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The Corps Environment

Army engineers partner with federal biologists to study duck nesting ecology

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Environmental Operating Principle #3
Create mutually supporting economic and environmentally sustainable solutions.

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Environment

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ENVIROPOINTS

USAEC commander shares impressions, focuses on agency legacy

Col. Matthew F. Kelly
Commander
U.S. Army Environmental Command

U.S. Army Environmental Command is a complex, unique organization. As a career Army officer, I knew of U.S. Army Environmental Command (USAEC), I just had no idea the scope and scale of what the organization does.

I think what's really been the most enlightening thing that I've had the opportunity to experience so far is gaining an appreciation of the professionalism and expertise of the people at USAEC. It really is top-level environmental stewardship and care that the team here brings to understanding how we can be good stewards of our environmental resources for the Army.

There is this group of professional, technical experts that look at Army impacts to the environment and do that every single day. They go in and look at some of the hardest, most complex, unique problems that no one else looks at. The organization doesn't typically look at things in a "short-term" model; we look at things over a 20, 30 or longer year timespan. We have people looking at problems that will not be solved while they are here to see the solution but want to make sure that they have set it up to be explained and completed by someone else. That is dedication to the core of our mission.

I was asked by a colleague if I was intimidated by going into this type of organization. I said from the technical perspective, I know that I don't know a whole lot about it, I just don't, but that's ok. But leadership is leadership, and I think if you bring that level of self-awareness, understanding and say "hey, I don't know exactly what you do but that's not my role, that's not necessarily what I need to know," you're on track. My job as a leader of this command is to shepherd, assist our team and continue to listen and provide results-oriented guidance to help them accomplish their requirements to continue the Army mission.

As I look at an organization of this type and its mission, it's clear that the Army cares about environmental matters. This is an entire command that looks at how the Army impacts the environment. The Army doesn't establish a "command" for nothing. They establish a command-level organization to address an issue or to ensure that we're looking at something in a way that makes sure we're doing the right thing, the right way, for the right reasons … I am certain that's how USAEC impacts how the Army looks at the environment.

There are obviously things that the Army does that impact areas of the environment; but we are trying to mitigate those, trying to lessen that impact, while continuing the nation's mission for national security and defense. We are trying to be the best stewards that we possibly can of our environmental resources for EVERYONE. We strive to ensure that the resources we have are used appropriately and are there for others to use going forward.

Simply, USAEC is such a unique place. A lot of people don't understand or appreciate it, but we really are here to enable the readiness of the Army; to enable the Army to train, to be that environmental authority that people can take advantage of. There are professionals here that you can ask environmental questions that will answer them extensively, because they like what they do, they respect it, and they have that depth of knowledge and reverence of their day-to-day mission. I really want to continue that awareness of the availability of USAEC because we're here to help agencies and organizations get to the objectives they need to achieve not only the substantive technical environmental work perspective but from the legal, public affairs and operations viewpoint.

Because of the level of expertise that we have at USAEC … I think we calculated once that we are in the thousands of years of environmental experience throughout the command … you don't build that level of proficiency overnight, it takes time. What we're working towards right now is "building that bench"; building those future environmental stewards from partnerships with local schools to the initial entry employee here at USAEC and passing on that level of knowledge. We must ensure that we continue to foster that talent and look long-term as USAEC continues past the first 50 years and into the future.

As we look at the continuing legacy of the command by how it all started looking at the impacts the Army had in testing of chemical munitions until now … analyzing cleanup sites, conserving endangered species, complying with ever-changing environmental regulations … the way I see the future of USAEC is to continue to do that substantive environmental work and the legacy of environmental stewardship that the current team has built going forward. USAEC will continue to advocate the criticality of the Army to train while understanding the impacts to the environment and mitigating those impacts to the environment. We want to build upon the legacy that has been shaped over the initial 50 years. We want to ensure that growth, resilience, and expertise are maintained throughout time.

New England District attends Raymark Field Office ribbon-cutting event

By AnnMarie R. Harvie
USACE, New England District

Scott Acone, U.S. Army Corps of Engineers New England District deputy district engineer for programs/project management, and Mike Looney, New England District project manager for the Raymark Superfund Site, joined congressional, state, and local officials in attending an Environmental Protection Agency (EPA) press event announcing significant funding for the Raymark Superfund Site under the Bipartisan Infrastructure Law. The event was followed by a ribbon-cutting to celebrate the grand opening of EPA's Raymark Field Office.

During the June 2 event at the former Raybestos Memorial Ballfield, in Stratford, Connecticut, Acone said that the funding announcement was exciting news.

"EPA and USACE's combined efforts to clean up the Raymark Superfund Site has had some positive results so far," he said. "There is still a lot to do at Raymark. This project has not come without challenges, but I'm happy to say that, together, we assessed the issues and found solutions that allowed us to move forward with the project."

Acone spoke about the long and solid partnership USACE shared with EPA.

"EPA frequently turns to USACE to manage large projects because we provide a wide array of experienced professionals," he said. "We are proud to take on these projects for the EPA and the people of New England."

The Raymark Industries Superfund Site consists of more than 500 acres in Stratford, Connecticut. The main products sold by Raymark, once known as the Raybestos-Manhattan Company, were friction materials. These included clutch facings, transmission plates, and brake linings, primarily for the automotive industry.

During the facility's 70 years of operation, liquid wastes were diverted into a drainage system and unlined lagoons. The lagoons discharged to groundwater and nearby Ferry Creek. As a result, groundwater coming from this facility has extensive solvent contamination, including volatile organic compounds (VOCs). Solids, which settled in the lagoons, were periodically removed by dredging and then widely used as "fill material." At first, the contaminated material, which contained primarily lead, PCBs, and asbestos, was used for filling at the facility itself, but eventually was taken to residential, commercial, and municipal properties. In addition, several wetland areas abutting or close to the Housatonic River were filled with this manufacturing waste.

According to Looney, EPA tasked the New England District team with the remedial design and construction of operable units (OUs) 3, 4 and 6, in accordance with an EPA Record of Decision from 2016.

"The work entails the excavation, consolidation, and capping of approximately 100,000 cubic yards of Raymark waste," he said. "Excavated Raymark waste from operable units 3 and 6 will be consolidated at the OU 4 Memorial Ballfield and covered with a low-permeability cap. Approximately 10,000 cubic yards of the highest contaminated waste will be transported for off-site disposal."

Janet McCabe, EPA deputy administrator and David Cash, EPA New England regional administer, made the funding announcement at the press conference. Other attendees included Sen. Richard Blumenthal, Sen. Chris Murphy, U.S. Rep. Rosa DeLauro; Connecticut Department of Energy and Environmental Protection Remediation Division assistant director Raymond Frigon and Stratford Mayor Laura Hoydick.

Scott Acone, New England District deputy district engineer for programs/project management, addresses the audience during the press conference. (USACE courtesy photo)

(From left) Scott Acone joined USACE partners David Cash, EPA New England regional administer, U.S. Rep. Rosa DeLauro, Stratford Mayor Laura Hoydick, and Janet McCabe, EPA deputy administrator in cutting the ribbon on the new EPA Field Office. (USACE courtesy photo)

World Migratory Bird Day celebrates the importance, connectivity, beauty of birds in flight

A whooping crane, center, stands in a field surrounded by sandhill cranes. (U.S. Army photo)

Black-capped vireo. (U.S. Army photo)

Red-cockaded woodpecker. (U.S. Army photo)

By Thomas Milligan
U.S. Army Environmental Command

We've all seen it. Maybe it was flocks flying in V-shaped formation, filling the sky at dawn or dusk. Perhaps it was majestic cranes stopping on a long journey to rest by a river, a golden eagle soaring on an updraft, or maybe it was a tiny songbird perching at a feeder.

These can all be part of the incredible migratory patterns of birds. Each year since 2006, World Migratory Bird Day is celebrated on the second Saturday in May, and again on the second Saturday in October. These annual events are part of an international outreach and education program celebrating migratory birds.

Last year in October, the celebration centered on the theme "Sing, Fly, Soar – Like a Bird," and this year the program focuses on awareness of the impacts of light pollution on bird migration and provides information and resources to help mitigate the impact of artificial lighting on birds.

For biologist Christopher Leach, like many others at the U.S. Army Environmental Command, the focus on birds is more than just a yearly endeavor.

"Really, just one day is not enough — it understates the importance. In a lot of ways, Migratory Bird Day could be every day, as these migrations are constantly happening around the world, and are so important to our global environment," said Leach. "Birds are considered an indicator species, and a diverse mix of bird species is an indicator of a healthy ecosystem."

Leach, who is based in San Antonio at U.S. Army Environmental Command Headquarters, said partnering with organizations like the National Audubon Society and local, state and national conservation organizations and agencies plays an important role in the Army's work supporting migrating birds. He also pointed to the beneficial educational opportunities these partnerships bring.

"People don't know enough of what they can do, how they can help," he said. "Just simple things like turning off your porch lights at night when birds are migrating or covering your plate glass windows. There are several things people can do."

Migrating birds face multiple threats including habitat loss, illegal hunting, and outdoor cats, as well as poisoning, climate change, and collisions with power lines, wind turbines and glass-covered buildings. These birds are highly dependent on a network of sites along their migration routes for breeding, feeding, resting, and overwintering.

At U.S. Army installations along major migratory corridors or "flyways," helping conserve habitat and protecting these natural bird migrations are major focuses. Prominent examples can be found at Fort Hood in Texas and Fort Sill in Oklahoma, where teams there have worked to preserve and restore populations of black-capped vireos, a songbird that was listed under the Endangered Species Act in 1987. Due in part to the installations' conservation efforts, the species was removed from the list — or "delisted due to recovery" — in 2018. Monitoring of black-capped vireos at both locations is ongoing and continues to show success.

Another prominent example of Army stewardship is the partnership between the Nebraska Army National Guard, U.S. Geological Survey, and the private conservation group the Crane Trust. Together they form the Crane Protection Team, dedicated to supporting endangered whooping cranes that migrate through multiple states, including Nebraska.

Larry Vrtiska, Nebraska Military Department Environmental Program manager, said the Crane Protection Team developed a predictive model that enabled the Nebraska Army National Guard to plan its training flight paths and aviation exercises to minimize the likelihood of interaction with migrating birds.

The team also helped drive the enhancement of habitat in key sites around 357 acres of trust-owned lands and led efforts to bury 2.7 miles of power lines along the Platte River corridor. Power lines pose a significant threat to newly fledged whooping cranes and other large birds such as eagles, hawks and owls.

By contributing to the protection of migratory birds and endangered species, the Army has established a strong partnership with U.S. Fish and Wildlife Service, which in turn improves the efficiency of consultations and obtaining permits for military construction and readiness activities.

"Protecting cranes protects the mission," Vrtiska said.

Other U.S. Army units around the country are also dedicating time, energy and resources to protecting birds and their habitat, while continuing to support vital training and testing missions.

Keeli Marvel, a natural resources specialist at Dugway Proving Ground in Utah, said there are multiple projects involving bird conservation on the installation, including upcoming work on burrowing owls in coordination with a local university research program and surveys of pinyon jay nesting colonies.

Marvel also said the installation has 11 golden eagle nesting territories — each one containing several nests. Working with non-profit partner Hawk Watch, a raptor conservation program based in Salt Lake City, Utah, the team at Dugway is carefully monitoring the birds using satellite and drone technologies.

"We've been putting specialized backpacks on eagles for several years, to learn more about their migration patterns, habitat use and behavior," Marvel said. "Through the use of newer technology like these trackers and drones, the Army collects data that maximizes use of training lands while reducing impacts to wildlife."

The Army also participates in monitoring programs like Integrated Monitoring in Bird Conservation Regions (IMBCR). Started in Colorado in 2007, the program has grown to become the second largest breeding bird monitoring program in the U.S., conducting surveys and developing population estimates on breeding bird populations. This work not only helps protect migrating birds and other species, but also allows for a deeper understanding of any impact U.S. Army activities may have and helps to shape plans to preserve mission integrity and good land stewardship.

"Across the entire nation and even around the world, the Army is serving as a good steward and environmental proponent," said Col. Alicia M. Masson, former commander of U.S. Army Environmental Command. "We are proving, time and again, that conservation and Army training and operations can in fact be compatible. This is important work, done by Army environmental professionals every day."

ERDC takes you 'Beyond the Gates' with new radio show

Jenny Laird (right), ERDC Unmanned Aircraft Systems (UAS) program manager, discusses how ERDC uses UAS on the first "Beyond the Gates" radio show, hosted by Annette Kirklin, ERDC public affairs specialist. (U.S. Army Corps of Engineers photo)

By Annette Kirklin
Engineer Research and Development Center

On June 16, the U.S. Army Engineer Research and Development Center (ERDC) premiered their new radio show, "Beyond the Gates: How ERDC Research Affects YOU" on 107.7 FM and Newstalk 1490 AM.

The program is a weekly 45-minute talk show hosted by Annette Kirklin, ERDC public affairs specialist. It airs Thursdays at 8:15 a.m. and replays at 9:15 a.m. Listeners will also be able to stream it live online at http://vicksburgradio.com/stream-now/ and find archived shows at http://vicksburgradio.com/erdcbtg/.

Each week, Kirklin will interview researchers from one of the seven ERDC laboratories to describe how their work impacts the community and the region.

As one of the world's premier public engineering and environmental sciences research and development organizations, ERDC's impact is vast, and this program will be vital in educating listeners about that impact. It will also showcase ERDC accomplishments in their own neighborhood.

To date, guests have included Jenny Laird, ERDC Unmanned Aircraft Systems (UAS) program manager with the Environmental Laboratory, who discussed how ERDC's UAS have been to monitor levees, wildlife surveys and algal blooms and to help manage mudslides at the Vicksburg National Military Park; and Dr. Jarrell Smith, research civil engineer with the Coastal Hydraulics Laboratory, who discussed the importance of hopper dredging to protect beaches and the ecosystems that depend on them.

Marsh Lake ribbon-cutting ceremony becomes reality

By Melanie Peterson
USACE, St. Paul District

Speakers and guests gathered for a ribbon-cutting ceremony at Marsh Lake, near Appleton, Minnesota, on a perfectly clear, summer day, July 14.

"Holding this dedication took five times, but I'm glad that journey was hard because nothing worth doing in life is easy. It takes a lot of hard work and effort," said Dave Trauba, regional wildlife manager with the Minnesota Department of Natural Resources (MNDNR) Southern Region, at the ribbon-cutting event. "But I'm glad it took a long time to get to where we're at today because it's a much better project today than it would have been."

Speakers included Trauba; Col. Karl Jansen, former U.S. Army Corps of Engineers St. Paul District commander; Sarah Strommen, MNDNR commissioner; Amber Doschadis, Upper Minnesota River Watershed District administrator; Jon Schneider, Minnesota Ducks Unlimited conservation programs manager; and Win Mitchell, former Ducks Unlimited state chairman and local resident.

"We have a win here at Marsh Lake, but it was a tough win. In 2019, Mother Nature gave us a run for our money with high-water flooding that challenged site conditions, but the whole team persevered," Jansen said. "We win as a team, a combined team with our partnerships across this region. It's our unified mission to restore, sustain and enhance the natural environment … and it's the beauty of this project that will endure for generations and pay wonderful dividends for nature and our society."

The Marsh Lake project involved habitat enhancement by improving conditions for waterfowl and fish in the area. The project included rerouting the Pomme de Terre River to its historic channel and constructing a drawdown structure and a fish passage at the Marsh Lake Dam. Less than 5% of the average cost for a habitat restoration project of this size, this project is expected to provide significant returns in environmental and habitat enhancement benefits. The total cost was $13.4 million.

Resilience is key to the success of this project.

"We've all learned a lot about resilience over the past couple years and really resilience is at the heart of what we do in our restoration work, and we can see the resilience in nature resources," Strommen said. "These efforts today will yield tremendous results preserving the river channels back to their historic conditions."

Marsh Lake lies within the Lac qui Parle Wildlife Management Area, managed by the MDNR. In the fall, as many as 150,000 Canada geese use the management area at one time. Marsh Lake is also home to Minnesota's largest breeding colony of American white pelicans and several species of fish. The variability associated with natural flooding and drying cycles will promote growth of emergent and submersed aquatic vegetation, increasing waterfowl habitat and reducing sediment resuspension.

(From left) Col. Karl Jansen, former St. Paul District commander, MDNR commissioner Sarah Strommen, and Amber Doschadis, Upper Minnesota River Watershed District administrator, cut the ribbon at the Marsh Lake ribbon-cutting ceremony. (Melanie Peterson)

The fish passage at Marsh Lake, near Appleton, Minnesota, July 14. (Melanie Peterson)

Justin Fisher, St. Paul District project manager, delivers remarks at the Marsh Lake ribbon-cutting ceremony near Appleton, Minnesota, July 14. (Melanie Peterson)

Dave Trauba, regional wildlife manager for MDNR's Southern Region, delivers remarks at the Marsh Lake ribbon-cutting ceremony near Appleton, Minnesota, July 14. (Dave Elmstrom)

SM-1: Completing the life cycle of the Army's first nuclear reactor

By Rebecca Yahiel and Brenda Barber
USACE, Baltimore District

SM-1 Deactivated Reactor Facility demolition progress is showcased by the pre-demolition start (left) and current (right) photos (USACE courtesy photo).

Nestled on the western shore of the Potomac River within the boundary of Fort Belvoir, the former Stationary, Medium Power Model 1 Nuclear Power Plant (SM-1) operated as the Army's first nuclear power plant. The landscape of the former site is changing dramatically as the U.S. Army Corps of Engineers (USACE) Baltimore District implements decommissioning work at the site.

Baltimore District, which is home to the North Atlantic Division's Regional Radiological Health Physics Regional Center of Expertise, is leading decommissioning efforts at the SM-1 under the Army's Deactivated Nuclear Power Plant Program. Under this program, the district is leading decommissioning activities at the two remaining Army deactivated nuclear power plants, one of which is the SM-1.

The SM-1 was the first prototype of a family of nuclear power plants developed by the Atomic Energy Commission and the Department of Defense. The mission of the SM-1 was to train nuclear power plant operators and to accomplish research and development tasks. USACE has been involved with this program since its inception in 1952, working jointly with the Atomic Energy Commission and Department of Defense entities.

Construction of the plant was completed in March 1957. First criticality was reached April 8, 1957, when it was the first nuclear power plant in the U.S. to furnish sustained electricity to the commercial power grid. After the 700-hour performance test, USACE assumed full operational responsibility July 1, 1960.

Fast forward to today — In 2020, Baltimore District awarded a contract for the decommissioning, dismantling and disposal of SM-1. In 2021, the team began to safely and efficiently decommission the site.

Decommissioning includes all aspects of the project including the removal of all reactor components, transportation and disposal of material, site cleanup and restoration. The USACE team works hand in hand with the decommissioning contractor to ensure this historic project is executed with safety as the top priority. The USACE team overseeing the SM-1 decommissioning has a proven track record of safely carrying out a broad array of radiological projects around the world.

Since the contract was awarded, the team has been working on technical work documents, engineering and work planning. In addition, the team is working on various aspects of historical preservation as this site is eligible to be included in the National Register of Historical Places.

In June 2022, the team hosted a site tour for the Nuke Digest reunion, which represents the former operators for the Army Reactor Program, many of whom were trained and worked at SM-1. The event was a success and allowed the team to hear new stories about the operation of the site and gave the former operators one last chance to visit SM-1 and reminisce before the demolition effort began.

In preparation for the start of decommissioning, asbestos, lead and all hazardous waste were safely removed from the building. In July 2022, the team successfully began the early stages of decommissioning the SM-1 building by removing the two large rooms that were the southern portion of the building. The former exhaust stack was then removed from the roof of the building. The stack was safely cut, lifted off the building by a crane and lowered to the ground. The team then cut and sized the stack into pieces for disposal.

By the end of October 2022, the crew completed the demolition of the main portions of the building including the former classrooms, administrative offices, the turbine deck and condenser, electrical room and chemical lab. The only remaining structures at the site are the vapor container and the spent fuel pit.

The team is in the process of transitioning to some additional site preparation to include installation of erosion controls and tree clearing. As 2022 ends, the team will start removal of structures along the shoreline and perform further decommissioning efforts interior to the vapor container.

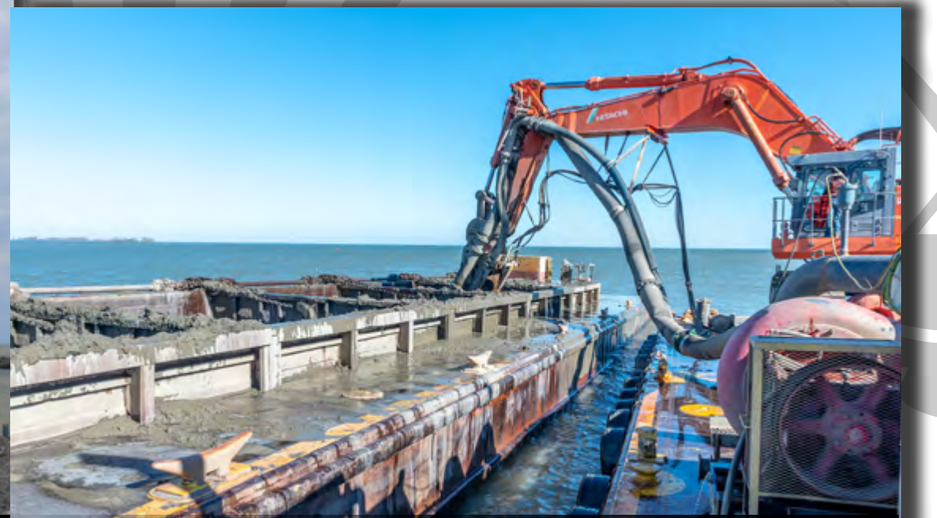
All wastes generated as part of project implementation are packaged in Department of Transportation (DOT)-compliant packaging and intermodal containers, and shipped by experienced personnel in compliance with DOT, Environmental Protection Agency, and Nuclear Regulatory Commission regulations.

Moving forward, the USACE team will work together to remove the primary reactor components from the vapor container, remove remaining structures at the site, and finally complete all subsurface soils remediation. Then, the work will focus on site restoration and final documentation, with an estimated project completion in 2026.

Learn more about SM-1 here.

ERDC, Buffalo District release dredged material guidance manual for Great Lakes region

Ryba Marine Construction pump equipment sits along the Dike 12 wall with the Cleveland Breakwater in the background. (USACE courtesy photo)



USACE Buffalo District contractor Ryba Marine Construction Co. pumps out dredged material from a scow in Toledo Harbor and into a confined disposal facility in Toledo, Ohio. (USACE courtesy photo)

By Jason Scott
Engineer Research and Development Center

Researchers from the U.S. Army Engineer Research and Development Center (ERDC) Environmental Laboratory and the U.S. Army Corps of Engineers (USACE) Great Lakes and Ohio River Division's Buffalo, Detroit and Chicago district recently released a technical report that provides guidance for evaluating the environmental suitability of dredged material in the Great Lakes region.

The "Environmental Evaluation and Management of Dredged Material for Beneficial Use: A Regional Beneficial Use Testing Manual for the Great Lakes" is the first guidance developed by USACE for evaluating the environmental suitability of dredged material specifically for beneficial use placements.

"There was a need to develop a regional approach to determining the environmental suitability of dredged material for beneficial use," said Dr. Karen Keil, ERDC environmental toxicologist and co-chair of the Great Lakes Dredging Team (GLDT). "The publication of this technical report should make implementing beneficial use of dredged material projects more efficient and support implementation of Section 125 of the Water Resources Development Act of 2020."

The Great Lakes region comprises eight states, with some harbors that overlap state boundaries, demonstrating the need for a regional approach for evaluating suitability of the beneficial use of dredged material.

Sediment is a valuable resource within the Great Lakes ecosystem, and many dredged sediments are suitable for a variety of beneficial uses. Beneficial use refers to using dredged material rather than disposing of it. In the Great Lakes region, and throughout the country, beneficial use of dredged sediment has been successful in nourishing beaches, replenishing eroding shorelines, creating habitat and restoring brownfields.

In the Great Lakes, sediments have become cleaner over time with the advent of the Clean Water Act and Great Lakes Legacy Act sediment remediations. The manual helps practitioners demonstrate that dredged material is environmentally suitable for a range of beneficial uses, including in projects involved with remediating and restoring U.S. Environmental Protection Agency (USEPA) Great Lakes Areas of Concern. Dredged sediment can be managed as a valuable resource with the potential to create economic, environmental and social benefits.

USACE has a clear set of guidelines to evaluate the suitability of dredged sediment for aquatic placements. However, prior to the publication of the manual, no USACE guidelines existed for unconfined upland beneficial use of dredged material.

"To allow upland beneficial use of dredged material, each state has its own guidance and regulations, some of which are very broad and not specifically meant for dredged material," Keil said. "The manual provides the necessary guidance for upland placement and is consistent with environmental regulations and guidance developed by the eight Great Lakes states as well as the USEPA."

ERDC researchers began working on the manual in 2011. In 2015, USACE Buffalo District took over as lead for its creation, working with colleagues from USACE's Chicago and Detroit districts, as well as ERDC.

The manual sets forth an approach that protects human health and the environment and supports projects that can restore habitats and redevelop brownfields. Approaches presented in the manual also support the goals of the GLDT, which provides a forum for the exchange of information regarding best practices, lessons learned, innovative solutions and sustainable approaches to dredging and dredged material management throughout the Great Lakes region.

"Assembling a Beneficial Use Testing Manual was likely as important to the coastal states as it is to the USACE districts," said Dan Breneman of the Minnesota Pollution Control Agency and co-chair of the GLDT. "Within the manual, each state's approach for managing dredge material can be reviewed, and those details then encourage innovative thinking."

Breneman added that the publication of the manual allows for engagement among key partnership staff for a better understanding of current regulatory procedures.

A project of this scope would not have been possible without interagency coordination and cooperation. However, the project did come with hurdles to overcome.

"During the process, some of our partner agencies were hesitant to include newer scientific evaluation protocols that were not included in previously published USEPA-USACE dredged material testing manuals, while other agencies wanted USACE to include newer testing methods" said Keil. "The end product is a testament to the effective collaboration among all project partners."

In addition to providing guidance for the Great Lake states, the publication of the manual supports USACE's Research and Development Strategy, specifically the "Ensure Environmental Sustainability and Resilience" priority, which, in part, directs USACE projects to "use over 70% of the sediment dredged from navigation channels for environmental benefits."

"Because each state approaches dredge material management from different perspectives and regulatory approaches, the USACE staff, who generated this manual, should be applauded for their efforts and persistence," Breneman said.

"This is a wonderful accomplishment that will continue to enable USACE and its partners in being good stewards of America's natural resources," said Dr. Edmond Russo, ERDC Environmental Laboratory director. "We are very proud of the team who made this significant achievement possible. ERDC looks forward to providing continued support to the USACE districts with a view toward delivering high-value impact that would otherwise not be possible."

ERDC Environmental Laboratory team receives prestigious technical achievement award

By Jason Scott
Engineer Research and Development Center

A team from the U.S. Army Engineer Research and Development Center's (ERDC) Environmental Laboratory (EL) recently received the Sebastian Sizgoric Technical Achievement Award from the Joint Airborne Lidar Bathymetry Technical Center of Expertise (JALBTCX) at their annual Coastal Mapping and Charting Workshop. The award recognizes any worldwide public or private contributor striving to advance the science of using light detection and ranging, or lidar, in coastal mapping and charting.

Sam Jackson, Christina Saltus, Glenn Suir and Molly Reif of EL's Environmental Systems Branch are currently working on a project, During Nearshore Event Vegetation Gradation (DUNEVEG), to extract metrics from lidar and hyperspectral imagery to remotely quantify dune vegetation biological characteristics. The goal of the project is to develop semi-automated tools that provide rapid and accurate estimates of these high-priority metrics, thereby improving the ability of coastal managers to assess and predict storm impacts as well as other important applications. The work is part of ongoing research and development funded by the USACE National Coastal Mapping Program.

"The efforts of the DUNEVEG project are helping to advance existing dune and wetland system knowledge and remote sensing techniques for developing new technologies to classify, quantify and estimate critical dune vegetation metrics," said Mark Graves, EL Environmental Systems Branch chief. "I am extremely proud of our ERDC team for receiving this prestigious award for the work they are doing."

According to JALBTCX, "the Sebastian Sizgoric Technical Achievement Award exemplifies Sebastian Sizgoric's creativeness and passion for lidar. The recipient will have made a major contribution in the field of lidar bathymetry and airborne coastal mapping and charting within the past two years. The goal of the award is to recognize those who are making notable contributions to science and practice."

"It was a great honor for our team to receive the Sebastian Sizgoric Award at the 2022 JALBTCX workshop. It was an unexpected surprise to be recognized with such a prestigious award for our work and we are so grateful to be chosen as the recipient this year," said Sam Jackson, EL Environmental Systems Branch project lead. "We would like to thank the JALBTCX and Jennifer Wozencraft for the opportunity to contribute our DUNEVEG work and for acknowledging our efforts among so many other deserving professionals in the field of coastal mapping."

Christina Saltus, with ERDC EL's Environmental Systems Branch, accepted the Sebastian Sizgoric Technical Achievement Award at the annual JALBTCX Airborne Coastal Mapping and Charting Workshop. Saltus is part of the project team that also includes Sam Jackson, Glenn Suir and Molly Reif. (USACE courtesy photo)

Uncovering the past: Mastodon jaw found on USACE land

By Hannah Mitchell
USACE, Walla Walla District

It was windy, and the little boat bounced on whitecaps as it crossed the Columbia River. On May 9, Walla Walla District archeologists and natural resource management staff were heading out to meet with tribal and community members to discuss an important discovery on U.S. Army Corps of Engineers' land.

One of the people in this group was a member of the public who, on April 14, had found something very special while hiking on USACE land: a mastodon jawbone.

The fossil most likely found its way to the beach after tumbling down the side of an eroding bluff. It was then found after the river washed it clean of sediment.

The hiker knew that fossils found on federal lands are federal property. So instead of taking the jawbone, he covered it up and contacted county officials, who contacted USACE.

"He did the right thing. He did not take it; he did not remove it from federal land. That would be theft of government property," said Walla Walla District archeologist Pei-Lin Yu. "The law requires that you protect finds and report them."

The jawbone wasn't the only fossil the hiker found at the site. He also presented pieces of petrified wood and a scapula (shoulder bone) of an animal that is yet to be identified. The group walked the beach to ensure there were no more fossils or cultural items lying exposed. No additional pieces were found, and the discovered fossils were brought back to the Walla Walla District headquarters building.

History

Mastodons lived in the Pacific Northwest long before people did. The mastodon jawbone that was found is estimated to be between 5 and 8 million years old, based on the level of mineralization of the bone and age of nearby geological layers.

Mastodons were ancient elephants that ate leaves and twigs and probably lived in forests. Mastodons were slightly smaller than mammoths, though both are comparable to modern-day elephants, and had a slightly different appearance. For example, mastodons had flatter heads than mammoths and their tusks did not grow as curved.

Teeth were another difference. Mammoths were mainly grass eaters and had flat, plate-like teeth. Mastodons ate woodier vegetation, a diet leading to the cone-shaped ridges of the teeth of the mastodon jawbone found in April.

What now?

The fossil will ultimately be displayed at the Ice Harbor Visitor Center in Burbank, Washington. Currently, the jawbone is on loan to Dr. Brett Lenz, cultural resources manager for the Wanapum Heritage Center Repository. Lenz and a team of researchers will be investigating the jawbone to determine the precise species of the mastodon, the age of the fossil, the conditions of its burial and preservation, and a little bit about the individual the fossil belonged to.

"We can look at what's called the 'taphonomy' of what was the bone and understand certain things like the history of what happened after the animal died. Was it rapidly buried or on the surface for a particularly long time? Is there evidence of gnawing on it by rodents or larger carnivores? We can understand a few things like that based on the taphonomy," Lenz said.

The fossil will be returned to USACE in January 2023 and displayed at Ice Harbor in February.

A 5- to 8-million-year-old young adult mastodon jawbone discovered on USACE land April 14. (Pei-Lin Yu)

A piece of petrified wood found at the same site as the mastodon jaw April 14. (Pei-Lin Yu)

A scapula (shoulder bone) found at the site. This bone is most likely from a large mammal that lived in the area thousands of years ago. (Pei-Lin Yu)

Mastodon teeth, easily identified due to the pointed tips, were used for eating spruce limbs, twigs and pinecones. (Pei-Lin Yu)

Botz steps up to serve his community during disaster response

Story and photos by Patrick Moes
USACE, St. Paul District

When it comes to disaster response missions, Chris Botz has seen a few during his 28-year career with the U.S. Army Corps of Engineers (USACE) St. Paul District.

As a park ranger at Baldhill Dam, located a few miles northeast of Valley City, North Dakota, Botz spends most of his time working shoreline management issues, ensuring campers have everything they need and adjusting the gates at the dam to regulate Lake Ashtabula water levels.

Botz said he loves his day-to-day job but also enjoys helping people during a disaster response mission. He added that when the call comes for him to switch gears and change his park ranger campaign hat out for his red emergency operations hat, it becomes a job of long hours, but one that he embraces and will do whatever is necessary to get the job done while helping survivors.

That willingness to serve is exactly what propelled Botz into action in April as a series of spring storms created severe flooding conditions within North Dakota. Botz said he was there supporting USACE flood operations within the Sheyenne River basin from Valley City all the way down to Kindred, North Dakota, which is about 30 miles from Fargo, North Dakota. The work, he said, was rewarding but required a lot of coordination with local officials, public works directors and local mayors.

While the job can be stressful, Botz said it's important to him because Valley City and the surrounding area are more than the place where he works, it's where he calls home, it's where he is raising his two children and it's where he met his wife.

"Valley City is a great place to work and raise a family," said Botz "It is small enough that you know most of your neighbors, and it comes together in times of need. I am fortunate that I was able to spend most of my career working in a job that I enjoy in a great area to raise a family."

For Botz, a Backus, Minnesota, native, supporting the flood fight is about taking care of the community. With too many disaster response missions under his belt to remember, he said that while his house was safe during this year's flood fight, it was in danger of being flooded during the 2009 and 2011 floods within Valley City. Having gone through those events, he said he could certainly empathize with the stress people in low-lying areas were facing as rising waters threatened their homes this year.

Chris Botz, park ranger, discusses temporary levee construction in Valley City, North Dakota,

While the water continued to rise, Botz said he and a small team from USACE fought back against Mother Nature and the Sheyenne River. He said USACE supported the city of Valley City's flood fight efforts by constructing temporary levees and providing technical assistance to help the community and the valley better understand what was needed to reduce the flood risk.

"When you see temporary levees go up in town it brings an uneasy feeling," said Botz. "You know that Mother Nature has sent us a challenge to work with, but it is a reassuring feeling knowing that town is prepared. We have an excellent public works department and fire department that has gone through this in the past. Once the levees go up, it falls on them to manage all of the water pumping to help keep the community dry."

The temporary levees, built by USACE's contractor, Strata Corporation from Grand Forks, North Dakota, included eight sections with a combined distance of more than 8,000 feet in length. They were constructed from clay soils "borrowed" from a field near Valley City.

Since the levees were not engineered to withstand a flood, Botz said the levees required routine monitoring to ensure they were able to hold back the river. He said the city was able to find more than 100 volunteers to monitor the temporary levees as the Sheyenne River slowly rose to the fifth highest flood elevation in recorded history. Volunteers monitored the levees 24 hours a day at the height of the flood and notified USACE officials as soon as a vulnerable area was identified. Botz said no serious issues were ever discovered, but the team remained vigilant.

Working 12-plus hour days, seven days a week, might be stressful for some, but Botz said it's a small sacrifice if it means the community can continue to go about their daily activities with minimal impact. That sense of selfless service was evident when Botz drove more than an hour away from his home to check on the small community of Fort Ransom, North Dakota — population of 105 people. While he was coordinating for the delivery of 6,000 sandbags with support from mayors in Valley City and Fargo, Botz said his son was getting ready for his prom in Valley City.

Joel Zietz (left), maintenance and repair coordinator at Baldhill Dam, and Chris Botz, park ranger at Baldhill Dam, adjust the dam gates at Baldhill Dam, near Valley City, North Dakota, to increase the outflow and create storage capacity within Lake Ashtabula, April 26.

Got goats? A different approach on invasive species control

Story and photos by Tiffany Natividad
USACE, Tulsa District

Invasive species are increasingly taking over our natural landscapes. These invasive plants can disrupt the delicate balance of the existing ecosystem by outcompeting our native bunch-type grasses for space and resources and choking out existing vegetation on our grasslands. Over the years, sericea lespedeza encroached into open grassy habitat, fences, drainage draws, and lake/river shorelines on U.S. Army Corps of Engineers' (USACE) lands. These invasive species have been removed in the past, with limited success.

Sericea lespedeza is a very aggressive, drought-hardy, perennial plant. Originally native to Asia, it was introduced as a forage crop in the United States in the 1930s and has completely overtaken native habitat since. The best way to control this invasive plant is to prevent the seed production and try to control it before it flowers and disburses the seeds.

While much research has been done documenting invasive species, not much research has been completed on effective control methods. Control methods for invasive plant species range extensively and can include: chemical control by use of herbicides, mechanical control through prescribed burning or mowing of affected areas, or biological controls by the introduction of a species that preys upon the invasive species in some way. This is where our four-legged friends with a great appetite come into play.

USACE Tulsa District is trying something different to reduce the use of chemical applications at the project level. The invasive plant species management practice of using goats as a biological control is on the move at Fall River Lake and John Redmond Reservoir in Kansas.

"The current landscape at these areas will allow for the existing sericea lespedeza and grasslands to be maintained by goats with minimal landscape damage and no chemicals being applied," said Christopher Wright, Tulsa District contract specialist.

A contract was awarded to have the goats browse a designated area to assist in the invasive species removal. The majority of the sericea lespedeza was maintained up to a level the goats would normally browse.

The current grass is being browsed to a height of approximately half the present height including the flower of the plants prior to going to seed heads. Grass height is being closely observed by the goat manager to ensure consistent management of the browsing area.

Fall River Lake goats ready to start the workday controlling invasive plant species.

Goats enjoying a salt lick within their browsing area at John Redmond Reservoir in Kansas.

Goats resting after a long morning of work controlling invasive species at Fall River Lake in Kansas.

See Got goats on page 20

Got goats continued from page 19

"The contract was awarded to utilize goats to assist with invasive species management to reduce the use of chemical application methods," said Eugene Goff, operations project manager for the Kansas area.

So, why goats? Goats possess a unique characteristic that separates them from almost all other types of livestock. They would rather eat brush and weeds than grass because they are browsers. They can also control the invasive weeds without disturbing the soil. Using goats to control invasive plant species is preferable to other biological control methods, such as insect releases, since the movement and spread of captive livestock can be more easily controlled and does not present the risk of a secondary invasion. And let's face it, who wouldn't mind watching these cute guys working.

Getting to see the progress that has been made in just three weeks is highly impressive. You can look at the fenced-in area and see where the goats have already been through. It looks like it was just mowed down compared to sections where they have not browsed yet.

Currently there are goats browsing at both Fall River and John Redmond projects. The current timeline is to have goats working for 30 calendar days within designated areas for weed reduction. The results will be evaluated once the contract period is completed.

"The way forward will be looked at for future contract options, to have a base bid with option years to use goats for expanded/enhanced invasive species management practice within the Kansas area of the Tulsa District," said Goff.

No trace of sericea lespedeza plants after goat browsing.

Cleared out browsing area after three weeks of working goats for invasive species control.

Week one of biological control on invasive species using goats at Fall River Lake in Kansas.

Smith inducted into the ERDC-WES Gallery of Distinguished Employees

By Carol C. Coleman
Engineer Research and Development Center

Dr. Jane McKee Smith became the newest member inducted into the Waterways Experiment Station (WES) Gallery of Distinguished Employees in a ceremony held at the U.S. Army Engineer Research and Development Center's (ERDC) main headquarters July 20, 2022.

Smith joins more than 100 former WES employees whose significant career achievements left a lasting impression on both the ERDC and the nation.

"Jane has helped pave the way for all of us," said ERDC director Dr. David Pittman. "Today, she joins a select group of professionals whose lasting contributions have helped ERDC grow into a world-class organization."

Prior to her retirement in 2021, Smith served as the Army senior research scientist for hydrodynamic phenomenon while stationed at the ERDC's Coastal and Hydraulics Laboratory (CHL). Her research focused on coastal hydrodynamics, including nearshore waves and currents, wave-current interaction, shallow-water wave processes and storm surge, with projects in theoretical and numerical studies as well as laboratory and field experimentation.

"Jane has been an inspiration not only to the CHL and ERDC workforce, but across the entire profession — and world," said Pittman. "There are only 40 senior scientists in the Army, and Jane was one of five at the ERDC. She's like the rarest of rare breeds."

Smith is a co-developer of the Steady-State Spectral Wave Model, a numerical model that is used throughout the world for coastal project planning and design. She was the wave modeling lead investigator for the Interagency Performance Evaluation Task Force evaluation of Hurricane Katrina and led development of a system to quickly forecast hurricane waves, storm surge and inundation for the Hawaiian Islands.

"ERDC has been a wonderful place to work," said Smith. "I worked on a lot of challenging projects, collaborated nationally and internationally and had the privilege to work on projects that made a difference to the world."

With more than 200 professional publications and 6,800 citations to her credit, Smith is an internationally recognized engineer whose exceptional leadership in coastal engineering research continues to have a tremendous impact.

In 2019, she was the first woman from the U.S. Army Corps of Engineers inducted into the National Academy of Engineering and this year she was informed she will be the first female recipient of the 2022 International Coastal Engineering Award from the American Society of Civil Engineers.

Dr. Jane McKee Smith and Dr. David Pittman, ERDC director, unveil an official portrait of Smith that will hang in the WES Gallery of Distinguished Employees.

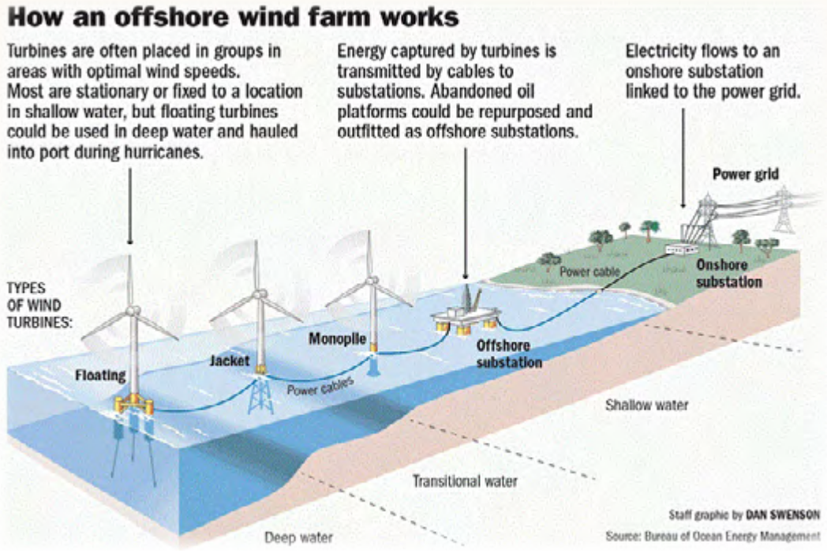
Dr. Jane McKee Smith addresses attendees during her induction ceremony into the WES Gallery of Distinguished Employees held at the ERDC's main headquarters in Vicksburg, Mississippi, July 20, 2022. (Khary Ratliff)

For more than 39 years, Smith was consistently a top contributor to the ERDC and has continued to serve in an emeritus role after retirement.

"There's a lot of work left to do," she said. "We need to lead not only with our technical knowledge and skills but with our hearts. We need to collaborate. We need to innovate. We need to communicate. We need to mentor, and we need to be inclusive. We need to be kind, and we need to be compassionate."

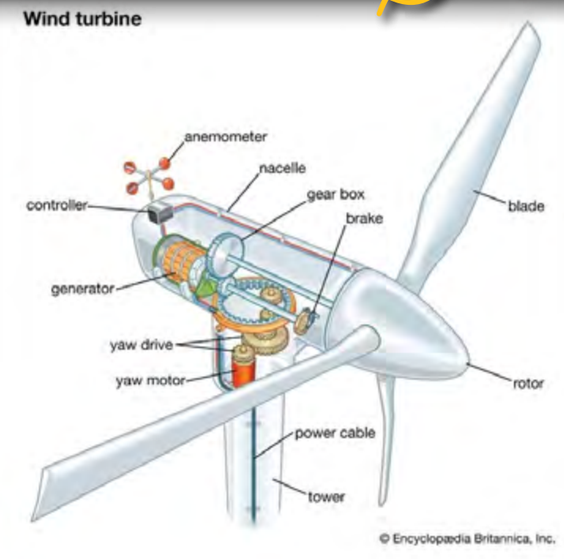
"Don't wait for somebody else to take the lead," she added. "Stand up — volunteer. Be the one that goes out and does the hard work that needs to be done, because this is the ERDC tradition."

Taking to the wind for climate change



Wind energy generated offshore is transported through buried underwater cables to on- or offshore substations where the voltage is stepped up and the electricity connects to an onshore electrical grid. (BOEM)

This is an example of what an offshore windfarm looks like. (BOEM)



A look at the internal structure of a wind turbine showing three massive blades that harness the power of the wind by turning gears inside a housing. As these gears turn, a connected electrical generator transforms wind power into electricity. (Encyclopedia Britannica)

By JoAnne Castagna
USACE, North Atlantic Division

Dec. 17, 1903, was a windy day at Kitty Hawk, a coastal area of North Carolina, but suitable for the Wright brothers' first test of their motor-operated flyer. In fact, they specifically chose this location for its wind.

They started the engine and the propellers turned. After a few attempts, they managed to get the flyer off the ground for 59 seconds for a distance of 852 feet. It was the first time humans would fly, but it wouldn't be the last.

Today, something else is harnessing the power of the wind at Kitty Hawk. Off the coast, a new offshore wind farm is being constructed through a collaboration of federal government agencies with the goal of making wind energy an everyday part of American life.

What's happening at Kitty Hawk is advancing the administration's offshore wind energy goals outlined in Executive Order 14008, Tackling the Climate Crisis at Home and Abroad, issued Jan. 27, 2021. The executive order directs interagency collaboration "... to increase renewable energy production on those lands and in those waters, with the goal of doubling offshore wind by 2030 while ensuring robust protection for our lands, waters, and biodiversity and creating good jobs."

To help meet this goal, the U.S. Army Corps of Engineers (USACE) North Atlantic Division is collaborating with the Department of the Interior's Bureau of Ocean Energy Management (BOEM). USACE is providing BOEM and its wind energy developer contractors scientific and technical support, and regulatory oversight prior to its construction of offshore wind farms in the waters off the mid-Atlantic and the Northeast coasts.

"This partnership is a great example of federal agencies coming together for a common goal: to advance renewable energy solutions for the nation," said Karen Baker, former USACE North Atlantic Division regional programs director and current BOEM chief of the Office of Renewable Energy Programs. "We look forward to applying USACE's scientific and technical support to enable the BOEM-led team."

What is Renewable Energy?

Renewable energy comes from natural sources or processes that are constantly replenished, such as sunlight or wind.

Wind can be harnessed to create electricity. To do this, wind turbines are used. Several turbines together create what is called a wind farm.

Though wind farms can be constructed either on- or offshore, wind energy resources tend to be stronger offshore. Wind turbines are large structures whose towers can be as tall as a New York City skyscraper. Typically, three blades extend from these towers with widths reaching the length of a football field.

Heavy foundations, that can be 220 feet long and weigh 1,000 tons, secure the turbines to the ocean floor. Wind turbines in deeper ocean waters can be constructed on floating platforms instead.

Electricity is generated as wind turns the turbine's blades. The blades turn a shaft inside the turbine. The shaft turns slowly and is connected to several gears that cause a smaller shaft to turn much faster. This smaller shaft drives the electrical generator.

This generated electricity then flows through a buried underwater cable to an onshore substation where the voltage is stepped up and it connects to the onshore electrical grid.

Before offshore wind farms like this can be constructed, wind energy developers must go through the National Environmental Policy Act (NEPA) review and approval process led by BOEM with USACE's support as a cooperating agency.

NEPA requires federal agencies to assess the environmental effects of their proposed actions prior to making decisions on permits to allow the construction of these structures.

Christine Jacek, USACE New England District project manager who is involved with offshore wind farm projects in the New England region, said, "USACE reviews and comments on the wind energy developer's environmental impact statement — a government document that outlines the impact of a proposed project on its surrounding environment. It's reviewed in accordance with our regulations and ensures impacts to the aquatic environment are avoided or minimized. Based on this review, USACE is responsible with providing the developer's permit decisions. These projects can't proceed without permit decisions issued by USACE."

USACE also makes sure wind energy developers' construction plans don't negatively impact USACE projects.

Naomi Handell, USACE North Atlantic Division regulatory program manager, gave this example: "If an underwater transmission cable route would cross a federal channel or the wind developer proposes to cross over an area where USACE is dredging sand for a project, we advise BOEM and the wind energy developers on ways to avoid this."

The following are a few of the offshore wind farm projects planned or moving forward in the waters off the mid-Atlantic and the Northeast coastlines:

Kitty Hawk Offshore Wind Project, North Carolina

USACE Norfolk District is serving as a cooperating agency as part of BOEM's environmental impact study review. According to BOEM, the project will sit 27 miles off the coast of Kitty Hawk. Throughout 122,405 acres of ocean, there will be up to 69 offshore wind turbines generating 5.2 gigawatts of energy to 700,000 homes by 2026. USACE's South Atlantic Division is also working on this project.

Coastal Virginia Offshore Wind Commercial Project, Virginia

Norfolk District is also serving as a cooperating agency as part of BOEM's environmental impact study review. This will be the biggest offshore wind farm in the United States and one of the biggest in the

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world, according to BOEM. This project will sit 27 miles off the coast of Virginia Beach. Throughout 176 miles of ocean, there will be up to 205 offshore wind turbines generating up to 8.8 million megawatts of power annually to 660,000 homes in 13 states by 2026.

U.S. Wind, Maryland

USACE Baltimore District is serving as a cooperating agency as part of BOEM's environmental impact study review. This project is projected to sit 11.5 miles off the coast of Maryland. Throughout 79,707 acres of ocean, the project is slated to have 126 offshore wind turbines generating 2 gigawatts of power for multiple states.

Ocean Wind 1, New Jersey

USACE Philadelphia District is serving as a cooperating agency as part of BOEM's environmental impact study review. This project will sit 13 miles off the coast of Atlantic City, New Jersey. There will be up to 98 offshore wind turbines generating up to 1.1 gigawatts of power annually to 500,000 homes by 2024.

South Fork Wind, New York

USACE New York District issued a permit and authorized construction in January 2022, to move forward. This project will sit approximately 19 miles southeast of Block Island, Rhode Island, and 35 miles east of Montauk Point, Suffolk County, New York. Throughout approximately 13,700 acres of ocean, there will be up to 12 offshore wind turbines generating approximately 132 megawatts of power for approximately 70,000 homes in New York.

Revolution Wind, Rhode Island

USACE New England District is serving as a cooperating agency as part of BOEM's environmental impact study review. This project will sit 18 miles off the coast of Rhode Island. There will be 100 offshore wind turbines generating 704 megawatts of power to 400,000 homes in Rhode Island and Connecticut.

New England Wind (Park City Wind & Commonwealth Wind), Massachusetts

New England District is serving as a cooperating agency as part of BOEM's environmental impact study review. This project will sit 19 miles southwest of Martha's Vineyard, Massachusetts. There will be 130 offshore wind turbines generating 2,000 megawatts of power for the Connecticut and Massachusetts power grids.

Mayflower Wind, Massachusetts

New England District is also serving as a cooperating agency as part of BOEM's environmental impact study review. This project will sit 26 miles off the coast of Martha's Vineyard. There will be up to 147 offshore wind turbines generating 804 megawatts of power for the Massachusetts power grid.

Vineyard Wind 1, Massachusetts

New England District authorized this project last summer. It will sit 14 miles off the coast of Martha's Vineyard. Throughout approximately 75,614 acres of ocean, there will be 84 offshore wind turbines generating 800 megawatts of energy for the Massachusetts power grid by 2024.

USACE addresses climate change

The Biden administration not only tasked federal agencies to work together to fight climate change, but also to develop their own plans. In response, USACE developed a Climate Action Plan in 2021 that benefits its projects, the people working on them, and the communities they serve.

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

The plan includes identifying programs and missions most at risk from climate change to ensure best use of taxpayer dollars; putting senior leaders in charge of these projects so they are held accountable; revamping supply chain policies and operations to create a more climate-resilient system; enhancing protections for workers and communities; and building a more equitable future for at-risk populations.

Wind energy benefits environment, economy

A supporter of the administration's push for wind energy, Marjaneh Issapour, director of Farmingdale State College's Renewable Energy and Sustainability Center, believes the United States could benefit from this renewable energy source in two major ways.

"Producing wind energy provides clean energy, reduces CO2 — carbon dioxide — and our carbon footprint. Producing wind energy domestically also makes us independent from oil, which hopefully would make us less exposed to international adverse situations that could cost us generations to come. It's a win-win situation," she said.

Issapour is a senior member of the Institute of Electrical and Electronics Engineers in Long Island, New York, where she chairs the Power and Energy Society and is a subcommittee member of the American Wind Energy Association.

She added these locations off the mid-Atlantic and Northeast coasts of the United States are prime areas to establish wind energy for several reasons. This includes having access to deep, open waters that enable wind farm parts manufacturers, some located solely in Europe, to ship materials to this region on large cargo ships.

Regarding wind turbine construction, Issapour said their size is growing.

"When you construct a building, the taller the building, the deeper the foundation has to be," Issapour said. "Wind turbine foundations are filled in with a special gravel material that makes the turbines steady and stable. This material is produced in Canada, which is also easily accessible to this region."

The economy of the mid-Atlantic and Northeast coasts will also benefit greatly. For example, according to BOEM, offshore wind farm construction in North Carolina and Virginia is expected to generate nearly $2 billion for the region's economy over the next decade.

BOEM has stated part of this will come from new jobs. For example, the Kitty Hawk project, once operational, will create 900 full-time jobs.

When these projects are operational, the economies of these regions will further benefit. BOEM states regions with offshore wind turbines tend to experience an increase in recreation and tourism.

Part of this may be due to an increase in recreational fishing because of an increase in fish habitats. The underwater foundations that support the tall wind turbines may attract a wide variety of fish and other marine animals.

According to BOEM, perhaps the most important benefit of offshore wind farms is they help decrease the region's reliance on fossil fuels and help tackle climate change.

When fossil fuels, such as oil, coal and gas, are burned to meet our energy needs, this releases carbon dioxide, sulfur dioxide and nitrogen oxide into the air, which degrades air and water quality and contributes to climate change.

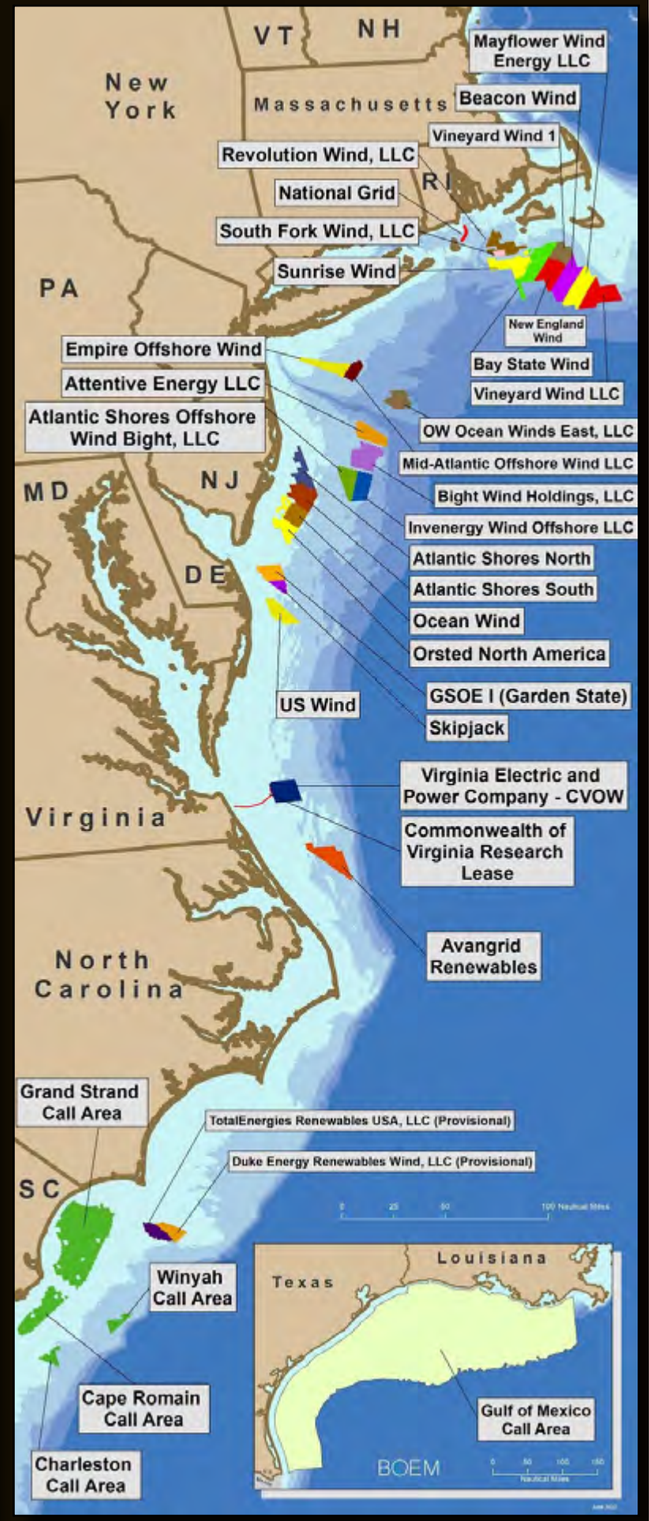
Construction and operation of the Kitty Hawk project alone, by BOEM's estimates, is expected to displace 1,330,032 tons of carbon dioxide, 860 tons of sulfur dioxide, and 703 tons of nitrogen oxide annually that would have been emitted from fossil-fuel burning facilities.

BOEM reports these projects are not only meeting federal climate change goals, but also state objectives. For example, the commonwealth of Virginia enacted the Virginia Clean Economy Act in April 2020. This act supports development of 2,500 to 3,000 megawatts of clean, reliable offshore wind energy to be in service by 2028 and has the goal of transitioning Virginia's biggest utility companies from their current electric portfolio to 100% carbon-free resources by 2050.

Issapour says Americans have been slow to accept renewable energy, such as wind energy, and she would like for them to think of the possibilities.

"Before you say 'no,' just take a look at the data and learn about it," she said. "Look at the long-term benefits. Don't be short-sighted but think of the generations to come. Ask yourself — what are the benefits for me, my family, and the longevity of our planet? We forget we are the guardians of this beautiful Earth."

The Wright Brothers would probably agree with her. People didn't believe they could fly, but the brothers kept researching and testing their flyers. As a result, today, we can fly to most locations throughout the world. Possibly in years to come, with the offshore wind farms being constructed now and those in the future, renewable energy will be just as common as boarding an airplane and climate change will be a passing breeze.



The Department of the Interior's Bureau of Ocean Energy Management's renewable energy activities in the mid-Atlantic and Northeast coasts. (BOEM)

St. Paul District finds win-win solution in maintaining navigation channel

Story and photos by Patrick Moes
USACE, St. Paul District

Maintaining the Mississippi River 9-foot Navigation Channel is one of the primary missions for the U.S. Army Corps of Engineers (USACE) St. Paul District.

To maintain the channel, the district typically removes around 1 million cubic yards of sand every year. While the sand is a nuisance for the navigation channel and the shippers moving bulk commodities to markets up and down the river, it's a blessing for developers looking for free, clean material to raise land above the flood plain, said Paul Machajewski, St. Paul District dredged material manager.

Machajewski said his team within the district's Channels and Harbors Branch recently worked with the city of La Crosse, Wisconsin, to support their efforts to elevate an area out of the floodplain. "In all, a local contractor removed around 200,000 cubic yards of river sand from our Brownsville, Minnesota, placement site and moved it to a site within La Crosse," said Machajewski.

The La Crosse beneficial use project is a big deal, said Machajewski. "Typically, contractors will come in and take about 30,000 to 40,000 cubic yards of material per year, the contractors for the La Crosse project are taking three-to-five times that amount."

Getting general construction fill material for free is a win-win for the community and USACE, said Machajewski. The benefits come from the fact that the city doesn't need to use their tax dollars on the sand while also being able to protect an area within their community from future flood threats. In addition to the benefits that the city receives, Machajewski said USACE receives significant benefits, too, by creating additional storage capacity for future dredging needs to maintain the navigation channel. He said he estimates that the La Crosse beneficial use project will generate an additional four-to-five years of future storage capacity.

Dan DeVaney, St. Paul District channel maintenance coordinator, said one of the key parts of the channel maintenance program is placing the material at specific upland placement sites, or river sand resource centers, for communities to reuse the sand for a variety of purposes. "The material is ideal for use in winter road maintenance, construction site fill, or even general fill material for the local farming communities as cattle bedding," said DeVaney.

Paul Machajewski, dredged material manager, looks on at the dredging near Brownsville, Minnesota, Sept. 24, 2021.

Dredging operations near La Crosse, Wisconsin, Sept. 24, 2021.

Dredging operations near La Crosse, Wisconsin, Sept. 24, 2021.

See St. Paul District on page 28

Dredging operations near La Crosse, Wisconsin, Sept. 24, 2021.

USACE staff are exploring other options for placing river sand, too. Eric Hanson, St. Paul District senior ecologist and environmental planner, said he is a part of a team that is exploring the possibility of using agricultural fields near the Mississippi River as options for permanently placing river sand removed from the navigation channel. He said they are looking at several methods that would use the river sand to improve the soil structure and function on poorly drained and semi-poorly drained agricultural lands with the end goal of improving overall crop production.

Hanson said plans are currently in development, and the team hopes to test the concepts over the next two-to-three years to verify the hypothesis that incorporating river sand would improve agricultural production. “If successful,” Hanson said, “this study would open up tens of thousands and perhaps hundreds of thousands of acres nation-wide not previously considered for the permanent placement of river sand, and provide an eco-friendly, cost-effective and collaborative solution to managing river sand.”

Machajewski said the potential for agricultural field placement is just one area where the team is looking for future solutions to the annual need to place river sand removed from the navigation channel. He said the team continues exploring opportunities and has started looking at blending it with soils for use around new road construction to improve drainage near roads.

USACE EWN program at heart of recent presidential executive order

By Jason Scott
Engineer Research and Development Center

The U.S. Army Corps of Engineers' (USACE) Engineering With Nature (EWN) program enables more sustainable delivery of economic, social, and environmental benefits associated with infrastructure. For more than 10 years, the program has grown substantially garnering support from collaborative partners from around the world and recently reaching all the way to the White House.

"Engineering With Nature represents an approach to developing and operating a project, expanding the benefits gained by integrating the natural landscape into the engineering design," said Dr. Todd Bridges, U.S. Army Engineer Research and Development Center (ERDC) senior research scientist for environmental sciences and national EWN program lead.

Nature-based solutions (NBS) is becoming a universal term to describe the types of projects EWN creates and is now the standard in the U.S. and internationally in relation to U.N. activities and communities of practice in climate-change treaties.

Layering nature-based solutions with traditional infrastructure achieves more socially acceptable, environmentally viable and sustainable projects. These projects potentially have lower whole-life costs, provide a greater diversity of benefits and may be more adaptable over time than conventional alternatives.

"Over the last five years, natural hazards, such as floods and storms, produced more than $10 billion in damages to Department of Defense (DOD) installations," Bridges said. "The complex DOD mission necessitates resilient infrastructure systems requiring innovative action.

"EWN is leading the way to harness the power of nature to support mission resilience."

The EWN program, and NBS in general, received major support from the highest level when President Joe Biden issued Executive Order 14072, "Strengthening the Nation's Forests, Communities, and Local Economies," April 22.

In Section 4, titled "Deploying Nature-Based Solutions to Tackle Climate Change and Enhance Resilience," the order identifies three activities to push NBS forward.

It calls for an interagency report on NBS and how to overcome obstacles in their implementation in the federal government and how to facilitate the progression of NBS. ERDC scientists and personnel from other federal agencies have joined a White House working group to develop ideas on how to implement NBS across the nation.

The order also directs the Office of Management and Budget to issue "guidance related to the valuation of ecosystem and environmental services and natural assets in federal regulatory decision-making." According to Bridges, this is critical for USACE project approval, justification, and evaluation through the benefit-cost analysis process.

Lastly, the order establishes the commitment to perform a national nature assessment. There is no national effort to collect the status of nature as it relates to humankind. This national nature assessment will look at the condition of nature and how it is being harmed.

"The issuing of this executive order lays the groundwork for big change where the Engineering With Nature program is concerned," said Bridges. "EWN is at the heart of this executive order. Many USACE projects already apply EWN principles, and the executive order will push EWN further into the mainstream from once innovative to now expected. Communities win with resilient natural infrastructure providing expanded economic, environmental and social benefits."

The California dredges the new navigation channel formed on the eastern side of Horseshoe Bend Island. This project was selected by USACE New Orleans District as a placement option for dredged shoal material. The island was self-designed by the strategic placement of sediment on the Atchafalaya River, allowing the river's energy to disperse the sediment — another example of harnessing natural systems and processes to engineer with nature. The project resulted in numerous engineering and environmental benefits, including a reduced need for dredging and increased habitat for a variety of species. (USACE courtesy photo)

Picture of wetland habitat that developed on Horseshoe Bend Island following placement of dredged sediment upstream of an existing sandbar. (USACE courtesy photo)

EWN program recognized with international award

USACE's Engineering With Nature program was recently recognized by the U.K. Environment Agency. The EWN program's "International Guidelines on Natural and Nature-Based Features for Flood Risk Management (NNBF)" received the U.K. Environment Agency's Flood and Coast Excellence Award for International Excellence.

"The NNBF Guidelines are the next step toward revolutionary infrastructure development — a set of real-world guidelines to help familiarize us with what was once novel," said Lt. Gen. Scott Spellmon, USACE commanding general and 55th chief of engineers.

NNBF provide cost-effective, self-sustaining alternatives to traditionally engineered flood management while offering additional benefits to ecosystems and communities. These guidelines enable organizations worldwide to apply best practices for NNBF in coastal and inland systems. They cover a range of nature-based features in coastal and fluvial environments, along with topics that apply to nature-base solutions more broadly.

The 1,000-page publication is the culmination of five years of collaboration among 77 cross-sector organizations spanning 10 countries on four continents.

"The strength of these approaches in delivering solutions is shown by the techniques described in these guidelines," said Ms. Caroline Douglass, U.K. Environment Agency executive director for Flood and Coastal Risk Management. "The guidelines provide the opportunity to learn from other global experts and have influenced the Environment Agency's vision for a ready and resilient response to flooding and climate change in the United Kingdom."

The International Excellence Award recognizes world-class practices and approaches to managing flooding and coastal erosion that are not currently mainstream in the UK. The award also recognizes outstanding international leadership, including emerging international thought and world-leading research on flood and coastal risk management issues, technical excellence in delivering flood risk management and managing coastal change and effective partnerships, engagement or shared learning between countries.

Dr. Todd Bridges (center), ERDC senior research scientist for environmental sciences and national EWN program lead, accepts the U.K. Environment Agency's Flood and Coast Excellence Award for International Excellence on behalf of the program. (USACE courtesy photo)

Harmful algal bloom solutions through partnership

By Dr. Mandy Michalsen
Engineer Research and Development Center

Under the Water Resource Development Act of 2018 (WRDA 2018), Section 1109, the U.S. Army Engineer Research and Development Center (ERDC) executed a five-year technology demonstration program to deliver scalable solutions to minimize the frequency and severity of harmful algal bloom (HAB) impacts to our nation's water resources.

Freshwater HABs are often caused by an overgrowth of cyanobacteria that can produce toxins and make waters unsafe for people and animals. HABs are increasingly reported in lakes and rivers and in water resources development projects across the nation, threatening drinking water supplies, limiting recreation and causing harm to multiple economic sectors. An HAB stretching over 90% of Florida's Lake Okeechobee was encountered in 2018; an event of similar magnitude was encountered along the Ohio River in 2015.

Developing rapidly deployable technologies for HAB prevention, detection and management that are scalable proportionate to the need is a tremendous challenge — one that requires an "all hands on deck" approach with partnership as the cornerstone.

Funds were first appropriated in fiscal 2019 to initiate the WRDA 2018-directed HAB Research Initiative. One of the first projects selected in fiscal 2019 was the HAB Interception, Treatment and Transformation System (HABITATS), a project guided by ERDC's operational water research team lead, Dr. Martin Page. HABITATS skims the water to collect cyanobacteria biomass, separates and concentrates the biomass, then converts the biomass to biofuel using hydrothermal liquefaction technology (HTL). HABITATS includes optional ozone treatment so that any toxins released from the cells can be neutralized prior to return of the purified water.

Page and his team partnered with academia, the University of Illinois Urbana-Champaign for, HTL expertise; with the private sector's AECOM for development of the dissolved air flotation technology that separates cyanobacteria from water; and others, all of which enabled rapid development, demonstration and optimization of HABITATS.

"Partnership definitely allowed our team to accelerate delivery of HABITATS," Page said. "That includes support of internal partners at the U.S. Army Corps of Engineers Jacksonville District and others. We're now upscaling and beginning the technology transfer process, which is very exciting to see."

The HAB Research Initiative has resulted in 34 new HAB prevention, detection and management projects, including 14 collaborations with federal and non-federal partners.

In fiscal 2022 alone, four new Cooperative Ecosystem Study Units (CESUs) were initiated to fill remaining identified HAB science and technology gaps. Marshall University will investigate environmental triggers of HAB events in riverine systems, which will guide development of prediction, prevention and management technologies for riverine HABs. The Ohio State University will quantify effectiveness of engineered solutions for reducing nutrient loads from agricultural lands into lotic systems. The University of Toledo will investigate novel and scalable

Researchers with ERDC's Environmental Laboratory Environmental Engineering Branch cultivate cyanobacteria that cause HAB as part of a wide-ranging effort to develop technologies to manage the HAB problem in lakes and reservoirs. (USACE photo)

methods of biodegrading cyanotoxins in freshwater bodies. The University of South Florida will develop a holistic HAB modeling and prediction capability for Lake Okeechobee and receiving waters.

The modeling platform will integrate capabilities complementary to those ERDC is now developing in collaboration with the National Oceanic and Atmospheric Administration, National Centers for Coastal Ocean Science for Lake Okeechobee and to those in development by the University of Florida for the Caloosahatchee River, which transports water from Lake Okeechobee west toward the Gulf of Mexico. The University of South Florida will also build the HAB modeling and prediction capability for the St. Lucie Canal, which transports water from Lake Okeechobee east toward the Indian River Lagoon and Atlantic Ocean. The holistic HAB modeling and prediction platform for Lake Okeechobee and receiving waters is scheduled for completion in fiscal 2025 and will empower water managers in South Florida with a muscular decision support tool.

Now in its fifth and final year, the HAB Research Initiative has rapidly accelerated development and delivery of scalable HAB prevention, detection and management solutions for the nation. Although the WRDA 2018 authorization is ending, new initiatives are beginning. Those initiatives include the WRDA 2020 Section 128-authorized HAB Technology Demonstration Program, which will sponsor field-scale demonstrations of lab-proven HAB prevention, detection and/or management technologies and produce cost and performance data to guide optimal technology use by water managers.

"Partnership has amplified the power of USACE-ERDC, enabling rapid capability development of solutions in the fight against this complex environmental problem," said Dr. Jen Seiter-Moser, ERDC technical director for Civil Works Environmental Engineering and Sciences.

Army engineers partner for 25 years with federal biologists to study duck nesting ecology in Alaska

By Rachel Napolitan
USACE, Alaska District

The whistling sound of beating wings moves through the forest as a common goldeneye duck lands in a nest box mounted to the side of a tree near the Moose Creek Dam in North Pole, Alaska. Focused on laying its eggs within the cozy confines of this man-made wooden structure, the bird is unaware of its vital role in a unique scientific study.

Through a cooperative effort between the U.S. Army Corps of Engineers (USACE) Alaska District and U.S. Fish and Wildlife Service Alaska Region, the team recently concluded its 25th summer of using nest boxes to learn about duck ecology at the Chena River Lakes Flood Control Project.

"The project involves serious dedication, long hours, bad mosquitoes, cold water and lots of hiking," said Justin Kerwin, senior park ranger at the federally owned property.

Scientists use information collected from the field research to assess the short-term effects of weather, like a late spring breakup or rainy summer, on the birds' breeding productivity along with determining how climate change influences the species. It also gives biologists the chance to evaluate how the red squirrel and pine marten, common predators of the goldeneye, impact the population, according to Eric Taylor, supervisory wildlife biologist in the U.S. Fish and Wildlife Service Alaska Region's Migratory Bird Program.

Through an analysis of the long-term data set, scientists discovered that common goldeneye hens now initiate egg laying 14 days earlier than when the study began in 1997, likely indicating the effects of a warming climate in Alaska.

"Such results are simply not possible unless one has the ability to evaluate a continuous data stream for a long time period," Taylor said.

For this endeavor to be successful, it takes a talented team of field researchers to gather the information needed to expand the scientific knowledge base. College students are ideal candidates for this work and benefit greatly from the experience of on-the-job training in waterfowl ecology, leadership and decision-making.

"Since 1997, the Fish and Wildlife Service has collaborated with USACE, who has provided funding to support four graduate students and over 40 undergraduate students attending universities and colleges in the U.S., Germany and Japan," Taylor said.

This year's research team was composed of two scholars from Mississippi State University — Riley Porter, graduate student, and George Williams, undergraduate student.

"My experience on the goldeneye project has been incredible, and life changing," Porter said. "Being able to work with the Fish and Wildlife Service in Alaska on waterfowl is literally a dream come true."

Having lived in the state for six years previously, Williams was looking for an opportunity to return to the Last Frontier while working in a field he loves.

"My reason for studying wildlife biology stems from my experiences outdoors in Alaska," he said. "Because of this, my goal has been to return to work with Alaskan wildlife. This project presented me with that opportunity, and I have relished my time up here."

Working with officials for the U.S. Fish and Wildlife Service and USACE park rangers at the Chena Project, the students track bird species that use the nest boxes and tag chicks that hatch. The students must monitor and time their visits to the boxes to ensure they tag and catalog each chick before they leave the nest.

When the eggs hatch, there is only about a 24-hour window to attach a small metal web tag to each duckling before they leap out of the box and head for the nearest water body, according to Kerwin.

"The fieldwork for this project is very demanding, but it teaches very quickly what it will take to make it in this profession," Porter said. "We are working 12-to-15 hours a day most days, seven days a week. However, the reward is being able to handle hundreds of ducks and even more ducklings."

Besides contending with the long hours required to perform their duties, the students found creative ways to safely catch the birds, preventing injury to both themselves and the ducks.

"Being able to handle the same birds continuously over two months shows you just how unique individual birds are," Williams said. "After a while, we discovered that each bird has its own personality."

For skittish birds, the team would play recorded robin calls to mask sounds made by walking across dry leaves carrying an extension ladder so incubating hens would stay in the nest box and allow Porter and Williams to catch them. Also, the team

A recently hatched common goldeneye duck rests in a researcher's hand in North Pole, Alaska. (Riley Porter)

Common goldeneye duck eggs rest in a nest box placed on a tree by the U.S. Fish and Wildlife Service at the Chena River Lakes Flood Control Project in North Pole, Alaska. (U.S. Army photo)

Students check a nesting box for common goldeneye ducks in a tree at the Chena River Lakes Flood Control Project in North Pole, Alaska. (Riley Porter)

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had lots of extra clothes to change into after encounters with ducks that would defecate as a means of defense. However, most hens were easy to catch and handle when they were measured, weighed and banded or tagged.

"Common goldeneyes are an incredible species," Porter said. "Although these birds are not in harm's way, that doesn't mean they are not a beautiful bird to study. Goldeneyes are known for the male's elaborate and complex mating display that consists of up to 14 different movements that portray the bird's superiority over other suitors."

While conducting fieldwork, the project team often meets community members who notice the boxes and see marked waterfowl.

"Public outreach has truly been one of the most rewarding and fun aspects of this project," Taylor said. "Talking to a family with youngsters about 'ducks who nest in boxes' or ducks with 'numbers on their eggs' and the excitement of seeing day-old ducklings are experiences that are invaluable and may just inspire that next generation of naturalists and conservationists."

This year, researchers found that adult goldeneye ducks occupied 25 out of 26 nest boxes on USACE land and documented 228 ducklings that hatched from these shelters, a record amount for the program.

"Other cavity nesting birds also use the boxes, such as boreal owls, bufflehead ducks and common mergansers," Kerwin said.

But, this is the first year that the team has spotted a Barrow's goldeneye duck using a nest box. Typically, this species of seabird resides in Southcentral and Southeast Alaska.

"We are not sure how it ended up here (in the interior of the state), or if there are physical changes within the environment that are more appealing, but we were happy to have her there and give her a great nesting experience," Porter said.

The project began in 1993 when students at the University of Alaska Fairbanks Student Chapter of The Wildlife Society received a grant from Ducks Unlimited to construct and install 150 boxes along the upper Chena River in the local state recreation area. In 1997, the program expanded to the Chena River Lakes Flood Control Project, which now houses an additional 26 boxes for the birds.

"The success of the common goldeneye project is the result of collaboration, support, enthusiasm and genuine interest from project leaders, park rangers, facility professionals and other personnel at the Chena Project," Taylor said. "The Corps has provided funding, logistical support, field assistance and even built hundreds of nest boxes for this project for over 20-plus years."

A biologist measures a common goldeneye hen that nested in tree-mounted box at the Chena River Lakes Flood Control Project in North Pole, Alaska. Scientists use information gathered by field researchers to assess the short-term effects of weather on the ducks' productivity along with determining how climate change influences the species. (U.S. Army photo)

Justin Kerwin, senior park ranger, candles a common goldeneye duck egg to check its intubation stage at the Chena River Lakes Flood Control Project in North Pole, Alaska. (U.S. Fish and Wildlife Service courtesy photo)

Justin Kerwin, senior park ranger, holds a common goldeneye hen at the Chena River Lakes Flood Control Project in North Pole, Alaska. Park rangers promote public safety and compliance with federal regulations, while conducting wildlife habitat enhancements. They also participate in public outreach to inform and educate people about USACE programs, projects and activities. (U.S. Army photo)

After exposure to the harsh interior climate, the boxes begin to decay and must be replaced by newer versions which USACE assists to create and install.

Since the program began, the Fish and Wildlife Service has also collaborated with the Alaska Department of Natural Resources, Chena River State Recreation Area, and Ducks Unlimited. The Fish and Wildlife Service hires, supervises and mentors students as biological science technicians or as volunteers; organizes field activities; trains and oversees the collection and management of scientific data; and works with collaborators to ensure success.

"Working with USFWS has been a fun and exciting experience," Kerwin said. "Both parties have learned a lot from each other throughout the years."

After graduating from college, students who worked on the project have gone on to secure jobs in wildlife biology with federal agencies across the United States, including USACE, Fish and Wildlife Service, National Park Service, and the U.S. Forest Service and with industry, private companies, and conservation groups.

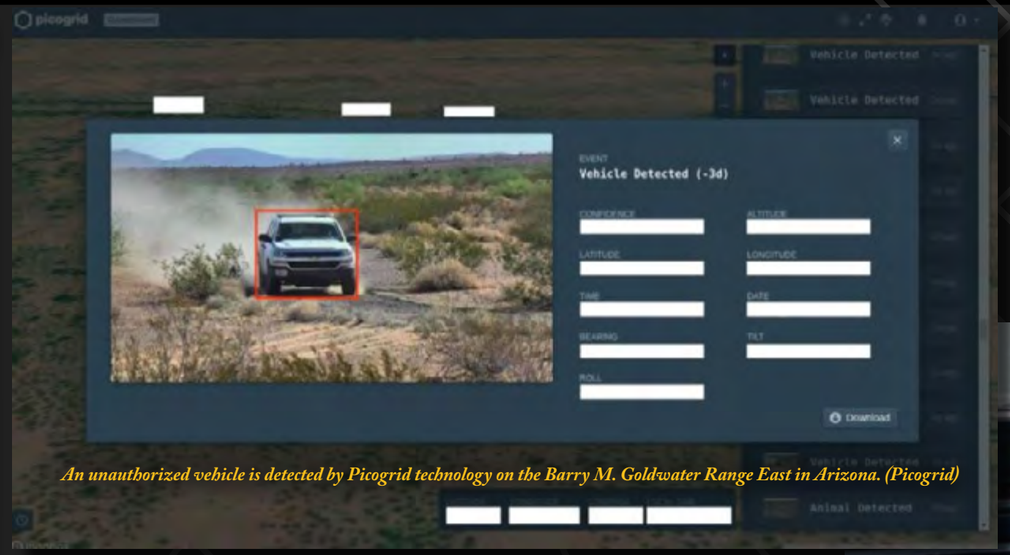
The Chena Project is the northernmost flood risk mitigation project operated by USACE. Moose Creek Dam and associated features reduce flooding in the interior Alaskan city of Fairbanks while the project's nearly 20,000 acres of public land offer visitors a myriad of recreational opportunities.

Watch a short video here:

Park rangers for USACE Alaska District often encounter community members when supporting common goldeneye duck research efforts at the Chena River Lakes Flood Control Project in North Pole, Alaska. One of the program's objectives is to provide public outreach to increase understanding, appreciation and support for waterfowl and wetlands management. **Watch more here.**

CERL-led team demonstrates real-time satellite-connected monitoring technology

Example view of a Picogrid Lander deployment at the Barry M. Goldwater Range East in Arizona. (Picogrid)



An unauthorized vehicle is detected by Picogrid technology on the Barry M. Goldwater Range East in Arizona. (Picogrid)

A management dashboard is used to remotely monitor environmental, military and industrial assets in real time. (Picogrid)

Using a management dashboard to remotely monitor environmental, military and industrial assets in real-time, wildlife is detected by Picogrid technology. (Picogrid)

By Kaley Skaggs
Engineer Research and Development Center

The U.S. Army Engineer Research and Development Center Construction Engineering Research Laboratory (ERDC-CERL) is spearheading an initiative to change the status quo and bring a new real-time monitoring capability to military installations and the warfighter.

ERDC-CERL, in partnership with Naval Facilities Engineering and Expeditionary Warfare Center and industry partner Picogrid, Inc., located in Hawthorne, California, is leading a National Defense Center for Energy and Environment (NDCEE)-funded project demonstrating the use of real-time satellite-connected monitoring technology at the Barry M. Goldwater Range East (BMGR East) in Arizona, in cooperation with the 56th Range Management Office at Luke Air Force Base.

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

Military bases rely on in-person patrols and unattended ground sensors to secure sensitive training activities, prevent accidents in active training ranges and meet environmental requirements. Current monitoring methods are labor intensive and do not always provide adequate coverage, leading to long detection times, high costs and potential gaps in monitoring capability.

David Delaney, the principal investigator on the project, says the goal is to provide resource managers and security personnel with improved situational awareness about what is happening in and around large military ranges in real-time.

"Traditionally, this has been outside the coverage of monitoring infrastructure and relied on roving vehicles for operational and security processes," he said. "It is important to create and demonstrate an enterprise-wide process for using this type of technology to address DOD-centric issues."

The satellite-connected technology provides an effective way of transmitting data from ground-based sensors, such as camera traps, surveillance cameras and weather stations, without the need for manual data retrieval or installation of extensive ground infrastructure.

"We're able to detect potential issues and threats to installation security and to monitor important natural and cultural resources in real time, which provides a better compliance posture with Integrated Natural and Cultural Resource Management plans and helps resource managers be more proactive instead of reactive when it comes to managing their resources," said Delaney.

"It's a real game changer," said Aaron Alvidrez, wildlife biologist for the 56th Range Management Office. "We are significantly improving our monitoring efforts."

Since installation at BMGR East, the team has had live 24/7 monitoring of remote and undeveloped areas where personnel have been historically limited to manual inspections and patrols. The system allows users to monitor far-flung remote sites in real time from the safety and comfort of their office, while the built-in artificial intelligence alerts users of important events, such as wildlife presence or trespassers at restricted sites.

"The technology helps expand the effectiveness of natural and cultural resource managers, security and range operations teams, so they can spend time responding to issues, not searching for them," said Martin Slosarik, a technical manager at Picogrid.

The collaboration team hopes this platform can be applied across military installations for automating physical security processes and streamlining Integrated Natural Resource Management Plan and Cultural Resource Management Plan compliance to further the Armed Services installation modernization efforts and provide a contribution to programs, such as the Virtual Testbed for Installation Mission Effectiveness.

Restoring bird habitats while sustaining ours

By JoAnne Castagna
USACE, North Atlantic Division

This past spring, Dr. Lenore Tedesco was looking out her window at The Wetlands Institute that sits in the middle of vast marshland in Cape May County, New Jersey.

Outside, heavy rain and flooding tides associated with the Mother's Day nor'easter, were thoroughly soaking the marsh, a low-lying wetland with grassy vegetation that is usually present in areas of transition between land and water.

To her dismay, she saw birds and their chicks being flooded out of their marsh homes. Some of the birds escaped to roads and some were struck by cars.

What pleased Tedesco, who is the executive director of The Wetlands Institute, was that some birds found refuge in the high grounds of several marsh islands that were recently restored with dredged sand and mud.

These dredging and beneficial use projects are the result of a collaboration between the U.S. Army Corps of Engineers (USACE) North Atlantic Division and other agencies and organizations. The projects involve dredging critical navigation channels and using the sediment to restore vanishing bird habitats while also enhancing resilience for coastal communities.

Beneficially using sand and mud is of increasing importance to USACE.

"One of the Army Corps' primary missions is to dredge federal navigational waterways to ensure easy passage by vessels," said Rena Weichenberg, environmental team lead of North Atlantic Division's Planning and Policy Division. "Sand and mud sediment removed from the bottom of the waterways were often historically placed in permitted ocean disposal sites or confined disposal facilities. There has been a welcomed evolution towards USACE retaining sediment in the system, and beneficially using it to both protect people and to protect, restore and create aquatic and related habitats."

The following are two USACE projects taking advantage of dredged material within the North Atlantic Division.

Seven Mile Island Innovation Lab - Cape May, New Jersey
USACE Philadelphia District

In 2019, the USACE Philadelphia District, U.S. Army Engineer Research and Development Center, The Wetlands Institute, and the state of New Jersey partnered to form the Seven Mile Island Innovation Lab in Cape May County.

The lab is based on a concept pioneered by the Dutch who use a "living lab for mud" to test and demonstrate environmental and social benefits.

The goals of the initiative are multi-faceted — advance and improve dredging and marsh restoration techniques in coastal New Jersey through innovative research, collaboration, knowledge sharing and practical application.

"The lab was created to act as a think tank to advance dredging and marsh restoration techniques," said Tedesco. "We put together a host of projects where we can test how we can beneficially use dredged material to create resiliency for both our ecosystems and our communities."

Seven Mile Island, New Jersey, has proven an ideal site for the lab due to the presence of existing and historic dredged material placement sites, federal and state channels including the New Jersey Intracoastal Waterway, extensive tidal marshes, and a mixture of sandy and muddy sediments.

The Wetlands Institute facility, located adjacent to the marsh, has served as a meeting space for partners and provides an ideal place to observe the successes of projects.

The lab is surrounded by 15,000 acres of marshland, providing a habitat for birds, fish, shellfish, and other wildlife. Marshes help to maintain water quality by removing nitrogen and phosphates and act as a buffer from flooding for coastal communities during destructive and powerful storms.

According to Tedesco, one study done by Lloyd's of London showed marshes play a critical role in reducing damage

In July 2022, thousands of birds can be seen nesting on Fort Wool and its adjacent barges. Parent birds have been observed protecting their nests, incubating their eggs, and brooding and feeding their young. (USACE courtesy photo)

The Dredge Fullerton, owned and operated by Barnegat Bay Dredging Company, conducts dredging in the New Jersey Intracoastal Waterway near Stone Harbor, New Jersey. The sediment was placed to create habitat on marshland owned by the New Jersey Division of Fish & Wildlife. (USACE courtesy photo)

USACE and its contractor Barnegat Bay Dredging Company completed a dredging and marsh restoration project near Stone Harbor, New Jersey, in December 2018. (USACE courtesy photo)

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to infrastructure from coastal storms. These industry models showed during Hurricane Sandy marshes prevented $625 million in direct flood damages across 12 states. In New Jersey, coastal marshes reduced property damages by more than 20%.

Unfortunately, marshes are at risk of decline due in large part to sea level rise, putting coastal communities at risk. Rising waters are also harming ecosystems.

"Marsh grasses grow well over a very narrow range of water depth," said Tedesco. "During times of naturally slow rising sea level, they can do quite well and keep up with rising water levels by building dense root structures and trapping storm-transported mud and sand.

"If sea level rises too fast, marshes can begin to drown and shift to open water areas or mudflats. Flooding during the nesting season can destroy bird nests or chicks of American oystercatchers and laughing gulls and many other bird species that depend on the marsh to nest and raise young."

As part of the lab's work, dredged sand and mud from the nearby 117-mile New Jersey Intracoastal Waterway have been used to restore drowning marshes and create new habitats, using a variety of techniques. This work provides habitat for long-legged wading birds, beach nesting birds, migratory shorebirds and other species that use the marsh, and can also increase marsh elevations to protect the marsh itself.

"Sediment is the currency of these ecosystems, and we know these marshes are sediment-starved, so we must work to find innovative ways to utilize the clean sediments that clog navigation channels to enhance marshes and offset sea level rise," said Tedesco.

Thus far, USACE and its partners have completed multiple dredging and marsh restoration projects throughout the back bays of Seven Mile Island.

The goal is to use dredged sand and muddy sediment to fill in low-lying and drowning areas of the islands and increase marsh elevations. This elevated marsh can provide nesting habitat for long-legged wading birds, such as egrets, herons and ibis, as well as colonial and marsh nesting birds such as the salt marsh sparrow, which builds a teacup-sized nest on or close to the ground.

Two of the islands enhanced with dredged materials support nesting for 25% of the long-legged wading bird colonies in New Jersey, including the glossy ibis, little blue heron, snowy egret, tricolored heron, great egret and black-crowned night heron, according to The Wetlands Institute. Almost all of these birds are considered priority species of greatest conservation or are state endangered species or species of concern in New Jersey.

In the last few years, birds have flocked to the project sites including beach nesting birds and migratory shorebirds to include black skimmers, common and least terns, American oystercatchers, sandpipers, plovers, and whimbrel. In addition, diamondback terrapins and horseshoe crabs are also using these habitats, and the team's restoration work is also enhancing some fish habitats.

Innovation lab team members are monitoring these marshes and placement sites and seeking innovative ways to improve dredging and placement techniques. These projects are always evolving, and the team is using lessons learned to improve them through adaptive management.

The team members find the work rewarding and enjoy working together.

"It's been wonderful. There is a true sense of respect and admiration for each other and a sense of the importance of the work we are all doing," said Tedesco.

Philadelphia District's use of dredged material has proven successful restoring bird habitats endangered by Mother Nature. USACE Norfolk District, on the other hand, is finding ways to beneficially use dredged sand and mud to create solutions for bird habitats endangered by progress.

Hampton Roads Beneficial Use of Dredged Material Project - Norfolk, Virginia
USACE Norfolk District

During the summer in Norfolk Harbor, Virginia, people used to see an island filled with birds — thousands of them. For this reason, the locals called it "Bird Island."

Its official name is South Island, and for the last 30 years until 2020, it was home to the largest and most productive bird colony in Virginia. Approximately 25,000 seabirds, wading birds and other migratory bird species used the island for shelter, forging and nesting — away from disturbances and predators.

Bird species on this island included the royal tern, sandwich tern, common tern, gull-billed tern, black skimmer, laughing gull, herring gull, and the great black-backed gull.

In Virginia, many of these species are identified as "species of greatest conservation need." The gull-billed tern is designated as a state threatened species. With the exception of herring gulls and great black-backed gulls, many of these birds are in peril or need to be protected.

Ground-level look at the nesting royal tern colony on Fort Wool. (USACE courtesy photo)

Close-up look at the nesting royal tern colony on Fort Wool. (USACE courtesy photo)

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On the federal level, the gull-billed tern and the black skimmer are U.S. Fish and Wildlife Service "species of conservation" and are listed as decreasing on The International Union for Conservation of Nature's "Red List of Threatened Species."

South Island is part of the Hampton Roads Bridge Tunnel complex, a series of bridges, anchoring islands and tunnels presently undergoing a massive expansion that includes widening lanes and adding tunnels. This has required substantial construction activity on South Island, making the island unsafe and unsuitable for the birds to use as a nesting location.

Understanding the importance of providing a safe alternative habitat, several agencies teamed together to investigate the feasibility of using dredged sand and mud. These agencies include USACE Norfolk District, the Virginia Department of Conservation and Recreation, Virginia Tech Shorebird Team, Virginia Department of Transportation, and Virginia Department of Wildlife Resources.

In Virginia, protecting bird habitats like "Bird Island" is especially important. According to Michelle Hamor, chief of the Norfolk District's Planning and Policy Branch, in Virginia, seabirds often nest in large groups. Because of this behavior, and because they like open, sandy areas, they typically breed in very few locations, so if a breeding area is lost it can have profound consequences.

This is the case with South Island. Several of the species on this island used it almost exclusively as a nesting place. According to Becky Gwynn, deputy director for the Virginia Department of Wildlife Resource, royal terns and sandwich terns nested on South Island and nowhere else in Virginia, and about 50% of black skimmers and common terns nested on the island.

As a temporary solution, the team worked together to create a habitat for these birds on Fort Wool, a former Army post on an 8-acre island connected to South Island by a stony jetty.

They converted the old post's parade ground into a 1.5-acre nesting habitat. To increase the available nesting area, three barges were anchored adjacent to Fort Wool, providing an additional acre, for a total of 2.5 acres of nesting habitat overall.

They cleared vegetation on the island to make it attractive to the seabirds and then placed 1,700 cubic yards of barged-in sand over the entire parade ground to provide an appropriate habitat for these species. Dredged sand and mud will be used in future work.

These birds like a habitat that mimics a beach island environment, so the team spread a coarse sand on the parade ground and a sand/pea gravel mixture onto the barges and created gentle slopes that mimic a barrier island. They also placed short sidewalls around the tops of the barges to prevent young chicks from running off the edges.

To lure the birds to the new habitat, bird call recordings were played and decoys of several tern species and black skimmers were placed on the island.

Their work was successful.

"In one site visit the first year, we recorded 3,500 royal tern chicks. We also documented 200 sandwich terns, 1,000 common terns, 150 black skimmers, and thousands of laughing gulls. Only one pair of gull-billed terns was documented on the barges during the first nesting season, but anglers and other observers spotted more in the air. And the gull-billed terns produced two fledglings – chicks that survived to take flight," said Gwynn. "In 2021, we documented 6,283 royal tern nests, 663 common tern nests, 139 black skimmer nests, and 15 gull-billed tern nests – a real success!"

Not only is this habitat beneficial for birds, but also for coastal communities. Providing these birds with a home keeps them away from cars and planes, reducing potential car collisions and bird strikes with aircraft from a nearby airfield.

The team has plans for this bird colony.

"We are conducting a feasibility study to investigate opportunities to create 10-to-12 acres of permanent habitat using dredged material from federal navigation channels for existing and future seabird colonies, specifically to increase the value and quantity of habitat for shorebirds, wading birds and migratory species," said Hamor.

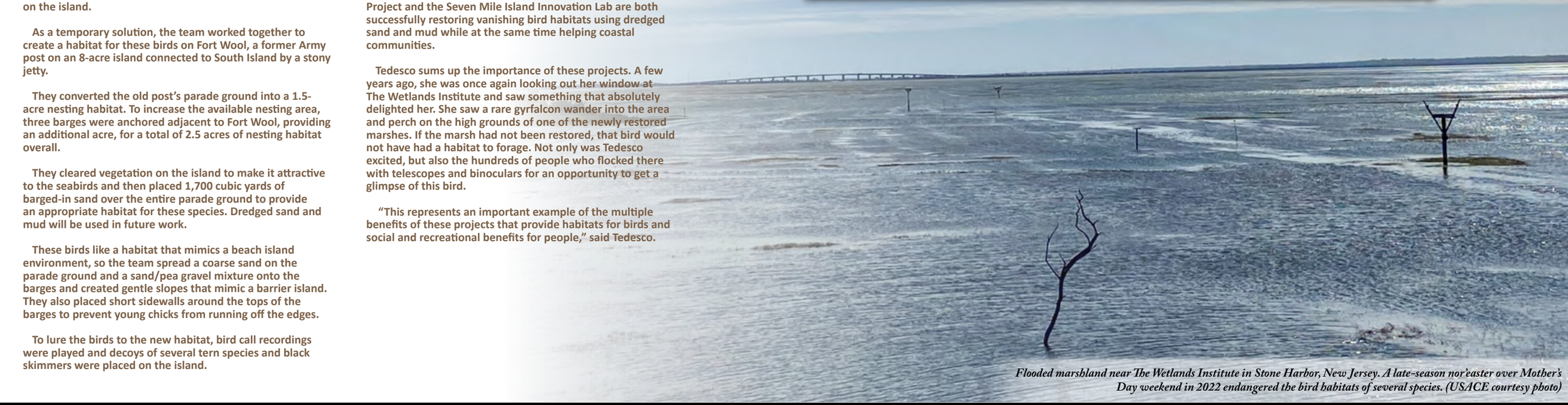
In addition, this new habitat may encourage the growth of clams, oysters, red drum, seatrout, summer flounder and striped bass, which can lead to increasing opportunities for commercial and sport fishing.

The Hampton Roads Beneficial Use of Dredged Material Project and the Seven Mile Island Innovation Lab are both successfully restoring vanishing bird habitats using dredged sand and mud while at the same time helping coastal communities.

Tedesco sums up the importance of these projects. A few years ago, she was once again looking out her window at The Wetlands Institute and saw something that absolutely delighted her. She saw a rare gyrfalcon wander into the area and perch on the high grounds of one of the newly restored marshes. If the marsh had not been restored, that bird would not have had a habitat to forage. Not only was Tedesco excited, but also the hundreds of people who flocked there with telescopes and binoculars for an opportunity to get a glimpse of this bird.

"This represents an important example of the multiple benefits of these projects that provide habitats for birds and social and recreational benefits for people," said Tedesco.

Ground-level look at the nesting royal tern colony on Fort Wool. (USACE courtesy photo)



Flooded marshland near The Wetlands Institute in Stone Harbor, New Jersey. A late-season nor'easter over Mother's Day weekend in 2022 endangered the bird habitats of several species. (USACE courtesy photo)

Continuous improvement in power generation reduces carbon footprint

By Thomas Milligan
U.S. Army Environmental Command

The U.S. Army, through its recently released climate strategy, has set a series of ambitious goals, including dramatic reductions in pollution and greenhouse gas emissions, as well as a comprehensive understanding of climate change implications in everything from strategy, planning, acquisitions and the supply chain.

This vision fits quite well with the ongoing work at the Red River Army Depot's power plant, where after years of planning, the team has installed and is operating a wood biomass boiler for its 24/7 steam-powered operations. The change not only saves money but creates a much cleaner way to produce that power using wood that otherwise would be headed to a landfill. This is the latest improvement at an installation that has a track record of continuous improvement.

The new wood-burning power source, which is replacing natural gas burners — that had already replaced coal-burning power sources — was originally envisioned as a cheaper alternative. But as the process of bringing the wood-burning process online continued, multiple other benefits have been built into the new operational power model, in line with larger Army climate strategy goals.

For starters, the new wood biomass boiler allows for the elimination of all coal burning, which dramatically reduces the installation's carbon footprint and site-generated pollution. But beyond that, the wood for the project comes from waste wood from pallets, boxes and other wood that otherwise would end up in landfills.

In addition, wood is a sustainable fuel and is not subject to the kinds of market conditions that coal, gas and other fossil fuels are subject to, increasing surety of supply. And because the wood byproducts that are converted to pellets are already at the installation, there are significant savings in transportation costs and in the carbon footprint that comes with that transportation.

Paul John, chief of the Environmental Division at the depot, said that the new boiler was installed in partnership with a private company under an energy-savings performance contract, to avoid the significant capital expense that such a boiler would normally incur. Essentially, the private partner agrees to help evaluate and oversee installation of the boiler, and the installation agrees to pay the company from its existing budget line until the company is reimbursed for its work. Then, at the end of that period, the installation has a cheaper, more efficient power production system in place without the capital expense or a budget increase.

"Several years ago, when this project was first envisioned, cost savings were the primary driver, and that remains important," Paul said. "But the reduction of the carbon footprint, the use of a sustainable source of fuel and the other benefits to the climate strategy make this even more impactful."

Craig Adams, chief of the boiler plant and a 15-year veteran at the facility, said the evolution at the power plant has been remarkable, and makes it an even better work environment.

"It's 100% better now than when we were burning coal, which is a corrosive substance. Since we switched to gas and now to the wood biomass boiler, the environment is much better for everyone that works there, health-wise, and just better overall," he said, adding that the fact that the team is taking things that would have gone to the landfill and turning them into power is a rewarding feeling.

Adams said that there have been some kinks to work out in operating the new boiler, in converting the wood into the right sized pellets. Due to this, and because readiness requires constant power, the plant is keeping natural gas burners on standby but continues to improve its processes.

Paul said that there are more opportunities the wood burning makes possible. He noted that the current system creates the necessary heat to produce steam and uses just 40% of the potential total energy output of the wood in doing so. He said if the installation were to install a secondary use for the additional power, he estimates the efficiency of the boiler could be improved.

"If we could generate electricity from this, that would be an even greater advantage," Paul said. "If we could use all the BTUs (British Thermal Units) in the wood, through a combined cycle, we could use 60% of the BTUs instead of 40% — and produce electricity in addition to the steam."

Adams said that in a recent month the plant that currently uses the boiler used more than 750 tons of wood and created more than 3,600 tons of steam to power the installation from more than 3,300 tons of water.

Construction, Engineering and Infrastructure Career Field update

By John Bentley
Construction, Engineering and Infrastructure Career Field

The U.S. Army is strategically focused on sustaining the most lethal and capable land force in the world. This strategy relies heavily on our ability to attract top civilian talent and then manage human resources, policies and systems to achieve the Army's vision. The Army describes how we will realize our human resource goals to accomplish this vision in the Army People Strategy, Civilian Implementation Plan. In addition to the Strategic Human Capital Planning done by commands, the Civilian Implementation Plan requires that the 11 Army Civilian career fields complete a cross-command, functional Strategic Workforce Plan (SWP) to build readiness and take care of people.

In collaboration with commands, key stakeholders and senior leaders, the Construction, Engineering and Infrastructure Career Field (CEI-CF) published the initial Strategic Workforce Plan in 2021. This plan is posted to the Army Career Tracker community page to improve availability and awareness across the entire CEI-CF workforce and help close competency gaps at every level.

The Strategic Workforce Plan highlights how talent development and management of the CEI-CF STEM-heavy workforce is a strategic key to Army readiness. The CEI-CF workforce makes up more than 98% of the Army's total construction and engineering and infrastructure workforce. This workforce leads the majority of the Army's mission and effort to accomplish civil works, planning, construction, engineering, project management, public works, real estate, operations and related research and development.

Stakeholder voices are welcome and heard through multiple venues including the CEI-CF group mailbox, CEI-CF Army Career Tracker community page; quarterly virtual workforce briefings; the monthly CEI-CF functional workgroup; Command Career Program Managers; senior leader engagement and quarterly Career Field Planning Boards. These activities drive engagement vertically and horizontally to achieve improvements in future iterations of the SWP. As a result, the SWP matures and evolves to ensure a mission ready CEI-CF civilian workforce. Email usarmy.belvoir.chra-accma.mbx.cei-cf@army.mil if you have any questions about the CEI-CF Strategic Workforce Plan.

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