Volume 23, Issue 2
May 2022

The Corps Environment

Orchestrating Everglades Restoration 32

Environmental Operating Principle #4

Continue to meet our corporate responsibility and accountability under the law for activities undertaken by USACE, which may impact human and natural environments.

Contents

The Corps
Environment

Lt. Gen. Scott A. Spellmon
Commanding General
Publisher

W. Curry Graham
Director of Public Affairs

Lara Beasley
Executive Editor

Jenn Miller
Managing Editor

Ildiko Reisenbigler
Editor

The Corps Environment is an online quarterly news magazine published by the U.S. Army Corps of Engineers under the provisions of AR 360-1 to provide information about USACE and U.S. Army environmental initiatives, policies and technologies.

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

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

ENVIROPOINTS

Partnering for Our Planet: Environmental Division

The following message is part of a series of messages from the U.S. Army Corps of Engineers' Environmental Community of Practice leadership, in commemoration of Earth Day and USACE's enduring environmental mission.

Ms. Lara E. Beasley
Chief, Environmental Division
U.S. Army Corps of Engineers

Personal Reflection on Earth Day

Happy Earth Day! Although Earth Day is technically every day here at the U.S. Army Corps of Engineers, this observance serves as a call to action to collectively acknowledge how important our planet is and what we can do to protect and preserve it — for not just ourselves, but for every species within our global ecosystem. From a geologic standpoint, human activity has made such a significant impact on our planet's climate and ecosystems that we have our own proposed epoch on the geologic time scale. This speaks volumes to the power we possess in shaping a sustainable future and Earth Day provides the opportunity to reflect upon this tremendous responsibility and recognize the ramifications and strengths in our actions.

Leadership Perspective

As chief of our Environmental Programs, I oversee the execution of nearly $2 billion worth of environmental cleanup and compliance work on an annual basis. Under these programs, our dedicated teams are cleaning up sites degraded by activities that occurred throughout history in support of military readiness and national security. However, our efforts are not limited to reducing risks to human health and the environment from previous events. Our efforts also center around ensuring the actions we take today fully consider the environment and are sustainable and advantageous not just to the immediate needs of our stakeholders, but to the longevity of our planet.

This includes incorporating green and sustainable remediation strategies that use natural resources and energy efficiently in our environmental cleanup activities; meeting federal sustainability requirements within our own operations and facilities; and as the service provider of choice for numerous Department of Defense and non-DOD agencies, ensuring the services and products we provide support their sustainability goals and targets as well.

Illustrated Success

Environmental stewardship is ingrained in our culture at the U.S. Army Corps of Engineers. It is indoctrinated through our Environmental Operating Principles, championed by our Environmental Community of Practice, and illustrated through the many actions being taken across our Environmental Programs and across the enterprise:

- **Enterprise-Wide Strength.** Across the enterprise, more than 10% of our workforce specializes in environmental disciplines, working alongside the rest of our diverse team to provide sustainable solutions that support our planet and the communities we serve across the globe. In honor of Earth Day, check out this short video about our efforts here.
- **Partnerships Across Programs.** Strong partnerships are key to addressing complex environmental challenges, such as climate change. Through the collaborative efforts of our Military Programs, Civil Works, and Research & Development directorates, we are advancing our Sustainability Program initiatives and aligning efforts with Executive Order 14057 to support the administration's goals on climate change mitigation and adaptation.
- **Employing Sustainable Practices at the Project Level.** The employment of innovative techniques and sustainable practices is exemplified at the Spring Valley Formerly Used Defense Site, where our Baltimore District project team received a 2022 Secretary of the Army Environmental Award and a 2022 Secretary of Defense Environmental Award for their efforts on this recently completed, complex environmental cleanup project. Read more here.

Maintaining Momentum

The environment is everywhere. It is all around us and is affected every day by the decisions we make. From the time we created the first atomic weapon in 1945, it took us over 20 years before we established Earth Day to mobilize our species and recognize the power we possess in affecting our planet. Recognition was the first step and ever since then we have been marching forward, leveraging our technical competencies across the enterprise to remediate the misdoings of the past and take deliberate actions to address current and future environmental threats. Look at all we have been able to accomplish so far. We can control this. We can fix this. Together, we have the power to shape a sustainable future for not just ourselves, but for every species that inhabits our planet.

ENVIROPOINTS

Partnering for Our Planet: ERDC Environmental Laboratory

The following message is part of a series of messages from the U.S. Army Corps of Engineers' Environmental Community of Practice leadership, in commemoration of Earth Day and USACE's enduring environmental mission.

Dr. Edmond Russo
Director, Environmental Laboratory
U.S. Army Engineer Research and Development Center

Personal Reflection on Earth Day

A 2022 theme for Earth Day is "Invest in Our Planet," emphasizing care for our global climate. For me, that means emphasizing our focus on climate preparedness, based on sound science, that leads to sustainable infrastructure, resilient communities, and a healthy ecosystem. We can achieve that within USACE by setting our sights on integrating more nature-based and built features in our projects, ensuring environmental justice and equity wherever we can, and being good stewards of the environment while maximizing the operational capabilities of the USACE, Army and nation.

Leadership Perspective

ERDC improves our ability to operate in the environment while minimizing impacts. We protect Soldiers from threats in the environment; we expand Soldier training windows that were previously constrained by the environment; we find the best concepts for the nation's infrastructure that deliver the greatest benefits to the public as well as the environment. Dr. Todd Bridges, our Army Senior Scientist for Environmental Sciences, succinctly stated that, "Nature is an important part of every lasting solution." We keep that perspective in what we do.

Successful environmental and infrastructure sustainability and resilience that include the potential future impacts of climate changes are at the core of the administration's Executive Orders 13990 and 14008. The objectives are obtainable and deliver great benefits but achieving them comes with challenges. The attainment of sustainability and resilience through actions and investments requires the application of new concepts, plans, methods, and technological innovations. To that end, ERDC is discovering, developing, and delivering innovative solutions to ensure that the USACE and Army can achieve their mission objectives while realizing the administration's goals.

ERDC has a rich history of solving tough challenges through collaboration with many partners and stakeholders. Together we can deliver the most robust solutions that inform current and future investments and actions that yield resilient and sustainable military and non-military infrastructure and operations, a stronger national security posture, healthier environment, and improved social and economic conditions. Looking forward, the USACE R&D Strategy lays out a new programmatic approach to addressing these priorities that will further increase our value to the nation. See: https://www.erdc.usace.army.mil/About/USACE-Research-and-Development-Strategy-2022/.

Illustrated Success

A poignant effort spearheaded by ERDC for USACE to achieve the mission and satisfy the administration's objectives is the establishment of the principles and practices of Engineering With Nature®, where natural processes as well as natural and nature-based features are intentionally integrated into infrastructure to maximize sustainability of projects and to enhance resiliency to natural events. USACE personnel as well as hundreds of national and international engineers, scientists, researchers, practitioners, managers and leaders are a part of the initiative and contributed to the developments in guidance for success in achieving lasting solutions. To learn more about EWN, visit: https://ewn.erdc.dren.mil.

Maintaining Momentum

Earth Day and its theme for 2022 are a reminder to double down on the work we are doing across USACE to achieve the administration's objective with respect to environmental and infrastructure sustainability and resilience. In ERDC, we will continue to deliver solutions for sustainability and resilience that are focused, decision-relevant, and that consider science-informed potential futures. We will develop and deliver those solutions for tactical requirements at the project, regional, and enterprise levels for military and non-military applications; for operational requirements that provide decision-makers the ability to optimize infrastructure investments to realize mission objectives; and for strategic requirements that enable authoritative analysis and evolution of agency policies to optimize infrastructure systems for sustainability and resilience.

ENVIROPOINTS

Partnering for Our Planet: Planning and Policy Division

The following message is part of a series of messages from the U.S. Army Corps of Engineers' Environmental Community of Practice leadership, in commemoration of Earth Day and USACE's enduring environmental mission.

Mr. Eric Bush
Chief, Planning and Policy Division
U.S. Army Corps of Engineers

Personal Reflection on Earth Day

For me, Earth Day is about acknowledging our common needs and common interests to protect the resources humankind depends on to sustain ourselves, our families, our economies, and our future. That challenge has never been greater, given the trajectories of population growth, resource depletion, and climate change. Equally so, our capability to innovate and leverage science, engineering, and technology to address these challenges gives me hope that we can reverse course where needed. Earth Day is a good opportunity to re-dedicate ourselves to protecting the resources and environmental systems we depend on and take for granted.

Leadership Perspective

One of the goals of our Civil Works Planning program is to proactively consider environmental compliance requirements established by the Clean Water Act, Clean Air Act, Endangered Species Act, and Magnuson-Stevens Act, which are our national foundation for the protection and wise use of environmental resources. We expect our study teams to embrace and acknowledge these companion federal mandates and seek to minimize environmental impacts during the planning of economic development projects. One new way we are doing that now is to evaluate environmental and social benefits and impacts, including tradeoffs, more holistically than we have in the past.

In Civil Works Planning, we are giving greater emphasis to identifying economically disadvantaged and underserved communities that may benefit from USACE planning and engineering services provided through our Continuing Authorities Program, which includes Planning Assistance to States (as well as local governments), Flood Plain Management Services, and our Tribal Partnership Program. In my view, there are significant unmet needs cutting across all of our business lines that USACE is uniquely well-positioned to respond to through these existing authorizations, especially given recent funding plus-ups provided by Congress.

Illustrated Success

One of the great things about working at Headquarters is that we are involved in projects in all parts of our nation. One of the best examples I would like to highlight is the recently completed Coastal Texas Feasibility Study prepared by our Galveston District along with our partners at the Texas General Land Office (https://coastalstudy.texas.gov/). The recommended plan will protect the entire coastline of Texas and is the largest-ever Civil Works project investment at $30 billion.

The recommended plan provides multiple lines of defense against all of the coastal storm hazards experienced along the Texas coastline (including sea level rise) along with extensive ecosystem restoration components, including features that will benefit National Wildlife Refuge lands. It's one of the most exciting studies I've been involved in.

Maintaining Momentum

We are living in unprecedented times now in many respects, and that confluence of opportunity and need makes what we do in Planning and Civil Works more relevant than ever. We are all about preparing for the future.

As you have likely heard, two new work plans (the 2022 Disaster Relief Supplemental Appropriations Act and the Infrastructure Investment and Jobs Act) totaling more than $22 billion were recently approved, adding to our already record-level Civil Works portfolio. When you add up all the regular budget work, work plans, and expected future appropriations, we are looking at approximately $80 billion of Civil Works work. With the new studies and other Planning work needed to implement operations and maintenance (O&M) and construction projects, it's never been a more exciting time to work in Civil Works and Planning!

ENVIROPOINTS

Partnering for Our Planet: Operations and Regulatory Division

The following message is part of a series of messages from the U.S. Army Corps of Engineers' Environmental Community of Practice leadership, in commemoration of Earth Day and USACE's enduring environmental mission.

Mr. Thomas Smith
Chief, Operations and Regulatory Division
U.S. Army Corps of Engineers

Personal Reflection on Earth Day

The foundation and history of Earth Day, as an event to raise national awareness and advocate for the health of our planet, are intrinsically linked to mission areas within the Operations and Regulatory program. We strive to meet Environmental Operating Principles (EOPs) in all USACE missions, and we are very excited to contribute to administration initiatives in climate change resilience, sustainability and environmental justice.

Leadership Perspective

As the Operations and Regulatory Chief, I lead a dedicated team of professionals and community of practice that ensures reliable navigation for maritime commerce, delivers clean and renewable energy sources through hydropower production, and issues permits and permit-related actions, that balance development with protection of our nation's wetlands and waterways. We also provide recreation opportunities for over 260 million visits annually, while responsibly and sustainably managing more than 12 million acres of public land and water.

I am particularly excited about one of this year's Earth Day themes, "Invest in our Planet." Within the Operations and Regulatory Community, we are actively working to implement the Infrastructure Investment and Jobs Act which highlights resilient infrastructure and sustainability. Making investments now that prepare the public for global changes is critical to our economy and the environment.

Illustrated Success

Three areas that I want to highlight this Earth Day are our Regulatory and Natural Resources Management programs along with our effort to transition to a zero-emission vehicle fleet.

- Through the Regulatory program, USACE recently issued a new nationwide permit to authorize discharges of dredged or fill material into waters of the United States for the construction, expansion, and maintenance of water reclamation and reuse facilities. Water reclamation and reuse facilities can be an important tool for adapting to the effects of climate change, such as changes in precipitation patterns that may affect water availability in areas of the country. The issuance of this new NWP contributes to the federal government's role in promoting water reuse and the National Water Reuse Action Plan.
- The Natural Resources Management (NRM) program is actively engaged in President Biden's 30x30 vision to conserve 30% of our lands and waters by 2030. The initiative, which seeks to reverse the negative impacts of biodiversity decline and climate change while increasing access to nature for communities, aligns well with NRM program focus areas. NRM lake projects have a unique mix of locations near both rural and urban underserved communities. The green spaces provided by our lakes are actively managed to sustain native, resilient ecosystems and provide significant economic benefits as well as quality outdoor experiences that foster a greater connection to our natural resources and Earth itself.
- USACE Civil Works (CW) is committed to further reducing our carbon footprint by transitioning our vehicle fleet to zero-emission vehicles. As directed by Executive Order 14057, CW is actively working toward installation of electric vehicle charging stations across the enterprise to support the procurement of new, zero-emission sedan and light-duty vehicles by 2027. Full replacement of all heavy-duty vehicles will follow by 2035. CW is collaboratively working with USACE Logistics Activity, the Huntsville Engineering Center, and Major Subordinate Command leaders to develop an achievable and efficient implementation plan.

Maintaining Momentum

In closing, these three examples provide just a tiny glimpse into the environmental efforts ongoing in the Operations and Regulatory Community. Our teams are working to move toward an all-electric fleet, develop new ways to conserve water, provide efficient hydroelectric power, prevent climate-induced storm damage, deliver the nation's commerce, and more. I am proud of the Operations and Regulatory team that treats every day as Earth Day!

ENVIRONMENT

ENVIROPOINTS

Partnering for Our Planet: Engineering and Construction Division

The following message is part of a series of messages from the U.S. Army Corps of Engineers' Environmental Community of Practice leadership, in commemoration of Earth Day and USACE's enduring environmental mission.

Mr. Pete Perez
Chief, Engineering and Construction Division
U.S. Army Corps of Engineers

Personal Reflection on Earth Day

As chief of Engineering and Construction (E&C) at USACE Headquarters, Earth Day represents a chance for the entire E&C community to reflect on the challenges facing our natural environment and our role as engineers in addressing those challenges. However, it is also worth remembering that every challenge also represents an opportunity. Climate change, environmental degradation, chemical pollution, and loss of critical species are all serious problems facing humanity now and in the future. Some of these problems can be solved by incremental progress and some can be solved with a creative leap, but all of them represent opportunities to learn and to respond with new and different approaches so that we can deliver sustainable and resilient systems, communities, and ecosystems that are ready for the threats of today and tomorrow.

Leadership Perspective

Engineering and Construction Division has a key role to play in shaping a sustainable future for USACE, the Army, the nation, and the world. Climate change is happening now and will continue to impact USACE missions, operations, and stakeholders. While we recognize the critical importance of reducing greenhouse gas emissions to lessen impacts later in the century, we also recognize that this change will happen regardless of what actions we take to reduce emissions, because we can't affect the emissions of the past. As a result, we have a responsibility to our partners and taxpayers to get ready for the impacts of climate change to ensure that when USACE designs and constructs a project, we build to last and perform for any reasonable future conditions. This is why the USACE Climate Preparedness and Resilience Policy Statement calls for mainstreaming climate change adaptation into our missions, programs, and operations. In short, we are taking an engineering approach to climate change, improving our understanding while we solve known problems and collaborating with science agencies, academic partners, and other internal and external experts to translate climate science into engineering practice.

Mainstreaming climate change impacts considerations into our normal business processes is a major element of the USACE effort to address the climate crisis, which is one of the administration's top priorities. This approach also supports several other administration priorities. It aligns with our commitment to environmental justice, ensuring that underserved and overburdened populations do not continue to bear the brunt of climate change impacts. Building robust, resilient infrastructure also creates good domestic jobs and supports American manufacturing, with benefits throughout the economy. Finally, it supports the administration's commitment to restoring America's standing as a global leader, showing the way to a prosperous, sustainable future that supports human health and environmental stewardship based in the latest actionable science.

Illustrated Success

Engineering and Construction's activities supporting environmental stewardship and other administration priorities are numerous, but a few key examples stand out.

- The USACE Vulnerability Assessment Tool provides screening-level assessments of the vulnerability of USACE projects to climate change, using projections of future change and indicators that are tailored to each of the eight Civil Works business lines. This tool provides USACE with information to identify opportunities for both climate change adaptation and mitigation at Civil Works projects. A similar approach underpins the Army Climate Assessment and Defense Climate Assessment tools that USACE has helped develop to support the Army and Department of Defense in assessing the climate exposure of military installations.
- Implementing the Sustainable Rivers Program in partnership with The Nature Conservancy to demonstrate that a strategic and science-based approach can be used at USACE reservoirs to maintain and enhance the environmental benefits and reduce negative environmental consequences of downstream flows.

Maintaining Momentum

As we approach mid-century, climate change and other environmental challenges will continue to be pressing issues facing USACE and the world. Engineering and Construction will continue to lead the way when it comes to preparing USACE for the impacts of climate change that are already occurring or reasonably foreseeable. USACE will continue to lead the interagency with our robust actions across the enterprise to deliver a more sustainable, just, resilient, and environmentally conscious future, on Earth Day and every day. Essayons!

Winners of the Secretary of the Army Environmental Awards Program for 2022 announced

By Cathy Kropp
U.S. Army Environmental Command

The U.S. Army recently announced the winners of the Secretary of the Army Environmental Program for 2022. These Secretary of the Army Environmental Awards recognize installations, teams and individuals for their excellence in endangered species protection, historic preservation, waste reduction, environmental restoration and pollution prevention, highlighting successes achieved between Oct. 1, 2019, and Sept. 30, 2021. Winners in the Army program go on to compete in the Secretary of Defense program later this year.

- **Maine Army National Guard** captured the **Natural Resources Conservation Award** for an installation with less than 10,000 acres for their Woodville Training Site. This new training facility was designed to protect the watershed and promote critical habitat, with the training resources strategically located to avoid negative effects on both habitat and wildlife.

- **Colorado Army National Guard**'s statewide environmental quality program and their ambitious multi-faceted approach to transform the organization for long-term resilience and comprehensive compliance netted them the **Non-Industrial Installation Environmental Quality Award.**

- Completely gutting a World War II-era building at Camp Mabry, addressing all structural problems, and then rebuilding it to historic standards helped the **Texas Army National Guard** win the **Cultural Resources Management Award** for large installations.

- The **Nebraska Army National Guard**'s Crane Protective Team developed a predictive model based on habitat that takes crane risk factors into account and allows Guard members to plan flight paths and aviation exercises that minimize the likelihood of affecting migrating birds. This innovative work won them the **Natural Resources Conservation Team Award.**

- Their collaborative work to ensure high-quality drinking water for their residents and workers is what helped **Fort Stewart/Hunter Army Airfield** win the **Environmental Quality Team Award.** Their water quality team is constantly seeking and finding ways to improve their environmental quality including establishing a backflow team, conducting water tower maintenance, and developing an intergovernmental service agreement for water tower inspections.

- The **U.S. Army Corps of Engineers' Spring Valley Formerly Used Defense Site Project Team** restored a residential property that in years past served as a burial pit for discarded Word War I chemical warfare agents. Due to site history, the nature of the contaminants, site condition, and location, the team faced daunting technical, engineering, health and safety, regulatory, and community relations challenges. Their dedicated teamwork and partnerships, as well as successful remediation, were recognized by the **Environmental Restoration Team Award.**

The winners of the 2022 Secretary of the Army Environmental Awards program are examples of how environmental stewardship and sustainability play a crucial role in maintaining Army readiness. Investments the Army makes in environmental programs and sustainability initiatives pay dividends in sustaining realistic training and testing capabilities both now and in the future.

USACE removes thousands of unexploded ordnances in Saipan

"After the removal of the ordnance items, it's the kind of project you can be proud of knowing your efforts helped keep people safe."
- Steven Jones, Honolulu District ordnance and explosives safety specialist

Some of the UXO removed from the site was detonated prior to the ceremony. (Minerva Anderson)

In collaboration with HydroGeoLogic, Inc. and local agencies, USACE Honolulu District removed more than 2,000 munitions and explosives of concern throughout the HOPE Recovery Center land in Marpi on Saipan. (Minerva Anderson)

Inside of a U.S. MK 1 Shrapnel round. (Minerva Anderson)

By Minerva Anderson
USACE, Honolulu District

The following article highlights the first ever Time-Critical Removal Action (TCRA) for the Commonwealth of the Northern Mariana Islands (CNMI). The contractor found almost 2,000 munitions and explosives of concern, investigated 192,000 anomalies, and processed 76,000 pounds of material as safe for recycling — almost 2 pounds every square foot.

Time-Critical Removal Actions are special, but they're not that special. At first blush this may seem like a strange way to lead off an article about an unexploded ordnance (UXO) cleanup, yet it's true. It's true that only a few of these types of UXO cleanup actions are authorized and funded each year. It's true that remediating 14 acres for our homeland isn't that special — well, it's kind of special.

What's So Special?

One must ask what motivated the U.S. Army Corps of Engineers and its partners at CNMI's Bureau of Environmental and Coastal Quality (BECQ) to push so hard for this. What pressed the contractor, HydroGeological, Inc., to accomplish their task on time, at the height of COVID, impaired by travel restrictions and other challenges? It's an easy answer actually: it's the story of the HOPE Clinic.

A Significant Find

The Hope Clinic sits on a 14-acre property located within the former Matoisa Army Ordnance Depot and had to close its doors for four months while contractor HydroGeoLogic, Inc. cleared the area of UXO. Essentially, it sits on what was ground zero for the ammunition fire and explosions that dispersed tons of munitions across the surface of the landscape.

Following a site visit earlier this year that revealed multiple munitions and explosives of concern (MEC) on the ground surface at Hope Clinic and surrounding areas, Honolulu District Commander Lt. Col. Eric Marshall staffed and approved a TCRA to facilitate immediate cleanup.

Marshall said the amount of UXOs found at the recovery center was considered "a significant find."

"Within four months, we found more than 2,000 pieces of munitions and explosives of concern. Not all that is necessarily explosive, but it is something that could be unsafe for the public, and that is a significant find across 14 acres of land," he said.

According to Steven Jones, Honolulu District ordnance and explosives safety specialist, some of the ordnances recovered on the property were 3-inch projectiles, 75-millimeter (mm) projectiles, 90 mm projectiles, 105 mm projectiles, 155 mm projectiles, 60 mm mortars, 81 mm mortars, and hand grenades.

"Since the initial site visit in 2020, I knew there was a risk at the Hope Clinic that required USACE's immediate attention. With the remoteness of Saipan as well as COVID restrictions we knew it would be a difficult project," Jones said.

"With the combined efforts of Honolulu District; St. Louis District; Pacific Ocean Division; Huntsville Design Center; USACE Headquarters; and local regulators, we were able to get a TCRA in place to immediately address the hazard. After the removal of the ordnance items, it's the kind of project you can be proud of knowing your efforts helped keep people safe," Jones concluded.

Effective Communication Key To Success

Successful execution of this TCRA is a result of effective communication, said Honolulu District project manager Lori Wong.

"Our communications were very effective throughout this project. We had a friendly relationship with the stakeholders; we listened actively to any concerns from the Hope Clinic related to their clients; and most importantly, we remained open-minded when listening to regulator and stakeholder concerns versus trying to force our process and objectives on to them. Basically, our team treated the Hope Clinic stakeholders like family with everyone willing to go the extra mile to stay on top of any challenges, such as differences in time zone," Wong said.

Wong said sincerity was felt on both sides during an in-person site visit from the Honolulu District commander.

"The subtle, non-verbal communication felt from our team by the stakeholders allowed them to trust us," Wong said. "In turn, they took care of our team while in the field. One example stands out — when our contractor was unable to access a site to test the equipment, the stakeholder made a call to someone they knew, and the gate was opened for us. I think this is an example of going 'above and beyond' the normal expectations of just a working relationship."

Marshall said like the rest of the team, he was completely locked in.

"I returned to Honolulu with one request for [Environmental Branch Chief] Dave Griffin and Lori Wong — that I could shake hands with Yvette when this job is done," Marshall said. "When I change command in June, I will look back and claim this day as one of my top two to three experiences during my tenure — ecstatic to be only a small part of CNMI's mission, and the HOPE clinic's eventual success."

Recognizing Contributions

On March 14, the Hope Clinic Ribbon-Cutting Ceremony was a milestone in the process to recognize those who contributed to the successful UXO removal project. Wong expressed that another measure of success was stakeholder feedback through the ribbon-cutting ceremony.

"The ceremony itself evidenced the satisfaction of the stakeholders, CNMI government, and regulators," Wong said.

During the ceremony Saipan Governor Ralph DLG. Torres said the Hope Recovery Center program is CNMI's sole substance abuse residential treatment provider, and their mission to build a safe and addiction-free society is now able to continue — and grow — with the hard work that made the event possible.

"I would like to personally thank commander [Lt. Col.] Eric Marshall. Thank you and your team of the U.S. Army Corps of Engineers, who have guided this project to its completion," Torres said. "Thank you for your partnership in addressing the issue of munitions that were left here on this land decades ago. The CNMI is thankful for the timely response, prioritization, and completion of this project so that the critical functions and services of our Hope Recovery Center can safely continue for our community."

Project Manager Wong expressed appreciation to stakeholders.

"This exhaustive effort from project approval to successful execution was made possible by the cohesive teamwork with all involved from our headquarters to district levels along with the Huntsville Design Center," Wong said. "I truly appreciate the patience and effort of Hope Center Administrator Yvette Sablan and our team of regulators at BECQ led by Administrator Eli Cabrera. This project would not be possible without the support of the local community," she said.

See USACE page 12

continued from page 11

Only The Beginning

Marshall said this is only the beginning of USACE's mission to remove UXO from the area that could potentially pose a threat to the public.

"We know there are other areas that need to be remediated and this is just the start. As part of the services we provide, we are going to continue to monitor to make sure that we've recovered everything and to educate the public on explosives safety," Marshall said.

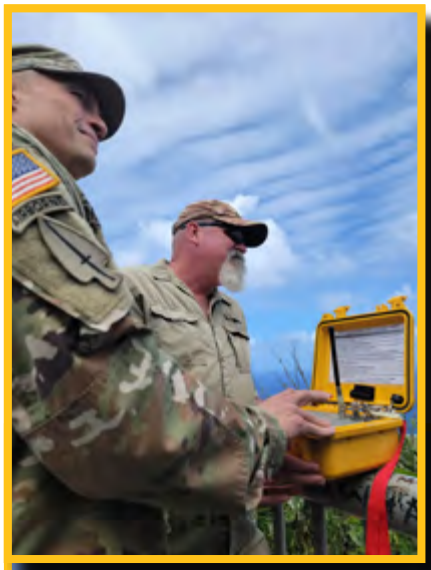
How Did We Get Here?

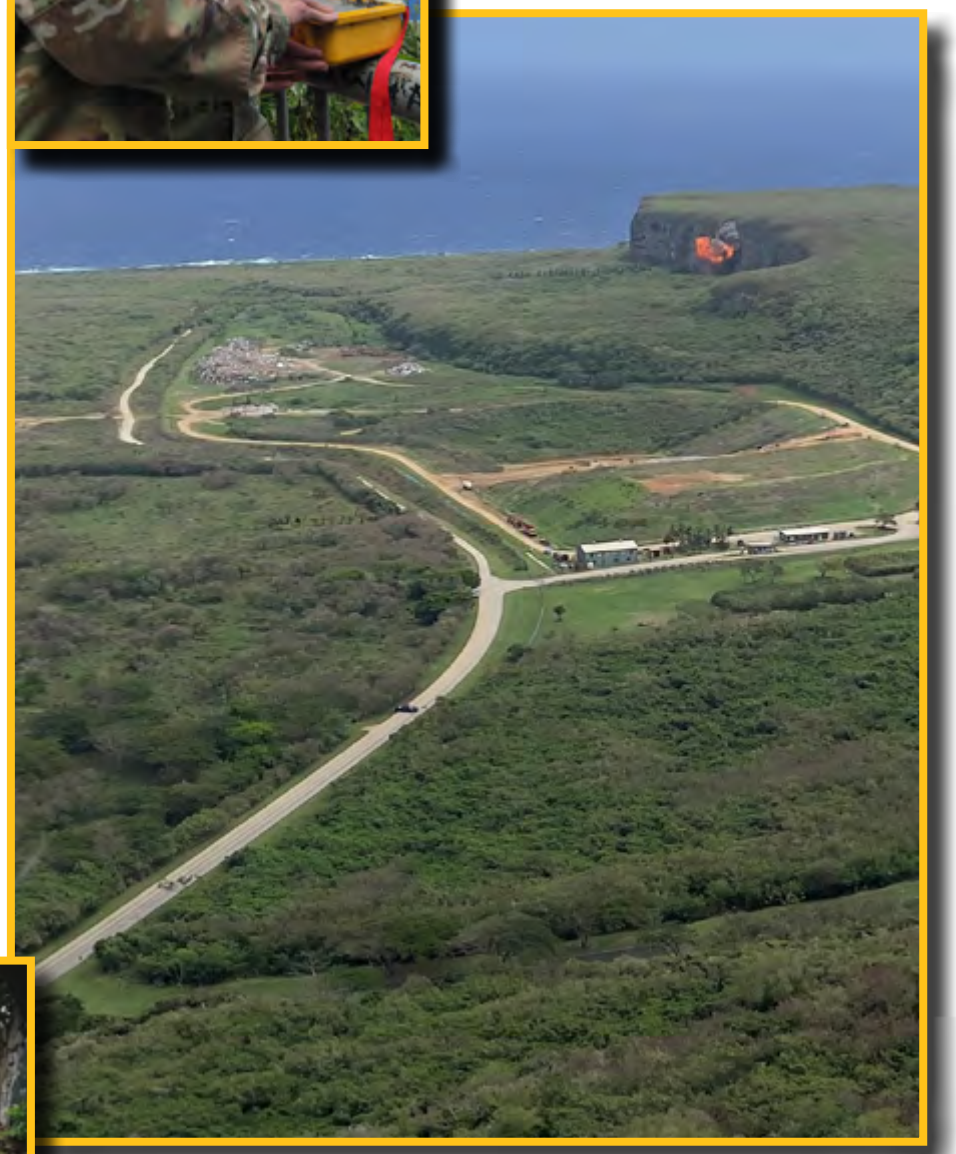
Saipan's history goes back thousands of years, yet it didn't play a role on the global stage until World War II. During this time, the U.S. and Allied forces invaded the island, and the Japanese lost the monthlong Battle of Saipan. The U.S. occupied the island and installed a military air base, which became a turning point in WWII. Constructed in 1945, Marpi Point Field is where the Matoisa Army Ordnance Depot and other ammunition storage facilities were constructed to support the war effort.

Fast forward 77 years, in addition to the presence of UXO from wartime activities, another danger affecting island residents has reared its ugly head. According to The Lowy Institute, an independent think tank based in Sydney, Australia, methamphetamine, heroin, and cocaine trafficking are on the rise in Saipan. The Pacific Islands have become a production site and trafficking destination.

As a result, Torres stood up a Substance Abuse, Addiction, and Rehabilitation (SAAR) program in 2019. He then designated Hope Recovery Center Administrator Yvette R. Sablan as the SAAR program special assistant to hit the substance abuse and other addiction challenges in Saipan head-on. The center's goal is to ensure individuals participating in their program are equipped with coping and relapse prevention skills that will ultimately prepare them to improve their interpersonal and life skills.

(From left) USACE Honolulu District's Steven Jones, ordnance and explosives safety specialist; Linoshka Soto Perez, project historian; and Lori Wong, project manager, at the HOPE Recovery Center land in Marpi on Saipan. (Minerva Anderson)





USACE Honolulu District and HydroGeoLogic, Inc., in collaboration with local agencies, removed more than 2,000 munitions and explosives of concern throughout the HOPE Recovery Center land in Marpi on Saipan. The interim removal action was marked with a ceremony March 14. Just prior to the ceremony, this photo shows the detonation of some of the UXO removed from the site. (Photo courtesy of HydroGeoLogic, Inc.)

(Inset) Prior to the ribbon-cutting ceremony at the HOPE Recovery Center in Marpi on Saipan, USACE Honolulu District Commander Lt. Col. Eric S. Marshall set off the consolidated demolition shot at Marpi Disposal Area while Paul Schmidt, HydroGeoLogic, Inc. UXO safety officer, looks on. (Edwyna Brooks)

Texas National Guard blends partnerships, technology to preserve historic assets

Building 1 as it looked in January 2020. After the exterior walls had been braced and a new roof was built, a new, modern interior was constructed within the building's historic masonry shell. (Sarah Benson)

The historic masonry shell of Building 1 was thoroughly braced on all sides so that a new interior and roof could be safely constructed. Here, workers check the bracing around the main entrance. (Sarah Benson)

A historically qualified mason reconstructs a section of Building 1's exterior wall using brick salvaged from a section of the foundation that could not be preserved. In the end, enough original brick was salvaged so that no new brick was needed for repairs. (Sarah Benson)

By Thomas Milligan
U.S. Army Environmental Command

The Texas Army National Guard's Cultural Resources Management (CRM) program — one of the largest and most complex programs of its kind — was recognized for blending collaborative partnerships and technological advances to effectively manage treasured archaeological, cultural and historic assets.

With more than 34,000 acres with prehistoric and historic archaeological sites, cultural landscapes, documents, buildings, structures, American Indian traditional cultural properties, as well as previously collected artifacts from earlier archaeological surveys, the Texas Army National Guard was recognized with the 2022 Secretary of the Army Environmental Award and 2022 Secretary of Defense Environmental Award for Natural Resources for a large installation.

The Texas ARNG has an ongoing relationship with 16 consulting American Indian tribes, manages a 221-acre National Register Historic District, a National Register-eligible Nike missile silo and radar site district, 52 National Register-eligible buildings, six traditional cultural properties, and almost 700 archaeological sites.

"The CRM program is both broad and complex, and it requires us to stay focused on our mission while actively engaging in close relationships with the many stakeholders we work with and serve," said Richard Martinez, Texas ARNG environmental program chief. "The CRM is fully integrated into the Texas Army National Guard operations and is a part of how we do what we do every day. That's a key to our collective success."

One of the more notable projects over the past two years has been the rehabilitation of Building 1 at Camp Mabry. The World War I-era building was essentially gutted to address structural problems and then rebuilt working with the Texas State Historical Preservation Office to ensure all historical standards were followed.

The structure now serves as a centerpiece of a historic district at Camp Mabry and as the Adjutant General's offices.

"We were able to preserve and transform a building that was nearly unsalvageable and convert it into a historic showplace, to preserve and celebrate our collective history," said Dedra Dahl, Texas ARNG project manager.

Another notable collaborative effort involved an enhanced traditional cultural property survey throughout the state of Texas. Building on a successful track record of engagement with American Indian tribes, the revised and improved survey brought in tribal representatives for collaboration to better identify and delineate traditional cultural use areas.

Along with these accomplishments, the Texas ARNG cultural resources manager also expanded its partnerships for site monitoring and inventories with universities, drastically reducing costs for such services compared to private contractors. The site monitoring contract includes capability to bring tribal specialists to the training sites to monitor cultural resources or projects as needed.

On the technology front, the Texas ARNG was lauded for the introduction of a "photo point database" for architectural and archaeological site monitoring that is linked to a geographic information system. The database, developed with a university partner, is being used to establish visual records of cultural sites to track impacts from fire, erosion, or other disturbances.

Another effort that blended technology and collaboration to produce better outcomes involved the complex process of curating and managing cultural and archaeological assets. Texas ARNG is in the final stage of completing an overarching curation agreement to cover over 30 years of individual agreements related to 30 years of archaeological investigations across the state.

"Our CRM program goals are aligned with Texas Army National Guard's goals — to put people first with proactive management to reduce cultural resource impacts, support readiness through efficient and effective stewardship, and communicate effectively with stakeholders ranging from the Native American nations, the State Historic Office and the public," said Kristen Mt. Joy, cultural resources manager.

"These efforts can pay dividends on multiple fronts. For example, historical preservation projects are planned to put preservation and modern requirements in balance, allowing modernization of existing facilities versus the extended time and costs to request and construct new ones."

Complex, extensive remediation at Spring Valley wins Army award

By Thomas Milligan
U.S. Army Environmental Command

In the lead-up to America's entry into World War I, the widespread use of chemical weapons by European powers posed serious challenges. The U.S. Army was behind its eventual foes in developing these weapons, and at the time, no American military research was more secret or urgent than chemical warfare.

At the American University campus in Washington, D.C., approximately 1,500 chemists, scientists and Soldiers assembled at American University Experiment Station from 1917 to 1918 to develop offensive and defensive capabilities in chemical warfare. Laboratory buildings and structures were quickly built to facilitate research and testing. Then, nearly as swiftly as the work began, came the end of WWI in November 1918. Plans were then launched to wind down the weapons research facility.

Baltimore District ordnance and explosive safety specialist James Ennis prepares a 75 mm munitions debris item for cutting on a remotely operated bandsaw as part of the process to render the item safe. (USACE courtesy photo)

Workers reduce poured concrete foundations to pieces smaller than the size of a 75 mm munition inside the tent at the site in May 2015, to ensure no items were inadvertently captured in the foundation during house construction. (USACE courtesy photo)

Many of the operations, equipment and supplies were transferred to Edgewood Arsenal in nearby Maryland when the experiment station closed. There were also chemicals, equipment, and other items that, following the standard practices of the time, were buried at the site in disposal trenches and covered over.

Over the years, the secret and urgent research was largely forgotten and the existence of the disposal pits at Glenbrook Road faded from memory.

Decades later at American University, chemical waste material was discovered when a disposal pit of military munitions was unearthed during trenching for utility lines — which followed earlier reports of trash and debris that gave off foul odors and irritated workers' eyes and noses. This discovery of chemical waste kicked off the U.S. Army Corps of Engineers (USACE) environmental restoration program for the Spring Valley Formerly Used Defense Site (FUDS).

"Our team faced daunting technical, engineering, health, safety, regulatory and community relations challenges due to the nature of the contaminants, as well as the site's condition and history," said USACE Baltimore District project manager Dan Noble. "This project represents one of the most unique burials of discarded WWI chemical warfare agents and was one of the most complex in the history of the U.S. Army Corps of Engineers' environmental restoration program. The successful completion of this project represents an incredible team effort and a significant accomplishment."

During the remediation, the team used in-depth aerial photography and detailed analysis of findings from past investigations of the site to enable precise determination of which areas had high probability of contamination, and which did not. The team also developed an innovative safety technique using a large tent operating under negative pressure with three chemical agent filtration systems to reduce the risk of any hazardous chemicals escaping the tent and reaching the neighboring properties, rather than the smaller blast structures often used in such remediation.

The team also efficiently and effectively dealt with a safety incident in 2017, when workers noticed a distinct odor and became nauseous. After an immediate shutdown, a board of investigation was formed and, following exhaustive inquiry, additional precautions were instituted in order to ensure worker and public safety.

Noble said key to the project's success was the team's development of strong partnerships and interactions with stakeholders, made possible by a robust program management system. With support at all management levels, the team collaborated with internal offices including Real Estate, Office of Counsel, and fund managers at the Baltimore District, as well as in USACE Headquarters and the Department of the Army, to assure that all regulatory and legal requirements were met and that adequate funds were available for the Glenbrook Road cleanup.

USACE Baltimore District Commander Col. Estee S. Pinchasin said the team has met its goals of protecting human health and the environment by reducing risk in the safest manner possible, while achieving acceptance of the cleanup by regulators and the community.

"Completion of the Glenbrook Road cleanup represents a significant milestone in support of the DOD mission to reduce threats to human health and the environment on non-DOD-owned lands resulting from past military use," said Pinchasin. "Removal of the many hazardous materials at Glenbrook Road represents the exact type of hazard the DOD wished to mitigate when it began the FUDS mission. The successful completion of this project in 2021 represents an important step in fulfilling the DOD promise of mitigating these types of hazards to ensure the safety of the American public."

Completed Glenbrook Road Remedial Action site in August 2021, where a house, munitions, laboratory debris, and contaminated soil were removed. (USACE courtesy photo)

The Spring Valley Glenbrook Road Remedial Action Team received the 2022 Secretary of the Army Environmental Award and 2022 Secretary of Defense Environmental Award for Environmental Restoration (Individual/Team Category).

Conservation of endangered whooping cranes, aerial training made compatible by teamwork, planning

Field biologists observed behavior of five adult whooping cranes using flooded shallow marsh habitat at the Sacramento-Wilcox State Wildlife Management Area. This study improved understanding of how whooping cranes use various components of the landscape. (D. Baasch, Crane Trust)

By Thomas Milligan
U.S. Army Environmental Command

For eons the majestic whooping crane, perhaps the best-known endangered species, has migrated in great flocks from Canada to the Gulf of Mexico and then back again. A critical stopover in this migratory pattern is the Platte River in Nebraska.

This area also happens to where the Nebraska Army National Guard (ARNG) conducts critical aviation exercises needed to ensure readiness.

The challenge? Finding solutions to protect the endangered cranes and other migratory species, while still eliminating the conflicts that training exercises could cause if not timed, managed and planned comprehensively.

For not only succeeding in rising to this challenge, but also for developing environmental models that can help protect the cranes in multiple states, the Nebraska ARNG was awarded the 2022 Secretary of the Army Environmental Award for their Natural Resources Conservation team.

"Protecting cranes protects the mission," said Larry Vrtiska, Nebraska Military Department environmental program manager, citing the formation of the Crane Protection Team with Nebraska ARNG, U.S. Geological Survey and the Private Crane Trust, who led planning and modeling efforts to successfully mitigate potential conflicts. "These models not only enable military training, but also any other activities on state or federal lands within the migration corridor. This work is validation that conservation and training activities can be compatible."

Vrtiska said a critical component of the Crane Protection Team's success was the development of a predictive model based on habitat that takes crane risk factors into account along the entire migration path through multiple states. Armed with this information, Nebraska ARNG is now able to plan its training flight paths and aviation exercises to accurately minimize the likelihood of interaction with migrating birds.

"The size and scope of the migration corridor meant that in many instances mitigation practices were being required to protect cranes, even when the likelihood of contact was exceedingly low," said Vrtiska. "By developing the predictive model, the team is allowing Nebraska ARNG to assess relative risk for whooping crane encounters with a degree of accuracy never before possible."

In addition, Nebraska ARNG also partnered with the Crane Trust to enhance habitat in key sites around 357 acres of trust-owned lands. The Crane Protection Team spearheaded efforts to bury 2.7 miles of power lines along the Platte River corridor — power lines are the number one killer of whooping cranes and other birds, including sandhill cranes, piping plovers and least terns.

The team also conducted disking of sandbars on approximately 300 acres, removing vegetation to allow for sandbar mobility and formation. Sandbars provide roosting habitat for whooping cranes and breeding habitat for terns and plovers with natural protection from predators and human disturbance.

The team then removed approximately 57 acres of undesirable woody plant species encroaching on river roosting habitat, particularly invasive cedar, which benefits cranes as well as grassland nesting birds, migratory waterfowl and regal fritillary and monarch butterflies.

And there's more to come in Nebraska ARNG's quest to be effective environmental stewards, while never losing site of its mission.

"A feasibility study will be completed this year for construction of viewing platforms for people to see the cranes. The platform would include educational displays about the military support of conservation and the Nebraska Army National Guard's role in improving crane habitat," said Brice Krohn, Crane Trust president, adding that the Crane Protection Team is looking for other innovative ways of blending conservation and training needs.

"One idea is using helicopters to practice forward-looking infrared equipment by conducting deer and bison surveys. The crane team's relationship with the Crane Trust is opening doors for even more ambitious efforts toward shared conservation goals throughout the state."

(Nebraska Army National Guard)
Before (left) and after photos of where the team buried several miles of powerlines to enhance habitat. Powerlines are one of the primary threats to crane survival during migration.

(Nebraska Army National Guard)
Soldiers flying a Nebraska Army National Guard CH-47 Chinook helicopter drop water from their 2,000-gallon bucket above the Brush Creek fire in Holt County, Nebraska, in June 2021. The team's work is integral to not only improving crane habitat, but also deconflicting the Nebraska ARNG's aviation mission from wildlife.

New approaches drive better outcomes for Colorado Army National Guard

By Thomas Milligan
U.S. Army Environmental Command

The Colorado Army National Guard's Environmental Quality (EQ) program has set its sights not just on improving the environment for effective management of military uses, but on being a leader in the state and nation in adopting, implementing and improving environmental management overall.

For this work, hallmarked by integrated energy-use reduction, waste minimization and diversion, and for moving the COARNG fleet to greener options, the unit was awarded the 2022 Secretary of the Army Environmental Award for Non-Industrial Installation Environmental Quality.

"EQ led the way, and in turn helped the COARNG become a leader in our state's environmental planning, while creating a model for other state agencies to follow in technology adoption and expansion," said Mark Hague, Environmental Branch chief. "We are now established as a leading force for long-term, comprehensive approaches to sustainability throughout the state of Colorado and for the military. As a military organization that includes some of the most high-tech, modern and cutting-edge missions, we embraced the environmental challenges, adopting the same forward-thinking approach."

One highlight of the COARNG's efforts is the significant strides the organization made converting to electric and hybrid vehicles from the internal combustion engines that had made up its fleet. In 2019-2020, the unit acquired six zero-emission vehicles — five electric vehicles and one plug-in hybrid. The COARNG also successfully pursued grant funding from the Regional Air Quality Council, which will help keep costs down as they transition to more zero-emission vehicles.

Each electric vehicle (EV) that replaces an internal combustion vehicle, with an annual average of 9,000 miles, has an estimated annual cost savings of $2,000 per vehicle in reduced fuel and maintenance costs. By 2026, COARNG plans to achieve 12% battery electric and 18% plug-in hybrid vehicles in its fleet of state and federal vehicles.

The EQ staff had to overcome challenges that complicated the implementation of EV charging stations because of conflicts between federal and state policies and regulations. By addressing these challenges, the COARNG has moved forward with construction at three high-density sites in Colorado, and created a model for others to use in addressing similar issues.

Another bright spot was the installation of a 150-kilowatt solar field at the Fort Lupton Readiness Center in 2020. This addition to the energy management program offsets 100% of the facility's annual electricity consumption.

This improvement at Fort Lupton is just the beginning, as the EQ team is already at work planning for future statewide improvements and expansions, including smart electric panels, micro-grid and distributed energy resource additions, generator expansion, and LED lighting retrofits. The planning and savings these improvements will bring are made possible by the EQ team's ability to leverage federal funds with a nearly 50% match from the state.

This year, as part of its ongoing improvement efforts, the COARNG is completing a statewide facility energy audit and advanced metering projects at priority facilities to provide a baseline that will drive future reductions in energy and water usage.

The National Guard partners closely with multiple state agencies, with key staff serving on the Governor's Greening Government Leadership Council, and collaborates directly with the National Renewable Energy Laboratory in Golden to pilot energy conservation initiatives and test and validate innovative energy solutions.

"At the COARNG, we are not just meeting environmental regulatory requirements, we're helping to establish those requirements," said Col. Charles Beatty, chief of staff.

A solar installer technician replaces a solar panel on Colorado's Fort Lupton Readiness Center, July 2020. Installation of the 150-kilowatt solar field offsets 100% of the facility's annual electricity consumption. (Colorado Army National Guard)

(Colorado Army National Guard)
The EQ program worked with state agencies to develop solutions to installation and administration of new infrastructure. In the process, the COARNG has developed the blueprint for other military and state agencies to follow in pursuit of electric vehicle fleets.

Fort Stewart-Hunter AAF team builds efficiency, improves water quality and conservation

By Thomas Milligan
U.S. Army Environmental Command

Effectively managing two community drinking water systems, implementing a collaborative multi-unit surveillance strategy to ensure water quality, while simultaneously building strong community relationships has earned the Fort Stewart-Hunter Army Airfield (AAF) water quality team a 2022 Secretary of the Army Environmental Award.

"Our water quality team has focused on developing better efficiencies and connecting formerly stovepiped operations into a cohesive group that helps us meet all Army, state and federal drinking water standards," said Col. Manuel Ramirez, Fort Stewart-Hunter AAF garrison commander. "We're dedicated to protecting the installation's community while collaboratively developing creative solutions to ensure we maintain military training capabilities and critical support functions."

One project that demonstrated the flexibility and innovation of the water quality team was the replacement of an aging water storage tank. Rather than simply replacing the tank in-kind, a collaborative assessment of requirements by the water quality team resulted in a much better solution. The result, two smaller tanks were installed — one for potable water, the other for fire suppression — improving both water quality and overall safety.

Removing stovepipes and expanding participation added an important cultural shift that helped lead to collective success of the team. By adopting a "see something – say something" approach to water system operations and quality monitoring, all Fort Stewart-Hunter AAF-affiliated agencies and personnel are empowered to participate as part of the shared mission of serving the community.

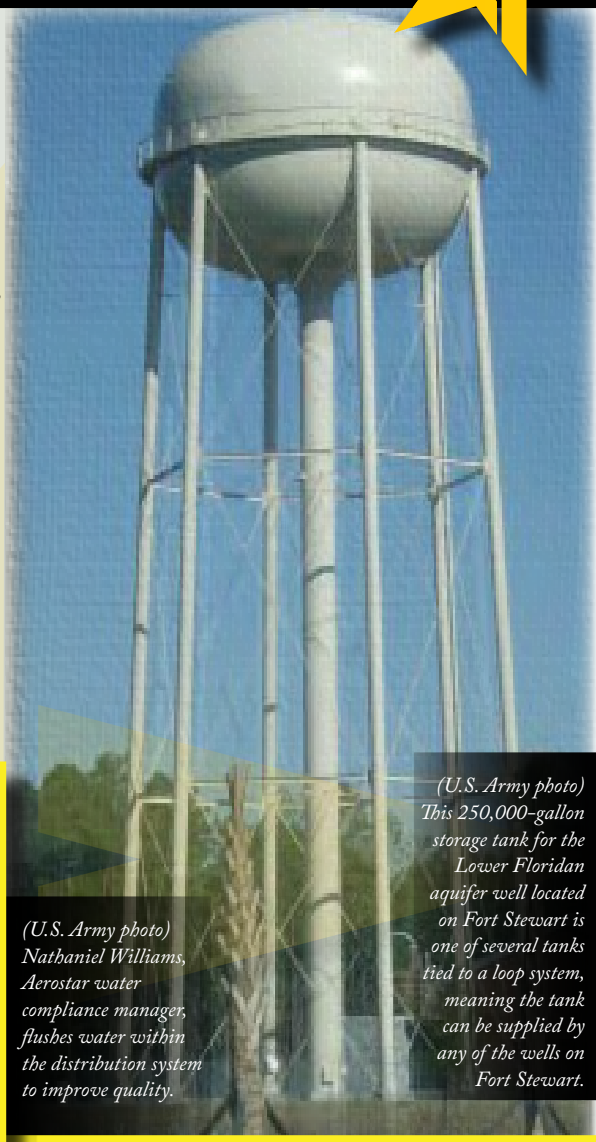
Another important improvement by the water quality team was the establishment of a joint responsibility and accountability sampling protocol, which has allowed the installation to avoid repeat sampling and unnecessary public notifications due to sampling errors. As a result, the water quality team has been lauded for its attention to effective regular monitoring to ensure full compliance with Georgia state regulations — collecting 40 bacteriological samples each month from the community systems and 12 samples each quarter from the non-community systems. To further improve water quality, an effective flushing program was implemented.

To improve efficient and timely response to emergencies, Fort Stewart-Hunter AAF has its own state-certified surveillance laboratory.

A vital component of the water quality team's success has been an extensive outreach program that includes multiple briefings, committee meetings, community water forums, as well as feedback sessions, roundtables and more. Fort Stewart-Hunter AAF Environmental Division chief Thomas Fry said that bringing the best science available to these partnership sessions between federal and state agencies, universities, research institutions and non-governmental organizations, as well as U.S. Army experts, helps bolster public confidence.

The Annual Consumer Confidence Report (also known as the water quality report) is an example of Fort Stewart-Hunter AAF outreach efforts. The water quality team developed its easy-to-read report in a manner to best support transparency to their water patrons. The format of this report was commended by the Georgia Rural Water Association as being "well-organized, and visually appealing — allowing for easy interpretation."

"Water quality is extremely important to our team, and the public knows it," said James Heidle, Fort Stewart-Hunter AAF director of public works. "We've built on existing relationships, involved experts from multiple agencies and organizations, improved our processes, and really set the groundwork for a highly effective water quality team."

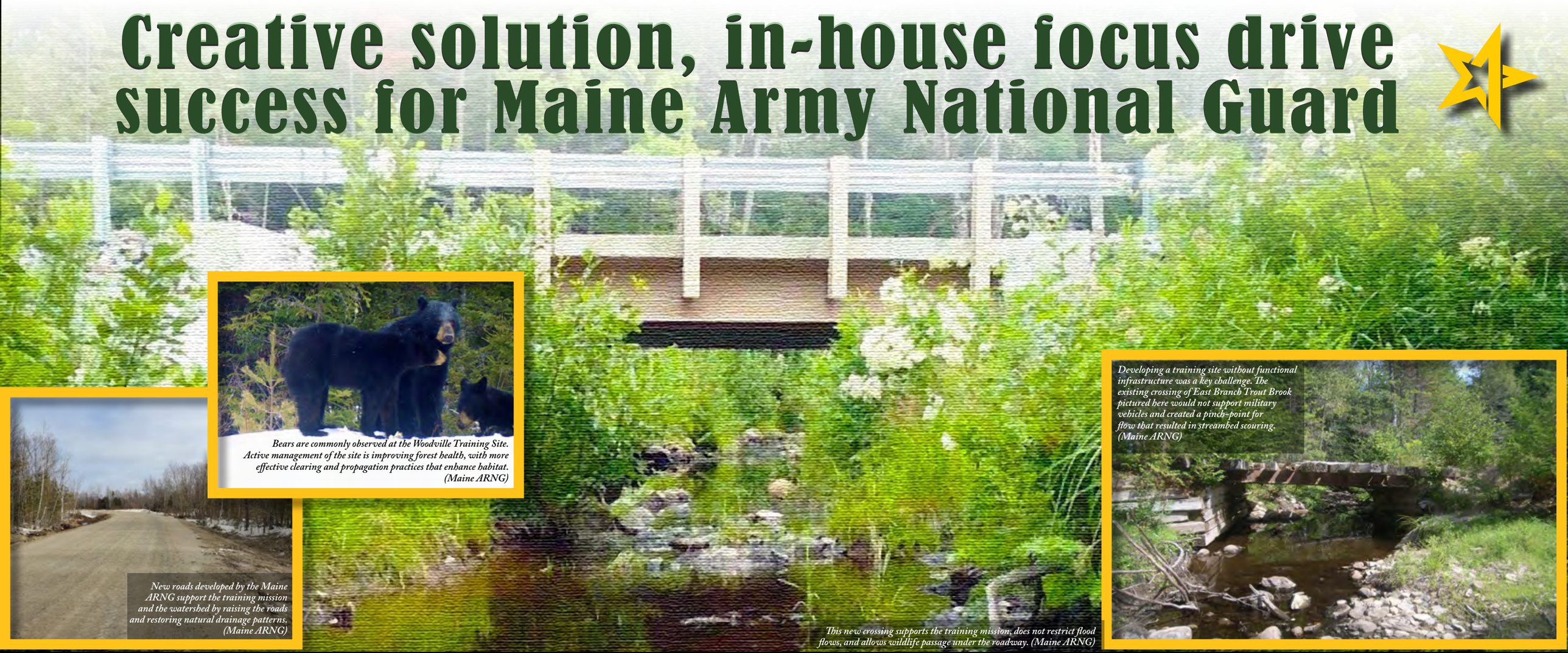


(U.S. Army photo) This 250,000-gallon storage tank for the Lower Floridan aquifer well located on Fort Stewart is one of several tanks tied to a loop system, meaning the tank can be supplied by any of the wells on Fort Stewart.

(U.S. Army photo) Nathaniel Williams, Aerostar water compliance manager, flushes water within the distribution system to improve quality.

(U.S. Army photo) Workers drill the Lower Floridan aquifer at Hunter AAF. The Lower Floridan aquifer was drilled to approximately 1,100 feet.

Creative solution, in-house focus drive success for Maine Army National Guard



Bears are commonly observed at the Woodville Training Site. Active management of the site is improving forest health, with more effective clearing and propagation practices that enhance habitat. (Maine ARNG)

New roads developed by the Maine ARNG support the training mission and the watershed by raising the roads and restoring natural drainage patterns. (Maine ARNG)

This new crossing supports the training mission, does not restrict flood flows, and allows wildlife passage under the roadway. (Maine ARNG)

Developing a training site without functional infrastructure was a key challenge. The existing crossing of East Branch Trout Brook pictured here would not support military vehicles and created a pinch-point for flow that resulted in streambed scouring. (Maine ARNG)

By Thomas Milligan
U.S. Army Environmental Command

The Maine Army National Guard (ARNG) needed a solution — a lack of available range and training space was creating significant deficiencies in training schedules and forcing units to travel to other states or remain under-trained.

The answer: creating the entirely new Woodville Training Site, a 5,340-acre training area planned and shaped out of the Maine wilderness. The multi-year, comprehensive project was led by Maine ARNG staff, who added a sharp focus on environmental conservation and minimal habitat impacts even as they met the pressing training need. For this exemplary work, the team was recognized with the Secretary of the Army Environmental Award for Natural Resource Conservation for a Small Installation.

Over the past two years, the environmental staff successfully completed nearly 4,200 pages of permit applications and federal authorization requirements almost entirely in-house, allowing 56 acres of new construction to proceed to include a light demolition range, small arms range, battalion-sized bivouac/billeting facilities, and over 7 miles of roads. The planning also incorporated stewardship and habitat quality, including northern long-eared bat, Canada lynx, and designated critical habitat for endangered Atlantic salmon.

"We believe this project stands to be an example for the ways that military land use and environmental stewardship go hand in hand," said Col. William Dionne, construction and facilities maintenance officer. "Active stewardship of the land over the long-term will improve wildlife habitat and forest health. We're putting in place effective management policies and taking management actions to enhance habitat and training."

Maine ARNG environmental program manager Andrew Flint also pointed to carefully planning construction to maintain habitat and water quality as a hallmark of the project, emphasizing the restoration of wetland connectivity, aquifer protection, and the protection and enhancement of already existing quality wetlands, while using other areas with less quality habitat for mission-critical training and range activities.

With more than 1,000 acres of wetlands on-site, the existing roads intersected wetlands and provided poor access to training lands. Using these roads for intensive military training would have caused ecological harm.

The planned development of the training site has unlocked the intersection of roads and wetlands, with 7 miles of new roads constructed to incorporate water crossings and open-bottom culverts preferred by wildlife and has returned water to natural channels.

The site can now accommodate battalion-sized training, weapons familiarization, and heavy maneuvers. Longer-range plans call for continuing updates to meet mission-critical training needs, weapons qualification, and continued emphasis on environmental and habitat preservation.

Opening the Woodville Training Site for operations this year is even more notable because the training site was not supported by significant budget allocations or financial support for the critical environmental work or construction required to build out the site. By taking on environmental compliance work in-house, and limiting use of outside contractors, Maine ARNG staff were able to create cost savings that extended the budget and produced an extraordinary outcome.

"The cost and time savings of in-house permitting and fieldwork projects are enormous. The money that has been saved by in-house environmental compliance work has been redirected to construction and development of the training site resources and kept us on schedule," said Flint. "This approach saves time as well; revisions, survey and permitting issues inevitably arise in the course of construction, but the environmental staff are now incredibly experienced at managing these issues on their own. This offers the Maine ARNG more flexibility and adaptability than if outside contractors were needed whenever obstacles arose."

As the Maine ARNG continues to operate the training site — which is located within an approximately 16-millon acre swath of forest land — it will continue to work with environmental, tribal, and state and federal agencies to maintain the highest level of environmental stewardship. For example, Maine ARNG staff are taking measures to prevent groundwater impacts from demolition training and working directly with the U.S. Fish and Wildlife Service to conduct necessary tree clearing in the winter to protect migratory birds and northern long-eared bats, which are not present in the winter.

This ongoing collaboration, as well as all the documentation that comes with a project of this size and scope, is being catalogued as part of a comprehensive repository — a vital resource in maintaining an effective, efficient training site and an environmental conservation model for use of military lands.

Stormwater pollution prevention measures keep waterways clean

By Sameria Zavala
USACE, Far East District

One way the U.S. Army Corps of Engineers Far East District (FED) is protecting and preserving our environment is through their Stormwater Pollution Prevention Plan.

Dr. Chon Song U, FED geologist, gives a detailed explanation on how the Environmental Protection Agency's Clean Water Act directs all U.S. Forces Korea (USFK) installations.

"Stormwater runoff is water from rain or snowmelt that does not immediately infiltrate into the ground and flows over or through natural or man-made storage or conveyance systems," said Chon.

Stormwater flowing through an industrial facility can pick up contaminants, discharging them directly or indirectly through storm sewer systems into nearby waterbodies, leading to surface water pollution.

"There are several techniques that FED has applied to reduce and minimize pollutants reaching stormwater," said Chon. "The most common pollutants on USFK installations are fuel-related chemicals such as fuel oil and engine oil. Those pollutants are mostly observed in car wash racks, parking lots, and vehicle maintenance facilities."

To prevent pollutants from reaching surface water, facilities are equipped with oil-water separators that recover oil from water. FED designed and installed a recycling water system located at the Camp Carroll car wash, instead of discharging wash water directly into the environment. Oil pickup is then coordinated though the garrison or base for disposal.

"Stormwater runoff through mismanaged industrial areas can contain toxic pollutants such as heavy metals and organic chemicals, or other pollutants such as trash, debris and oil," said Chon. "The grease, eventually impacting waterbodies, degrades habitats, pollutes drinking water resources, and can even cause hydrologic changes to receiving waters, due to sediments and other debris."

The Clean Water Act, governed by the Environmental Protection Agency, establishes the basic structure for regulating discharges of pollutants into the water and regulating quality standards for surface waters. FED also regulates the Stormwater Pollution Prevention Plan in accordance with the Korean Environmental Governing Standards.

Additionally, regular monitoring through laboratory analysis and continuous visual inspections of each site helps keep surface water clean.

"The Clean Water Act directs to remove untreated wastewater from cities and industries, and thus makes waterways of the local community and installations safe for human beings as well as ecologic habitats," said Chon.

To assure USFK presence is in alignment with the Clean Water Act and Korean Environmental Governing Standards, FED acts as a steward of the environment, upholding stormwater pollution prevention measures to keep waterways clean and supporting a sustainable future.

(USACE courtesy photo)
To prevent pollutants from reaching surface water, facilities on military installations are equipped with oil-water separators that recover oil from water.

(USACE courtesy photo)
Regular monitoring through laboratory analysis and continuous visual inspections of each site helps keep surface water clean. FED regulates the Stormwater Pollution Prevention Plan in accordance with the Korean Environmental Governing Standards.

ERDC expertise helps determine origin of PCBs at Eighteenmile Creek

ERDC research physical scientist Brett Hayhurst deploys a semipermeable membrane device along the east seawall in Lake Ontario at the Oak Orchard Creek embayment June 2020. (USACE courtesy photo)

ERDC research physical scientist Brett Hayhurst joined a team led by USACE Buffalo District to evaluate the origin of PCBs in the Eighteenmile Creek Area of Concern in Niagara County, New York. (USACE courtesy photo)

By Holly Kuzmitski
Engineer Research & Development Center

The U.S. Army Engineer Research and Development Center (ERDC) conducts research on everything from bats to explosives, but customers frequently call upon ERDC for technical expertise as well.

This was the case when ERDC Environmental Laboratory research physical scientist Brett Hayhurst joined a team led by U.S. Army Corps of Engineers (USACE) Buffalo District project manager Tim Noon to evaluate the origin of polychlorinated biphenyls (PCBs) in the Eighteenmile Creek Area of Concern (AOC) in Niagara County, New York.

"Brett did the hydrologic analysis and was the physical research scientist who set up the path of water column sampling, deployed the samplers and collected the data," Noon said. "Brett was really technically knowledgeable about the complicated geography and set of programs."

The geography that Noon is referring to is the region in and around the Great Lakes that encompasses 43 AOCs. According to the Restoring Great Lakes AOC website, these regions were identified by the International Joint Commission under the 1987 U.S.-Canada Great Lakes Water Quality Agreement as having high levels of environmental harm resulting from human activities at the local level to the extent that impairment of beneficial uses has occurred.

Eighteenmile Creek is one of 26 remaining AOCs slated to be restored under the U.S. Environmental Protection Agency's (EPA) Great Lakes Restoration Initiative.

The EPA's Superfund program has had part of this site on a priority list since March 2012.

"From the creek's headwaters at the Barge Canal to Harwood Street in Lockport, there is a corridor that contained legacy contaminants," Hayhurst said. "The New York State Department of Health issued a 'don't eat' advisory for any fish caught in the area because PCBs were found in the fish."

Superfund is the informal name of the 1980 Comprehensive Environmental Response, Compensation, and Liability Act, U.S. legislation that gives the EPA the authority and the funding to clean up contaminated sites.

"Contamination from the Superfund site moves downstream into the AOC and ultimately into Lake Ontario, so that's the nexus of the two," Noon said. "And that's partially why it's an AOC, but the Superfund and the AOC are administratively separate from one another."

"We started the investigation to determine conditions in the AOC, how do we get to cleanup and what does that look like," Hayhurst said. "USACE was asked to do a data gap analysis, which is collection and analysis of existing data from Superfund, federal, state and local sources. We worked with a team to see what data was missing and to evaluate results and future steps."

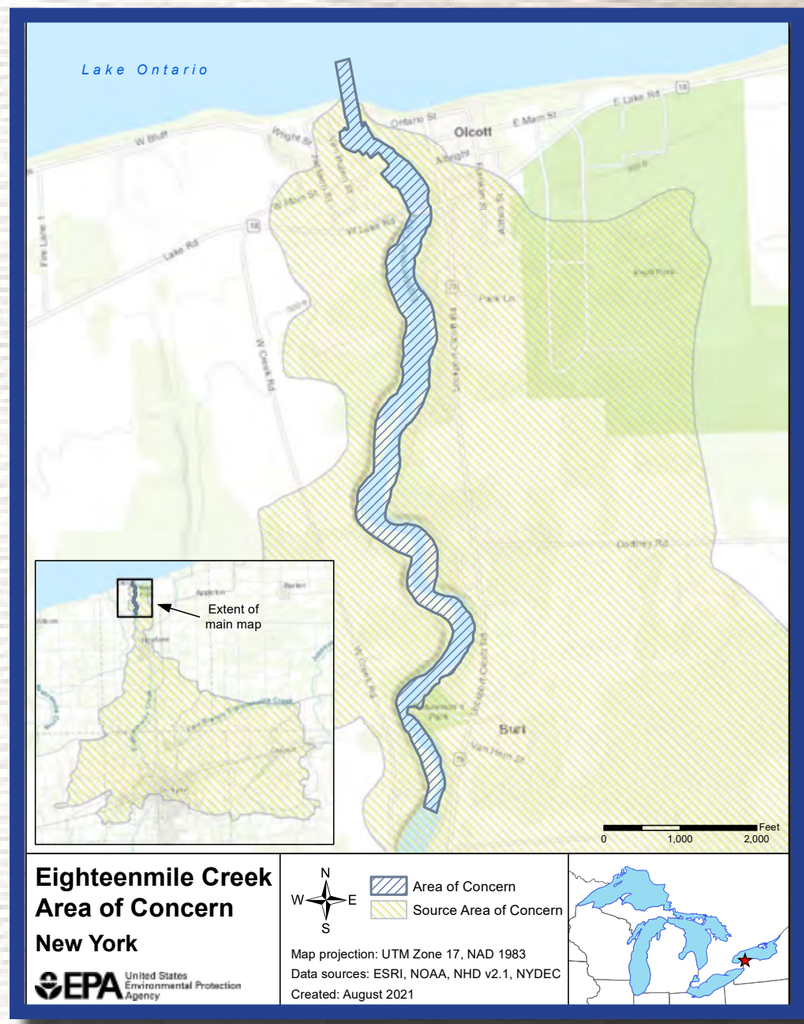
As the data gap analysis continued over years, recommendations were made to collect some sediment samples and create a map that depicts what type of contaminants are in the various sediments. The ultimate goal for the data gap analysis was to determine what was driving the beneficial use impairments in the Eighteenmile Creek AOC.

"We were evaluating the sediment and benthic macroinvertebrate community data — bottom-dwelling, small aquatic animals and insect larvae —to see what kind of contaminant concentrations were present," Hayhurst said. "Then we went up the food web to look at fish and mink data. Data analysis within the AOC indicated very low PCB concentrations within the benthic community, and the sediments were not driving a need for any specific management action related to the AOC."

After the team completed the evaluation, they reassessed the situation and thought about how the PCBs were accumulating in fish.

"We proposed that the fish are not bioaccumulating PCBs from the lower diet, but instead uptaking PCBs from the whole water column through bioconcentration," Hayhurst said. "Elevated PCB concentrations are not coming from AOC sediment. The whole water column contains both the particulate and the dissolved phase of PCBs, but the dissolved PCBs are the most concerning."

"USACE is one of the critical federal partners in the Great Lakes Restoration Initiative in that we provide a lot of unique capacity and subject matter expertise to help ultimately delist these AOCs," Noon said. "USACE and ERDC bring our expertise in service to the EPA and in partnership with our federal and state partners for the purpose of restoring the Great Lakes."



Upper Mississippi River Restoration program celebrates 35 years

By Melanie Peterson
USACE, St. Paul District

Reflecting on the Past

In 2021, the Upper Mississippi River Restoration program, or UMRR, celebrated its 35th year since it was first authorized by the Water Resources Development Act of 1986.

The UMRR program, previously called the Environmental Management Program, or EMP, was the first environmental restoration and monitoring program undertaken on a large river system in the United States. The program consists of habitat rehabilitation projects, monitoring and research, and is authorized under the Continuing Authorities Program.

Tom Novak, program manager with the U.S. Army Corps of Engineers (USACE) St. Paul District, started with USACE in 1988 and has worked on the UMRR program since 1999. The program saw a lot of changes over the years, explained Novak. For example, islands are built lower and with more dynamic edges — compared to 30 years ago.

"We're using those lessons learned over the past 35 years, and we're getting better at it," said Novak. He said there are also a lot of changes, for instance with increased sedimentation in the river and the introduction of invasive species like zebra mussels and Asian carp. Policy and implementation guidance also change, and a report is due to Congress every six years about what has been learned and how the program can improve.

Novak recalled working on the Spring Lake Islands habitat rehabilitation enhancement project near Buffalo City, Wisconsin, when he first began. The district celebrated the completion of the project with a ribbon cutting in October 2007. He also worked on the Pool 8 islands project near Brownsville, Wisconsin, that was completed in 2012, and the Capoli Slough Islands restoration project near Ferryville, Wisconsin, that was completed in 2016.

Although he retired in February 2020, Novak came back part-time as a rehired annuitant to help mentor other project managers and program managers. "The people come and go, but the program endures," said Novak. "People will build off of what I've done, and the program will keep accelerating and getting better and we will learn new things."

Novak, who studied architecture, said he enjoys building something from nothing. "On the island building side, you have some flexibility and creativity. There's more than one way to do it," said Novak. He also enjoys building relationships with partner agencies like the U.S. Geological Survey and the U.S. Fish and Wildlife Service and state resource agencies.

Celebrating the Present

"For 35 years, the Upper Mississippi River system has provided cultural, recreational, ecological and economic value to communities and tribal nations who reside in the river's watershed. The UMRR program and partnerships improve and support these values for present and future generations," said Jill Bathke, planner.

Communication outreach included a 35th anniversary flyer and short video. Watch the video here.

"We're really excited to be sharing the success with the public, to highlight what the partnership has done and to educate the public on the wide-reaching benefits and value of the program," said Bathke.

USACE St. Paul District's Brian Turner, natural resource specialist, and Angela Deen, UMRR program manager, met with the public at the Mississippi River master plan meeting at Gull Lake Recreation Area in Brainerd, Minnesota, July 21, 2015. (Patrick Moes)

Looking to the Future

Since 1986, the UMRR program has completed 56 habitat projects that improved critical fish and wildlife habitat on 106,000 acres in Illinois, Iowa, Minnesota, Missouri and Wisconsin. From 2005 to 2015, UMRR projects benefited nearly 35,000 acres of habitat — nearly 50% of all habitat reported by USACE nationally.

"It's an exciting program to work on. This is the largest river restoration project in the nation," said Angela Deen, UMRR St. Paul District program manager. "We are working hard to restore habitat that was lost and keep habitat that's existing in place for the climate that we are forecasting."

The UMRR program has 22 projects in various stages of construction and design. These projects will benefit another 65,000 acres of habitat when implemented. The program encapsulates three USACE districts – St. Paul, St. Louis and Rock Island districts, with Rock Island serving as the program lead. In the St. Paul District, there are four projects in construction and two in the planning phase.

USACE St. Paul District staff gathered near Brownsville, Minnesota, to highlight and dedicate the completion of a 3,000-acre environmental project along the Mississippi River in Pool 8, Aug. 30, 2021. (Patrick Moes)

Partnerships on the Upper Mississippi River advance soil research

USACE St. Paul District's Eric Hanson (left),ecologist, and Aaron McFarlane, biologist, examine soil in Pool 8 of the Upper Mississippi River, near LaCrosse, Wisconsin, July 22, 2020. (Melanie Peterson)

Marissa Kneer (left) and Nia Hurst, ERDC research biologists, consult a Munsell chart to characterize soils at the Conway Lake restoration project immediately upstream of Lansing, Iowa, Sept. 24, 2021. (Aaron McFarlane)

By Melanie Peterson
USACE, St. Paul District

"We've dug a lot of holes," said Aaron McFarlane, U.S. Army Corps of Engineers (USACE), St. Paul District biologist, "and that's just the beginning."

Upper Mississippi River Restoration Program

USACE is moving dirt near Conway Lake, a habitat rehabilitation and enhancement project immediately upstream of Lansing, Iowa. Conway Lake is one of the ongoing restoration projects under the Upper Mississippi River Restoration program, or UMRR.

One component of the UMRR program is island building to restore lost habitat. Over the 35 years of the program, this has included a granular, or sand, base that is topped with fine-grained sediments consisting of slit and clay typically dredged from backwater areas.

This approach mimics natural conditions in which fine sediments are deposited in floodplain soils during flood events and natural conditions throughout the Mississippi River Valley. While restoration sites are successfully planted with grass species, many sites have exhibited slow growth, low survival and at times substantial tree mortality. Now, spurred on by the efforts of McFarlane, researchers are beginning to change that narrative.

New research and development at Conway Lake, in partnership with the U.S. Army Engineer Research and Development Center, or ERDC, is looking at different baseline soil characterizations. Three different experiment test areas have been established as part of the Conway Lake project. Each test plot has a different depth of fine material placed over the sand base.

The ultimate goal, said McFarlane, is to better understand the science of soil conditions and how it relates to vegetative response.

The work on research and development started this field season at Conway Lake, and that work will be leveraged for additional work at the McGregor Lake restoration project, near Prairie du Chien, Wisconsin. If funding can be secured, this will be a long-term research project that will inform future restoration projects.

"This collective effort will help inform multimillion-dollar decisions for the UMRR program and help us maximize the ecosystem restoration benefit throughout the district," said Zach Kimmel, program and project manager.

Ultimately, the UMRR program will have to weigh the benefits of the more expensive soil blending to see if the results are worthwhile. The blended soil can currently cost up to three times as much as a sand base, but the team also expects that costs may be reduced as new techniques are explored and implemented.

"These studies will show what the soil looks like just after being constructed, and then we can watch them develop and observe how they change," said McFarlane. "I hope we can learn along the way, implement small improvements over time, and in the end greatly increase the likelihood of successfully establishing the prime habitat we are aiming for. This is a great example of adaptive management."

While there are no results from Conway yet, ERDC has concluded its testing from soil samples taken from natural islands in Pool 5, near Fountain City, Wisconsin, and Pool 10, near Guttenberg, Iowa, and man-made islands in Pool 8, near La Crosse, Wisconsin, and Pool 9, near Eastman, Wisconsin.

This research showed that in natural sites there are looser, less dense, less compacted soils with higher amounts of sand in them in general, and they are mixed with fine soil organic matter. This supports the idea that a blended soil base more closely mimics a natural island setting.

ERDC Partnership

The St. Paul District is conducting these experimental soil studies in partnership with ERDC, leveraging existing programs to inform the future of island building in the Upper Mississippi River.

McFarlane completed a six-month detail with ERDC University, which has been instrumental in kickstarting this research and creating those additional connections, said Kimmel.

"This soil problem, it was a concern of a lot of other biologists, but it's difficult to complete that research at a project level," said McFarlane. "With the ERDC University detail, I was able to start that initial research and establish a partnership with a lab that had an expertise in soil. Then, I was able to bring that back to the district and continue that partnership."

Programs being leveraged for the soil testing include the Regional Sediment Management Program, Engineering With Nature, Dredging Operations Technical Support, and Dredging Operations and Environmental Research Program.

A DAY in the life of a USACE regulatory project manager

As a regulatory project manager with the USACE Charleston District, Erica Fritz plays an instrumental role in the district's Regulatory Division, working to balance economic development with environmental protection.

Story & Photo By Dylan Burnell
USACE, Charleston District

It's 9 a.m. and Erica Fritz just sat down at her desk. She not only carries her morning cup of joe, but also a pair of tall boots. Fritz is a project manager with the U.S. Army Corps of Engineers (USACE) Charleston District's Regulatory Division and her day is just beginning.

Why the boots? Because for her, the day could end up one of two ways. Either at her desk reviewing permit applications and regulations, or out in the field taking data points and determining what truly is a wetland.

Years of congressional legislation and executive orders have given USACE permitting authority over Waters of the United States, or WOTUS. Fritz's job, among other things, is to determine what is and is not WOTUS and to evaluate potential impacts to those areas.

The role of USACE's Regulatory Division is to balance reasonable economic development with environmental protection, and Erica Fritz is on the front-line of that mission. She routinely reviews and processes permit requests from developers looking to build on or around wetlands and other waters.

The first step of the process is to try and avoid any possible impact to wetlands. If avoidance is not feasible, then the goal is to minimize and mitigate the impact development may have. These steps can be done through a variety of ways, but they always have the same end goal of balancing reasonable development with environmental protection.

What leads someone to a job like this? A background with a vast combination of years of public service and private sector experience, during which she has become quite knowledgeable in her field. Fritz studied biology in college and then went to graduate school where she continued to study wetland and forest ecology. Whether it was in college, at the U.S. Forest Service, or working for private sector companies, the environment has always been at the forefront of her career.

"I am passionate about the environment," Fritz said. "But my other strong passion in life is people and being able to help them. In this role, I get to kind of marry those two together. I enjoy when members of the public call and have questions, because one of the highlights of my day is helping them navigate the process and understand why we do what we do."

Having a background in the private sector has proven very beneficial. Her knowledge of both sides of the permitting process has made working with applicants a whole lot easier.

"I am happy that I have that private experience because when I work with people from the private sector, I can tell them I truly understand their questions. I can say, 'Hey I have sat in your chair before, I get it, and here's what's going on,' and I really enjoy that."

Fritz prefers to come into the office, even in this virtual world we are working in today. At the office, she can be around her coworkers, ask questions and learn more.

The first thing to do in the morning is to fire up the computer and check her email. She looks to see if there are any new projects assigned to her and if there are, looks them over and adds them to a tracking sheet. The regulatory division has an incredibly high workload with South Carolina being so low-lying and saturated compared to other states. In recent years, the state has also grown more popular and attracted more development, further adding to the intensity and workload.

"Everyone in regulatory has their own way of tracking their workload," Fritz said. "I start by looking at my projects on my tracking sheet and their time requirements. I learned we have some projects that can take 30 minutes to an hour to complete, so I try to get those done and out the door when I have time. It's go-go-go all day and there's not a moment there is not somethingto do, and I love that."

When it comes to what life is like working day-to-day in regulatory, Fritz said it is a very collaborative and fast-paced atmosphere. With ever-changing rules and regulations, USACE regulatory project managers must adapt and remain flexible. This leads to many seasoned project managers helping those who are newer, like Fritz.

"I really enjoy that when we are all working hard and someone has a question, we all cluster up together. Even the more seasoned project managers get to help out and we all get to listen in and learn together. It's a collaborative approach and everyone is busy."

When she's not working, Fritz likes to spend her time enjoying the land she works so closely with. Whether its kayaking, running or just taking a nice hike, she loves all-things outdoors.

While moving from the private to the public sector was certainly an adjustment for her, she could not be happier with the decision.

"It was a significant change to leave the private industry to come back to the public sector, but it was a great decision. I am a public servant at heart, and I truly love what I do."

It may be hard work, but at the end of the day, when Erica Fritz leaves the office, she can't help but look at the beautiful landscapes she works with every day. And as she does, it never fails to bring a smile to her face.

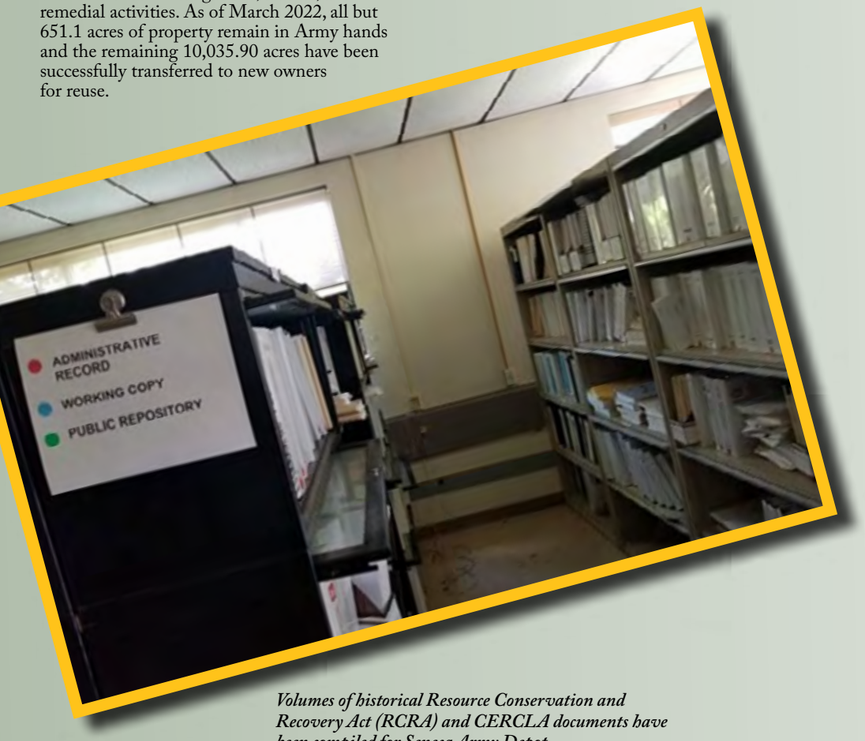
"It was a significant change to leave the private industry to come back to the public sector, but it was a great decision. I am a public servant at heart, and I truly love what I do."

Cleanup, transfer activities near completion at Seneca Army Depot

By James T. Moore
USACE, Headquarters

The U.S. Army Corps of Engineers (USACE) provides environmental cleanup support to the Army's Base Realignment and Closure (BRAC) Environmental Restoration program. This program identifies, investigates, and cleans up contamination at closing and realigning Army installations to ensure the property is safe for transfer and projected reuse.

USACE has been supporting the Army's remediation efforts at Seneca Army Deport under the BRAC Environmental Restoration program since October 1999. This 10,687-acre former military facility located in Seneca County, New York, was operated by the Department of the Army from 1941-2000. The Army has been the caretaker of the installation pending the closure of environmental investigations, studies, and remedial activities. As of March 2022, all but 651.1 acres of property remain in Army hands and the remaining 10,035.90 acres have been successfully transferred to new owners for reuse.



Volumes of historical Resource Conservation and Recovery Act (RCRA) and CERCLA documents have been compiled for Seneca Army Depot. (James Moore, USACE)

BRAC Overview

During the 1980s, to keep pace with modernization and changes required to support the mission of the Department of Defense (DOD), Congress acted to eliminate excess infrastructure and reduce operating costs. Congress authorized five rounds of BRAC.

The first four BRAC rounds were conducted between 1988 and 1995 and are referred to as Legacy BRAC. The last round occurred in 2005. From a property transfer perspective, the first four rounds were designed to yield immediate and ongoing savings for DOD — and according to DOD estimates, the first four BRAC rounds collectively eliminated 21% of the DOD's 1988 installation capacity.

Site History

Seneca Army Depot was designated for closure and redevelopment under DOD's BRAC process in October 1995. As part of the BRAC process, the Army commissioned an Environmental Baseline Survey (EBS) of the depot. Under the EBS, all property that was identified as being subject to transfer or lease was classified into one of seven standard environmental conditions of property area types, as defined by the Community Environmental Response Facilitation Act (CERFA) and DOD BRAC Cleanup Plan Guidebook.

This was achieved by identifying, characterizing, and documenting the presence or likely presence of a release or threatened release of a hazardous substance or petroleum product associated with the historical and current use of the depot. Areas that were designated as Category 1, 2, 3 or 4 under the CERFA process were suitable for transfer or lease, subject to consideration of the qualifiers. Areas that were designated as Category 5, 6 or 7 were not suitable for transfer, pending further investigation and remediation, as may be needed.

At the completion of the EBS, 113 BRAC parcels of land were identified and classified within the 10,687-acre depot. As part of the depot's closeout, approximately 8,250 acres were transferred to new owners for reuse by 2017. As of March 2022, 10,035.90 acres have been successfully transferred with all but 651.1 acres of property remaining in Army hands.

Once Seneca Army Depot was added to the 1995 BRAC list, the Army's primary objective expanded from performing remedial investigations and completing necessary remedial actions to include the release of non-affected portions of the depot to the surrounding community for their reuse for other, non-military purposes (i.e., industrial, municipal, and residential).

To address employment and economic impacts associated with the depot's closure, the Seneca County Board of Supervisors established the Seneca Army Depot Local Redevelopment Authority (LRA) to prepare a plan for redevelopment of the Seneca Army Depot property. The designated future use of land within the depot was first defined and approved by the Seneca County LRA in 1996. The planned use for portions of the depot was later modified by the Seneca County Industrial Development Agency in 2005.

Environmental Cleanup Activities

Sites being restored under the BRAC Environmental Restoration program include those contaminated by past or closing defense activities and where a response is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and certain corrective actions required by the Resource Conservation Recovery Act (RCRA).

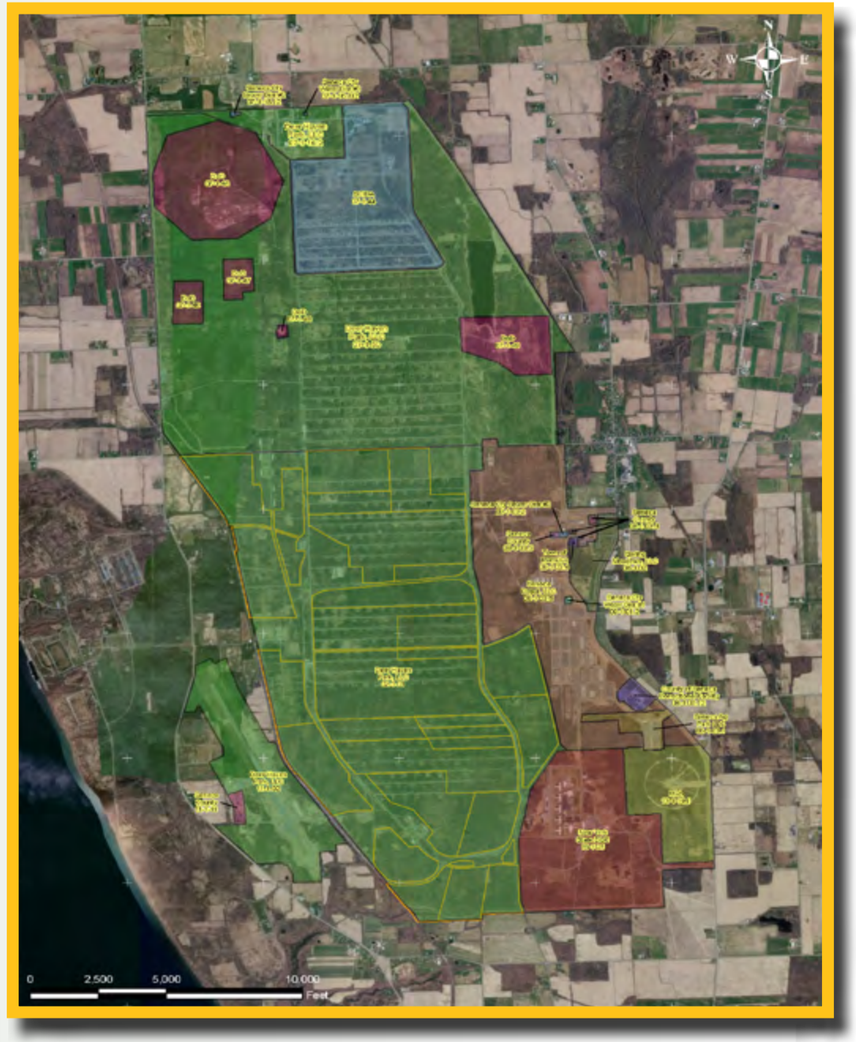
The depot consists of 17 Operable Units and 84 Areas of Concern (AOCs). To date, Records of Decisions have been signed for 83 of the 84 AOCs, with the last Record of Decision being scheduled for the Open Burning/Open Detonation (OB/OD) Grounds in late 2022.

Using the CERCLA process, nine criteria were presented in the draft Proposed Plan for the Seneca OB/OD Grounds. The most effective alternative to achieve the remedial objectives for the Seneca OB/OD Grounds is Alternative 4, which involves excavating OD Hill, performing surface/subsurface clearance over the entire site, and implementing land use controls. This alternative is recommended because it reduces the level of munitions and explosives of concern to an acceptable level for the anticipated future land use, achieves remedial action objectives, does not require significant long-term maintenance, and is cost effective.

The U.S. EPA approved the OB/OD Detonation Area Feasibility Study April 7, 2022. Next steps include finalizing the Proposed Plan and Record of Decision for the OB/OD Grounds later this year and completing recommended remediation.

Once the removal action in the Seneca OB/OD Grounds is complete, the last 640 acres can be transferred. The current planned reuse of the property is to construct a solar power field across the entire 651.1 acres.

More information on the Seneca Army Depot project can be found here.



As a result of environmental cleanup activities, 10,035.90 acres of Seneca Army Depot have been transferred for reuse. (Map courtesy of Parsons)

ERDC team delivers annual Earth Day message to local students

By Jason Scott
Army Engineer and Research Development Center

(USACE courtesy photo)
ERDC Installation Operations Command chemical engineer Bobby McComas (center) demonstrates the EM River Model, a tabletop visualization of riverine processes, to students at Bowmar Avenue Elementary School.

On April 20, a group from the U.S. Army Engineer Research and Development Center's (ERDC) Installation Operations Command and Environmental Laboratory celebrated Earth Day with fourth grade students from Bowmar Avenue Elementary School in Vicksburg, Mississippi. The U.S. Army's theme for Earth Day this year is "A Partnership for the Planet."

After an introduction to what ERDC does, students visited three separate stations to learn about different environmental challenges. The EM River Model provides a tabletop visualization of riverine processes. The model allows the students to manipulate riverine systems and see immediate effects. Students were also shown a demonstration of an oil spill and the effects it has on a body of water and aquatic plants and animals. At the third station, students experienced show-and-tell where preserved aquatic specimens were shown, including pallid sturgeon and white shrimp.

The first Earth Day was celebrated in 1970, when a United States senator from Wisconsin organized a national demonstration to raise awareness about environmental issues. Rallies took place across the country, and by the end of the year, the U.S. government had created the Environmental Protection Agency. By 1990, Earth Day was an event celebrated by more than 140 countries around the globe. Earth Day is officially celebrated each year on April 22.

(USACE courtesy photo)
Cynthia Banks (right), ERDC Installation Operations Command environmental protection specialist, shows fourth grade students from Bowmar Avenue Elementary School in Vicksburg, Mississippi, different preserved aquatic specimens — including pallid sturgeon and white shrimp.

ERDC working to address energy and water resiliency

Engineers at ERDC are working to develop an Installation Energy and Water Plan to address resiliency for energy and water security at the ERDC Waterways Experiment Station in Vicksburg, Mississippi.
(USACE courtesy photo)

By Jason Scott
Army Engineer and Research Development

The U.S. Army Engineer Research and Development Center (ERDC) is working to develop an Installation Energy and Water Plan (IEWP) to address resiliency for water and energy security at the ERDC Waterways Experiment Station (WES) in Vicksburg, Mississippi.

"Our current IEWPs address where we are vulnerable," said Lt. Gen. Scott Spellmon, U.S. Army Corps of Engineers (USACE) commanding general and 55th Chief of Engineers for USACE. "We must ensure our plans are developed to account for the dynamics of today."

The purpose of the IEWP is to provide a roadmap for how to improve security and resilience of installation systems and operations when external and internal energy and water services are disrupted.

"Other Army installations that have developed an IEWP have had to use outside vendors," said Dr. David Pittman, ERDC director, who also serves as chief scientist and director of research and development for USACE. "However, creation of the ERDC's IEWP is a collaborative effort amongst most of our labs, using a data-driven approach."

Development of the ERDC's IEWP looks to mitigate risks to all critical missions, to reduce the risk of future disruptions, to reduce energy and water use of all missions through conservation and efficiency efforts, and to lower total operating costs while fully maintaining services.

"We have several goals we look to meet with the creation of the ERDC's IEWP," Pittman said. "We are hoping to provide 14 days' worth of sustained energy and water that are necessary for critical missions."

ERDC provides critical support to installations around the world that help power America's mission abroad. In the event of the loss of power or water, the ability to function normally with no disruptions is a top priority to leadership.

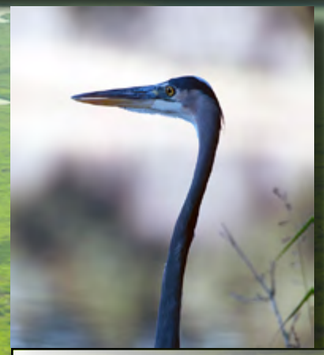
"We are doing great things for installations around the globe," Pittman said. "Developing an IEWP for the ERDC will give this installation the same level of energy and water resiliency and security. It will allow us to continue our mission should one of our labs lose power or water for an extended period."

ERDC researchers and engineers are currently working to establish the enterprise's baseline condition and future projections. ERDC researchers will then propose courses of action to improve identified deficiencies, which will be further refined in an implementation plan. Through this implementation plan, new funding opportunities for improving energy and water resiliency and security will be available for the ERDC WES campus.

IEWPs for the ERDC's Construction Engineering Research Laboratory in Champaign, Illinois; Geospatial Research Laboratory in Alexandria, Virginia; and Cold Regions Research and Engineering Laboratory in Hanover, New Hampshire, will be developed in the future.

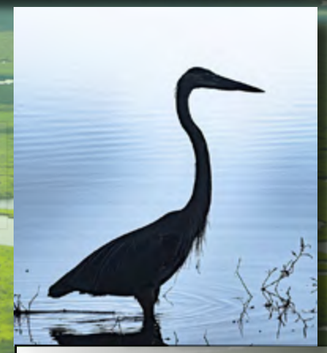
Orchestrating Everglades restoration

The American alligator, once endangered, are now thriving due to state and federal protections, habitat preservation, restoration and conservation efforts such as the CERP.



The great blue heron is one of the largest herons on the North American continent. The birds live in saltwater and freshwater habitats. USACE and its partners are working to improve the quantity, quality, timing and distribution of water throughout South Florida.

USACE and its partners are working to improve the quantity, quality, timing and distribution of water throughout South Florida. Programs such as the CERP provide a framework for restoring, protecting and preserving the greater Everglades ecosystem.



A great blue heron is seen here slowly stalking small fish along the river shoreline of Myakka River State Park in Sarasota, Florida.

Great egrets wade in shallow water to hunt fish, frogs and other small aquatic animals. Through the RECOVER program, agencies can provide a process for incorporating new science to track the progress of impacted ecosystems and manage water.

Story & Photos by Brigida Sanchez
USACE, Jacksonville District

Close your eyes for a moment and call up your old friend. Yes, that old friend, Ms. Imagination. It's probably been a while since you've spoken but ask her. Ask her to take you to the largest subtropical wilderness in the United States. A place where you can sit for a while in a vast, untamed landscape. Look up, and you'll see cumulus clouds scurrying across a big blue skyway. Listen, and you'll hear a full orchestra of rustling cypress, a choir of birds, stridulating bugs, croaking frogs, and bellowing gators playing in harmony as blades of grass and saw palmetto swing and sway in the sunlight.

Then as a bead of sweat slowly slides down your back, and a squadron of mosquitos dives down in an audacious plan of attack, you quickly open your eyes.

Welcome back from your introductory trip to Florida's Everglades. A world of 1.5 million acres of sawgrass marshes, mangrove forests, and hardwood hammocks dominated by wetlands.

The U.S. Army Corps of Engineers (USACE) is one of 10 federal and state agencies, alongside the Miccosukee Tribe of Indians of Florida and the Seminole Tribe of Florida, vested in the Comprehensive Everglades Restoration Plan (CERP). The plan is to restore, preserve and protect the south Florida ecosystem while providing for other water-related needs of the region, including water supply and flood protection. The question is, how does this fellowship track changes in the system that is the Everglades. The team must consider many factors such as challenges of climate change, urban development, the 8 million inhabitants and growing population that rely on it for potable water, and the flora and fauna that the Everglades sustains.

The answer is Restoration Coordination and Verification (RECOVER), a multi-agency team of scientists, modelers, planners, and resource specialists who organize and apply scientific and technical information in ways that are essential to supporting the objectives of the CERP.

"Preliminary investigations began in the early 2000s, and the majority of the current monitoring programs began around 2005," said Gina Paduano Ralph, lead scientist, USACE Jacksonville District. "In addition, some monitoring components were built on existing efforts and, therefore, have an even longer and more valuable data sets."

She went on to explain that there is a critical link between the acquisition of monitoring and research data to the system-wide assessment of status and trends of ecological indicators, as well as to the decision-makers through the Adaptive Management program. These factors are essential to reducing the uncertainty in decisions and evaluating CERP's success. This type of monitoring and feedback loop ensures that science guides CERP decision-making, increasing the overall success of Everglades restoration initiatives.

The question scientists are seeking to answer is can they restore the remaining Everglades to approach its original state? Humans have played a role in the Everglades' current state, and now with CERP in its restoration.

Through CERP, restoration is achieved by removing barriers to sheet flow, creating, and cleansing water, managing seepage, and adjusting operations. It is through these components that management of the water that is crucial to reestablishing the Everglades can be reached.

RECOVER scientists are on the ground, trekking through mud, gliding across wetlands in airboats, and kayaking through what is the Everglades to observe and collect data. The team has developed and implemented a Monitoring and Assessment Plan (MAP).

Jenna May, USACE Jacksonville District biologist, said, "The RECOVER MAP is designed to test ideas about what can be done to restore the ecosystem and determine whether changes seen in the ecosystem result from restoration activities or other factors, such as climate change and rising sea level. Some of the plant and animal species, or ecological indicators, RECOVER is monitoring as part of the MAP include submerged aquatic vegetation, eastern oyster, crocodiles, juvenile spotted seatrout, periphyton, tree islands and wading birds."

May noted that the first-generation Picayune Strand Restoration Project is a success story. The project intends to redistribute freshwater flow, creating more uniform salinity patterns within the Ten Thousand Islands Estuary.

Regarding CERP, ecological benefits that have been documented are manatees taking advantage of the Manatee Mitigation Feature, a warm-water refuge. May also added that there has been a reemergence of foraging wading birds and native flora that have been absent in the area for decades.

Along with successes, there are environmental conditions that are a challenge in ecosystem restoration. For example, May cited that scientists realize that the pre-drained Everglades system was more saturated than previously thought. To achieve the team's ecological outcomes, more water needs to flow through the system to have more birds, more bugs, more frogs, more gators, and of course, more native plants. Existing constraints such as seepage management, water storage and water quantity will also need to be addressed before enough additional water is available to see improvements in the southern portions of the system.

"Additionally, some project teams are strategizing how to promote systemwide resilience so that the goals and objectives of the CERP can still be met in light of future changes, such as climate change and sea-level rise," said May.

CERP has seen success through challenges because of RECOVER's ability to capture a dynamic picture from the micro- to the macro-level.

"The team continues to provide rich data resources and powerful predictive tools to CERP projects for almost two decades," said May. "I think we are fortunate to have developed some robust long-term datasets that projects can use and feel confident in."

Is it possible to know how many birds have nested? Can planners figure out if there are enough oysters and native aquatic plants to help filter the water coming down from the north? Can we have CERP without RECOVER?

"RECOVER is a requirement of the Programmatic Regulations. However, the continued decline in RECOVER resources to include monitoring data severely limits RECOVER's ability to conduct scientific investigations to promote the best possible outcomes with CERP," Ralph said.

The dictionary defines syncopation as a musical term meaning a variety of rhythms played together to make a piece of music. So, birds singing, bugs friskily rubbing their wings, leathery lizards huskily groaning, and of course, scientists with their spreadsheets and electronic dashboards plugging in numbers are all essential to orchestrating the restoration of the largest subtropical wilderness in the United States, the Everglades.

Imagine the orchestra of that sound.

USACE researchers collaborate with Native American tribes to improve wildrice productivity

By Jason Scott
Army Engineer and Research Development

U.S. Army Corps of Engineers (USACE) researchers are working with the Lac Vieux Desert Band of Lake Superior Chippewa Indians and other Native American tribes to help improve wildrice *(Zizania palustris)* productivity. The U.S. Army Engineer Research and Development Center (ERDC) work is supporting two six-year USACE Detroit District Planning Assistance to States studies.

Wildrice, or "manoomin" in the Anishinaabe or Ojibwe language, is found in fringe and riparian wetlands along lakes and rivers in the Great Lakes region. It is culturally significant and an important Great Lakes region Native American tribe food source. Wildrice is also a vital part of traditional religious ceremonies for these tribes.

The Native American tribes harvest wildrice using traditional methods. Called "knocking the rice," harvesters gently guide a canoe through the rice while using "knockers" to carefully knock or brush ripe rice into the canoe, taking great care not to damage the plants. This centuries-old method helps sustain wildrice stands.

Knowledge of wildrice has been handed down through oral tradition. ERDC researchers found the Native American tribes to be an invaluable repository of wildrice ecological and cultural information.

In addition to its cultural significance, wildrice is also important to the region's ecology. Wildrice is an annual plant that lacks a rhizome, and its seeds germinate following a prolonged submergence in cold temperatures. In ecosystems where it is found, wildrice functions as an aquatic habitat and food resource.

Wildrice is also sensitive to ecosystem changes. Large stands of wildrice indicate a healthy, functioning ecosystem. However, over the last few decades wildrice production has significantly declined.

Many factors, including precipitation, water quality, water temperature, vegetation competition, soil properties and hydrology, impact wildrice production.

"Current ERDC research focuses on 12 lakes in the upper peninsula of Michigan," said Dr. Jacob Berkowitz, research soil scientist in the ERDC's Environmental Laboratory. "There are varying levels of wildrice productivity across these research lakes."

ERDC research at the lakes is focusing on three components, each important to sustaining wildrice production: nutrient concentrations in the water column and in sediment porewater, soil physicochemical properties and hydrology.

"ERDC continues to work collaboratively with the Native American tribes of the upper Great Lakes region to identify ecological threats to wildrice," Berkowitz said. "Researchers are developing monitoring and mapping tools to help the tribes improve wildrice management."

The benefits of these updated management practices will improve water quality, reduced flood risks and ensure the future sustainability of wildrice in the region.

A healthy stand of wildrice is indicative of a highly functional ecosystem in the northern Great Lakes region. (Kevin Philley)

Wildrice flowers and seeds at one of the research lakes where researchers at ERDC's Environmental Lab are working to help improve wildrice productivity. (Christine VanZomeren)

Successful flood project benefits small village and New York City

Before the project got started, the stream's banks were eroding, causing trees and clay sediment to fall into the stream. (Delaware County Soil and Water Conservation District)

Completed project. (Delaware County Soil and Water Conservation District)

Members of multiple agencies that collaborated on the completion of the Steele Brook Streambank Stabilization Project. (USACE)

Matthew Krzyston (left) and other members of Delhi's Joint Flood Mitigation Committee have a discussion at Reservoir Park while work was in progress. (Delhi's Joint Flood Mitigation Committee)

By JoAnne Castagna
USACE, New York District

Matthew Krzyston grew up in the village of Delhi, a rural community located in Delaware County, New York.

"I grew up half a mile downstream from Reservoir Park. As a young kid, my parents would take me there to picnic and play in Steele Brook. It was a special place that people of all ages loved to visit," said Krzyston. "However, during storm events, extreme eroding of the streambanks caused trees and clay sediment to fall into the stream. This created flooding in the village and made it impossible to even enter the park and it was basically forgotten."

Four decades later, Krzyston is part of a team of people that helped to change this. Today, he's a council member with the town of Delhi and a member of Delhi's Joint Flood Mitigation Committee. The committee, with the help of the U.S. Army Corps of Engineers (USACE) New York District, restored Steele Brook's banks and as a result, there is less flooding, improved water quality, and it's giving new life to Reservoir Park.

"Now the park is more accessible and more beautiful than it ever was before. I was excited to bring my boys — ages 13 and 15 — back to the same park where my parents had brought me.

"When we entered, they were amazed that they had never seen this hidden gem that is right up the road. My youngest looked around and said it felt like we were in a national park. We will be retuning often," said Krzyston.

The Steele Brook Streambank Stabilization Project is one of many projects USACE has performed under its New York City Watershed Environmental Assistance Program.

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

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

Steele Brook flows into the West Branch Delaware River that is located in the heart of the village of Delhi. The West Branch flows into the Cannonsville Reservoir, one of several reservoirs that annually supply almost 97 billion gallons of water to the New York City water supply system.

If a streambank is eroding and trees and clay sediment are falling down the streambank and into the waterway, this can reduce the quality of the water that will eventually become the public's drinking water and it can also cause flooding.

A portion of Steele Brook's streambank was showing a great deal of erosion. During storm events, trees and clay sediment washed down from the banks into the stream and down the waterway. This debris got lodged under bridges within the village causing the water to overtop and causing extreme flooding for the residents and businesses, impacting a population of approximately 3,100.

Krzyston said, "I witnessed flooding within the village stemming from Steele Brook on two occasions. Two important bridges were almost completely blocked with woody debris that had eroded from the riverbank. Floodwater jumped the banks, flowed down main street, and entered residential, business and municipal properties. Municipal workers and local businesses took emergency action, using heavy equipment to remove the woody debris that was blocking the bridges. This action allowed water from Steele Brook to pass under the bridges and subside back within the river's banks."

In order to restore the streambank to reduce flooding and improve water quality, several agencies collaborated including USACE, the New York State Department of Environmental Conservation, New York City Department of Environmental Protection, village of Delhi and Delhi's Joint Flood Mitigation Committee, Delaware County Department of Watershed Affairs, and Delaware County Soil and Water Conservation District.

The streambank stabilization work included clearing the fallen trees and debris from the 632-foot-long Steele Brook and its 21-foot-high slopes to stabilize the streambanks.

Along the edges of the stream, loose stones were placed. The stones slow down the stream, reducing potential damages downstream.

Also, along the stream border, a stacked rock wall was built. This was done to prevent sediment from running off the slopes into the stream during storm events.

Above the stacked rock wall, 8,414 feet of the bank that was eroding was revegetated with native plants including native willow live stakes.

"The plants' roots stabilize the soil and prevent the soil from running into the river. The vegetation also traps and absorbs sediment and pollutants, like harmful phosphorus and nitrogen particles, from entering the stream," said Graydon Dutcher, stream program coordinator with the Delaware County Soil and Water Conservation District.

These pollutants can come from nearby roads. Dutcher said, "When streambanks are eroded, it makes it easier for soil and pollutants to travel from roads to bodies of water. During storm events, water on roads can sweep up contaminants and transport them to bodies of water, such as a stream, adversely affecting the water that will eventually become a part of the water supply. Now with the newly planted vegetation, the floodwater will drain from the road and filter through this vegetation before entering the stream."

Another way to prevent pollutants from traveling from roads to the stream is by making sure there is a healthy floodplain. The stream was realigned to include a floodplain.

A floodplain is an area of low-lying ground that is adjacent to the stream that keeps a river clean by filtering the water that runs from roads into the stream and absorbing pollutants before they enter the stream. Floodplains also provide space for water to spread out and slow down during big storm events. Because of Steele Brook's steep side slopes, there was little to no floodplain, so the water ran straight into the stream without getting filtered.

Preventing sediment from entering the stream is not only beneficial to the public's water supply, but also to aquatic habitats. Clay sediment can reduce oxygen in the water suffocating aquatic wildlife.

To further protect aquatic habitats, a mixture of deep and shallow water depths was created in the stream to support different types of fish and invertebrate life.

Deep water — or pools — were created. Pools have slow-moving waters that are favorite places for certain species of fish, such as trout, to hang out.

Shallow water — or riffles — were created. Riffles are faster-moving sections of a stream where rocks break the water surface. When the water rushes over the rocks, it adds oxygen to the water. These are good places for certain insects to live.

Additionally, this project has given the public access to Reservoir Park once again and the village is encouraging visitors. According to the mayor of Delhi, picnic tables and grills will be placed in Reservoir Park to encourage not only locals to enjoy the area, but also visitors from New York City.

"The flood commission members are very grateful to the Army Corps for the role they played in this project. I considered this to be an emergency. We have the local know-how and energy to address these types of emergency situations. However, it is very difficult — sometimes even impossible — to implement these projects without support from the Army Corps," said Krzyston. "While the project was designed to ensure public safety, the social and recreational benefits to the local population are immeasurable. There will be many family memories made at Reservoir Park."

New York City Watershed System

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

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

A watershed is an area of land that catches rain and snow that drains or seeps into a marsh, stream, river, lake, or groundwater.

This water eventually gets stored in reservoirs, a place where water is collected and kept for use when wanted, such as to supply a city.

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

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

"In 1996, all of the municipalities in the New York City watershed region came to an agreement. They wanted to avoid the creation of a huge filtration plant. Instead of a plant, they agreed to have small projects throughout the region to provide the public with clean water with minimal filtration. This is how our New York City Watershed Environmental Assistance Program came about," said Rifat Salim, USACE New York District project manager.

Coastal and Hydraulics Laboratory invention team receives patent for bedload transport measurement technique

By Patrice Creel
Engineer Research and Development Center

Utilizing their combined decades of experience in river mechanics, a four-member team of research physicists and hydraulic engineers with the Engineer Research and Development Center (ERDC) combined their expertise to invent the Integrated Section, Surface Difference Over Time, version 2 (ISSDOTv2) method, which accurately measures the sediment moving on the bed of large sand-bed rivers. The team from ERDC's Coastal and Hydraulics Laboratory (CHL) received their patent, "Bedload transport methodology and method of use," in July 2021.

The initial research work to develop and validate the functional relationships was completed by David Abraham as part of a doctoral dissertation in 2008. Subsequently, CHL employees Tate McAlpin, Thad Pratt and John Shelley all made significant contributions to the methodology.

"Without these contributions, the method might have just ended up on a dusty shelf of PhD dissertations," Abraham said.

Answering this river engineering challenge, the new method estimates an overall bed-load transport rate by measuring bathymetric elevations multiple times in a specific area. It computes volumetric surface differences for incremental time steps related to erosion and/or deposition rates. An equation was developed that relates the incremental scour or deposition rates to the average transport of a moving sand wave, thereby providing an estimate of the sand moving on the bed of the river.

"The method is for anyone who needs to know how much sediment (usually sand) is moving in bed-forms (sand waves) on the bottom of large sand-bed rivers," McAlpin said. "So, first and foremost, that would be river managers who are responsible for keeping the navigation channels open."

McAlpin added it will also benefit geomorphologists, wildlife ecologists, sand miners, lock and dam and port operators and even private marina operators.

Invention Uses and Advantages

The U.S. Army Corps of Engineers (USACE) river managers no longer view sands moving in riverbeds as a nuisance or problem related to dredging requirements. Instead, these sands are proving to be an important element as river engineers and managers are now asked to allocate bed-sediment resources for a variety of competing purposes and interests.

"For river managers to make involved decisions, they must have some idea of how much sediment is moving on the bed of a river," McAlpin explained. "This invention provides a much-needed quantitative management tool for those tasked with allocating a river's sand resources."

Through the use of this method, USACE can address critical issues, such as land-building in the Louisiana coastal areas and commercial sand mining in many locations throughout the country. For environmental concerns related to the Endangered Species Act and environmental impact statements, USACE managers must evaluate sands' availabilities. Such evaluations reveal ecological habitat river features and ensure adequate draft depths in navigation channels to meet lock and dam navigation requirements.

"Recent applications of this patented method in support of districts included bedload transport measurements to develop bed-load rating curves and sediment budgets," McAlpin said. "This is important for quantifying the amount of sediment entering/leaving/accumulating in an area. It has also been utilized to evaluate the habitat suitability, or lack thereof, for endangered species. Numerical modeling of sediment transport processes is becoming more and more prevalent, and these bed-load transport measurements can be utilized to validate these numerical models."

Cooperative Effort

This invention was developed in cooperation with the University of Iowa and the USDA-ARS National Sedimentation Lab. Tests were conducted at the National Sedimentation Laboratory in Oxford, Mississippi.

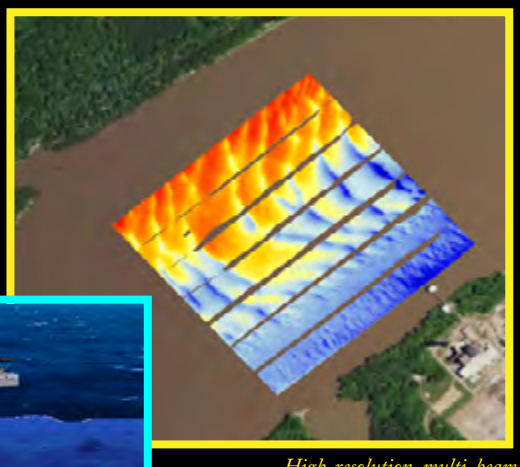
"The team determined an incremental amount of movement between two mapped surfaces could be utilized to quantify the bed-load moving on large rivers. The measured 3D scour and deposition volumes from the difference of the two measured surfaces and the time between those two measurements allowed for the computation of a volumetric transport rate," McAlpin said. "The transport values for each swath of data are combined to get the total bed-load for the whole river cross section. Numerous examples of its current usage include numerical model validation, bed-load rating curve and sediment budget development."

He added that there are possible uses for the method in support of the military in terms of access/denial associated with riverbed forms limiting draft clearance.

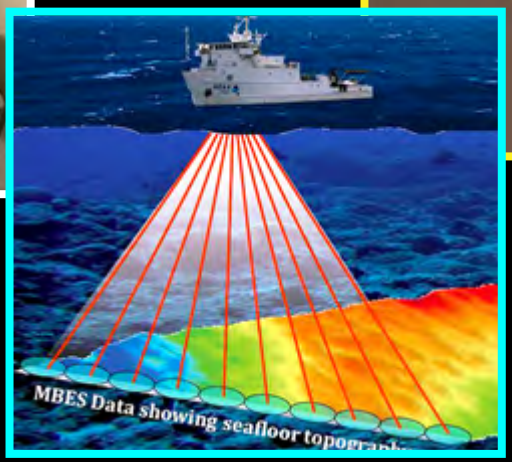
"Now, Corps districts have a dependable way to measure the quantity of sand moving in the dunes on the bottom of large sand-bed rivers," McAlpin said. "To date, 10 Corps districts have used the method for the various purposes mentioned above with total funding exceeding $4 million dollars."

Link to patent application:
https://uspto.report/patent/grant/11,067,475

Members of CHL team discuss their invention. From left, CHL's research hydraulic engineer David Abraha, research physicist Tate McAlpin, and research physicist Thad Pratt invented these methods to answer river engineers' challenges. (USACE courtesy photo)



High-resolution, multi-beam measurements of the sand waves moving on the bed of the Mississippi River. (Courtesy of USACE)



MBES data showing seafloor topography. (Courtesy of USACE)

There and Back Again: A salmon's tale in the Pacific Northwest

By Hannah Mitchell
USACE, Walla Wall District

Some fish live in freshwater streams and lakes. Other fish live in the ocean, in saltwater. Then there are salmon who do both.

Salmon are anadromous, meaning they live part of their lives in freshwater and part in saltwater. The life cycle of a salmon can be thought of as a long journey to the ocean and back again.

In the Pacific Northwest, salmon start their lives in the freshwater rivers of Washington, Oregon, and Idaho. As they mature, they travel to the Pacific Ocean, where they grow bigger and stronger before traveling back up the rivers, sometimes over hundreds of miles, to spawn and create the next generation of salmon to start the cycle over again.

Hatching in the Hatchery

In Idaho, on the north fork of the Clearwater River, eggs and milt are collected from returning adult salmon at the Dworshak National Fish Hatchery (DNFH).

In the wild, fertilized eggs would lay in rocky streambeds until they hatched. In hatcheries like DNFH, fertilized eggs are placed in incubation trays with circulating water. Temperature is closely regulated to keep the eggs healthy and growing at an appropriate rate.

When salmon hatch, they do not need food right away. Newborn salmon are called alevin, or sac fry, because they are still attached to their yolk sacs. This yolk can sustain them for several weeks before it is completely absorbed.

In the hatchery, the sac fry is kept in their incubation trays until the egg yolk is completely absorbed.

"Once the egg sac is absorbed, they look like there's a zipper up their center. Once they're 'zipped up' that's when they get moved into the nursery," Jeremy Sommer, Nez Perce Tribe hatchery manager for the Dworshak National Fish Hatchery, said.

When the young salmon, now called fry, are moved to the nursery, it means they are old enough to need food. At first, the fry are so small their food is the consistency of dust. However, as they grow, they are fed larger and larger pellets. While in the nursery, fry are kept in water from the Dworshak Reservoir, like they were in the incubation trays. This water protects them from diseases and pathogens in the river water during their early and most vulnerable stages of life.

"We're using reservoir water from above the (Dworshak Dam). This helps us manage around the disease IHNV (Infectious Hematopoietic Necrosis Virus), which has plagued the facility for years. We've managed pretty successfully for about a decade," Mark Drobish, U.S. Fish and Wildlife Service hatchery manager for the Dworshak National Fish Hatchery, said.

Once they are big enough, the young salmon are transferred to outside raceways or burrows ponds, where they have more room to move and grow, transitioning from fry to smolt. Eventually, the smolt switch from reservoir water to river water. Once the smolts reach a certain size, about 5.8 fish per pound, they are released into the river to begin their trip to the ocean.

Hatchery releases at the Dworshak National Fish Hatchery typically take place in late March and into April.

"We raise millions of fish. We are one of the largest steelhead facilities in the United States," Sommer said. "We work as a team to raise about 2.1 million B-run steelhead … We also raise 1.65 million spring Chinook salmon that get released here. We also transfer another 400,000 juvenile Chinook to the Nez Perce Tribal Hatchery for grow-out to be released as smolts. The Nez Perce Tribe also raises Coho at the facility as part of the Coho Restoration Project."

An incubation tray filled with steelhead eggs. The hatchery regulates the temperature and flow of water in the trays to keep the eggs healthy and growing at an appropriate rate. (Matthew Cole)

A juvenile fish barge transporting smolts downriver. Water on the barge continually circulates to ensure there is enough oxygen for the fish and to allow the salmon to imprint on the river. (USACE courtesy photo)

Hitching a Ride

From the hatchery on the Clearwater River, it is approximately 500 miles to the Pacific Ocean. As the smolts make their way downriver, they navigate the currents and avoid predators like birds and larger fish such as bass and northern pikeminnow. According to the U.S. Fish and Wildlife Service, a young salmon's diet might consist of zooplankton, insects and small crustaceans.

About 70 miles downriver, the smolts encounter Lower Granite Dam, the first of many dams between them and the Pacific Ocean. As they approach, the smolts have multiple ways to pass through or over the dam. Some go over the spillway, or spillway weir, which acts like a fish waterslide over the dam. Smolts can also pass the dam through the juvenile bypass system, which takes them to the Lower Granite Juvenile Fish Facility (JFF).

At the fish facility, some of the smolts are weighed, measured and tagged to study their migration patterns. The young fish are then either sent through an outfall pipe that deposits them back in the river or into raceways where they wait for chauffeured transportation to the ocean via truck or barge.

Once on a juvenile fish barge, it is a straight shot to the ocean, as the young salmon are transported through the navigation lock of each subsequent dam on the Snake and Columbia rivers. Water on the barges continually circulates to ensure there is enough oxygen for the fish and to allow the salmon to imprint on the river.

"Our barges, as we go downriver, they actually intake water, freshwater, and then all the extra goes out the sides. That allows the fish to olfactory imprint on the way down," Elizabeth Holdren, supervisory fisheries biologist at Lower Granite Dam, said.

This imprinting allows young salmon to create a scent map they can use to return once they've grown up in the ocean.

On the barges, the juvenile fish don't have to worry about predators or anything else until they are dropped off downriver of Bonneville Dam, near the mouth of the Columbia River. From there, they are on their own, ready to put their anadromous nature to use and transition into saltwater living.

In the Ocean

Salmon grow rapidly in saltwater. According to the U.S. Fish and Wildlife Service, steelhead can grow to over 2 feet, while Chinook can reach nearly 3 feet. However, the larger they grow, the more attractive they are to those who want to eat them. In the ocean, salmon who want to live long enough to spawn must survive sealions, anglers, orcas, birds, sharks and anything else that comes along.

Employees at the Dworshak National Fish Hatchery work to release juvenile steelhead into the Clearwater River. (Matthew Cole)

Salmon can spend up to five years in the ocean, eating smaller fish, crustaceans and insects before returning to the rivers to spawn. On the return journey, salmon use the food energy they have stored during their time in the ocean to travel upriver against the current and return to the river where they were born.

The Return Journey

Using the scent maps they created when they were young, the salmon released from the Dworshak National Fish Hatchery travel 500 miles from the ocean to return to the stretches of the Clearwater River where they were released.

Below Bonneville Dam, salmon may still fall prey to sealions or seals that follow them up the Columbia River. However, after making it above Bonneville, that is less of a concern.

"A few might be eaten by bears in tributaries. Mostly their carcasses are scavenged by eagles and critters after they have spawned. Generally, once a salmon has returned to the Columbia River, the greatest risk they face is being caught in a fishery," Christopher Peery, fsh biologist for the Walla Walla District, said.

On their way, the salmon pass the dams once more, navigating the fish ladders and fish facilities where they are examined and counted.

At Lower Granite, NOAA, along with fishery managers from the states and tribes, collect about 18-20% of the returning adult salmon. They take genetic samples and scales before the salmon return to the fish ladder. The genetic samples allow fishery managers to assess where the salmon came from and track genetic lines. Some of the fish collected are kept and then trucked to hatcheries to be used as broodstock.

"Lower Granite provides the opportunity to collect broodstock for Nez Perce Tribe, Idaho, and Washington hatcheries," Holdren said.

The salmon in the river continue their journey to their spawning grounds. The hatcheries continue to collect eggs and milt, and the cycle perpetuates. Before long, the next generation will be making their way to the sea, continuing the journey. There and back again.

NOAA employees at the adult fish facility at Lower Granite processing adult salmon who are on their way upriver. At Lower Granite, NOAA, along with fishery managers from the states and tribes, collect about 18–20% of the returning adult salmon. (USACE courtesy photo)

Tulsa District programs work together for the good of the environment

Story & Photos by Stacey Reese
USACE, Tulsa District

Special hunts, prescribed burns and forestry may seem to have little in common but, all play a vital role in the U.S. Army Corps of Engineers (USACE) Tulsa District's vast environmental mission.

While the correlation may not be apparent, controlled deer hunts and the environment go hand in hand. Hunting is an imperative part of wildlife conservation. Hunts held throughout Tulsa District projects play an important role in wildlife management.

"In areas where the deer population needs to be managed, but the harvest needs to be limited, controlled hunts are the perfect solution," said Jeff Knack, Natural Resources and Recreation Branch chief.

These controlled hunts provide an outreach to visitors who might not otherwise have that hunting opportunity. Hunts are tailored to youth, veterans, and disabled hunters.

"Getting kids in the outdoors teaches them to preserve the ecosystems around us," said Josh Wingfield, Texoma Area environmental specialist. "These hunts teach them about their own responsibilities such as ethics, patience, respect, responsibility, and emotion control. These are things they carry with them the rest of their lives."

The ultimate goal of wildlife management is to monitor populations to keep population growth at a level which is beneficial to the herd.

"A partnership with the Oklahoma Department of Wildlife Conservation works to ensure the wildlife management goal is achieved," said Knack.

Staff from ODWC does spotlight surveys throughout the summer months. These counts show trends going up or down over time in population, harvest, and participation of the deer at the project, determining how hunts should be held to manage the population.

"These trends tell a more complete story than just looking at a single year, which can be impacted by things like precipitation and temperature," said Micah Holmes, assistant chief of Oklahoma Department of Wildlife Conservation's Communication and Education Division.

Prescribed burns, also known as controlled burns, use a method of planned fires to meet management objectives and are another important part of wildlife management. "Utilizing these burns enables staff to maintain and increase habitat diversity," said Tulsa District environmental biologist Stacy Dunkin.

These burns help reduce dangerous fuel loads and restore natural habitats for the good of the deer population as well as other wildlife found around the projects.

Burning of leaves and other debris on the forest floor returns nutrients to the soil. This practice stimulates new growth of nutritious vegetation for the deer and other wildlife population.

Tulsa District added a forester to the district for the first time in October of 2019, adding another layer to the environmental program.

A properly managed forestry program allows for thinning of the vegetation. This benefits the ecosystem by removing trees that are not thriving in a particular area, allowing more sunlight to reach the forest floor.

"The added sunlight helps regenerate growth, providing for sustenance of wildlife such as deer and turkey," said Reilly Cloud, Tulsa District forester. "Thinning the trees increases the forest health as well as the wildlife."

Cloud uses guidelines such as tree diameter, height and age when determining thinning needs for an area.

Using an increment bore, Cloud can take a sample from the tree giving him the ability to count the rings and get an age for that particular tree. Once he has the needed information, the sample goes back into the tree and the tree remains healthy.

Along with the age of the tree, Cloud also considers the height and diameter of trees in the stand.

A sight index table uses the factors to give a number showing how well trees are doing in a certain area. The taller a tree gets, the better the stand gets. Species that do well are left standing, while those not suited for the area are thinned to ensure management objectives are met.

All these programs work hand in hand for the good of the environment. Maintaining the habitat in a sustainable way helps ensure perpetuation of the species for future generations. Tulsa District manages more than 1 million acres of lands and waters.

Tulsa District forester Reilly Cloud uses an increment bore to sample an oak tree. This sample enables Cloud to gauge the age of the tree by counting its rings.

Natural resource specialist Adam Miller sets fire to vegetation along the dam at Broken Bow Lake in southeastern Oklahoma during a prescribed burn.

Cleanup of Elizabeth Mine Superfund Site completed

By Stephen Dunbar
USACE, New England District

The demobilization of the project trailer Dec. 8, 2021, marked the completion of 20 years of cleanup at the Elizabeth Mine Superfund Site, Strafford, Vermont.

"The Elizabeth Mine is one of the largest and most intact historic mining sites in New England. It was operated for more than 100 years producing over 3.25 million tons of ore and 50,000 tons of copper," said U.S. Army Corps of Engineers (USACE) New England District project manager Stephen Dunbar.

Mine tailings, waste rock, and smelter waste remained after the mine was closed in 1957. These wastes discharged acid rock drainage (ARD) and dissolved metals, resulting in dissolved copper concentrations as high as 6,000 parts per billion (ppb) and pH readings as low as 2 standard units in the Copperas Brook, subsequently placing 5 miles of the West Branch of the Ompompanoosuc River on the Environmental Protection Agency's Impaired Waters List.

In 2003, EPA Region 1 retained the New England District to manage the cleanup of the site. From 2003-2006, the project delivery team (PDT) focused on stabilizing the Tailing Dam, which was determined to be at risk of failing and releasing a tailing flow that could significantly damage downstream property and surface waters. The PDT constructed surface and groundwater diversion structures, constructed a buttress and toe drain system along the toe of the Tailing Dam, and began capturing and treating the contaminated discharge.

From 2007-2010, the PDT constructed a treatment plant for ARD and iron-impacted water. The treatment plant utilized an innovative lime amendment rotating cylinder treatment system to oxidize and precipitate metals. The PDT also relocated approximately 233,000 cubic yards of waste rock from the steep edge of the North Open Cut down to the Tailing Dam area and began demolition of buildings deemed unsafe in their current condition.

All demolition was coordinated with historic preservation specialists and all structure locations were preserved via placement of large, rounded stone to provide contrast against the existing landscape.

During the 2011 and 2012 construction seasons, the PDT conducted additional building demolition/abatement, consolidated 435,000 cubic yards of tailings, re-graded the 45-acre tailings pile, constructed an engineered cap over the tailings, constructed more than 2 miles of surface drainage channels, and treated over 10 million gallons of ARD and iron-impacted water.

The 45-acre cap is now home to Vermont's largest solar array. The array provides 5 megawatts of power annually, enough energy to supply 1,500 homes.

During the 2018 and 2019 construction seasons, the PDT constructed a Passive Treatment System (PTS) to replace the water treatment plant. The PTS, which consists of an anoxic limestone drain, settling pond, vertical flow pond, and polishing wetlands, eliminates the $250,000 needed annually to maintain the water treatment plant.

Next step for the PDT was the transformation of the South Open Cut and South Mine contamination source areas. This transformation included pumping and treating 4.3 million gallons of water from the pit lakes, blasting unsafe rock slopes, excavating and consolidating 37,000 cubic yards of waste material, and excavating and reusing 46,500 cubic yards of on-site materials and 1,900 truckloads of imported materials.

Finally, during the 2021 construction season, the PDT closed the 1898 Adit by remotely installing a 10-foot by 10-foot by 60-foot-long concrete plug 60 feet below the ground surface, eliminating the risk of an uncontrolled release of over 1 million gallons of mine-impacted water from the inner workings of the mine.

More than 2,500 native plants and wetland seed mixtures were installed during wetland restoration activities through 2019. In total the PDT created 15.4 acres of wetlands, a net increase of 6.9 acres. All work performed on the more than 250-acre Superfund site since 2011 was performed under a formally adopted and implemented "Green Remediation Strategy" that earned the PDT the Green Dream Team Award in the 2014 USACE Sustainability Awards Program.

Work performed at Elizabeth Mine has yielded positive results. The Tailing Dam is stable, leachate flow from the Tailing Dam has been reduced by 80% to just 11 gallons per minute; copper concentration just below the South Open Cut has dropped from 186 to 13 parts per billion (ppb); and copper concentration just below South Mine has dropped from 845 to 15 ppb.

In Copperas Brook, copper concentration has been reduced by 99%, iron load by 95%, and pH increased by 4 standard units, resulting in the West Branch of the Ompompanoosuc River being removed from the EPA Impaired Waters List.

"The success of this project is largely due to the strong partnership between all stakeholders, including the Environmental Protection Agency, Vermont Department of Environmental Conservation, representatives from the towns of Strafford and Thetford, local residents, the U.S. Army Corps of Engineers, New England District and our contractor since 2011, Nobis Engineering," said Dunbar. "It is bittersweet to finally hand over to the state of Vermont a project that not only addresses the contamination threat to the environment but also a renewed home for the wide range of wildlife, a new source of power to the local community, and a preservation of history for all to see."

A moose enjoying new wetlands established at the South Mine, September 2020. (USACE courtesy photo)

Aerial view of the Tailings Pile Cap with solar array. Wetland restoration areas are in the foreground; the leachate passive treatment system is right of the Tailings Pile; and the remediated Tailings Pile #3 is in the upper left background. (USACE courtesy photo)

Elizabeth Mine Tailing Pile (pre-construction) looking south, May 2003. (USACE courtesy photo)

Transformed South Open Cut in December 2021. (USACE courtesy photo)

Several PDT members at historic interpretive panels overlooking the 45-acre cap to the east.(From left to right) John Schmeltzer, Vermont Department of Environmental Conservation; Perkens Deriphonse, Department of the Army Intern; Casey Haskell, New England District technical lead; Nick Skianes, New England District project engineer; Stephen Dunbar, New England District project manager; Chris Adams, Nobis project manager; Ed Hathaway, EPA project manager; Brett Kay, Nobis chief of engineering; and Andrew Bulluck, Nobis engineer. (USACE courtesy photo)

Army Civil Works studies, projects and programs to be accomplished with Bipartisan Infrastructure Law funding

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

The U.S. Army announced in January the Civil Works studies, projects and programs that the U.S. Army Corps of Engineers (USACE) would implement in Fiscal Year (FY) 2022 with the $22.81 billion in supplemental funding provided in two recently enacted laws — the Infrastructure Investment and Jobs Act; and the 2022 Disaster Relief Supplemental Appropriations Act.

The spend plan supports the administration hitting the ground running by focusing on current FY 2022 spending. Future announcements will provide spend plans for subsequent years. Each spend plan will be in continued support of administration goals of expanded access to America's ports through dredging, as well as building resilience in the face of global climate change, while benefitting economically disadvantaged communities and regions, and advancing environmental justice.

"The Army will work with community partners to leverage these historic Civil Works funds for investments that strengthen national supply chains through our commercial navigation mission, help communities impacted by climate change to increase their resiliency, advance environmental justice, and invest in communities that have too often been left behind," said the Honorable Michael L. Connor, Assistant Secretary of the Army for Civil Works.

Bipartisan Infrastructure Deal: Infrastructure Investment and Jobs Act, Public Law 117-58

With the $17.099 billion provided in Public Law 117-58, the Army will fund Army Civil Works studies and projects, maintain existing infrastructure, and repair damage and dredge channels in response to floods and coastal storms.

Through this investment in water resources infrastructure, over $5 billion will help improve community resilience in the face of global climate change and $3.936 billion will address commercial navigation improvements at coastal ports and on the inland waterways.

The Army plan funds the South Florida Ecosystem Restoration program at $1.098 billion, a historic funding level that will enable significant progress in restoring Florida's nationally significant Everglades ecosystem. In the coming year, the Army will engage with environmental justice communities in the development of a strategy to allocate $130 million in two pilot programs authorized in the Water Resources Development Act of 2020 that target economically disadvantaged community's needs.

As part of this effort, the Army plan funds to completion 15 feasibility studies, the Preconstruction Engineering and Design (PED) phase of five projects, and 19 construction projects in FY 2022. Additionally, in FY 2022, 22 new projects will be funded in the Construction account.

Disaster Relief Supplemental Appropriations Act, 2022, which is Division B of Extending Government Funding and Delivering Emergency Assistance Act, 2022, Public Law 117-43

Of the $5.711 billion supplemental funds that Public Law 117-43 provides for the Army Civil Works Program, $100 million is designated for studies of proposed projects in the four states where major disasters were declared in FY 2021 due to Hurricane Ida — Louisiana, New Jersey, New York, and Pennsylvania. Leveraging these funds, 11 feasibility studies, plus the preconstruction engineering and design for six projects, will be funded to completion within the Investigations account in FY 2022.

This law also provides $3 billion for construction of qualifying flood and storm damage reduction, including shore protection, projects, with $1.5 billion to be put toward projects in the four states where major disasters were declared in FY 2021 due to Hurricane Ida. The Army will use this funding, in part, to construct a total of 11 projects in FY 2022, including 5 in states where major disasters were declared due to Hurricane Ida, and 6 in other states and territories.

Additionally, Public Law 117-43 provides $868 million of Mississippi River and Tributaries funding to construct, rehabilitate and repair damages to projects, including $500 million to construct flood and storm damage reduction projects in the state of Louisiana. This funding will be used to complete two projects, continue construction of the Lower Mississippi River Main Stem Project including a significant investment in levee safety, and to complete one of the features of that project in FY 2022.

Additional Information

Additional details regarding the amounts provided to various programs, projects and activities for each of the five appropriations accounts for FY 2022 may be found at: https://www.usace.army.mil/Missions/Civil-Works/Budget/. Look for future announcements regarding funds to be executed in FY 2023 and FY 2024.

Training opportunities to consider

By Jennifer A. Miller
USACE, Headquarters

Historically, much of U.S. Army Corps of Engineers (USACE) training has been organized through the Proponent-Sponsored Engineer Corps Training (PROSPECT) program, which is managed and implemented through the USACE Learning Center and featured in-person learning opportunities.

As the last two years have shown us, face-to-face training options may not always be possible for multiple reasons (i.e., budget issues, travel restrictions, personal circumstances, etc.). Although PROSPECT remains a leading option for training, other reputable sources for both technical and non-technical training exist. Some of these may be full-fledged courses, and some are shorter webinars or self-paced on-line seminars.

All employees should consider their career goals and interests and use those as the guiding framework for developing their individual development plan (IDP) and for selecting and justifying training. To the extent practicable, local and remote training alternatives can be emphasized so that maximum training opportunities can be funded within available time and budget.

Some possible vendors for online and other training resources are provided below. Note that this is not a comprehensive list and is not an official endorsement. Rather, this is an example of some options for high-quality training. An internet search will certainly identify additional opportunities. One additional caveat: some of these programs have a cost. You need to coordinate training costs with your supervisor prior to making any commitments or enrolling in any courses!

- **SERDP/ESTCP (DOD Environmental Research Programs):** https://www.serdp-estcp.org/index.php
- **Interstate Technology & Regulatory Council:** http://www.itrcweb.org/Training
- **ASTM International:** https://www.astm.org/
- **Contaminated Site Cleanup Information:** https://clu-in.org/
- **Society of American Military Engineers:** www.same.org
- **USEPA Watershed Academy:** https://www.epa.gov/watershedacademy

Upcoming M2S2 training opportunities

By Dr. Kari Meier
USACE, Headquarters

Military Munitions Support Services (M2S2) hosts periodic webinars to provide training, case studies, and lessons learned for munitions response activities. Webinars are open to USACE team members, as well as customers, regulators and stakeholders. Upcoming webinars include:

- **May 25, 2022:** M2S2 Webinar Series - MMRP Conceptual Site Model Project Studies.
- **July 20, 2022:** M2S2 Webinar Series - Risk Assessment and RAOs for Munitions Response.

Additional details on these sessions and to register, visit the CLU-IN website: https://clu-in.org/training/.

Sustainable art challenge inspires creative reuse of materials

By Jenn Miller
USACE, Headquarters

In commemoration of Earth Day, the Environmental Division within U.S. Army Corps of Engineers (USACE) Headquarters hosted a sustainable art challenge to reconnect with natural resources as well as reconnect with each other.

For this division-wide challenge, teammates were asked to create their own sustainable art using recycled or reclaimed materials. The rules were simple. The art had to be made by USACE Headquarters Envionmental Division teammates and/or their families and the art had to contain at least 50% reclaimed, reused or recyled material.

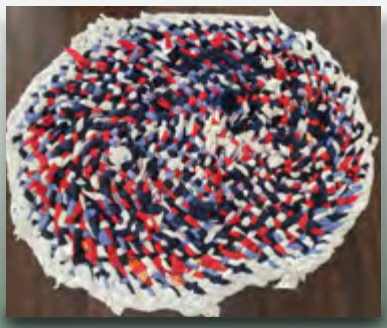
For this inaugural challenge, art submissions were judged by Ms. Lara Beasley, USACE Environmental Division Chief, and Col. John Lloyd, USACE Chief of Staff.

Two entries were selected for "Best in Show," to include a youth and adult category.

The Best in Show for the youth category was awarded to Kiara Knepper, daughter of Antonia Giardina, and her art piece, HEX-Force 3000. The HEX-Force 3000 is a shelving unit created out of extra chopsticks from COVID-19 takeout meals and resused cardboard. The piece was spray-painted white and holds Grogu, from The Mandalorian, and his favorite ball.

The Best in Show for the adult category was awarded to Ashley Elder and her art piece, Rag Rug. This bathroom rug was created by braiding and knotting old, unused t-shirts together. This rug is not only easy to wash and dry, but it also features patriotic coloring.

Kiara Knepper's art piece, HEX-Force 3000. (Antonia Giardina)



Ashley Elder's art piece, Rag Rug. (Ashley Elder)

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