placing the dredged material on Crab Bank was not the least-cost placement method, a non-federal sponsor was needed to make the concept a reality. The South Carolina Department of Natural Resources (SCDNR) stepped up to fill that role and share in the costs of the project. If not for their commitment and partnership, this sandy material would have wound up sequestered in the ocean placement site and this seabird sanctuary lost for good.

Although the actual construction only took a few weeks, the idea came about years ago when the Post 45 project delivery team was trying to identify potential projects to maximize the beneficial use of the available sandy dredged material from the harbor deepening. Crab Bank rose to the top.

“Nine years ago, Crab Bank was just a concept, three years ago SCDNR stepped up to make it a reality, and this spring it becomes vital habitat and nesting grounds for shorebirds. It is rare in an engineer’s career to see a project from concept to completion. Seeing this to completion is very rewarding,” said Brian Williams, one of the project managers.

Approximately 660,000 cubic yards, or 66,000 dump truck loads (one dump truck carries about 10

cubic yards), of material created the crescent-shaped footprint, which can be seen from the Ravenel Bridge, Alhambra Hall, or other waterfront spots on the harbor side of Mount Pleasant.

“The work is fascinating to see,” said Jeff Livasy, project manager. “The hydraulic cutterhead suction dredge sucks up the material from the channel floor, similar to a vacuum cleaner, and it is pumped onto the island through various types of pipe. Once the material is on the island, bulldozers begin shaping the material.”

“This is a little different than a beach renourishment project,” said Chip Forbes, the field engineer for Norfolk Dredging Company, the contractor working for the district. “We usually have our guys smooth out the sand perfectly, so it is flat and even

terrain, but in this case, the birds do not want that. Different birds like different terrain so this has been fun creating something with lumps, bumps and some flat surfaces.”

The natural isolation of the island keeps the birds and nests safe from predators. Over 15 different bird species have been spotted nesting on the island in previous years.

“The number of shorebirds and seabirds’ nests are declining each year,” said Janet Thibault, a wildlife biologist for SCDNR. “Having places for them to have refuge is really important. Around March or April, the birds will come back, find mates and build nests. So, I’m just really excited to see this project happening.”

This one-time placement of material could have as much as a 50-year life span, but in such a dynamic environment we know the footprint will be reduced and change each year. Mother Nature will play a large role in the life of Crab Bank. SCDNR will monitor the island each season with special cameras. This live webcam will also allow the public to view the island’s inhabitants in real-time.

Visitors are not allowed on the island during the official nesting season which runs from March 15 - Oct. 15 each year. During the remaining months, the island is only open below the high tide line, and pets are prohibited.

With most of the island inaccessible, exploring the island

by kayak or motorized boat is a fun way to see the activity. However, visitors are asked to avoid generating boat wakes since they may cause erosion on the island.

USACE is proud to have partnered with the SCDNR on the restoration of this vital habitat and is excited to “Welcome Back the Birds” with a public event this April. Stay tuned to the social media channels of both agencies this spring for more information.

Dredged material from the Charleston Harbor Deepening project is added to Crab Bank, a 32-acre site of prime nesting habitat for many coastal birds.
(Jackie Pennoyer)

USACE researchers looking for solutions to Great Lakes water quality issues



(USACE courtesy photo)

Researchers will use this 25-acre test site in Defiance, Ohio, to find solutions to non-point source pollution in the Great Lakes Basin.

By Jason Scott
Engineer Research and
Development Center

The U.S. Army Engineer Research and Development Center (ERDC) and the U.S. Army Corps of Engineers (USACE) Buffalo District are collaborating with the U.S. Environmental Protection Agency (EPA), the U.S. Geological Survey (USGS) and other federal and state agencies to find solutions to water quality issues in the Great Lakes.

“The Great Lakes has a nutrient problem that is decreasing water quality,” said Dr. Jacob Berkowitz, research soil scientist in ERDC’s Environmental Laboratory. “Harmful algal blooms (HABs), which have been linked, in part, to excess phosphorous, are causing major issues.”

According to the EPA, a collaborating agency on this project, “HABs are overgrowths of algae in water. Some produce dangerous toxins in fresh or marine water, but even non-toxic blooms hurt the environment and local economies.”

HABs are caused by cyanobacteria — or blue-green algae, a nuisance species — and it impacts human health and safety, fish and wildlife, water supply, reservoir operations and recreation. The city of Toledo, Ohio, was cut off from drinking

water access for more than two days in 2014 due to a toxic HABs event in Lake Erie.

There is an abundance of farmland around the Great Lakes, meaning there are fertilizers and other chemicals that are used on crops. These chemicals, including phosphorous, seep into groundwater and eventually wind up in the Great Lakes.

The Great Lakes Restoration Initiative (GLRI) identified reduction of phosphorous loading in Great Lakes watersheds as a priority item to address degraded water quality at regional scales.

“EPA is excited to collaborate with USACE and the USGS on this GLRI project — a project that has been several years in the making,” said Chris Korleski, director of EPA’s Great Lakes National Program Office. “This partnership allowed us to put an innovative idea into action, and as we monitor the site over the next five years, we will develop a better understanding of how phosphorus can be retained on the landscape and kept out of Great Lakes tributaries and the Great Lakes themselves, including Lake Erie.”

Researchers are looking at the possibility of using wetlands to decrease nutrient loading in the

Great Lakes, particularly Lake Erie. However, some research suggests that wetlands soils have a limited capacity to retain phosphorous.

In some cases, in situ soils — those soils that are in their original condition, may not have the capacity to retain additional phosphorous or may be potential phosphorous sources. In these cases, management strategies to address soil phosphorous saturation are required.

“Right now, Lake Erie is having kidney failure. With the Great Black Swamp drained and few wetlands available to filter agricultural runoff, excess fertilizers are concentrating right in the lake. It’s a big problem and solving this issue will take a team of teams,” said Lt. Col. Eli Adams, commander of the Buffalo District. “So, we’re partnering with local and federal agencies in forums like the Western Lake Erie Basin Partnership. We’re also leveraging ERDC and collaborating with them on this demonstration project. It has huge potential benefits not only for the health of the Maumee River Watershed, but for communities whose residents and economies depend on the Great Lakes for a clean water supply.”

Currently, research is looking at soil phosphorous storage capacity (SPSC), which was developed to estimate the capacity of soils to

operate as phosphorous sinks. SPSC utilizes extractable phosphorous, aluminum and iron. It provides a relative measure of phosphorous dynamics and is inexpensive and rapid compared to other methods.

“We are looking at the best way to use wetlands in excess nutrient, especially phosphorous, sequestration,” Berkowitz said. “Soil characteristics determine the capacity of wetlands to sequester phosphorous; however, soil sampling protocol to document SPSC for constructed wetland siting has not been developed.”

ERDC is evaluating results from an SPSC for wetland best management practices development. To date, 79 soil samples taken from eight locations have been analyzed for SPSC. Coastal and inland sample locations were identified by local project partners. The next phase of the project will be to begin testing at a 25-acre test site built in Defiance, Ohio. While the site is up and running, it will not be fully operational until spring 2022.

“We’ve seen that most locations sampled contained phosphorous storage potential,” said Berkowitz. “The SPSC method has proven useful for evaluating soil phosphorous sorption dynamics, is relatively expedient and inexpensive and can be applied in multiple capacities.”



Global partners developing global solutions

By Courtney Chambers

Engineer Research and Development Center

Flooding is not unique to the United States. It is a problem we can unite against with the international community. The U.S. Army Corps of Engineers' (USACE) Engineering With Nature® (EWN) program joined forces with the Netherlands' Rijkswaterstaat (RWS), the Environment Agency of the United Kingdom, the National Oceanic and Atmospheric Administration (NOAA), and a community of 77 multi-sector, international organizations to collaboratively develop the International Guidelines on Natural and Nature-Based Features for Flood Risk Management (Guidelines). In doing so, this broad and diverse collaboration drew expertise and best practices from around the world to advance the development of 21st century water infrastructure.

Modern society is affected by many types of hazards — manmade, natural and combinations of the two. These combined challenges require new solutions that are effective, sustainable, and adaptable. Just as the challenges are often layered and complex, the solutions necessitate a systems approach that includes layering and combining measures and phased development to adapt to uncertain changes.

Functions provided by nature are a critical component of this approach. Natural and Nature-Based Features (NNBF) provide opportunities to increase the functional performance of flood risk management systems, provide long-term risk mitigation, increase the resilience and sustainability of water infrastructure systems, and reduce maintenance and repair costs, while creating additional social and environmental value for communities.

NNBF also expand the arsenal of management solutions available to decision-makers, project planners and practitioners, but comprehensive guidelines are needed to inform their use for engineering functions. Additionally, broad endorsement and acceptance of proposed guidelines are necessary to affect innovative change in the practice of infrastructure development. To that end, the EWN program and its extensive network of partners answered the call by delivering the Guidelines.

"For the Netherlands, a country of which about 30% is below sea level and about 60% of its surface is flood prone, 'engineering with nature approaches' have become essential for improving our flood safety in an adaptive manner," said Michèle Blom, director general, the Netherlands RWS.

The Guidelines evolved over five years through a collaboration with 77 cross-sector organiza-

tions that drew from international experience and best practices to provide technical information on conceptualizing, planning, designing, engineering, operating, and maintaining NNBF (e.g., beaches, dunes, islands, wetlands) as a part of flood risk management systems. Decision-makers, project planners, and practitioners now have this resource available to aide in the development and implementation of projects that reduce flood risk to communities and improve the resilience of coastal and inland water systems.

years, the Guidelines' contributors and authors attended working meetings hosted by partnering agencies to establish a common approach for organizing the guidelines, share and coordinate information, and integrate the chapters into the 1,017-page document. At each of these locations, site visits allowed contributors to see nature-based features in the landscape providing flood risk protection to communities around the world.

The Guidelines are organized so that readers can begin where their interests lie; there was no expectation that someone would start on page one and read each chapter in order until the end. Given the conceptual connections and relationships among the topics, the chapters were developed in a collaborative environment with communication and engagement across chapter teams. Each chapter begins with a list of its key, high-level messages, includes references to other chapters and uses icons and case studies to draw attention to key topics covered elsewhere in the Guidelines.

"The National Oceanic and Atmospheric Administration recognizes that the scope of flood risk management challenges, worldwide, cannot be fully addressed solely through use of conventional infrastructure and is proud to be a contributor to the International Guidelines on Natural and Nature-Based Features for Flood Risk Management," said Richard W. Spinrad, under secretary of commerce for Oceans and Atmosphere and NOAA administrator.

"We hope these guidelines will provide a new baseline for the technical assessment and implementation of nature based solutions for our client countries and partners," added Sameh Naguib Wahba, global director, Urban Disaster Risk

Management, Resilience and Land, World Bank.

Since its publication in September 2021, the Guidelines have been downloaded over 4,200 times from locations in 61 countries. There are more plans being discussed for how the Guidelines will be offered to the public. In fact, the community of contributors joined in writing the Guidelines are committed to the next steps of training and implementation of NNBF as part of flood risk management solutions.

For more information on the NNBF Guidelines, please visit the EWN webpage (www.engineeringwithnature.org) or contact Dr. Todd Bridges, National Lead of the USACE EWN Program, at Todd.S.Bridges@usace.army.mil or Courtney Chambers, EWN Communications Lead, at Courtney.E.Chambers@usace.army.mil



"Natural and Nature-Based Features are increasingly important to the Environment Agency and its partners in enabling flood risk management programs that create better places for people and wildlife," said Caroline Douglas, executive director, Flood and Coastal Risk Management, the Environment Agency of the United Kingdom.

The process of developing these Guidelines began in 2016 with the first in-person meeting of the project at the U.S. Army Engineer Research and Development Center (ERDC) in Vicksburg, Mississippi. Over the course of five

Giving teachers the tools to prepare students for the future

Front exterior of the new West Point Elementary School.

Story and Photos by JoAnne Castagna
USACE, New York District

Recently, Col. Matthew Posner, M.D. spoke at the ribbon-cutting ceremony for a new state of the art elementary school at the U.S. Military Academy at West Point, New York, a school he attended as a child.

“Robinson, or Mr. R as he was known, was one of my teachers. He, without a doubt, taught me all that I really needed to know for a future in my current profession. He taught, he disciplined, he coached, he nurtured, he cared. He set high standards for us, academically and spiritually,” said Posner who is a USMA graduate and an orthopedic surgeon at Keller Hospital.

He continued, “One time our class spent a week at Lake Frederick under Mr. R’s care. We had outdoor classes, competed in field events, and took survival training courses. Why do I mention Mr. Robinson so prominently? To remind us of the most important link in the education chain: our teachers, especially our elementary school teachers who take on our kiddos as relatively blank canvases and help create masterpieces.” Mr. R was invited to the ceremony and was in the audience.

Posner’s fourth grade daughter Sarah-Jane attends the same elementary school.

He said, “I hope my daughter can look back at her elementary school days with the same fondness of her teachers and experiences as I do. The new school gives our teachers a whole new set of tools to educate our kids with.”

This is likely to happen. The U.S. Army Corps of Engineers (USACE), New York District completed construction on the school that is providing teachers the tools they need to teach students about STEAM or science, technology, engineering, art, and mathematics to prepare them for the 21st century.

USACE has constructed many of the structures on the historic 200-year-old military academy. Now it’s created a new school for the children of Army Soldiers and Department of Defense civilians who live at the academy.

Teachers at the school are providing students a STEAM education. To do this, they are using a myriad of technological tools and the school is designed to be flexible and adaptable to provide different kinds of learners the environments they need to succeed.

Posner said, “STEAM gets a bad rap, as many adults and kids are easily intimidated by math, science, and engineering. Many

folks believe that rocket science is capable of being understood by just few super intellectual kids. Making STEAM education available at young ages enables our children to see just how fascinating these disciplines really are and knocks down any perceived barriers that STEAM is too complex for the average child.”

He added, “The world has transformed into a technology-based economy. Our children must be comfortable on computers. They must be well-versed in science and engineering. In a way, the recent COVID-19 pandemic has turned many folks into pseudo-scientists, epidemiologists, geneticists, and pharmacists. STEAM is important in our everyday lives and it’s incredibly important to have the background in the basics of these disciplines.”

The new West Point Elementary School is providing this. It replaced an outdated structure that was built in the 60s. The school serves 509 students from pre-kindergarten to fifth grade and is located near the campus’s middle school and gym.

The multi-story, 95,552-square-foot school was built into the side of a mountain and has beautiful views of the Hudson River, the river valley, and the surrounding forests. Its design embraces this beauty to educate

students about their region and the local culture.

To bring the vibrancy of the region into the building, large windows were installed throughout the school and the floors and ceilings were painted with a wide variety of colored paints. What also brings the vibrancy of the region into the building are the interior structures. Timothy Pillsworth, New York District project engineer, said, “For example, instead of having utilitarian staircases, the stairwells are painted with pleasing colors for a pastoral feel.”

Speaking of utilitarian, instead of having corridors with classrooms to the left and right, students are learning in flexible learning spaces called Learning Neighborhoods. The school has five Learning Neighborhoods. Inside each neighborhood there are six learning studios, a teacher collaboration room, and a kitchenette that surround a central learning Hub.

The studios can be used for large or small groups and one-on-one instruction. They are flexible spaces that provide teachers an opportunity to be more collaborative in their teaching and they will be able to group students with like interests, needs, and learning goals.

Another benefit of these spaces is that it makes the best use of time during a day. Instead of students leaving their neighborhoods to see different instructors, the instructors come to them in the neighborhoods.

The center Hub area serves as a seating and learning area and has a variety of different chairs and tables for students including couches, beanbags, and pillows.

Posner said that the center hubs are his favorite aspect of the new school because he feels students should learn about collaboration. “It’s not an innate behavior to work effectively with others in small or large groups,” said Posner. “The school is designed to promote this collaboration at the lower grades and really builds on this concept as they advance in grades.”

When training to become a doctor, he realized the importance of collaboration. “Medicine is all about collaboration and life-long learning. I remember the first thing that my anatomy professor told us on our first day of medical school. He said, ‘Everything you get taught over the next four years is already outdated.’ This really hit home for me. Learning never ends, no matter the profession you choose. And didactic-style

learning is not an efficient or even a realistic way to learn as an adult. Exposing our children to collaborative learning and learning through multiple platforms is, in effect, getting them ready to be adult learners.”

Sarah-Jane, agrees. She said she enjoys sitting in the collaboration spaces where the students do science experiments and read books.

Each Learning Neighborhood is equipped with the latest educational tools and the students are embracing them. Fifth grader Daisy said, “I like the new school’s technology. It is high-tech, and it is easy to work with.”

As you walk through the school there is an area you can’t help but notice — the library. From the hallway, students can peer down through windows into this high-ceilinged room that is fully stocked with books and well-lit from its large windows. Fifth grader Alyssa thinks this is the best part of the new school. She said, “It is a very quiet and a calm place to read and concentrate.”

Throughout the entire school there are interior soundproof windows, water bottle filling stations and partition walls that open

and close like accordions, allowing the teachers to expand or limit the areas where they give their lessons.

The school not only teaches STEAM but applies it to save the school energy.

Throughout the school, there are light-emitting diode (LED) light fixtures. These lights have sensors that turn off or dim the lights depending on the amount of natural light entering the large windows and if there are people occupying the room.

Additionally, natural light from the large windows is being used to the fullest. Light wells are also throughout the school to let in natural light.

Besides sufficient light, adequate heat is also important, especially in this region.

To efficiently regulate the room temperature, a special pump system is being used. Instead of having one big boiler for the entire school, the building will have three smaller ones.

If heat is needed, one of the boilers will run up to 30-40% of its capacity. If additional heat is needed, the second one turns on and so on. They will ramp up or down depending on the need.

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The boilers are part of a radiant heating system. Radiant heating systems supply heat directly to the floor or to panels in the wall or ceiling of a structure. In the school, heated water circulates through plastic tubing within the floors. Pillsworth said, “When students sit on the floors in the wintertime, the floor is warm.”

During the warmer months, the students have air conditioning — something they never had before — provided by an efficient central chiller plant.

Some of the building’s energy is generated from solar panels and a wind turbine on the roof of the building.

Outside, there are playgrounds for the different age groups, an outdoor patio for art classes and an amphitheater for instruction, gatherings and performances.

Sarah-Jane said, “We really like the playground and all of the space. We couldn’t eat in the cafeteria last year, but we could eat outside that is so big.”

Daisy agreed, “The playground is fun to play on after all of the classes.”

USACE is also constructing an enclosure that connects the new school to an existing gymnasium, so the students won’t have to walk outside to get to their physical education classes.

Most recently, the old elementary school was demolished and created space for a main access drive, bus drop-off, parent drop-off, and 123 parking spaces.

While all these school features were being constructed, USACE got the students involved as a way for them to learn about STEAM careers.

Since before USACE even broke ground on the project, the students

have been highly anticipating their new school and playing an active role in its creation. Throughout the construction, students looked out their windows at the construction and made daily entries in journals about the changes they observed.

One thing they observed in the beginning was trees being removed to make space for the new school. The students were concerned that this would harm wildlife. The teachers saw this as a real-life learning opportunity and arranged for a wildlife expert to speak with them. Together they came up with solutions to safeguard wildlife.

Not only did the students interact with wildlife specialists, but also with USACE engineers and architects who performed studies with them and showed them maps and printouts of the project. This experience made many students extremely interested in architecture and planning.

USACE also arranged to have speakers for the students. Civil engineers, architects and environmental specialists spoke with the students and explained what’s involved with planning and constructing a new school. One of the speakers explained how soil is removed to prepare for the building. From this, the students learned about slopes and the differences between different soils and terrains.

As construction progressed on the project and the school’s interior was being worked on, the students wanted to play a role in the designing of their Learning Neighborhoods.

They selected the color schemes, the furniture for the center Hub area, and they voted on an animal mascot to represent each Learning Neighborhood. They chose animals indigenous to this region including the snowy owl, turtle, black bear, and raccoon. When students enter their Learning Neighborhood, they see a mural of their mascot displayed at the entrance.

Now that the school is completed, it continues to educate the students about STEAM careers. When students enter the building, the floor in the main foyer displays the granite that was removed to make way for their new school and to show them what was there before.

Eight thousand cubic yards of granite was blasted, excavated, and recycled. Some of the rock was used as fill in the construction and some was used by the academy.

As they continue to walk throughout the building, students see colored concrete on the floor with contoured lines, showing them the original foundations or grades. “Students will be able to use these grades to create topographical maps,” said Pillsworth.

In the hallways, the students will be able to see and learn about the building’s internal operating systems. “There are glass windows on the hallway walls, displaying the guts of the building, such as the heating pipes inside the walls,” said Pillsworth.

On the hallway ceiling, students can look inside a 20-foot-long window, exposing the school’s internal mechanical piping, wiring, and cabling systems at work. “There are signs stating, ‘This is your chill water pipe where your air conditioning comes from’ and ‘This is a fire sprinkler pipe for fire protection,’” said Pillsworth.

On the roof, where additional energy is being generated from solar panels and a wind turbine, the students can monitor the weather and learn about renewable energy. “The students have an energy dashboard that tells them, ‘Today is a sunny day or a windy day. We will be generating this much electrical power,’” said Pillsworth.

Outside, there is a walking path around a stormwater detention pond.



The fully stocked library with tall ceilings and large windows.

Pillsworth said, “Classes can walk around this system and see the vegetation and animals, and how the system works to protect the environment. It’s also a way for students to see how local plants and grasses can be integrated into construction projects.”

Just as the students were involved during the construction of their new school, they were just as involved in the ribbon-cutting. Students attended the ceremony from their Learning Neighborhoods using their new video conferencing system as a COVID-19 safety precaution.

Besides Posner’s speech, Sarah-Jane and other students spoke to the audience and took groups on tours of the Learning Neighborhoods. Their involvement in their school will continue because of the tools it provides that will prepare them for the 21st century.

It already has for Sarah-Jane. The new school already has her thinking of the future. She said, “I want to be a marine biologist when I grow up. I see my dad taking care of people every day. I want to do the same thing, except with animals that live in the ocean. The science classes and labs in the new school are fun. We are just starting to use them!”



The center Hub area of one of the Learning Neighborhoods.



Students in a learning studio in one of the Learning Neighborhoods.

ERDC district liaisons building bridges between R&D and USACE districts

By Michael Winkler and Dr. Paige Buchanan
Engineer Research and Development Center

U.S. Army Corps of Engineers (USACE) Commanding General and 55th Chief of Engineers Lt. Gen. Scott A. Spellmon has brought a continued emphasis on research and development (R&D) through the USACE Campaign Plan. This has resulted in the creation of a cadre of U.S. Army Engineer Research and Development Center (ERDC) subject matter experts to bridge the gap between R&D and critical work conducted across USACE districts.

ERDC district liaison officers (LNOs) “will change the way ERDC supports the Corps of Engineers in such positive ways,” said Dr. David Pittman, director of USACE R&D and the director of ERDC. “The relationships will help ERDC continue building the trust required for innovative technologies to be fully utilized in solving the hard problems faced across the districts.”

In an August email to command staff, Spellmon reemphasized how R&D will be critically important to USACE in the future.

“It’s my firm belief that we will not ‘build our way’ out of many of the challenges we face — we have to think, innovate, and engineer our way out,” Spellmon said. “To do that, we’ll need new, improved, and, in some cases, yet-to-be-discovered tools and technologies that only a robust and responsive R&D program can deliver. Please make no mistake, this is one of my highest priorities, as it is for the U.S. Army, the Department of Defense and the President. In my eyes, this is a ‘no fail’ mission that we all must embrace and accomplish.”

As part of Spellmon’s path forward to elevate R&D as a USACE program, he requested that Pittman assign ERDC LNOs to USACE districts.

“For many years, ERDC has been engaging on the major subordinate command (MSC) level

with both lab directors and technical directors, but this takes it a step further,” Pittman said, adding that the LNOs have a twofold purpose. “We want them to build relationships across their assigned district(s) to not only inform and educate district personnel about ERDC capabilities but also to learn how ERDC can fully support the districts in solving the issues they face. Many of the LNOs have already been doing this for years, but for others, this will be a new experience.”

The ERDC district LNOs will collaborate with district personnel regarding R&D and technology innovation. The program’s intent is to engage district senior leaders monthly to assist in answering any fundamental R&D-related questions, address requests for more information on specific technologies and help identify opportunities for technology insertion or innovation early in the project planning process, where R&D can make the largest impact.

MSC and district personnel will connect with the ERDC LNOs through a Microsoft Teams site. The site features interactive posts, contact information for all ERDC liaisons and many ERDC resources.

Gaining in popularity, use of the Team’s page has increased to include members from outside the group of ERDC liaisons and their MSC counterparts. For example, USACE’s Planning Community of Practice is now connected to the group, with more than 100 USACE planners from MSCs and districts joining the site.

The ERDC District LNO initiative is championed by ERDC Environmental Laboratory Director Dr. Edmond Russo and ERDC Coastal and Hydraulics Laboratory Director Dr. Ty Wamsley. For more information about ERDC liaisons, contact ERDC MSC Liaison Coordinator ERDC Strategic Integration Office’s Michael Winkler at

Michael.F.Winkler@usace.army.mil.



SALUTES



Name:
Maureen Smith

Position:
Program Analyst, Environmental Science Division, Environmental and Munitions Center of Expertise (EMCX)

Retirement Date:
Sept. 30, 2021

Contributions:

During Maureen Smith's nearly 30 years of program analyst experience she provided financial analysis support to USACE Headquarters, U.S. Environmental Protection Agency (EPA), and U.S. Army Installation Management Command. One of her most significant contributions

while at the EMCX was serving as the Interagency Agreement Coordinator for all EPA Superfund-issued agreements with USACE.



Name:
Hopeton Brown

Position:
Program & Liabilities Branch Chief, USAEC

Retirement Date:
Dec. 31, 2021

Contributions:

During his 33 years of civil service, Brown worked for eight years at military installations and in the environmental field for 25 years, all of it with U.S. Army Environmental Command (USAEC). Brown is also the

president of the nonprofit organization Give Back Jamaica, founded to support students at Crescent Primary School in Spanish Town, Jamaica.



Name:
Vanessa Musgrave

Position:
Environmental Services Manager, USAEC

Retirement Date:
July 14, 2021

Contributions:

Musgrave has 34 years of federal environmental and energy service with the EPA, Fish and Wildlife, NOAA, Army and Air Force. She helped design and execute several environmental public health studies and led the Army Compatible Use Buffer (ACUB) program, negotiating a special ACUB project for multiple installations in the Southeast. She conducted NEPA execution and regulatory review for the

national Doppler weather radar program, and developed an energy efficiency program for Illinois. At the Massachusetts Military Reservation, she developed and managed regulatory compliance, biological studies, public outreach and program administration for the Air Force cleanup program. She also taught at Johns Hopkins University and developed staff training courses in each position she held.



Name:
Enrique "Ike" Mapa

Position:
General Engineer, USAEC

Retirement Date:
Dec. 31, 2021

Contributions:

Mapa has worked for the Army and Air Force in San Antonio, Texas, for the last 33 years. Mapa started his career as an engineering consultant for HVAC facility design. He worked for the Air Force at Randolph and the former Brooks Air Force Base in a variety of engineering positions before moving to USAEC 11 years ago. In the Acquisition

and Technology Branch, Mapa focused on energy technology for LEED buildings, demilitarization and disposal for Fielded Army Weapons, and Environment, Safety, and Occupational Health summaries and Environmental Quality Life Cycle Cost Estimate analysis for the Army Weapons Program.

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Name:
Ellen Maly

Position:
Midwest Team Chief, USAEC

Retirement Date:
Dec. 31, 2021

Contributions:

Throughout her 36-year career with USAEC, Maly served as an environmental engineer and managed installation restoration and military munition restoration projects throughout the Army. Maly oversaw the Closed, Closing and Transferred Range Inventory, the Munitions Site Inspection program, was a founding member

of the Tri-Service Ecological Risk Assessment Work Group, served a one-year detail working on the Endangered Species Act to gain resource credits for the red-cockaded woodpecker, served for years as the Army's natural resource damage trustee and performed contract management and oversight.



Name:
Andrew Maly

Position:
Team Chief, USAEC

Retirement Date:
Dec. 31, 2021

Contributions:

During his 35 years of civil service, Maly served on active duty as a construction engineer and combat engineer including deployment to operations Desert Shield and Desert Storm. He also served in civil and environmental engineering positions at the installation level (Fort Polk), USACE, USAEC, Army

Public Health Command, as well as serving a detail with the Office of the Deputy Assistant Secretary of the Army for Environment, Safety, and Occupational Health. The EPA recognized Maly on multiple occasions for his contributions in both the environmental compliance and restoration arenas.



Name:
Sharon Moore

Position:
Environmental Services Manager, USAEC

Retirement Date:
Dec. 31, 2021

Contributions:

Moore has worked for the Army, Navy and Marine Corps for 27 years at USACE Galveston and Norfolk districts, U.S. Navy Facilities Engineering Command Atlantic and Southwest, U.S. Marine Corps Twentynine Palms, Installation Management Command (IMCOM) and USAEC. In 2010, Moore began working for USAEC

as a subject matter expert in threatened and endangered species. In 2013, she moved to IMCOM to work as the G4 cultural resources program manager, and in 2015 she moved back to USAEC to work as an environmental support manager in the Northeast and Europe Division.



Name:
Damon Cardenas

Position:
Acquisition and Technology Branch Chief, USAEC

Retirement Date:
Dec. 31, 2021

Contributions:

Throughout his 33 years of civil service, Cardenas held positions including industrial hygienist, environmental protection specialist/engineer and physical scientist. He worked at the installation, agency and command levels performing functions in the

conservation, pollution prevention, compliance and restoration environmental pillars where he provided mentorship and leadership to others.

Environmental Operating Principles

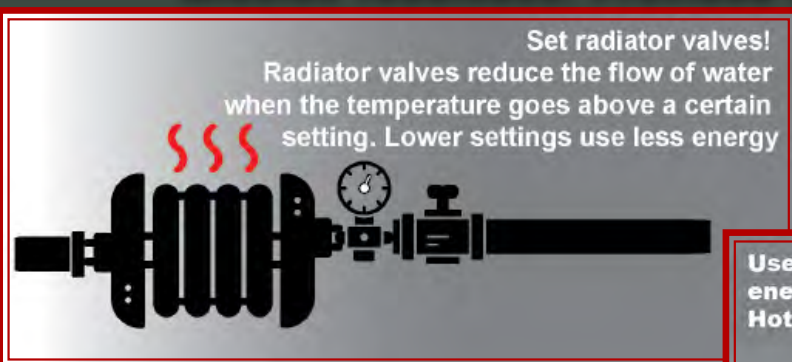
- 1 Foster sustainability as a way of life throughout the organization.
- 2 Proactively consider environmental consequences of all USACE activities and act accordingly.
- 3 Create mutually supporting economic and environmentally sustainable solutions.
- 4 Continue to meet our corporate responsibility and accountability under the law for activities undertaken by USACE, which may impact human and natural environments.
- 5 Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs.
- 6 **Leverage scientific, economic and social knowledge to understand the** environmental context and effects of USACE actions in a collaborative manner.
- 7 Employ an open, transparent process that respects views of individuals and groups interested in USACE activities.

Learn more about the EOPs at:

www.usace.army.mil/Environmental-Operating-Principles

Energy Saving Tips:

October was Energy Action Month. Energy resilience is essential to mission readiness. Provided below are some helpful tips:



(Artist Credit: PROSYMBOLS from The Noun Project)

