

POWER OF

R&D

NEWSLETTER

— **CONNECTING THE DOTS •
TO INNOVATION**

WEED GONE WILD

Research takes aim at fast-spreading hydrilla
species threatening aquatic ecosystems



US Army Corps
of Engineers

FIELD NOTES

COLONEL CRAIG S. BAUMGARTNER

TRANSATLANTIC DIVISION



Serving as the commander of the Transatlantic Division has reinforced one thing above all: the world we operate in is always changing, and with it, so must we.

As USACE's tip of the spear in U.S. Central Command (CENTCOM), U.S. Special Operations Command, and their component commands across the Middle East, Central and South Asia, and the Levant, we are tasked with delivering rapid, adaptive solutions that meet the evolving needs of our mission partners. Our mission is shaped by this dynamic environment and its ever-changing demands — whether it's safeguarding our personnel, ensuring water security, or supporting our allies and partners. What remains constant is our commitment to innovation as the driving force behind everything we do.

For our Division, innovation isn't just an idea — it's essential to how we deliver resilient and sustainable solutions. We work closely with partners like the U.S. Army Engineer Research and Development Center (ERDC) to ensure our designs are effective and adaptable to the challenges we face in the field. This collaboration allows us to tackle complex problems with cutting-edge solutions that serve immediate needs and long-term stability.

In alignment with CENTCOM's Theater Strategy of People, Partners and Innovation, our efforts remain focused on driving innovative solutions to address the evolving security landscape.

As Gen. Michael "Erik" Kurilla, CENTCOM Commander, emphasized, innovation plays a critical role in securing our regional and global interests by enabling real-time decision advantages and strategic depth. Through our partnerships, we are not just reacting to challenges but proactively developing technologies and strategies that reinforce stability and security in the region. Our ongoing collaboration with CENTCOM underscores our shared commitment to this modern and integrated vision of the Central Region.

Our commitment to innovative solutions spans mission-critical areas like water security, a long-standing concern in our Area of Responsibility (AOR), now exacerbated by prolonged heat waves, reduced precipitation and the ongoing impacts of climate change. That's why I'm particularly proud of our Middle East District's collaboration with ERDC, the University of Virginia and U.S. Agency for International Development. Together, we are developing a scalable solution for wastewater treatment — the Distributed Low-Energy Wastewater Treatment System.

This scalable and mobile system is designed to bridge the gap between rudimentary wastewater setups and permanent treatment plants. It's a flexible solution for bases transitioning between expeditionary and permanent operations, ensuring that we meet immediate operational needs while planning for long-term sustainability.

In our Expeditionary District, we've seen firsthand how essential innovation is to force protection. Due to ongoing attacks against U.S. presence in the AOR, our teams worked with ERDC to implement protective systems that significantly reduced risks to personnel. The ability to deliver these solutions quickly and effectively speaks to the strength of our R&D partnerships and our commitment to staying ahead of emerging threats.

Our success is driven by collaboration across every level of our organization. The partnerships we've built with research institutions, mission partners and stakeholders ensure we're not just responding to challenges but anticipating them. This forward-thinking mindset is what allows us to adapt and deliver the best solutions for our Warfighters and allies.

The work we do, from design and engineering to on-the-ground execution, ensures we remain agile and responsive to the needs of our warfighters and mission partners. Our efforts are critical to driving the innovations that allow us to deliver the best solutions, no matter the challenge.

Thank you for your dedication to our mission. Together, we continue to push the boundaries of what's possible, delivering excellence for our partners and ensuring the safety and success of those we serve.

As we look ahead, innovation will continue to be the key to our mission's success. I'm incredibly proud to lead a team that embodies creativity, expertise and an unwavering commitment to excellence. Together, we will continue to shape the future and meet the challenges of tomorrow with the same advanced ingenuity that has defined our past achievements.

Essays!

COL Craig S. Baumgartner
Commander
Transatlantic Division



“Our success lies in our ability to anticipate challenges, not just react to them. By staying at the forefront of innovation, we ensure that we’re always ready to deliver the solutions our mission partners need to succeed.”



NAVIGATE

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● Louisville District's dam safety team, along with members from ERDC, deployed USACE Dam Bot 1.0 to perform a conduit inspection at Taylorsville Lake's Dam in Taylorsville, Kentucky, in September. The robot, which can be operated remotely, removes the need for personnel to enter confined spaces. Dam Bot 1.0 has an extendable arm to photograph difficult to reach areas, aiding dam safety personnel with assessments of dam outlet works and providing beneficial information with its photogrammetry and lidar capabilities. (U.S. Army Corps of Engineers photo by Kelsie Hall)

● On the Cover: Using an underwater camera system, ERDC Public Affairs Specialist Jared Eastman captured this image of hydrilla nearly blocking out the sunlight in an outdoor research tank.



US Army Corps of Engineers

Our mission is to deliver vital engineering solutions, in collaboration with our partners, to secure our nation, energize our economy, and reduce disaster risk.

A GLIMPSE INTO THE FUTURE



Nick Cohn
Research Oceanographer
U.S. Army Engineer Research and Development Center



Dylan Anderson
Research Civil Engineer
U.S. Army Engineer Research and Development Center

Numerical models help project climate's impact on critical dune systems

Coastlines are being threatened by the effects of a changing climate, creating challenges for both civil works and military planners.

Coastal resiliency and flood risk management are at the forefront like never before, but as conditions change, planners need help assessing these areas to ensure the measures they put into place will still be effective, not just 10 or 20 years down the road, but 50 to 100 years in the future.

ERDC researchers are working on a set of tools to assist planners in forecasting the evolution of coastlines and coastal dunes to help inform decision making and basic planning efforts. Coastal dunes are important as they protect houses, infrastructure and roads from flooding during coastal storms.

These numerical models – Process-Based Tools for Optimizing Coastal Dune Performance – have been developed to focus on coastal processes that determine whether these natural structures will be present or absent or whether they're going to grow or erode over time.

Following tests in North Carolina and Florida, work is being done to develop additional features to be more applicable to other physical settings, including expanding to military bases and civil works projects around the country.

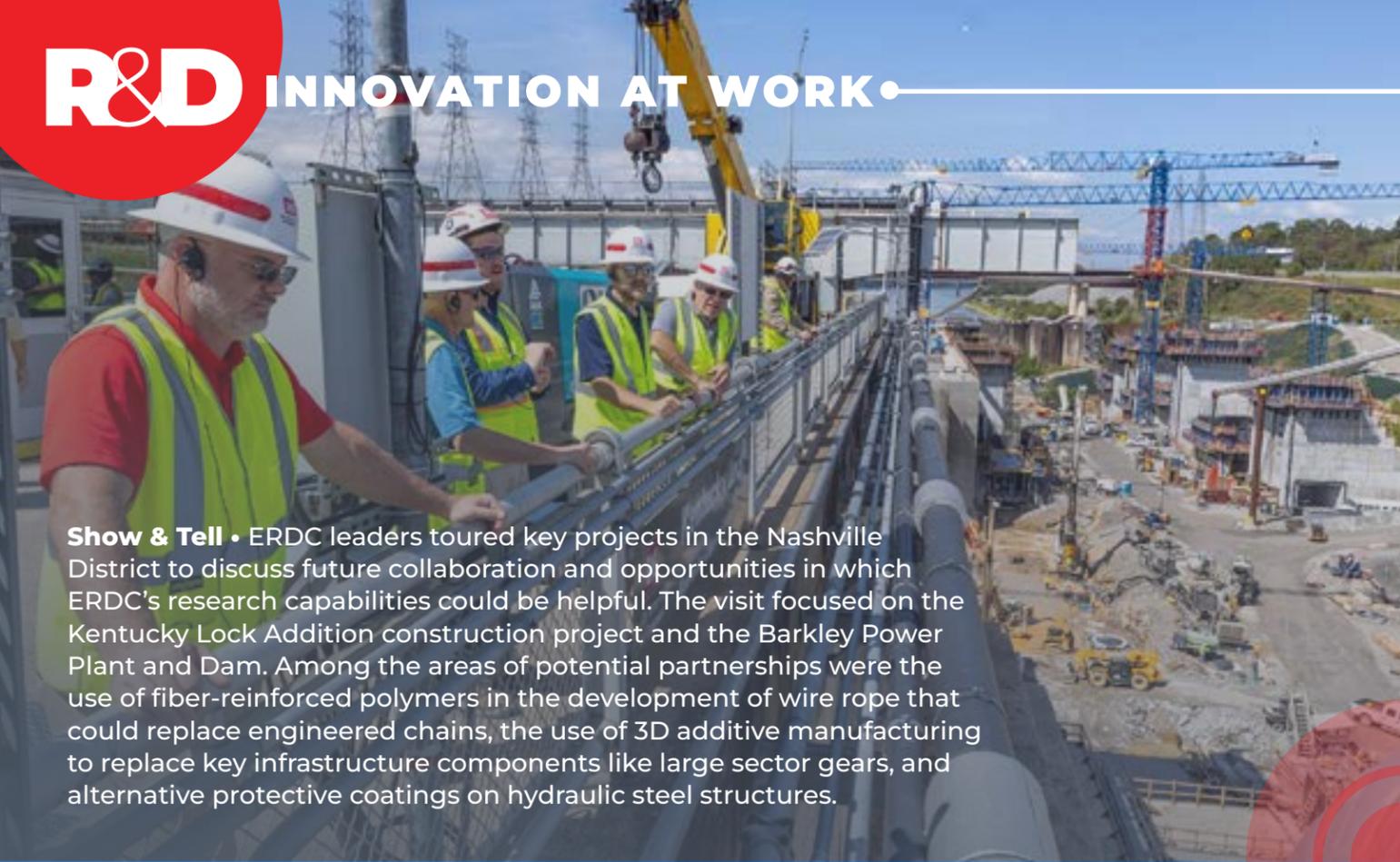
To read the full story, visit:
<https://www.erdc.usace.army.mil/Media/News-Stories/Article/3951950/probabilistic-models-aid-the-long-term-assessment-of-coastal-dune-stability/>

“The future is really uncertain, and rather than planning for one future or even 10 futures, we need efficient tools that can see all of the possible futures, so that we're more prepared.”

DYLAN ANDERSON

CONNECTING THE DOTS

Models provide coastal planners data for SOUND, PRACTICAL SOLUTIONS to threats posed by a changing climate



Show & Tell • ERDC leaders toured key projects in the Nashville District to discuss future collaboration and opportunities in which ERDC's research capabilities could be helpful. The visit focused on the Kentucky Lock Addition construction project and the Barkley Power Plant and Dam. Among the areas of potential partnerships were the use of fiber-reinforced polymers in the development of wire rope that could replace engineered chains, the use of 3D additive manufacturing to replace key infrastructure components like large sector gears, and alternative protective coatings on hydraulic steel structures.



Leveraging the Power of AI • During a visit to ERDC, Maj. Gen. Kimberly Colloton, USACE Deputy Commanding General, and Maj. Gen. Kimberly Peoples, USACE Mississippi Valley Division Commanding General, learned about current efforts across the enterprise to deploy Artificial Intelligence (AI) in STEM and business applications. They viewed demonstrations on AI-enabled systems for engineering, construction and contingency operations. The tour also included an overview of the High-Performance Computing Modernization Program, which facilitates much of ERDC's computing capabilities to support AI missions in USACE, and a briefing about how AI is being used in research operations, such as discovering new efficiencies in USACE dredging operations.



A Few Days at the Beach • ERDC research is working to better understand how wind-blown sediment impacts rapid shoaling rates in the navigation inlet at Port Mansfield, Texas. Wind-blown – or aeolian – sediment transport relies on the convergence of several favorable conditions, such as grain size, an arid climate and seasonably high winds. To measure the impact of aeolian sediment transport on the inlet, researchers set up traps to catch sediment during sea breeze conditions. This collection, along with the capture of data detailing wind conditions, will help refine wind-blown sediment transport estimates into the adjacent navigation channel.



Harsh Environment, Crucial Research • ERDC scientists completed a challenging mission to deploy ice mass balance buoys in the Lincoln Sea, north of Greenland and Canada's Ellesmere Island. The project supports NASA's ARCSIX (Arctic Radiation-Cloud-Aerosol-Surface Interaction Experiment) program, which studies factors that add to the Arctic's summer surface radiation budget and impact the early melt season, which is May through mid-July. ERDC's portion of the mission – through deployment of the buoys – was aimed at measuring ice properties, net radiation budget, meteorological variables and Navy-relevant upper ocean properties on sea ice.



To learn more about these projects and programs, email: cerd.info@usace.army.mil

PENNIES SPENT — MILLIONS SAVED

Early involvement by coatings experts can have big impact on project success

Using the wrong coatings on an infrastructure project can lead to millions of dollars in remediation costs later in a project. A team of USACE experts wants to prevent these issues by providing input earlier in the process.

The USACE Paint Technology Center, Technical Center of Expertise (PTCx) is at the forefront of cutting-edge research and development on coatings, while also supporting project managers across the DOD in making sure they use the correct coatings, methods and personnel to protect infrastructure, reduce downtime and extend service life.

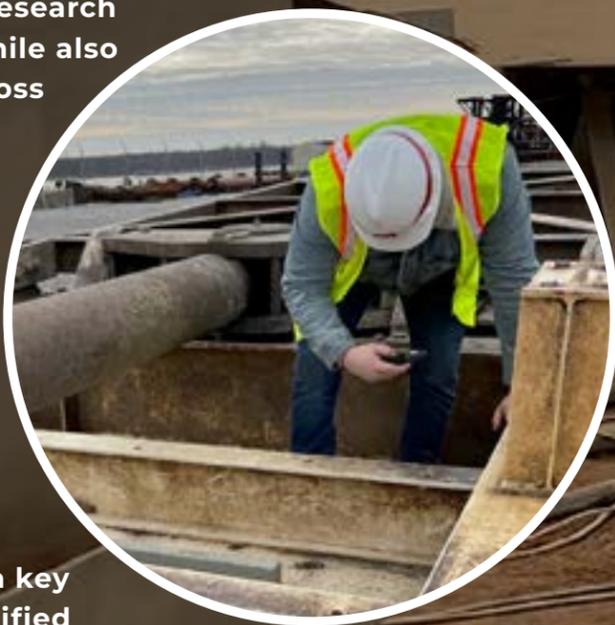
From offering timely reviews of project specifications and scrutiny of coatings planned for construction, to establishing the criteria by which our military uses these coatings, the PTCx's Field Support Team has become a key resource. Comprising several certified coating experts, the team also leverages the world-class R&D arm of the PTCx.

In addition to conducting inspections and failure analyses, the team is focused on helping project managers early in the planning process to address challenges before they arise.

To read the full story, visit:
<https://www.erdc.usace.army.mil/Media/News-Stories/Article/3951969/early-involvement-of-coatings-experts-can-have-big-impact-on-project-success/>



Brooke Divan
Physical Scientist &
Director of Field Relations,
USACE Paint Technology Center,
Technical Center of Expertise



“We won’t turn any request away. We love building the relationships in the districts, with the other [service] branches, because we know we can help. And the sooner the better.”

BROOKE DIVAN

CONNECTING THE DOTS

Over the past year, the Field Support Team supported **39 DIFFERENT USACE DISTRICTS**

WHAT MAKES A HEALTHY LEVEE?



Dr. Simone Whitecloud
Research Ecologist
U.S. Army Engineer Research and Development Center

Improved metrics help evaluate vegetation growing on critical flood-protection systems

A levee's vegetation health is a key indicator of the earthen structure's ability to withstand an overtopping event. Yet for decades, engineers and disaster-response planners have visually graded levee vegetation on a limited three-option scale: good, average or poor.

An ERDC multidisciplinary team is working to modernize widely used flood models by developing a vegetation index that more comprehensively quantifies vegetation stability on coastal levees. The index will incorporate an array of ecological measurements, such as root/shoot ratios, evapotranspiration rates, soil moisture, vegetation shear, root strength, and vegetation age, size and type. The idea is that healthy vegetation will better withstand overtopping events, as roots help hold soil in place to limit erosion.

The team plans to develop the index by not only using such tried-and-true methodologies as field sampling and greenhouse experiments but also by incorporating remote sensing through satellites, UAVs and planes. This will enable flood models to include real-time data, a potential game changer in disaster planning and response.

To read the full story, visit:
<https://www.erdc.usace.army.mil/Media/News-Stories/Article/3956304/erdc-looks-to-modernize-flood-models-with-levee-vegetation-index/>



CONNECTING THE DOTS
23 MILLION AMERICANS
are protected by our nation's levees

TAKING BACK THE RIVER

Combined USACE, ERDC teams seek to wipe out aquatic nuisance

Hydrilla, which the U.S. Fish and Wildlife Service lists as the “world’s worst invasive aquatic plant,” was first identified in the Connecticut River in 2016. It has rapidly spread into the river’s many coves, tributaries and boat basins – posing considerable risk to navigation, flood control, hydropower, recreation and aquatic ecosystems. And because this strain of hydrilla is genetically distinct from other known strains, new treatment methods are needed.

The USACE New England District along with ERDC’s Aquatic Plant Control Research Program are leading a study to better understand and treat this unique hydrilla strain. Researchers have studied its growth patterns and developed a detailed understanding of its weak points and effective treatment strategies. After completing laboratory testing of the efficacy of herbicides approved for safe aquatic use by the U.S. Environmental Protection Agency, researchers conducted field tests in the Connecticut River during the summer of 2024.

Lessons learned will be used to treat the hydrilla to suppress its growth, diminish its negative effects and benefit the Connecticut River’s natural ecology and the local economy.

To read the full story, visit:
<https://www.erdc.usace.army.mil/Media/News-Stories/Article/3960123/combined-usace-erdc-teams-look-to-wipe-out-aquatic-nuisance/>



Dr. Ben Sperry
Research Biologist
U.S. Army Engineer Research and Development Center



CONNECTING THE DOTS

Spread of Connecticut Hydrilla poses threat to NAVIGATION, FLOOD CONTROL, HYDROPOWER, RECREATION AND AQUATIC ECOSYSTEMS

CONNECT WITH

Dr. Robyn Barbato

Dr. Robyn Barbato is a research microbiologist with ERDC's Cold Regions Research and Engineering Laboratory in Hanover, New Hampshire.



How is R&D important in your projects?

Research and development play a critical role at ERDC and across the Armed Services. It is the foundation for innovation and discovery, leading to new solutions, from using terrain assessment to identify military threats such as pathogens to using biotechnology to stabilize soils and de-ice military assets. It also enables important progress on technologies, such as using computational science and remote sensing to determine operational conditions in the Arctic as it continues to experience unprecedented thaw and melt. R&D also maintains core competencies that allow us to solve critical problems at critical times for the military. With it, we can solve the problems of the future, and also pivot quickly when today's problems change.

Where do you see the need for more R&D?

We need more R&D in Arctic operations and biotechnology. There is a pressing need to be able to defend and operate in Arctic environments, as outlined in the DOD and service-led Arctic strategy documents. With advances in biogeochemical observations, remote sensing techniques, and mathematical modeling, we are at the cusp of developing high-fidelity products for analysts to make decisions in the field. However, what is hindering that cusp is getting a handle on the disruption due to thawing terrain and melting ice. This is challenging our modeling efforts in fantastic ways. By making more observations, we will be able to develop better risk assessments. Secondly, biotechnology offers new opportunities, particularly in the realm of materiel. By advancing our ability to test and scale biotechnological products, we can offer new solutions.

USACE R&D STRATEGY

Below are the current Top 10 USACE R&D Priorities to address the nation's toughest challenges with multi-disciplinary solutions. These strategies lay the foundation for a bold, new era of USACE R&D.

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Mitigate & Adapt to Climate Change



Ensure Environmental Sustainability and Resilience



Win Future Wars



Secure Reliable Installation Energy



Modernize Our Nation's Infrastructure



Revolutionize and Accelerate Decision Making



Support Resilient Communities



Improve Cyber and Physical Security



Enable Smart & Resilient Installations



Protect and Defend the Arctic



SCAN FOR MORE ON USACE R&D PRIORITIES

For additional information email: CERD.INFO@USACE.ARMY.MIL

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