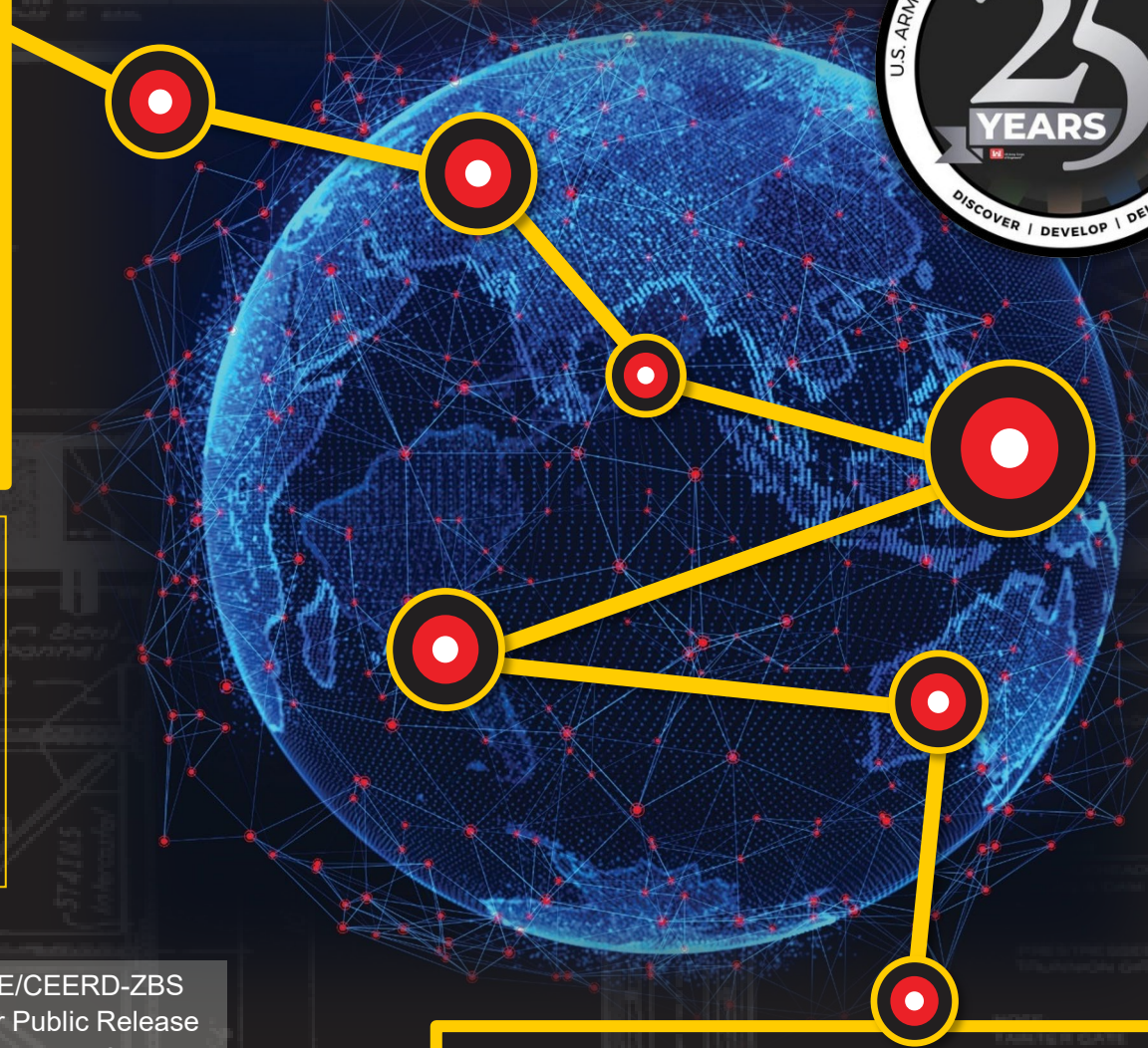


The Power of ERDC: ERDC Capabilities

Mr. Michael Winkler

Strategic Integration Officer
Strategic Integration Office
U.S. Army Engineer Research and Development Center

30 November 2023



**CONNECTING THE DOTS
TO INNOVATION**



U.S. ARMY



**US Army Corps
of Engineers®**



ERDC
ENGINEER RESEARCH & DEVELOPMENT CENTER

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601-634-5239
Version: 2023.11.09



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Why R&D?

USACE Commanding General on the Importance of R&D



“ I feel strongly that **in order to achieve our vision**, we also need to **elevate our research and development programs**. We're **working to expand our R&D initiatives** and strengthen our partnerships with academic institutions to **leverage our nation's scientists** – the enormous capacity they bring – so that we can meet the challenges of the 21st century head on. I believe that **investment in research and development** will help us **find solutions for today's challenges** like those posed by harmful algal blooms, drought, wildfires, reservoir sedimentation, and of course, engineering with nature. ”



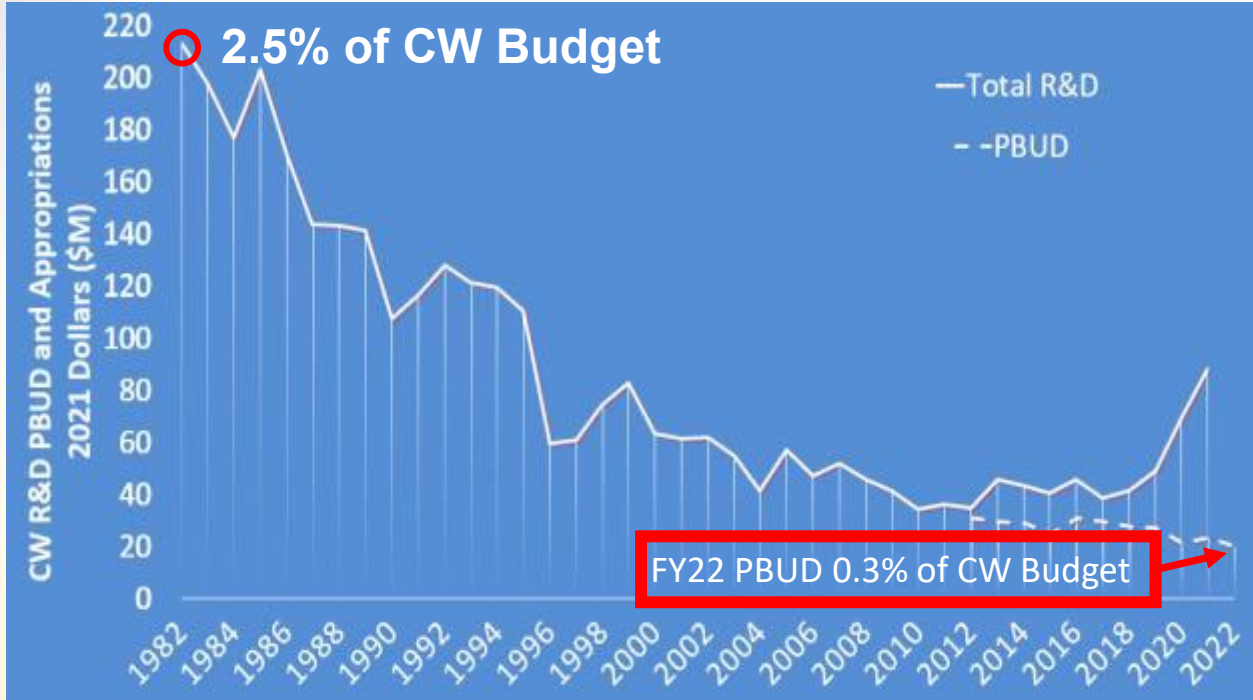
LTG Scott Spellmon
55th Chief of Engineers
US Army Corps of Engineers

TESTIMONY BEFORE THE SENATE APPROPRIATIONS COMMITTEE (ENERGY & WATER SUBCOMMITTEE)
ON THE USACE BUDGET • 09 JUNE 2021



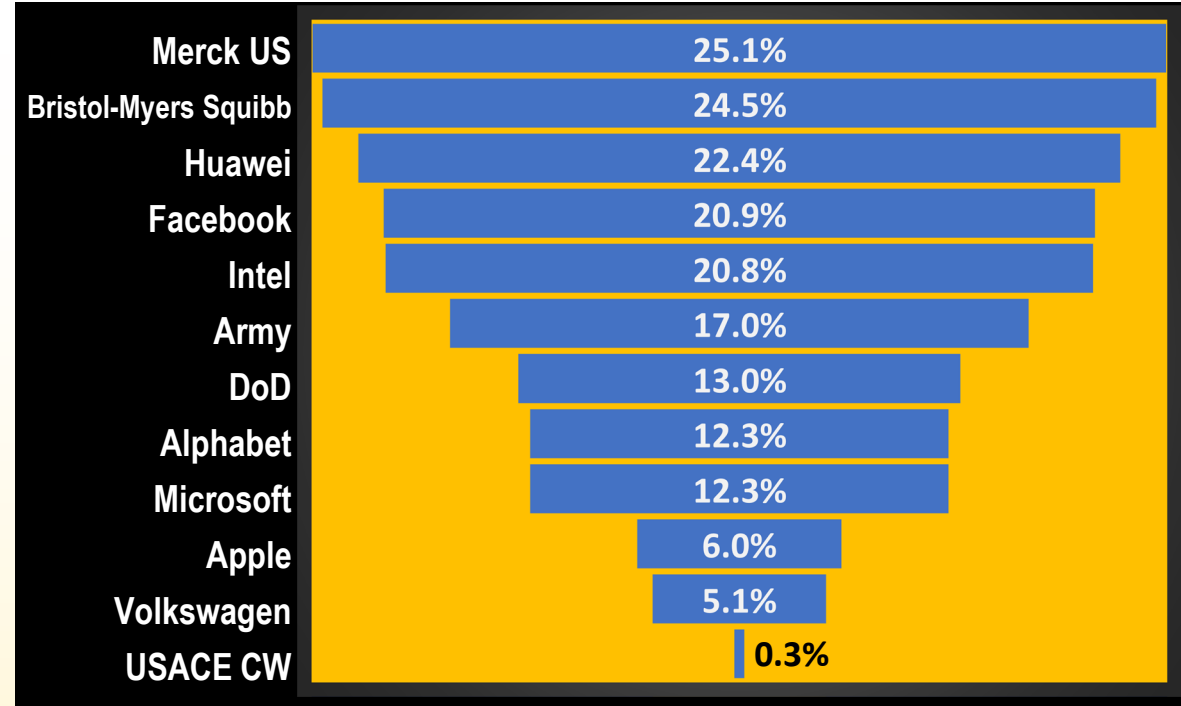
USACE CW R&D Investments

Downward Spiral for Many Years



CW R&D Investment 1982-2022*

*Adjusted for Inflation, Constant 2021 Dollars



R&D Investment of World-Class Organizations

Percent of Total Revenue. Data from FY17 except USACE. FY22 Presidents Budget Request Army =7.4%; DoD RDTE=15%.

President Joe Biden



“We used to invest almost 2 percent of our GDP in research and development. We don’t now. China is.”

STATE OF THE UNION
01 MAR 2022



What is the USACE Campaign Plan LOE 2?



**Support National
Readiness**

**Revolutionize
Program and
Project Delivery**

**Improve
Partnering and
Strengthen
Relationships**

**Modernize
USACE**

Click on the Annotation option *N* and then use the Pencil Tool or checkmark to mark your response.



Commander's Intent

Personal Guidance from the Commanding General for the USACE R&D Strategy



1. Develop a Research & Development Strategy
2. Elevate R&D as a USACE program
3. Tell this story!
4. Increase R&D investment

Ultimate Goal: Discover, develop, deliver, sustain and connect **new technologies** to finish **quality projects faster, cheaper, and better** than ever before.

“ I believe that **investment in research and development** will help us **find solutions for today's challenges** like those posed by harmful algal blooms, drought, wildfires, reservoir sedimentation, and of course engineering with nature.

LTG Scott A. Spellmon

Senate Committee on Appropriations, Subcommittee on Energy and Water Development, June 9, 2021





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USACE Top 10 R&D Priorities

Laying the Foundation for a New Bold Era of Innovation



1 
 Mitigate and Adapt to **Climate Change**

2 
 Win **Future Wars**

3 
 Modernize our Nation's **Infrastructure**

4 
 Support Resilient **Communities**

5 
 Enable Smart and Resilient **Installations**

6 
 Ensure **Environmental Sustainability** and Resilience

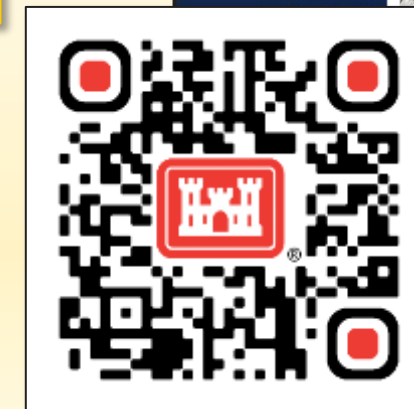
7 
 Secure Reliable Installation **Energy**

8 
 Revolutionize and Accelerate **Decision Making**

9 
 Improve Cyber and Physical **Security**

10 
 Protect and Defend the **Arctic**

Priorities are not ranked; numbers are for identification purposes only



USACE R&D STRATEGY

Scan the QR Code to download a copy of the USACE R&D Strategy and other USACE R&D communication products

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USACE Civil Works: Operational R&D

Changing the Paradigm for Leveraging the Benefits from R&D



Congressional Authorizations via Water Resources Development Act (WRDA)



For Those Who Have Worked With ERDC, Which Lab(s) Have You Worked With? Check All That Apply



Construction
Engineering
Research Lab

Coastal &
Hydraulics
Lab


Cold Regions
Lab

Environmental
Lab

Information
Technology
Lab

Geospatial
Research Lab

Geotech &
Structures
Lab

Click on the Annotation option  and then use the Pencil Tool or checkmark to mark your response.



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ERDC Leadership



Decades of Experience Solving the World's Toughest Challenges

EXECUTIVE OFFICE



DR. DAVID PITTMAN
Director



MS. PATRICIA SULLIVAN
Deputy Director



COL CHRISTIAN PATTERSON
Commander



DR. LUCY PRIDDY
Associate Director



MR. JEFF ECKSTEIN
Chief of Staff

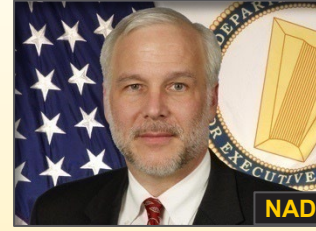
LAB DIRECTORS



DR. ANDY NELSON
Construction Engineering
Research Laboratory -- IL



DR. TY WAMSLEY
Coastal and Hydraulics
Laboratory -- MS



DR. JOE CORRIVEAU
Cold Regions Research
and Engineering
Laboratory-- NH



DR. EDMOND RUSSO
Environmental
Laboratory -- MS



MR. VIJAY ACHARYA
(Acting)
Geospatial Research
Laboratory -- VA



MR. BART DURST
Geotechnical and
Structures Laboratory --
MS



DR. DAVID HORNER
Information Technology
Laboratory -- MS

ERDC SENIOR SCIENTISTS (ST)



VACANT
Environmental
Science



DR. EDWARD J. PERKINS
Environmental Networks
& Genetic Toxicology



DR. MATTHEW FARTHING
Hydrodynamic
Phenomenon



**DR. MIHAN HOUSE
McKENNA TAYLOR**
Near Surface
Phenomenology



DR. JASON ROTH
Weapons Effects/
Structural Dynamics

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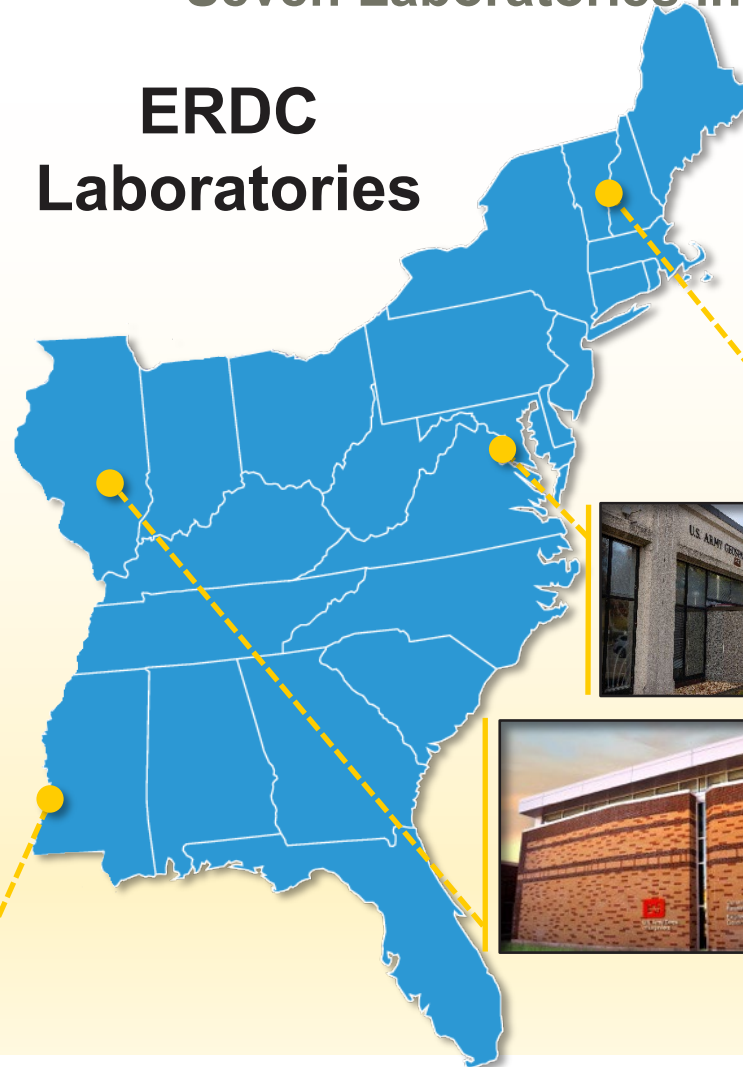
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ERDC Overview

Seven Laboratories in States



ERDC Laboratories



ERDC Headquarters
Vicksburg, Mississippi



Coastal and Hydraulics Laboratory (CHL)



Environmental Laboratory (EL)



Geotechnical and Structures Laboratory (GSL)



Information Technology Laboratory (ITL)



Cold Regions Research and Engineering Laboratory (CRREL)
Hanover, New Hampshire



Geospatial Research Laboratory (GRL)
Alexandria, Virginia



Construction Engineering Research Laboratory (CERL)
Champaign, Illinois

Field Offices

Permafrost Tunnel Research Facility
Fox, Alaska

Alaska Research Office
Fairbanks, Alaska

Lewisville Aquatic Ecosystem Research Facility
Lewisville, Texas

Contingency Base Integration Technology Evaluation Center (CBITEC)
Fort Leonard Wood, Missouri

Field Research Facility
Duck, North Carolina

Corbin Field Station
Woodford, Virginia

Extreme Exposure Station
Treat Island, Maine

ERDC International Research Office
London, England

A World-Class Research & Development Organization that Discovers, Develops and Delivers New Ways to Make the World Safer and Better Every Day

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Civil Engineer is the #1 Most Common Career Field at ERDC. What's #2?



Computer Scientist

Biologist

Physical Scientist

Click on the Annotation option *N* and then use the Pencil Tool or checkmark to mark your response.

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ERDC's People are Our Greatest Strength

Highly Qualified, High Motivated to Solve Complex Challenges



Civilian FTE Employees

2,511*

Engineers & Scientist (E&S)

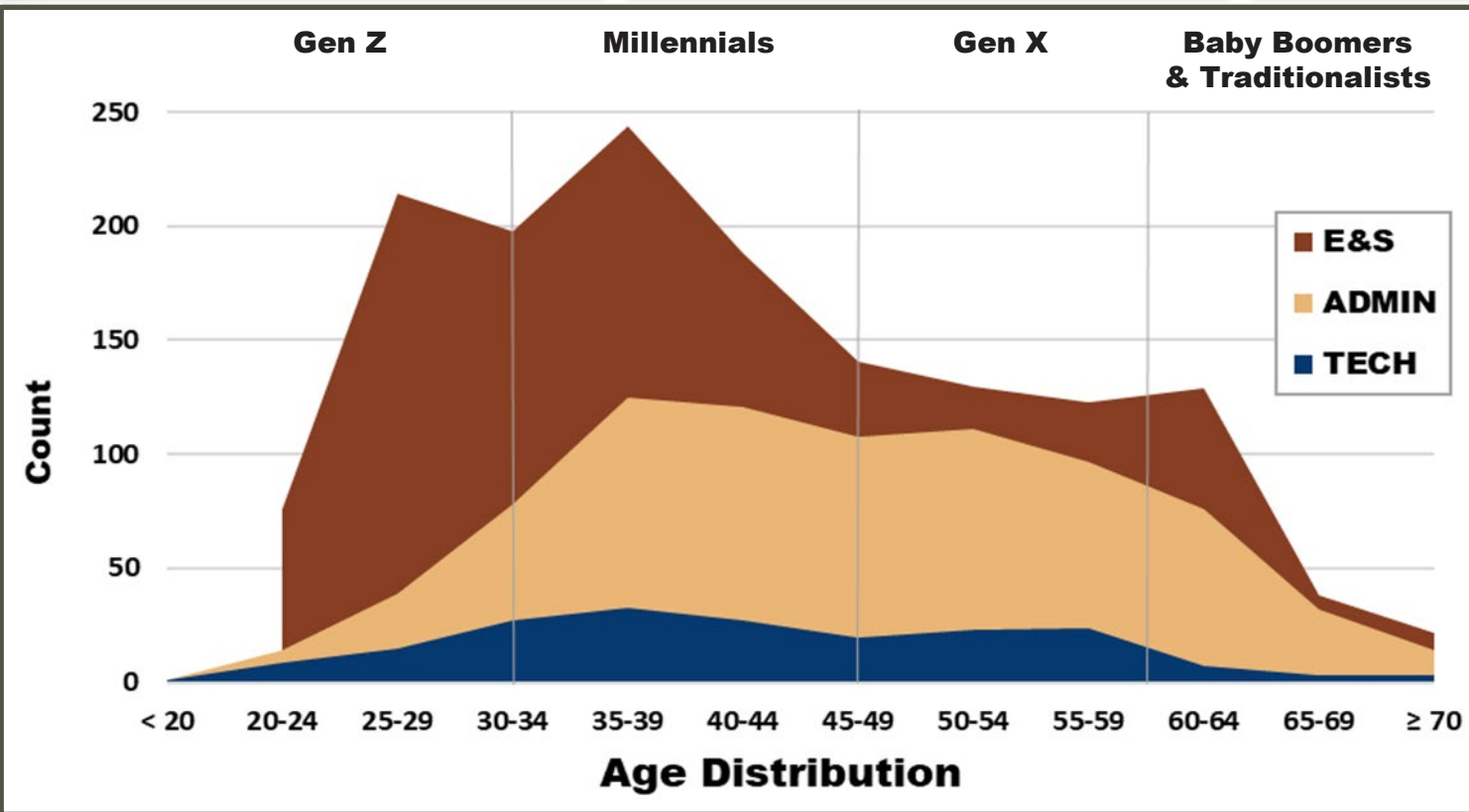
1,503

E&S w/Advanced Degrees

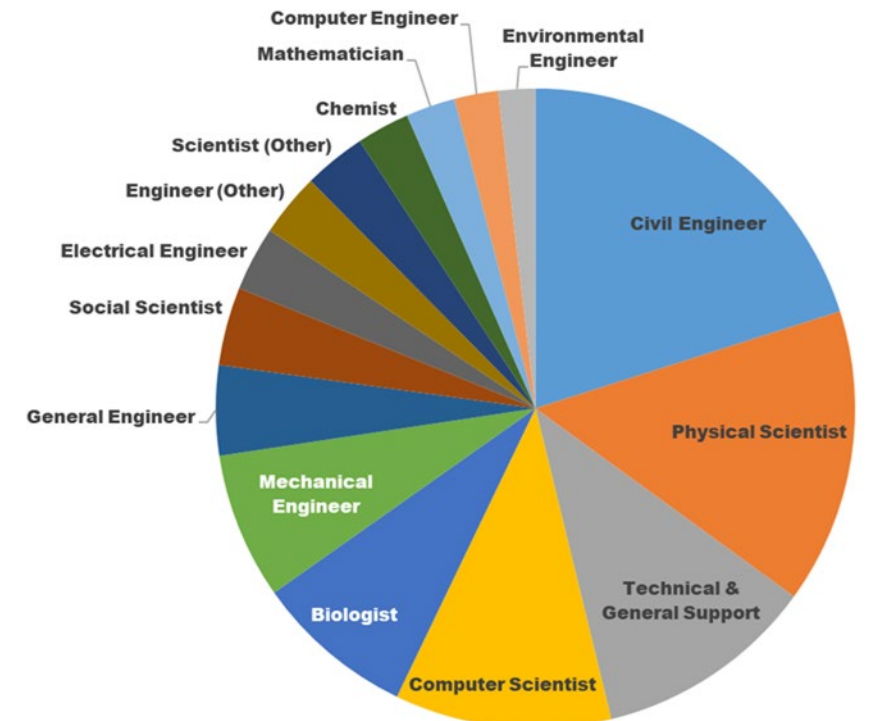
1,168

E&S w/PhDs

444



ERDC E&S Technical and Career Fields



* Does not include other workforce population segments: student trainees, temp positions, active-duty military, AFP Interns, or contractors. Data reflects the End FY23, slide updated 12 OCT 2023.



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Delivering Innovation

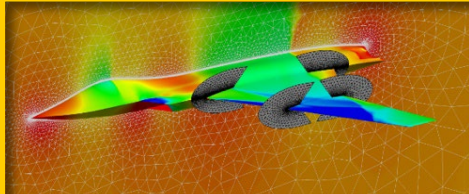
ERDC's Research and Development Areas (RDAs)



RESEARCH & DEVELOPMENT AREAS



CIVIL WORKS



**ENGINEERED
RESILIENT
SYSTEMS**



**GEOSPATIAL
RESEARCH AND
ENGINEERING**



**INSTALLATION
AND OPERATIONAL
ENVIRONMENTS**



**MILITARY
ENGINEERING**

CORE COMPETENCIES

SPECIALIZED ERDC KNOWLEDGE THAT ENABLES OUR RESEARCH AND DEVELOPMENT AREAS



**BATTLESPACE
TERRAIN MAPPING AND
CHARACTERIZATION**



**BLAST AND
WEAPONS EFFECTS
ON STRUCTURES AND
GEO-MATERIALS**



**CIVIL AND
MILITARY
ENGINEERING**



**COLD REGIONS
SCIENCE
AND
ENGINEERING**



**COASTAL, RIVER
AND
ENVIRONMENTAL
ENGINEERING**



**COMPUTATIONAL
PROTOTYPING OF
MILITARY
PLATFORMS**



**MILITARY
INSTALLATIONS
AND
INFRASTRUCTURE**

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National Challenges

Three of the Biggest Problems Facing the Nation that ERDC is Addressing



CLIMATE CHANGE



**CHAMPION:
DR. JOE
CORRIVEAU**
Cold Regions Research and
Engineering Laboratory

ENERGY RESILIENCE



**CHAMPION:
DR. ANDY
NELSON**
Construction Engineering
Research Laboratory

ENVIRONMENTAL SUSTAINABILITY



**CHAMPION:
DR. EDMOND
RUSSO**
Environmental
Laboratory



The Power of ERDC



51 Capabilities Available To Help Our Stakeholders Complete Quality Projects On Time and Within Budget

THE POWER OF ERDC

CERL **CHL** **CRREL** **EL** **GRL** **GSL** **ITL**
51 Capabilities Available to Help Our Stakeholders Complete Quality Projects on Time and Within Budget

- Airfields and Pavements:** Delivers new and improved methods for the design, construction, evaluation, rehabilitation, and maintenance of structural systems for pavements and other transportation facilities.
- Aquatic Ecology and Invasive Species:** Laboratory and field studies on ecological processes and dynamics, impact analysis, habitat evaluation, restoration, inventory and monitoring on freshwater ecosystems.
- Biogeochemical Processes in Earth Materials:** Enhances battlespace awareness and force protection, and sustain training through microbial forensics and use of new plant materials.
- CAD/BIM Center:** Coordinates the capabilities, requirements, and deployment for Computer-Aided Design (CAD), Building Information Modeling (BIM), and Computer-Aided Facilities Management (CAFM) technologies throughout the tri-services.
- Climate Change:** Experts across diverse disciplines translate climate science into actionable, decision-relevant information to predict, forecast, model, and track climate change; next-generation infrastructure designs and innovative technologies are leveraged to achieve climate change resilient objectives.
- Coastal Engineering:** Plans and executes general coastal engineering studies and investigations for project planning and design, performance monitoring and evaluation, geologic and geomorphic analyses, sedimentation engineering, and dredging and dredged problems, as well as shore protection measures.
- Coastal Observation and Analysis:** Advances coastal science and engineering through observational research; provides engineering support for harbor monitoring, dredging, beach nourishment, inlet channel maintenance, land and hydrographic surveying and wave measurements.
- Coastal Processes:** Investigates fundamental near shore processes such as waves, wind, currents, sediment transport, and morphology change on site-specific and regional scales, research dredged material fate and stability, inlet navigation channel evolution/maintenance, research dredged material fate and stability, impacts of inlets on adjacent beaches, and regional beach fill performance/maintenance, impacts of inlets on adjacent beaches, and regional sediment management, and conducts regional wave information studies hindcasting, forecasting, and "nowcasting" of coastal waters.
- Computational Analysis:** Researches, develops, refines, validates, compares, and applies advanced computational methods to model physical, biological, and sociological systems.
- Concrete and Materials:** Serves as the single point of expertise for the U.S. Army Corps of Engineers (USACE) in concrete and materials-related research, materials testing, and in-depth materials analysis.
- Cybersecurity Engineering and Analysis:** Proactively protects computer systems within the DoD while promoting a productive environment for the research development test and evaluation (RD&E) community.
- Data Representation and Analysis:** Concentrates on the exploitation, analysis and display of geospatial information.
- Data Signature and Analysis:** Applies remote sensor derived geospatial and environmental data collection, processing and display.
- Ecological Processes:** Highly integrated, multi-disciplined tools, procedures and methodologies in the areas of characterization of biotic and a biotic ecosystem components and processes; ecological carrying capacity; data acquisition technologies; Geographic Information System and remote sensing applications; ecosystem impact analysis; ecosystem and landscape modeling and analysis; and threatened and endangered species and bio-diversity conservation.
- Ecological Resources:** Provides technical support and technology transfer in support of ecological assessment, management, and restoration of habitats, communities, and landscapes for the Department of Defense, including USACE and other Federal agencies.
- Energy:** Holistic integrations of power delivery & distribution, energy storage, and demand-side energy efficiencies and conservation measures.
- Energy Resilience:** Deliver holistic energy solutions to drive emission reduction; provide expertise in energy generation, transmission/distribution, demand-side drivers with modeling and simulation capabilities to address the full energy cycle.
- Engineering Processes:** Processes and tools for life-cycle management of engineering processes, including design, construction, operations, maintenance, and disposal.
- Engineering Resources:** Delivers engineering solutions to our Warfighters and the Nation involving systems design and development, pavements and materials research development testing and evaluation (RD&E), and the use of environmentally controlled facilities to test, evaluate, and improve infrastructure and equipment for use in cold regions.
- Environmental Chemistry:** R&D in environmental analytical chemistry methodology and molecular biology to support the Army Civil Works and Military Environmental Quality programs.
- Environmental Engineering:** R&D of technologies to better understand, predict, treat and control contamination associated with all types of environmental media (air, water, soils, sediment, etc.) and structures.
- Environmental Processes (Civil Works):** Investigates the physical, chemical, biological, and ecological processes that are critical to the assessment, modeling, management, and remediation of aquatic and terrestrial ecosystems.
- Environmental Processes (Army):** Basic and applied research to address CONUS and OCONUS Army environmental needs including potable water supply systems, wastewater and storm water collection, treatment, reuse, and disposal systems, solid and hazardous waste management systems and industrial waste treatment.
- Environmental Risk Assessment:** R&D on the bioavailability and effects of chemical contaminants on endpoint organisms in the environment.
- Environmental Sustainability:** Provide expertise in infrastructure and environmental sciences and engineering to deliver innovative tools that will address sustainability and resilience challenges at home and abroad.
- Environmental Systems:** Basic and applied research to develop environmental sensing, characterization and monitoring capabilities necessary to quantify environmental site conditions and trends at local and regional scales.
- Field Data Collection and Analysis:** Develops, tests, deploy, maintain and operate water resource, environmental and sediment instrumentation systems.
- Force Projection and Sustainment:** Provides solutions toward sustaining operations at remote installations by understanding the impacts of extreme and austere environmental conditions on maneuver support, materiel, tactics, and military procedures in polar regions.
- Geospatial Applications:** Tests and evaluates the collection and processing methods of emerging geospatial systems, platforms and technologies.
- Geotechnical Engineering and Geosciences:** Executes research and development efforts to include testing, evaluation, and investigation in the areas of water resource infrastructure, geotechnical engineering, seismic engineering, geology, geophysics, and soil and rock mechanics.
- Harbors, Entrances, and Structures:** Investigated a wide range of inland and coastal facilities, navigation channels, and/or structures to assess performance, verify and/or optimize designs, and develop more effective and economical new designs. Conduct investigations and research studies of a wide variety of hydraulic structures such as investigations of harbors, channels, and pump stations.
- Hydrological Systems:** Develops and applies modeling capabilities for providing cutting-edge solutions to military and civil works issues in surface water, groundwater, and watersheds.
- Impact and Explosion Effects:** Develops and demonstrates physically rational, application-oriented, analytical engineering and numerical models to predict airblast, fragmentation, projectile penetration, cratering and objects, ground shock, and water shock environments produced by weapon impacts and detonations and the explosively-induced loads transmitted to structures by these events.
- Information Generation and Management:** Encompasses research and development technologies for collection and processing of geospatial data, geographic information systems, remote sensing, geospatial intelligence, and human terrain data collection and management in support of military or national objectives.
- Information Science and Knowledge Management:** Provides services and supports ERDC research and development projects through categorization, archiving, management, optimization and retrieval of information and knowledge to include library and information systems science services.
- Institute for Systems Engineering Research:** Improves engineering, design, and process systems by developing next-generation computational tools for new systems and products that will assist decision makers in selecting the most appropriate courses of action to resolve issues.
- Land and Heritage Conservation:** Tools to help the Army obtain and analyze geo-cultural information in theatre operations and preserve cultural resources on fixed facilities and in zones of operations.
- Materials and Structures:** Research and technologies to improve the durability and resilience of military and civil works facilities and infrastructure.
- Mobility Systems:** Focuses on research, experiments, and evaluations to ensure that U.S. military forces maintain ground mobility the planning, design, operation, management, and maintenance of navigation channels, locks, ports, and waterway systems to provide safe and efficient marine transport, cost effective systems, and environmentally acceptable conditions including research on fish passage and avoidance relative to hydraulic structures.
- River Engineering:** Research related to geomorphic, hydraulic, and sedimentation engineering in rivers, streams, and reservoirs including alluvial channel and floodplain development, wetland and river system hydraulics, integrated river basin management for stabilization and restoration.
- Scientific Software:** Investigates a wide range of high-end data systems solutions in response to technical requirements. It researches and develops capabilities that address data display, data analysis, data visualization, data archiving, and mass storage.
- Sensor Integration:** Researches, develops, refines, validates, and applies advanced nano-scale and macro-scale transduction and communication methods to observe, measure, and document the physical world, and as components of servo-feedback systems to control structures and systems constructed to influence and leverage elements of the physical world.
- Signature Physics:** To conduct research and develop decision-making and prediction products focused on the sensor-target interaction and influence of terrain and weather environment on signal propagation.
- Software Engineering and Evaluation:** Investigates software engineering methodologies; conducts research, development, and studies of Information Systems and applications; develops, tests, operates, and maintains automated Information Systems for the ERDC, USACE, DoD, and other federal agencies.
- Structural Engineering:** Develops design and analysis procedures to help structures, above and below ground, resist static and dynamic loading and to determine effects from explosives, conventional and nuclear weapons, earthquakes, and other sources.
- Structural Mechanics:** Conducts basic and applied research, technology demonstrations, and facilities assessments for the development and transition of technologies to protect the Warfighter and the Nation's critical military and civil works infrastructure.
- Survivability Engineering:** Provides force protection engineering expertise for deployed forces, from foxholes to fixed facilities, against an array of threats ranging from sabotage, small arms, and terrorist attacks to advanced weapons equipped with multispectral targeting systems.
- Terrestrial and Cryospheric Sciences:** Investigates fundamental processes and properties of terrain and terrestrial materials as affected by weather and climate to solve problems for the military and the Nation.
- Water Quality and Contaminant Modeling:** Conducts research, development, and special studies to predict environmental quality.
- Wetlands and Coastal Ecology:** Conducts field and laboratory investigations on biotic and abiotic resources in wetlands and coastal systems and develops products/systems supporting assessment restoration, and management of wetlands and coastal ecosystems.

- **Compiled list of the 51 ERDC Capabilities designed as a reference guide for all ERDC laboratories and their expertise**
- **Provides connection to a POC through a Branch Chief**



CONSTRUCTION ENGINEERING RESEARCH LABORATORY



ERDC
Robotics
Research
Facility

Chemistry
&
Synthetic
Biology
Lab

CERL CONSTRUCTION
ENGINEERING
RESEARCH
LABORATORY

Location:

Champaign, Illinois

CERL Workforce

Total: 318

E&S: 227

Other: 91

Source: FY21 Strategic Plan

CERL Capabilities

Installations

- 14. Ecological Processes
- 23. Environmental Processes
- 37. Land and Heritage Conservation

Facilities

- 16. Energy
- 38. Materials and Structures
- 18. Engineering Processes

For more information:

<https://www.erd.usace.army.mil/Locations/CERL/>



USACE
Paint
Technology
Center of
Expertise



Triaxial
Earthquake
& Shock
Simulator



ERDC
Robotics
Research
Facility



ERDC
Forward
Operating
Base Lab
(EFOB-L)



CERL Core Competencies

Training Lands & Heritage

- Acoustic Impact
- Cultural Resources
- Human System Dynamics
- Training Land Sustainment
- Threatened & Endangered Species

Materials & Structures

- Structural Analysis
- Building Energy Systems
- Synthetic Biology & Chemistry
- Innovative Material Applications
- Construction Standards & Systems

Sustainment Management System

- Solution Delivery
- Product Engineering
- Sustainment and Operations
- Infrastructure Performance Assessment & Modeling

Installation Readiness

- Water Use Security
- Installation Analytics
- Infrastructure Readiness
- Power & Energy Resilience
- Advanced Compliance Tools



COASTAL AND HYDRAULICS LABORATORY



Location:

Vicksburg, MS

CHL Workforce

Total: 291

E&S: 195

Other: 96

Source: FY21 Strategic Plan

CHL Capabilities

Navigation

- 40. Navigation
- 27. Field Data Collection and Analysis
- 06. Coastal Engineering
- 31. Harbors, Entrances and Structures

Flood and Storm Protection

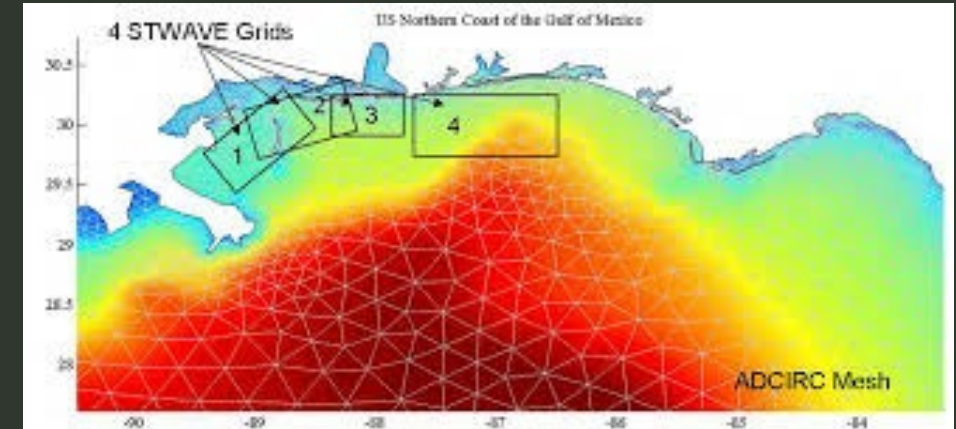
- 8. Coastal Processes
- 41. River & Estuarine Engineering
- 32. Hydrologic Systems
- 07. Coastal Observation and Analysis

For more information:

<https://www.erd.usace.army.mil/Locations/CHL/>



Ship Simulator



CSTORM



Wave Attenuation Through Mangrove Forest

Core Competencies

- Hydrology
- River and Estuarine Engineering
- Coastal Science and Engineering
- Fluid Structure Interaction
- Maritime Operations

Service Areas

- Navigation
- Flood and Coastal Risk Management
- Water Management
- Sediment Management
- Coastal and Hydraulics Military Engineering



Location:

Hanover, New Hampshire

CRREL Workforce

Total: 202

E&S: 147

Other: 55

Source: FY21 Strategic Plan

CRREL Capabilities

Research and Engineering

03. Biogeochemical Sciences

19. Engineering Resources

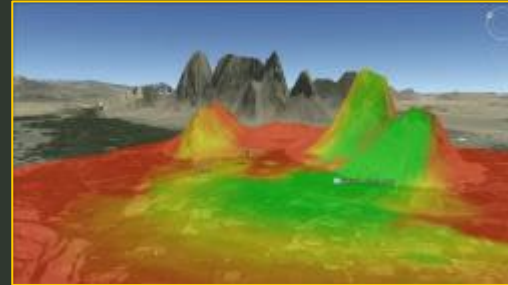
44. Signature Physics

49. Terrestrial and
Cryospheric Sciences

28. Force Projection and Sustainment

For more information:

<https://www.erd.usace.army.mil/Locations/CRREL/>



Environmental Awareness for
Sensor and Emitter Employment
(EASEE)



Installing a
FROST probe
at Hill AFB,
Utah



Permafrost Tunnel



Cold Weather Concrete



SUSV over snow vehicle
experiments at Grand Mesa,
Colorado

CRREL Scientists and Engineers strive to delivering environment Relevant solutions to the nation and the Warfighter through innovative research and development.

Core Competencies include:

- Operational Impacts of Extreme Cold Weather Environments
- Performance Predictions of Critical Infrastructure in Cold Regions
- Ice, Snow, and Soil Properties, Behavior, Mechanics and Distribution
- Geotechnical/Permafrost Engineering
- Material Engineering for Cold Regions

Applied Science and Engineering Solutions, Informed by Basic Research Discoveries - the Laboratory's Foundation



ENVIRONMENTAL LABORATORY



Location:

Vicksburg, MS

EL Workforce

Total: 276

E&S: 222

Other: 54

Source: FY21 Strategic Plan

EL Capabilities

Environmental Processes and Engineering

- 20. Environmental Chemistry
- 22. Environmental Processes
- 21. Environmental Engineering
- 24. Environmental Risk Assessment
- 50. Water Quality and Contaminant Modeling

Ecosystem Evaluation and Engineering

- 26. Environmental Systems
- 51. Wetlands and Coastal Ecology
- 15. Ecological Resources
- 02. Aquatic Ecology and Invasive Species

For more information:

<https://www.erd.usace.army.mil/Locations/EL/>



Harmful Algal Blooms



Engineering With Nature®



Cognitive Ecology and
Ecohydraulics Research Facility

Service and Support

Our researchers in the Environmental Laboratory conduct research in ecosystem science and technology, environmental resiliency, environmental sensing, ecological modeling and forecasting, risk and decision science, environmentally sustainable material, systems biology, climate change, and environmental security. We partner with other government agencies, academia, and industry to solve complex environmental systems problems. We provide solutions to environmental systems challenges worldwide, including:

- Analytical chemistry
- Aquatic and wetland ecosystems

- Chemistry, cleanup, and remediation
- Dredging and dredged material management
- Fate and effects
- Geospatial analysis and mapping
- Hazardous/toxic waste assessment and cleanup
- Invasive and threatened/endangered species
- Molecular ecology
- Modeling and ecosystem restoration
- Risk assessment, sensing, and monitoring
- Stewardship/recreation and benefits analysis
- Unexploded ordnance detection and ordnance management
- Wetlands technology



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GEOSPATIAL RESEARCH LABORATORY & ARMY GEOSPATIAL CENTER



Location:
Alexandria, Virginia



GRL Workforce	AGC Workforce
Total: 75	Total: 188
E&S: 65	Civilians: 181
Other: 10	Soldiers: 7

Source: FY21 Strategic Plan

GRL Capabilities

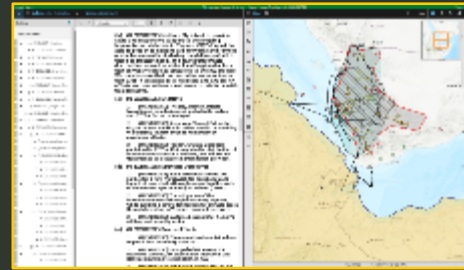
- 13. Data and Signature Analysis
- 12. Data Representation
- 29. Geospatial Analysis
- 34. Information Generation and Management

AGC Capabilities

- Warfighter Support Directorate
- System Acquisition & Support Directorate

For more information:

<https://www.erd.usace.army.mil/Locations/GRL/>



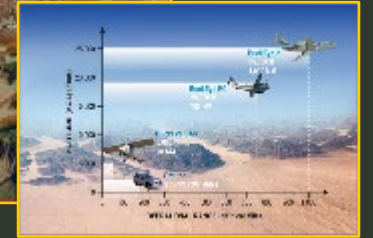
Joint Planning Services



Full Motion Video to 3D



Custom 3D Datasets



Collection

GRL Focus Areas

Terrain Assessment: GRL researches and develops advanced methods for terrain assessment using remote sensing methods. This includes automating workflows and delivering solutions to solve terrain-based challenges.

Decision Support Tools: GRL develops and delivers Joint Planning Services which is a set of integrated geo-enabled decision support tools to promote collaborative, collective and shared planning and decision making. The tools are available on the enterprise and are linked to authoritative databases and can be used for strategic and operational planning including Emergency Response and contingency operations.

Enabling Digital Twins: GRL has developed a series of 3D collection, mapping, and autonomy capabilities for interior and subterranean structures. These tools can inform structural monitoring and inspection. Additionally, GRL develops tools to generate high quality 3D scenes based on collected geospatial data.

Reducing O&M Costs: GRL has developed and prototyped a concept for digital buoys with Louisville District and the IENC program. A national capability could save USACE and USCG fleets \$100+M in costs.

Warfighter Support: Wide Area high altitude terrain and bathymetric collection processing and dissemination of strategic-operational-tactical imagery, elevation data, geospatial information, LIDAR and mission related products.

Warfighter Training: Provide Geospatial Training, Reach Back Support and Geospatial Content in 2, 2.5 and 3 D. # D content creation and streaming of geospatial data to tactical users.

Hydrology: Provide authoritative data and content information on worldwide water location, quantity and quality. Manage the Joint worldwide water database to support Joint operations.

Standards: Synchronize geospatial policies, priorities, program strategies and technologies across Army Acquisition ensuring efficient integration and application of standards and performance metrics.

Architecture: Provide geospatial architecture and data domain expertise to Army programs. Develop, acquire and field geospatial intelligence capabilities.

Test and Evaluation: Evaluate, assess and develop solutions for the Tactical Exploitation of National Capabilities.

Recon and Survey: Develop, manage, field and sustain the combat engineer and survey capabilities to support engineering and terrain management operations.

USACE Common Operating Picture (uCOP): Provides USACE leadership, managers and staff with an authoritative, enterprise and highly customizable Agency-wide application for visualizing and analyzing all available data for USACE programs and projects for informed decision-making.

GEOTECHNICAL AND STRUCTURES LABORATORY



Location:

Vicksburg, Mississippi

GSL Workforce

Total: 443

E&S: 278

Other: 165

Source: FY21 Strategic Plan

GSL Capabilities

Geosciences and Structures

- 47. Structure Mechanics
- 48. Survivability Engineering
- 46. Structural Engineering
- 30. Geotech Engineering and Geosciences

Engineering Systems and Materials

- 10. Concrete and Materials
- 01. Airfields and Pavements
- 33. Impact and Explosion Effects
- 39. Mobility Systems

For more information:

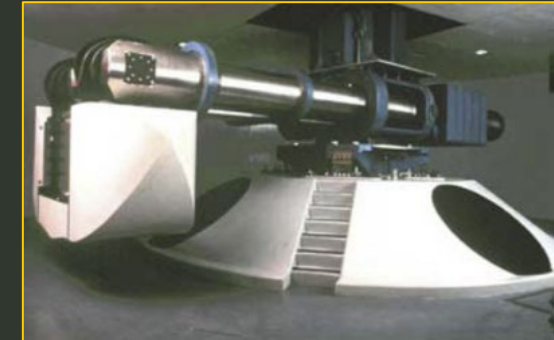
<https://www.erd.usace.army.mil/Locations/GSL/>



Heavy Vehicle Simulator
"The Titan"



Near-Surface
Wind Tunnel
Facility



Centrifuge

Through a unique combination of laboratory experimentation, materials characterization, full-scale field testing, and high-performance computational analysis, GSL develops and delivers innovative solutions in:

- **Force Projection/Maneuver Support** – technologies to enable power projection and freedom of maneuver for U.S. forces throughout the world;
- **Force Protection/Weapons Effects** – technologies to protect the Warfighter and the Nation, such as improved protective structures and survivability measures;
- **Civil Works/Infrastructure** – technologies to enhance infrastructure design, construction, maintenance, evaluation, assessment and security/protection;
- **Operational Support/Technology Transfer** – support to Military Engineering- and Civil Works specific requirements and technology transfer through "reachback" support, training, and on-site technical assistance.



INFORMATION TECHNOLOGY LABORATORY



Location:

Vicksburg, Mississippi

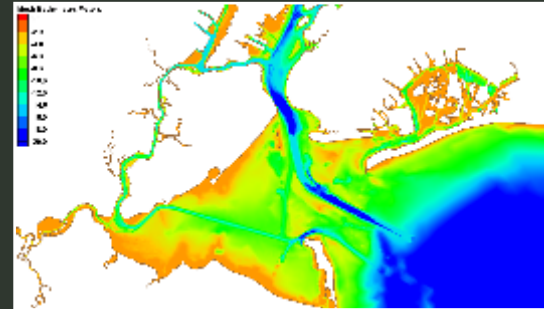
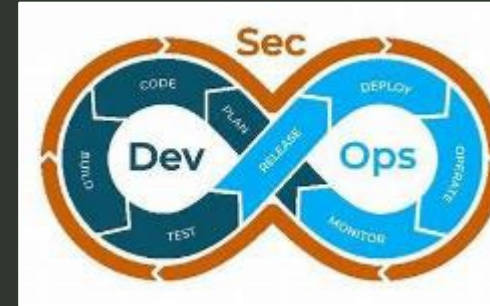
ITL Workforce

Total: 392

E&S: 233

Other: 159

Source: FY21 Strategic Plan



ITL Capabilities

Computational Science and Engineering

- 09. Computational Analysis
- 36. Institute for Systems Engineering Research
- 42. Scientific Software
- 43. Sensor Integration

Software Engineering and Informatics

- 11. Cybersecurity Engineering and Analysis
- 04. CAD/BIM Technology
- 35. Information Science and Knowledge Management
- 45. Software Engineering and Evaluation

For more information:

<https://www.erdcl.usace.army.mil/Locations/ITL/>

ITL Research Focus Areas



High-performance
Computing



Cybersecurity



Modeling, Simulation
& Analysis



Data & Decision
Science



Business
Process
Automation



Robotics and
Autonomy



ERDC Capabilities – Wiki Page

https://wiki.erdcdren.mil/index.php?title=ERDC_Capabilities



WINKLER, MICHAEL F [Talk](#) [Preferences](#) [Watchlist](#) [Contributions](#)

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ERDC Capabilities

The U.S. Engineer Research and Development Center conducts diverse research and development in support of the Soldier, military installations, and the Corps of Engineers' civil works mission, as well as for other federal agencies, state, and municipal authorities, and with U.S. industries through innovative work agreements. Below are 51 distinct capabilities available across ERDC. Concise summaries (storyboards) of current research projects are available for each capability to view or download. These storyboards should give you a basic understanding of the depth and breadth of ERDC's research, and should allow you to consider the art of the possible in regard to problems your agency or institution is facing. If you would like more information about any of the capabilities or research projects, please contact us at ERDCinfo@usace.army.mil. We will promptly respond to your request.

- Airfields and Pavements:** Delivers new and improved methods for the design, construction, evaluation, rehabilitation, and maintenance of structural systems for pavements and other transportation facilities.
 - 01.1 Expedient and Expeditionary Airfield Damage Repair (E-ADR)
- Aquatic Ecology and Invasive Species:** Laboratory and field studies on ecological processes and dynamics, impact analysis, habitat evaluation, restoration, inventory and monitoring on freshwater ecosystems.
 - 02.1 Aquatic Ecology and Invasive Species Branch
 - 02.2 Fish Deterrent Development
 - 02.3 Aquatic Plant Control Research Program
 - 02.4 Field and Laboratory Studies on Pallid Sturgeon
 - 02.5 Engineering with Nature®
 - 02.6 Harmful Algal Blooms (HABs)
 - 02.7 Resilient Vegetation Management for Southwestern Division
- Biogeochemical Processes in Earth Materials:** Enhances battlespace awareness and force protection, and sustains training through microbial forensics and use of new plant materials.
 - 03.1 Microbial Metabolic Processes During Permafrost Thaw
 - 03.2 Intelligent Environmental Battlefield Awareness
 - 03.3 Understanding the Environment as a Threat
- CAD/BIM Center:** Coordinates the capabilities, requirements, and deployment for Computer-Aided Design (CAD), Building Information Modeling (BIM), and Computer-Aided Facilities Management (CAFM) technologies throughout the tri-services.
 - 04.1 Dynamic Immersive Virtual Environment (DIVE)
- Climate Change:** Experts across diverse disciplines translate climate science into actionable, decision-relevant information to predict, forecast, model, and track climate stressors; next-generation infrastructure designs and innovative technologies are leveraged to achieve climate change resilient objectives.
 - 05.1 ERDC Climate Change Solutions: A Decade of Defining Excellence
- Coastal Engineering:** Plans and executes general coastal engineering studies and investigations for project planning and design, performance monitoring and evaluation, geologic and geomorphic analyses, sedimentation engineering, and dredging and dredged problems, as well as shore protection measures.
 - 06.1 Evaluating Beneficial-Use of Navigation O&M for Coastal Storm Risk Management (CSR) Sediment Management at Merrimack Inlet, MA
 - 06.2 National Coastal Mapping Program
 - 06.3 National Coastal Mapping: Arctic Mapping
 - 06.4 Ecosystem Restoration by Thin Layer Placement of Sediment
- Coastal Observation and Analysis:** Advance coastal science and engineering through observational research; provides engineering support for harbor monitoring, dredging, beach nourishment, inlet channel maintenance, land and hydrographic



- Wiki Page with all 51 ERDC Capabilities
- Storyboards of current ERDC Research
- Used Previously Existing Storyboards



“...I’ve asked Dr. Pittman to **assign ERDC LNOs** to all of our MSCs and Districts. I expect that you’ll “hug” them as one of your own and **treat them as valued members** of your extended, virtual staff. You should develop them as you would any one of your team so **they know your missions** as well as you. They’ll start by asking, “How can I support you?” and, with your help, **they’ll eventually proactively come to you, before you know to ask, with solutions you couldn’t know existed**. And in the process, you’ll learn the **right questions to ask** of our R&D team. Only this type of partnership and relationship can make us successful.



LTG SCOTT SPELLMON
USACE Commander

LTG SCOTT SPELLMON

Email to Corps Leaders 25 AUGUST 2021



Which of the Following is **NOT** a Role of an ERDC Liaison?



Build relationships

Facilitate communication

Market ERDC capabilities

Connect people to technologies

Click on the Annotation option *N* and then use the Pencil Tool or checkmark to mark your response.



ERDC District Liaison Responsibilities



What is Expected of an ERDC Liaison

The ERDC Liaison serves as the first contact or interface between the District and ERDC for R&D and technology innovation. Expectations include:

- **Quarterly contact** with the Commander and DPM to strengthen personal relationships and the Chief of Operations for maintenance issue updates
- **Monthly contact** with the Chief of Planning to understand new investigations/studies or E&C Chief to inquire about new starts in PED
- **Attend relevant monthly** meetings to gain understanding of the District's Program Development for future years
- **Request to be added to PRB email Distribution List** to receive final slides each month; offer your availability to attend and listen in to gain context in the nature of the technical issues.
- **Provide quarterly update** using the "Communication Rollup" Tab on the ERDC-District Liaison Teams' Site or link
- **Provide background information** to the Commander and DPM on how to implement R&D activities
- **Inform the MSC Liaison and Deputy MSC Liaison** of any execution or resourcing problems with ERDC delivery
- **Identify opportunities** for technology insertion or innovation into the District program
- **Attend USACE R&D DMR(s)** and other meetings as requested by ERDC leadership



MSC, Deputy MSC and ERDC District Liaisons

Connecting USACE MSCs and Districts to ERDC Expertise



Great Lakes and Ohio River Division (LRD)

- **MSC Liaison:** Dr. Edmond Russo
- **Deputy MSC Liaison:** Dr. Jennifer Seiter-Moser
- **Buffalo District (LRB):** Mr. Michael Greer
- **Chicago District (LRC):** Dr. Brook Herman
- **Detroit District (LRE):** Dr. Dave Smith
- **Huntington District (LRH):** Dr. Christine VanZomeren
- **Louisville District (LRL):** Dr. Rich Fischer
- **Nashville District (LRN):** Dr. Andrew McQueen
- **Pittsburgh District (LRP):** Dr. Tony Bednar

North Atlantic Division (NAD)

- **MSC Liaison:** Dr. Joseph (Joe) Corriveau
- **Deputy MSC Liaison:** Dr. Robert (Bert) E. Davis
- **Baltimore District (NAB):** Dr. Julie Rosati
- **New England District (NAE):** Dr. Igor Linkov
- **New York District (NAN):** Dr. Kyle McKay
- **Norfolk District (NAO):** Dr. Duncan Bryant
- **Philadelphia District (NAP):** Dr. Cary Talbot
- **Europe District (NAU):** Mr. Andy Margules

Mississippi Valley Division (MVD)

- **MSC Liaison:** Dr. Ty Wamsley
- **Deputy MSC Liaison:** Mr. Eddie Wiggins
- **St. Paul District (MVP):** Dr. Gaurav Savant
- **Rock Island District (MVR):** Dr. Gaurav Savant
- **St. Louis District (MVS):** Mr. Eddie Wiggins
- **Memphis District (MVM):** Mr. Eddie Wiggins
- **Vicksburg District (MVK):** Mr. Keith Flowers
- **New Orleans District (MVN):** Dr. Julie Rosati

Northwestern Division (NWD)

- **MSC Liaison:** Dr. Andy Nelson
- **Deputy MSC Liaison:** Dr. Robert (Rob) M. Wallace
- **Kansas City District (NWK):** Dr. George Calfas
- **Omaha District (NWO):** Dr. George Calfas
- **Portland District (NWP):** Mr. Quincy Alexander
- **Seattle District (NWS):** Mr. Quincy Alexander
- **Walla Walla District (NWW):** Mr. Quincy Alexander

As of 08 NOV 2023



MSC, Deputy MSC and ERDC District Liaisons

Connecting USACE MSCs and Districts to ERDC Expertise



Pacific Ocean Division (POD)

- **MSC Liaison:** Mr. Bartley (Bart) Durst
- **Deputy MSC Liaison:** Dr. Elizabeth Ferguson
- **Alaska District (POA):** Dr. Tom Douglas
- **Far East District (POF):** Mr. James L. Davis, Dr. Jason Roth, ST
- **Honolulu District (POH):** Dr. Elizabeth Ferguson
- **Japan District (POJ):** Dr. Elizabeth Ferguson

South Atlantic Division (SAD)

- **MSC Liaison:** Dr. Ty Wamsley
- **Deputy MSC Liaison:** Dr. Julie Rosati
- **Charleston District (SAC):** Dr. Ned Mitchell
- **Mobile District (SAM):** Mr. Eddie Wiggins
- **Jacksonville District (SAJ):** Ms. Ashley Frey
- **Savannah District (SAS):** Dr. Ned Mitchell
- **Wilmington District (SAW):** Dr. Julie Rosati

Transatlantic Division (TAD)

- **MSC Liaison:** Mr. Bartley (Bart) Durst
- **Deputy MSC Liaison:** Mr. Nicholas (Nick) Boone
- **Transatlantic Expeditionary District (TAE)**
and **Middle East District (TAM):** Mr. Nicholas (Nick) Boone

South Pacific Division (SPD)

- **MSC Liaison:** Dr. David Horner
- **Deputy MSC Liaison:** Dr. Cary Talbot
- **Albuquerque District (SPA):** Dr. Jackie Pettway
- **Sacramento District (SPK):** Dr. Robert (Rob) M. Wallace
- **Los Angeles District (SPL):** Mr. Ivan Beckman
- **San Francisco District (SPN):** Mr. Ken Pathak

Southwestern Division (SWD)

- **MSC Liaison:** Dr. Edmond Russo
- **Deputy MSC Liaison:** Dr. Patrick (Pat) Deliman
- **Fort Worth District (SWF):** Dr. Rumanda Young
- **Galveston District (SWG):** Ms. Susan Wolters
- **Little Rock District (SWL):** Dr. Eric Britzke
- **Tulsa District (SWT):** Dr. Mandy Michalsen

Huntsville Engineering Center (HNC)

- **MSC Liaison:** Dr. Andy Nelson
- **Deputy MSC Liaison:** Dr. Elizabeth Ferguson

As of 08 NOV 2023

ERDC LIAISON MS TEAMS PAGE



US Army Corps
of Engineers®

U.S. ARMY



How To Become a Liaison Member of ERDC Liaisons MS Teams Page

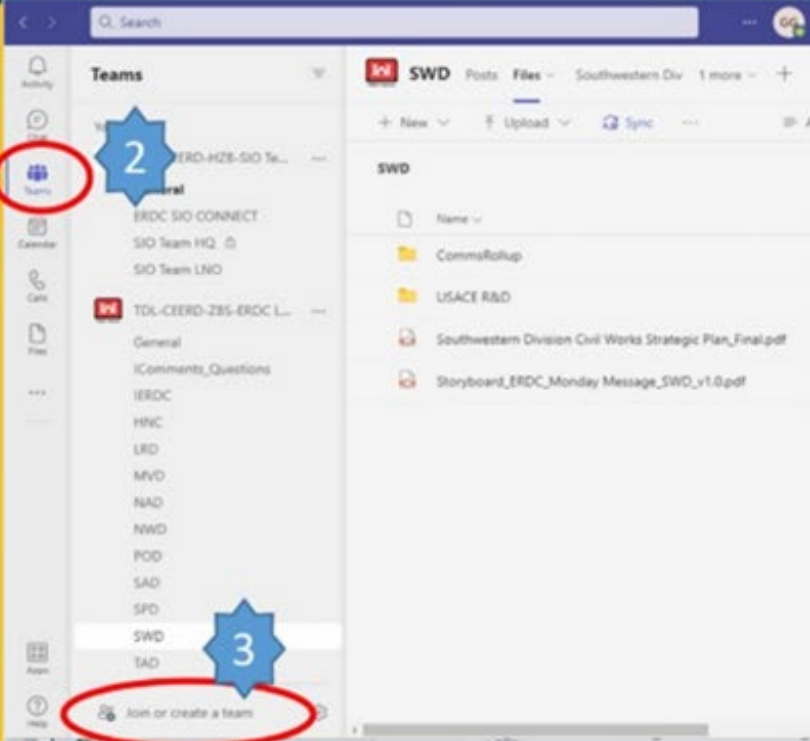


TDL-CEERD-ZBS-ERDC LIAISONS

The ERDC Liaisons Microsoft Teams site contains information and documentation for ERDC MSC engagements. Each Division has its own channel to facilitate communication and collaboration. The “Posts” tab provides those outside of ERDC a single place to request assistance. You can also easily share documents with the “Files” tab.

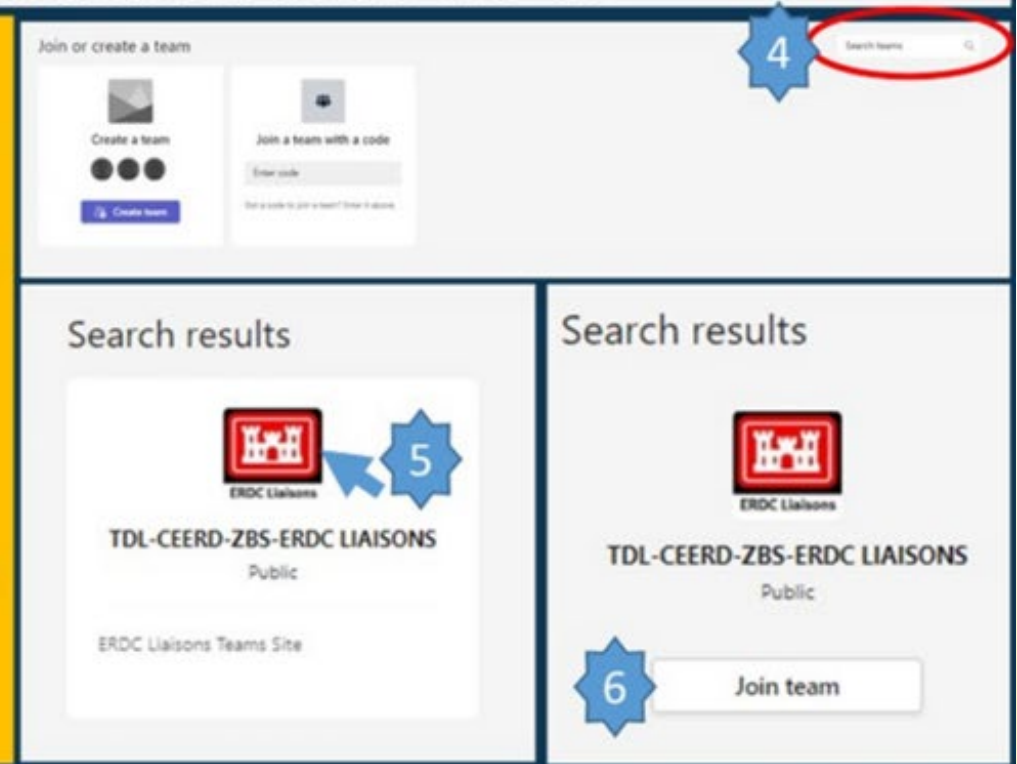
To join the ERDC Liaisons MS public Teams page:

1. Log into USACE MS Teams
2. Select the “Teams” icon on the left-hand side
3. Select “Join or create a team”



4. Use Search Box in upper right corner to search for TDL-CEERD-ZBS-ERDC LIAISONS. It is case sensitive, so use all caps.

5. Move your mouse over the Team site.
6. Select “Join team”



The ERDC Liaisons Teams site is officially titled: TDL-CEERD-ZBS-ERDC LIAISONS



ERDC Liaisons MS Teams Page

12 Channels / General Tab Posts



GENERAL TAB POSTS –
only place all TEAM members will receive post notifications. Monthly posts from the CG’s R&D Update, Technology Spotlight.

12 CHANNELS
or sub-folders including all 9 MSCs.
This allows for ‘cross sharing of information across MSCs as well as the entire Enterprise.



FEATURES – Individual MSC Channels



Example: LRD Channel

TDL-CEERD-ZBS-ERDC LIAISONS

General

ERDC

LRD

10 hidden channels

LRD Posts Files Great Lakes and Ohio ... LRD Calendar

Woodard, Kenneth L (Ken) CIV USARMY CELRH (USA) 4/14 11:30 AM

Who could I talk to at ERDC about small "rain gardens", or similar green infrastructure to address flooding issues?

2 replies from Michael and Andrew

Reply

LRD Posts **Files** Great Lakes and Ohio ... LRD Calendar

+ New Upload Sync Copy link Download Add cloud storage Open in SharePoint

Name	Modified	Modified By
CommsRollup	January 18	Winkler, Michael F ...
LRB Tour	May 4	Winkler, Michael F ...
LRD IPLAN	February 17	Winkler, Michael F ...
LRN-LRH Tour	April 26	Girard, G David CT...
USACE R&D	January 6	Girard, G David CT...
2022.01.24_Slides_ERDC_LRD LDP - Leaders...	January 25	Winkler, Michael F ...
Testing of Expedient Flood Fighting Produc...	December 9, 2021	Rosati, Julie Dean ...

If someone needs assistance, they can post questions under their respective MSC Channel by using the **"Posts"** tab. This allows questions to be answered quickly and routed to the correct liaison for assistance.

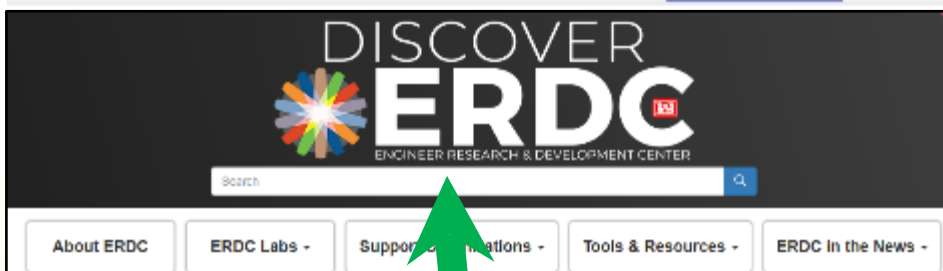
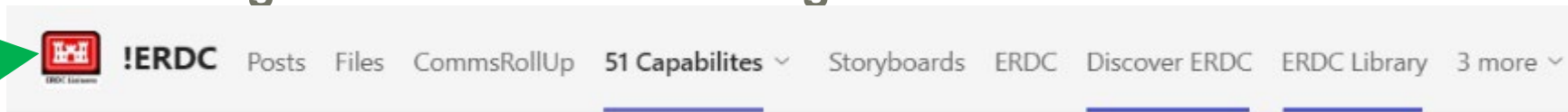
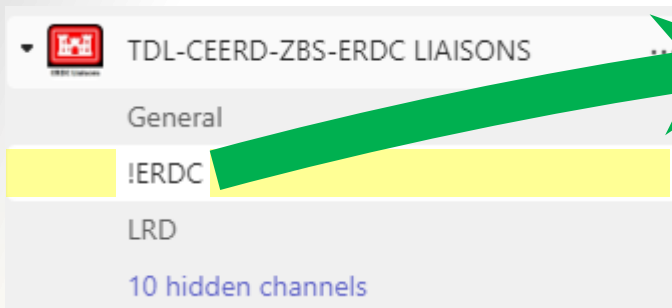
An ERDC LNO for this subject matter will provide a response. ERDCs Michael Winkler monitors to ensure a timely response.

Collaboration Folders for LRD and ERDC to share information.

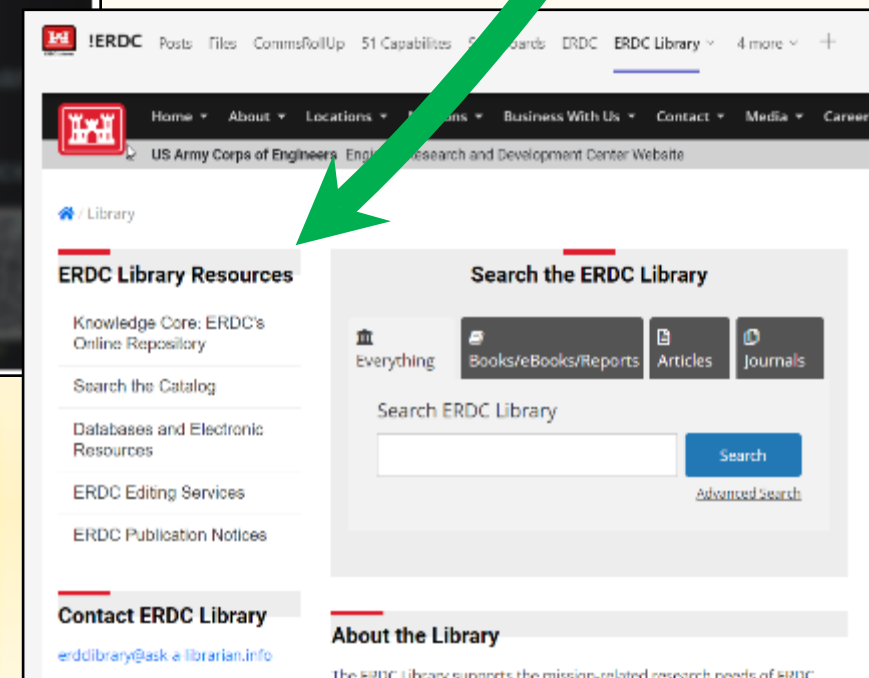


Features – !ERDC Channel

Connect Through MS Teams of All Things ERDC



ERDC Library:
Allows for a literature search of ERDC research



ERDC Capabilities – 51 ERDC Capabilities with Story Boards of current research Efforts

Discover ERDC Features:
1) Search Engine
2) About ERDC
3) ERDC Labs



UNCLASSIFIED

How Can ERDC Support Your Ongoing or Future Studies?



Click on the Annotation option *N* and then use the Text tool to type your response.

UNCLASSIFIED



Dredging Operations Technical Support (DOTS)



Program Overview

- Primary technology transfer mechanism for dredging and navigation since 1978
- Provides “one-door-to-the-Corps” access to comprehensive information on technology related to navigation O&M functions
- Program functions include rapid, short-term technical responses for the field, technology demonstrations, training, database management, publications, and development and dissemination of technical guidance





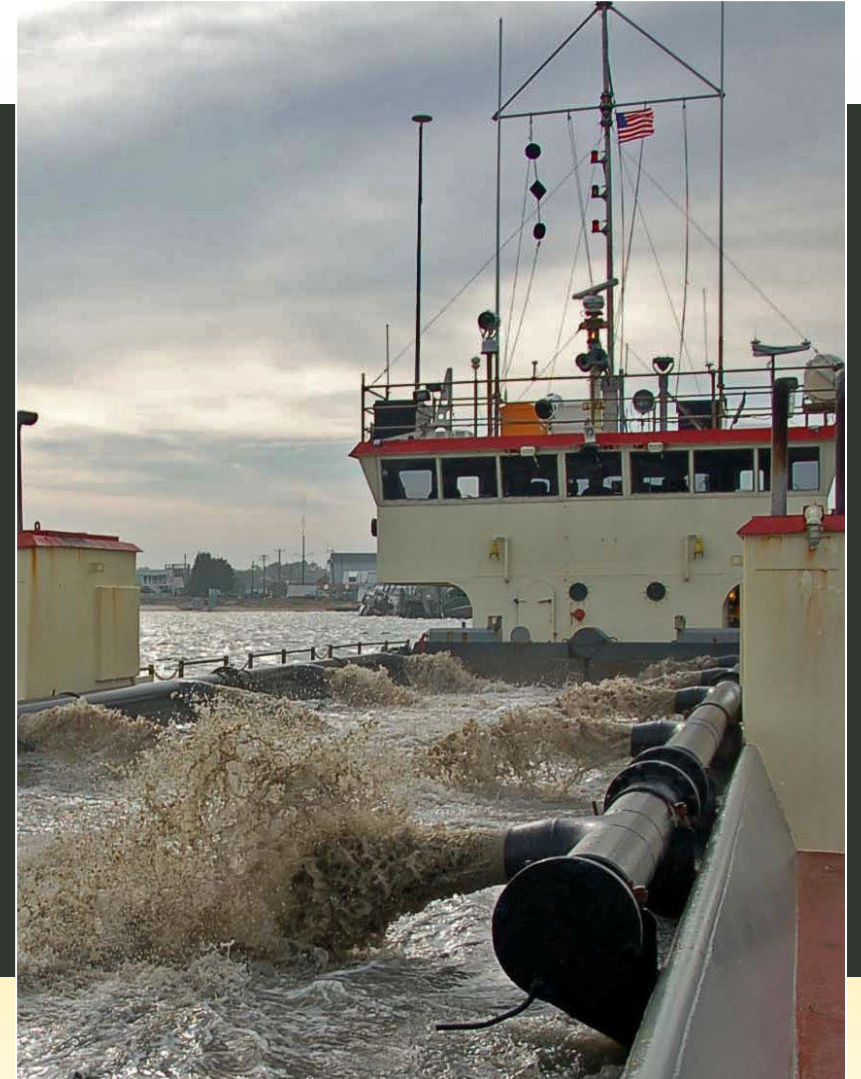
UNCLASSIFIED

Benefits of DOTS

To the Civil Works Program



- DOTS provides technology transfer services for all R&D programs aligned with the navigation business line by fostering application of state-of-the-art technologies and ongoing research results for high priority problems identified by the field
- The DOTS program's technology transfer function provides access to an extensive, up-to-date, consistent technology base whereby timely, proactive responses to technical issues can be made as they emerge
- This approach promotes networking and solutions to common problems confronting the navigation dredging community



UNCLASSIFIED



UNCLASSIFIED

DOTS Website

<https://dots.el.erdc.dren.mil/>



- The DOTS program provides website services by mobilizing the right people, skills, and technology that support the USACE navigation mission through improved ERDC communication
- DOTS is committed to transferring knowledge and value generated by the ERDC federal dredging programs and initiatives to our USACE customers and public through a highly usable website
- Short-term, rapid-turnaround technical efforts that address challenges encountered during maintenance and operation of navigable waterways and infrastructure
- 80 hours labor, can include travel

UNCLASSIFIED

Water Operations Technical Support (WOTS)



Summary

Goal: Identify, develop, and share innovative concepts and technologies that will support sustainable engineering solutions to complex environmental problems at Corps projects nationwide.

Impact to USACE Missions: Provides technology to solve water management and related environmental problems resulting from project operations related to environmental and water management issues.

Issues/Risk: Not applicable.

Army Partners: ERDC Labs

Requirement: Technical Support for USACE Division and District Offices.

Technical Approach

How is it done today?

The Corps conveys these concepts and technologies through the best available mechanisms, such as direct technical assistance, specialty workshops, information bulletins, technical notes, executive notes, technical reports, webinars, miscellaneous papers, instruction manuals, videos, meetings, seminars, briefings, and the Internet.

What are the limitations/gaps?

- Incorporates R&D products from other USACE CW Projects and activities.
- No R&D is conducted in the program, can provide new R&D guidance.

What's new in your approach?

The incorporation of all relevant and innovative technology solutions from ERDC to assist USACE Divisions and Districts in solving complex operational problems.

WOTS Funding History

Category	FY21				FY22				FY23				FY24			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
WOTS																
Task 1: Demo and Tech Transfer																
USACE O&M	\$0.5M				\$0.5M				\$0.5M				\$0.5M			
Total (\$XXM)					\$0.5M				\$0.5M				\$0.5M			

Total Funding (FY21-FY24)= \$2.0M

Progress

What was accomplished in the last 12 months?

- Provided direct technical assistance to USACE Divisions and Districts through:
 - Principal Investigator (PI) responses
 - Workshops
 - Report dissemination
 - Webinars and other virtual communication

What are the projected accomplishments in the next 12 months (or first year)?

- Similar expectations to the previous operational years of the program.



QUESTIONS?

**DO YOU HAVE ANY ERDC SUCCESS STORIES?
PLEASE SHARE IN THE CHAT!**

CONNECT WITH US

Michael Winkler

Strategic Integration Officer
ERDC Strategic Integration Office
U.S. Army Engineer Research and Development Center
U.S. Army Corps of Engineers

Michael.F.Winkler@usace.army.mil

601.634-4057 (office) • 601.529-6250 (cell)



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ERDC
ENGINEER RESEARCH & DEVELOPMENT CENTER