Bay Planning Coalition

KEYNOTE ADDRESS

Dr. Todd Bridges

University of Georgia - College of Engineering;
Environmental Science Associates (ESA)

SPEAKER

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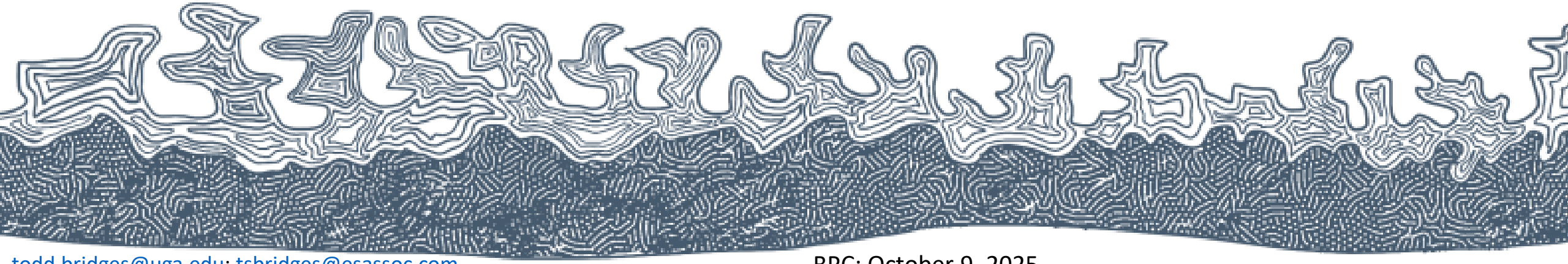
Sediment Management for the 21st Century: The Planet and People Need a Better Way

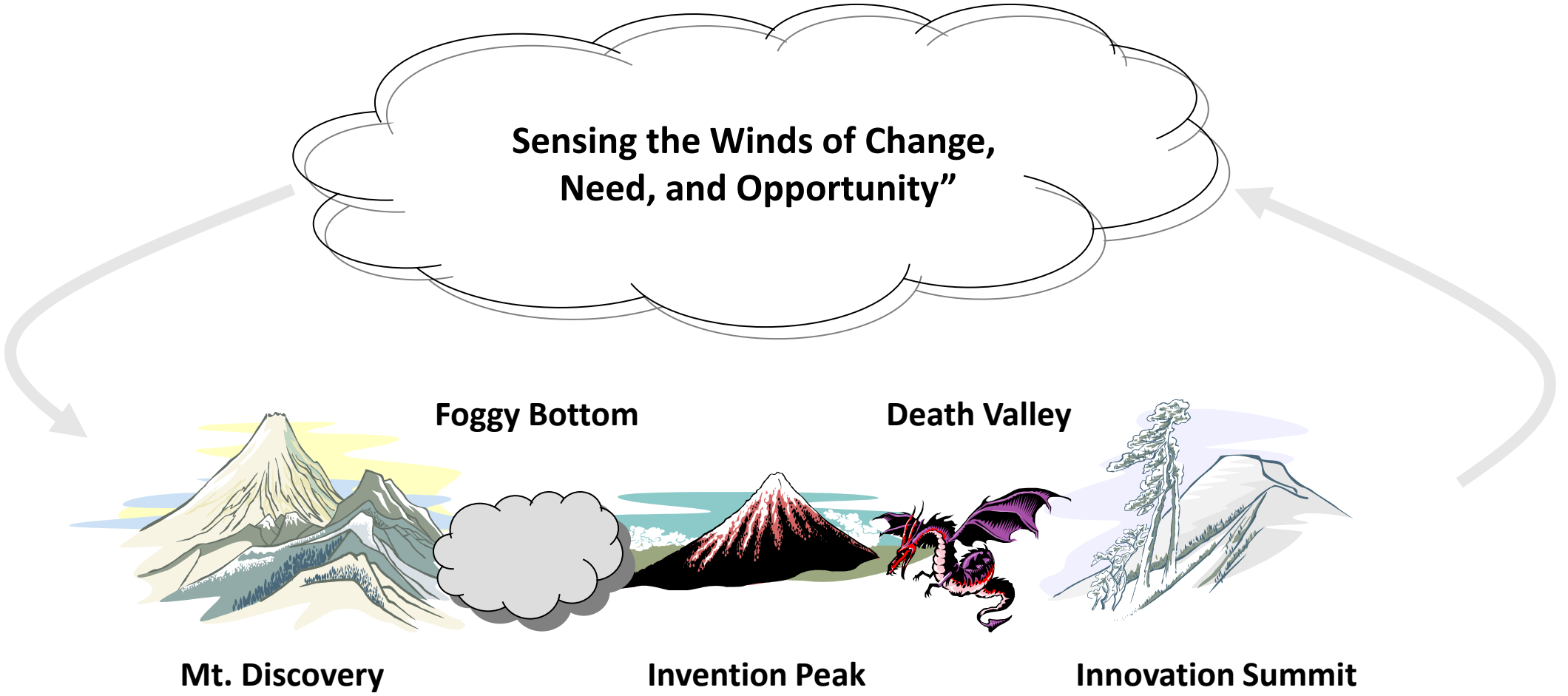
Dr. Todd S. Bridges
Professor of Practice, Resilient and Sustainable Systems,
College of Engineering, University of Georgia
Senior Scientist, Environmental Science Associates



todd.bridges@uga.edu; tsbridges@esassoc.com

BPC; October 9, 2025

"Navigating the Innovation Landscape"



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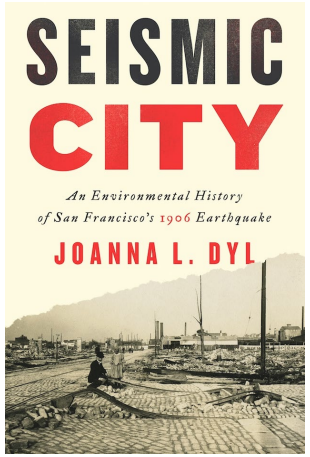
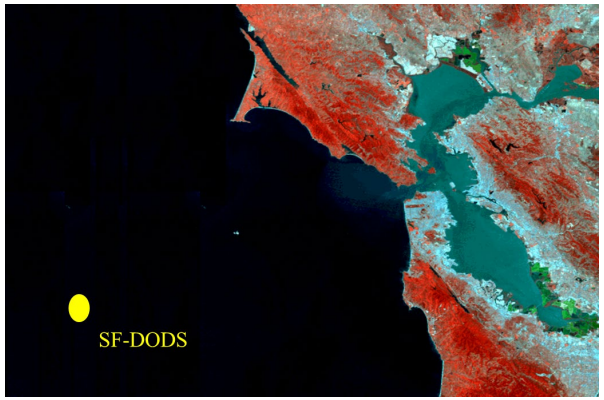
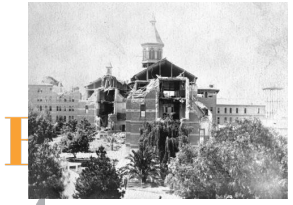
What is Innovation?

- Innovation: *The introduction of something new into practice*.
  - It's about more than "new tech".
    - A new concept, way of thinking, business process, engineering model, construction technique, measurement method, etc.
- Innovations can range from small to large, depending on the impact for practice and the value produced.
    - From incremental to transformative.
- The questions:
  1. What notable innovations have you or your organization achieved in dredging and BU?
  2. What is holding back the pace of innovation?
  3. What actions could be taken to accelerate innovation?

San Francisco Bay







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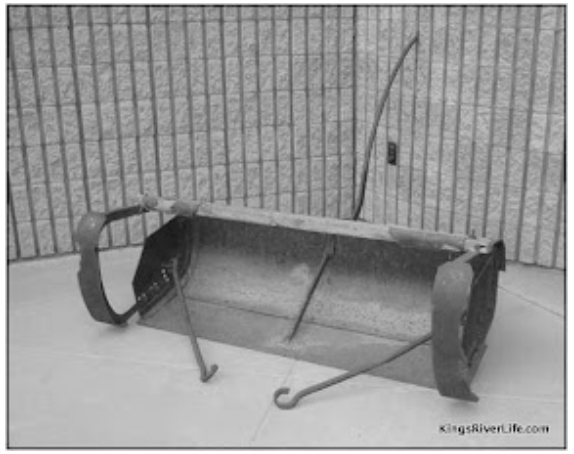
The Tools of Transformation


Murden


Fresno Scrapper, invented by James Porteous, 1883


Bay State Dredging Company, 1884


Essayons


Miocene Ditch construction, Nome River, AK, 1901-03


Goetz

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Dredging and Sustainability

- The US dredges ~250,000,000 cubic yards of sediment annually
- ~30% of dredged material is beneficially used (BU)
  - *Beneficial use is using dredged sediment to achieve additional benefits beyond the purposes related to its removal, including other economic, environmental or social benefits*
  - >1.5 billion cubic yards used in beach construction over last 100 years
  - 100s million cubic yards of BU since 1970
    - E.g., 25,000 acres of wetlands created in south Louisiana

Sustainability: "create and maintain conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations." NEPA (1969)

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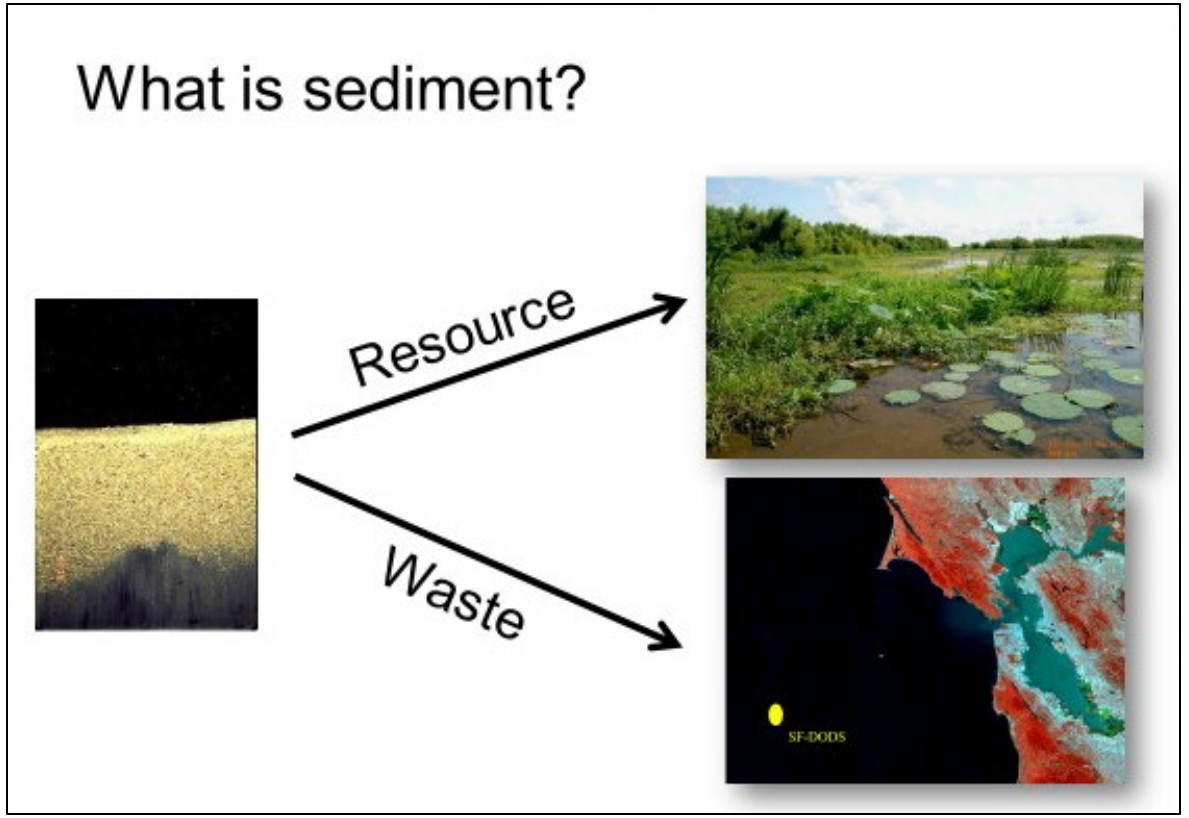
Application to Dredging



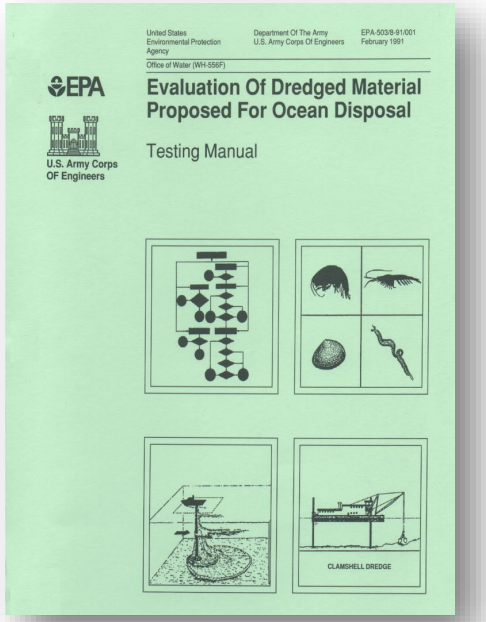
*From a presentation I gave at the National Dredging Meeting in May 2012

Bridges, T.S. and T. Velinga. 2018. Integrating Dredging in Sustainable Development. In *Dredging for Sustainable Infrastructure*, P. Lapoyrie, M. van Koningsveld, S. Aarninkof, M.Van Parys, M. Lee, A. Jensen, A. Csiti, and R. Kolman, eds. CEDA/IADC, The Hague, the Netherlands.

Fax machine
Cell phone
Internet
www
Amazon.com

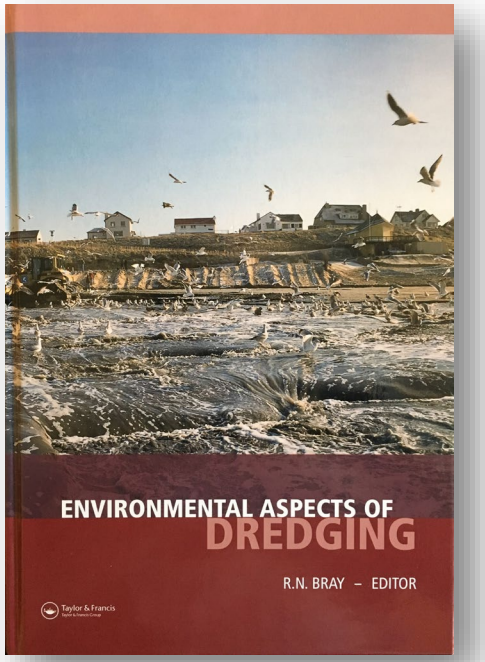
Progress

Dredging for Sustainable Infrastructure



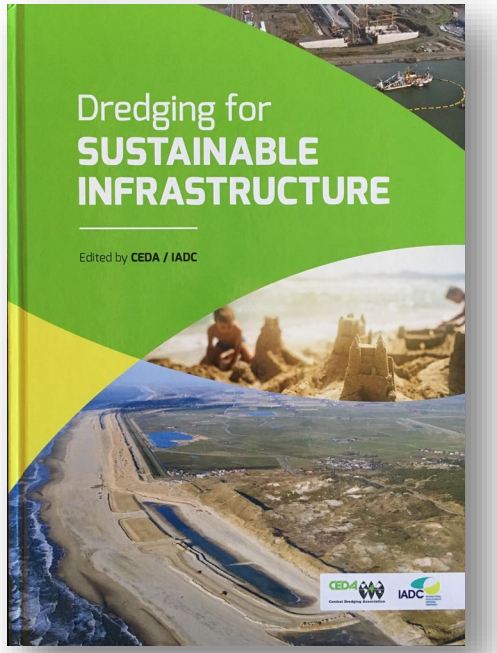
1977/1991

OTM 1977/1991: Will disposal of dredged material "unreasonably degrade or endanger: human health, welfare, or amenities, marine environment, ecological systems, or economic potentialities."



2008

CEDA 2008: "It is, therefore, of the utmost importance that we be able to determine whether any planned dredging will have a positive or negative impact on the environment."



2018

CEDA 2018: "This book …presents state-of-the-art guidance to achieve dredging projects that fulfill their primary functional requirement, while adding value to the (natural and socio-economic) system based on a thorough understanding of the natural system and proactive engagement of stakeholders throughout."

Chapter 2: *Integrating Dredging with Sustainable Development*, by Todd Bridges and Tiedo Velinga

Guiding Principles:

1. Comprehensive consideration and analysis of the social, environmental and economic costs and benefits of a project is used to guide the development of sustainable infrastructure.
2. Commitments to process improvement and innovation are used to conserve resources, maximize efficiency, increase productivity, and extend the useful lifespan of assets and infrastructure.
3. Comprehensive stakeholder engagement and partnering are used to enhance project value.

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Beneficial Use Benefits: *The USACE '70 x 30' Goal*

"Beneficial use" is using dredged sediment to achieve additional benefits beyond its removal from a channel/waterway, including other economic, environmental or social benefits.

DEPARTMENT OF THE ARMY
HEADQUARTERS, US ARMY CORPS OF ENGINEERS
441 G STREET NORTHWEST
WASHINGTON DC 20314-1000

CECG 25 January 2023

Beneficial Use of Dredged Material Command Philosophy Notice

Teammates,

Today I am formally issuing a Beneficial Use of Dredged Material Command Philosophy Notice which outlines my vision for expanding the U.S. Army Corps of Engineers beneficial use of dredged material (BUDM) program. This philosophy notice aligns with two of my four key priorities for the organization, Partnerships and Innovate.

Dredged material is a valued resource that is not to be wasted, but instead used for benefits to the ecosystem, economy, and to deliver the USACE mission more effectively and efficiently across our portfolio of Navigation, Flood Risk Management and Aquatic Ecosystem Restoration projects.

Through a symbiotic relationship with navigation dredging, you are being called to generate productive and positive uses of dredged material. If there is a need for USACE to dredge an authorized channel, the operational strategy should inherently include beneficial use placement options. Equally, if there is a need for sediment, gravel, or rock material to implement a project, beneficial use from dredging operations within authorized channels should be considered as a source in the planning and execution strategy. We must do these things in compliance with applicable laws and regulations, including the Federal Standard for dredged material disposal or placement. A proper analysis of the total lifecycle cost of dredging and placement as well as the full benefits will result in an accurate determination of the Federal Standard.

USACE historically uses 30-40% of the sediments derived from the Navigation mission for beneficial purposes. I have established a goal for USACE to advance the practice of BUDM to 70% by the year 2030 ("70/30 Goal").

Achieving our vision will require purposeful documentation and an innovative pursuit both internally and externally with our partners and stakeholders. You will need to leverage available solutions, strategies, and tools to the maximum extent practicable while developing and applying new approaches and technologies to address the associated engineering challenges.

Districts and divisions are hereby called upon to participate in supporting this shared vision, provide input into the actions to be undertaken, and ensure ultimate success of the BUDM program.

Now is the time to get involved. For more information on how to get involved, contact Tiffany Burroughs, Chief Navigation, HQUSACE by phone at (202) 761-4474 or by email at tiffany.s.burroughs@usace.army.mil

BUILDING STRONG!

SCOTT A. SPELLMON
Lieutenant General, US Army
Commanding

"Dredged material is a valued resource that is not to be wasted, but instead used for benefits to the ecosystem, economy, and to deliver the USACE mission more effectively and efficiently across our portfolio of Navigation, Flood Risk Management and Aquatic Ecosystem Restoration projects."

"I have established a goal for USACE to advance the practice of BUDM to 70% by the year 2030 ("70/30 Goal")."

BUILDING STRONG!

SCOTT A. SPELLMON
Lieutenant General, US Army
Commanding


Horseshoe Bend, Atchafalaya, LA

Middle Harbor, Port of Oakland, CA


Hamilton Wetlands, San Francisco Bay, CA


Galveston Bay, TX


Cat Island, Green Bay, WI


Thin-Layer Placement for Wetlands, Avalon, NJ

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Water Resources Development Act (WRDA) 2024: *Beneficial Use of Dredged Material*

SEC. 1130. MAXIMIZATION OF BENEFICIAL USE.

(a) Beneficial Use of Dredged Material.--Section 1122 of the Water Resources Development Act of 2016 (33 U.S.C. 2326 note) is amended—

...

(B) by striking paragraph (1) and inserting the following:

``(1) promoting resiliency and reducing the risk to property and infrastructure of flooding and storm damage;''

...

(c) Beneficial Use of Dredged Material.--Section 125(a)(1) of the Water Resources Development Act of 2020 (33 U.S.C. 2326g) is amended--

...

(2) by adding at the end the following:

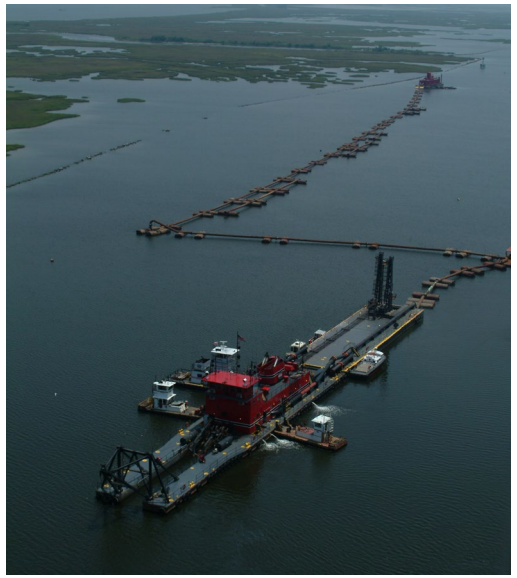
``(B) National goal.--To the greatest extent practicable, the Secretary shall ensure that not less than 70 percent by volume (as measured in cubic yards) of suitable dredged material obtained from the construction or operation and maintenance of water resources development projects is used beneficially.''.

(d) Maximization of Beneficial Use in Dredged Material Management Plans.--Each dredged material management plan for a federally authorized water resources development project, and each regional sediment plan developed under section 204 of the Water Resources Development Act of 1992 (33 U.S.C. 2326), including any such plan under development on the date of enactment of this Act, shall--

(1) maximize the beneficial use of suitable dredged material; and

(2) to the maximum extent practicable, prioritize the use of such dredged material in water resources development projects in areas vulnerable to coastal land loss or shoreline erosion.

...



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Applying the Full Range Practices for *Sustainable Sediment Management and Beneficial Use*

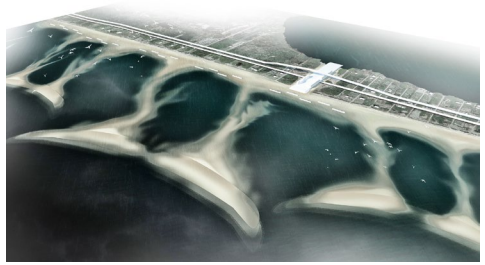
Sediment "Recharge" via Dredging

Direct Wetland "Nourishment"

Wetland Creation

Island Enhancement or Restoration

Engineering / Operational Effort



Strategic Placement

Thin-Layer Placement for Bottom Contouring

Beach and Dune Construction

New Island Construction

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USACE Agency-Specific Procedures for the Principles, Requirements, and Guidelines

Section 234.4 “(c) Net public benefits. The Corps shall strive to maximize net public benefits to society. Public benefits encompass economic, environmental, and social goals, include monetized and un-monetized effects, and allow for the consideration of both quantified and unquantified effects.”

Section 234.7 “(h) …In the development of alternatives, the use of natural systems, ecosystem processes, and nature-based solutions shall be considered. Full consideration and reporting on nonstructural and nature-based alternative actions shall be an integral part of the evaluation of Federal water resources investment alternatives, and a full nonstructural in addition to a full nature-based alternative will be included in the final array of alternatives. Nonstructural and nature-based aspects should also be included in the other alternatives in the final array when appropriate…”

103992 Federal Register / Vol. 89, No. 244 / Thursday, December 19, 2024 / Rules and Regulations

DEPARTMENT OF DEFENSE

Department of the Army, Corps of Engineers

33 CFR Part 234

[Docket ID: COE–2023–0005]

RIN 0710–AB41

Corps of Engineers Agency Specific Procedures To Implement the Principles, Requirements, and Guidelines for Federal Investments in Water Resources

AGENCY: U.S. Army Corps of Engineers, Army, Department of Defense (DoD).

ACTION: Final rule.

Secretary of the Army to revise the 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G)[2] for the U.S. Army Corps of Engineers (Corps). Section 110 of the Water Resources Development Act of 2020 (WRDA 2020) (Division AA of Pub. L. 116–260) directed the Army to issue its final Agency Specific Procedures (ASPs) necessary for the Corps' Civil Works program to implement the P&R and Interagency Guidelines[3] (henceforth "Principles, Requirements and Guidelines," or PR&G).

The P&R were released in March 2013 and set the overarching policy direction. The Interagency Guidelines were finalized in 2014 and provide a common framework for Federal agencies to implement the P&R. The PR&G provide a framework to guide how Federal water resources agencies develop proposed investments in water resources. The PR&G replace the 1983 P&G. Each water resources agency is to develop ASPs to implement the PR&G.

This rule establishes the Corps' ASPs to implement the PR&G. The ASPs provide a framework for the Corps to use in the planning process for projects, plans, and programs. The ASPs focus project development on maximizing net a national water resources planning policy. The national water resources planning policy states that all water resources projects should reflect national priorities, encourage economic development, and protect the environment by: (1) seeking to maximize sustainable economic development; (2) seeking to avoid the unwise use of floodplains and flood-prone areas and minimizing adverse impacts and vulnerabilities in any case in which a floodplain or flood-prone area must be used; and, (3) protecting and restoring the functions of natural systems and mitigating any unavoidable damage to natural systems.

Section 2031 of WRDA 2007 also called for the Secretary of the Army to revise the 1983 P&G for use by the Corps in the formulation, evaluation, and implementation of water resources projects. WRDA 2007 required that these revisions to the P&G address the following: the use of best available economic principles and analytical techniques, including techniques in risk and uncertainty analysis; the assessment and incorporation of public safety in the formulation of alternatives and recommended plans; assessment methods that reflect the value of projects for low-income communities

The Principles and Requirements for Federal Investments in Water Resources (P&R)[1] were established pursuant to the Water Resources Planning Act of 1965 (Pub. L. 89–8), as amended (42 U.S.C. 1962a–2), and consistent with Section 2031 of the Water Resources Development Act of 2007 (WRDA 2007) (Pub. L. 110–114, 42 U.S.C. 1962–3). In WRDA 2007, Congress instructed the

[1] See https://obamawhitehouse.archives.gov/sites/default/files/final_principles_and_requirements_march_2013.pdf. Last accessed May 21, 2024.

National Summit: *Measuring What Matters*
November 30, 2022; Washington D.C.

“It matters because it matters to the President.”

“Our sponsors no longer want to see ‘off the shelf’ solutions.”

“We can’t value everything, but we need to value what we can.”

Michael L. Connor, ASA(CW)

https://ewn.erdc.dren.mil/?p=7841

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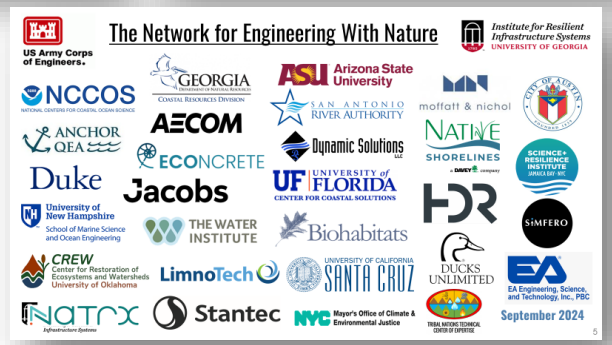
Engineering With Nature®

…the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits through collaboration.

Key Elements:

- Science and engineering that produces operational efficiencies
- Using natural process to maximum benefit
- Increase and diversify infrastructure value
- Science-based collaboration to organize and focus interests, stakeholders, and partners



"We absolutely want to do more engineering with nature everywhere we work across the Corps, you have my commitment."

— LTG Scott A. Spellmon, 55th Chief of Engineers, to the House Committee on Transportation & Infrastructure, Water Resources & Environment Subcommittee (24 June 2021)

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American Society of Civil Engineers: Policy Statement 575 - Nature-based Solutions

Policy

Nature-based solutions (NbS) align natural and engineering processes to deliver infrastructure that provides economic, environmental, and social benefits. The American Society of Civil Engineers (ASCE) supports:

- Expanding infrastructure and community resilience through protection, restoration, prioritization, and implementation of NbS and processes to achieve societal, environmental, and economic benefits.
- Addressing the threat of climate change in part through nature-based infrastructure planning, design, construction, and funding for post-project monitoring and adaptive management.
- Avoiding harm to natural land and seascapes by using NbS where possible and appropriate.
- Updating policies and guidance to facilitate planning, design, retrofitting, permitting, and implementation of nature-based infrastructure and conventional infrastructure.
- Education and training programs to inform engineers of the full range of possible engineered options, including nature-based, hybrid, and conventional features.
- Global collaboration to accelerate research, development, and demonstration projects to advance engineering practices and standards for NbS.

Fort Pierce City Marina, Florida

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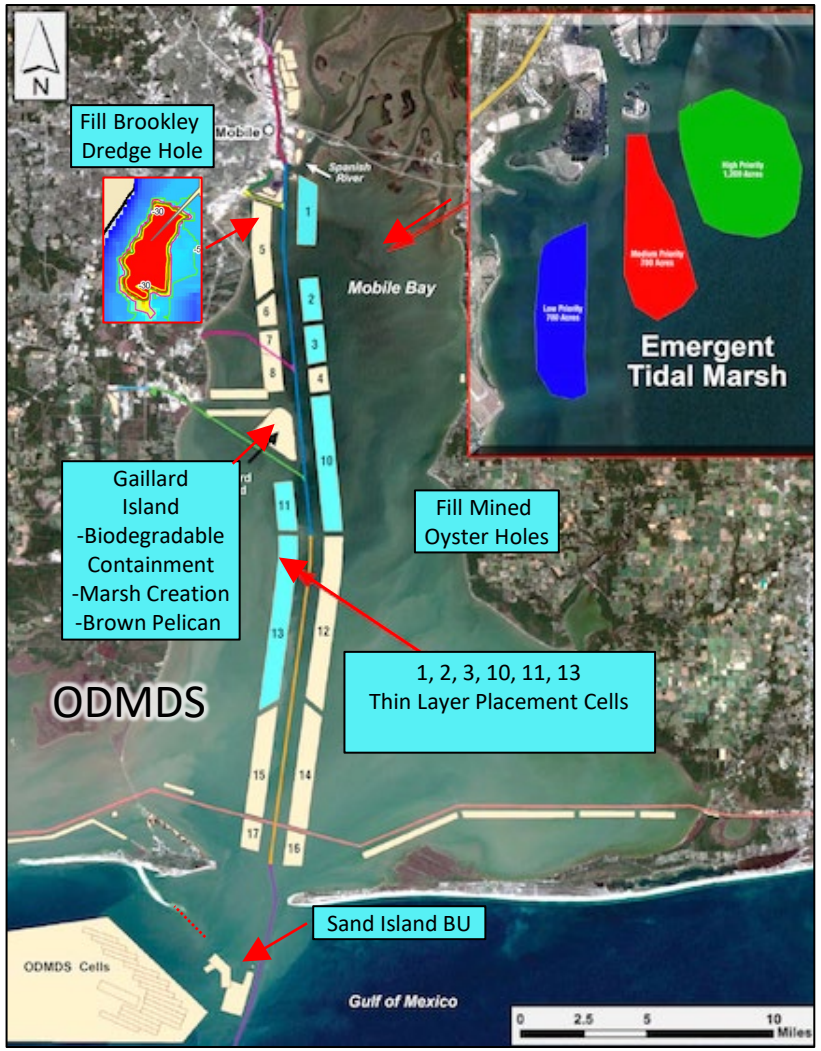
Mobile Bay: *Innovation thru Science-Informed Collaboration*



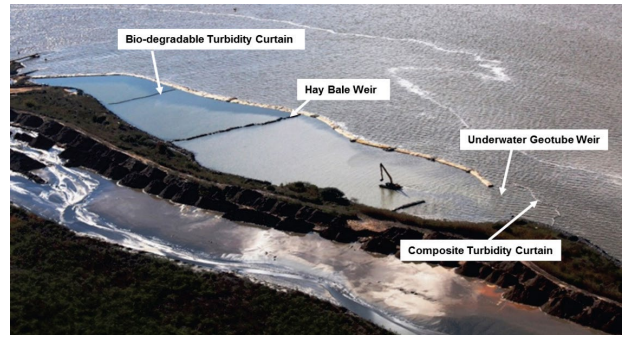
The Problem: *WRDA86*

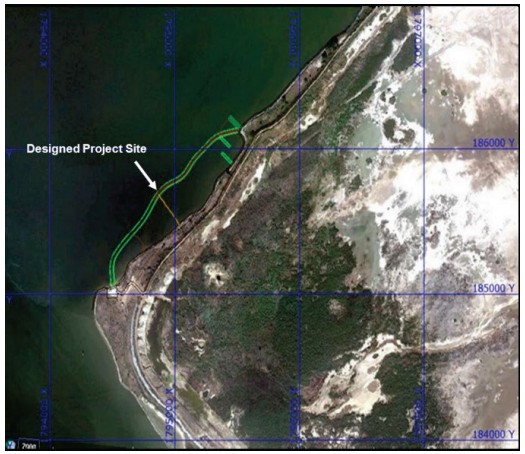
Place <u>all</u> dredged sediments in ODMDS

- 4.0 mcy/yr, hopper dredge, 20+miles
- Tripled maintenance costs

The Solution: *2014, decision reversed*

- EWN approaches and demonstration
- RSM Interagency Work Group





The Benefits: *$12M reduced operational costs + more BU!*

- Thin Layer Placement in Mobile Bay
  - Sand Island Beneficial Use Area (SIBUA)
    - Downdrift benefits to Dauphin Island
    - Protect lighthouse
- Fill dredge hole
  - Brookley Hole, Oyster Holes
- Gaillard Island
  - Marsh Creation, biodegradable containment, Brown Pelican
- Future in-Bay placement:
  - TLP for 1000-acre emergent marsh

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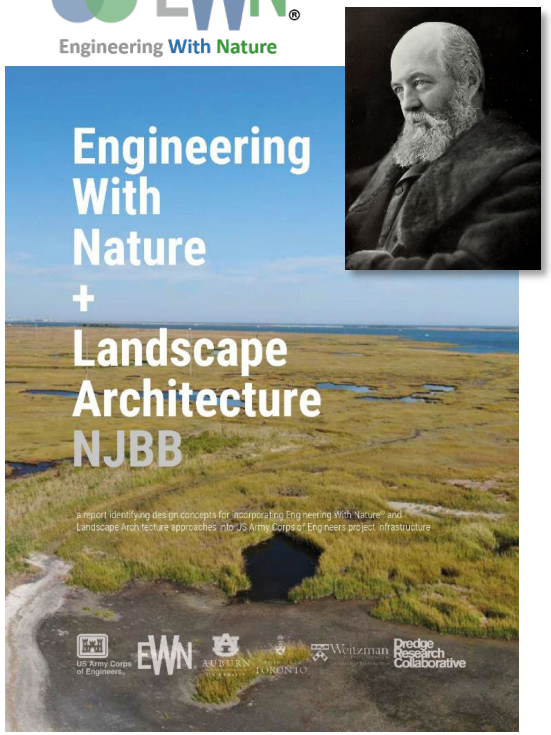
Upscale Partnering: *SMIIL*

Seven Mile Island Innovation Laboratory

- Collaboration and partnership that s building first-of-their-kind NBS projects in coastal New Jersey
  - Began in conversation
  - Accelerated by a storm (Sandy)
  - Progressed through piloting
  - Now in full-scale implementation



US Army Corps of Engineers

NOAA

The Nature Conservancy
Protecting nature. Preserving life.

NEW JERSEY DIVISION OF Fish and Wildlife

Wetlands INSTITUTE

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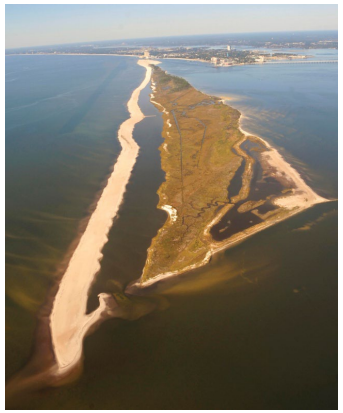
Partnership for Nature-Positive Sediment Management

- Goal: Transform the relationships, business practices, and technology to deliver nature-positive infrastructure projects.
  - Dramatically reduce the costs of environmental compliance and mitigation.
  - Dramatically increase the environmental value of engineering solutions.
  - Transform conflict into collaboration.
  - Co-develop new solutions for 21st century Nature-based Solutions.

USACE research investment and collaboration with USFWS leads to delisting of ILT, efficient conservation

Stimulating new ideas, best practice, building collaborations



Deer Island, MS restoration, BU, coastal resilience

Collaboration with regulatory and resource agencies on EWN produces innovation and win-wins

Seven Mile Island Innovation Laboratory, NJ

US Army Corps of Engineers

NEW JERSEY DIVISION OF Fish and Wildlife

The Nature Conservancy
Protecting nature. Preserving life.

U.S. ARMY CORPS OF ENGINEERS
THREATENED & ENDANGERED SPECIES TEAM (TEST)

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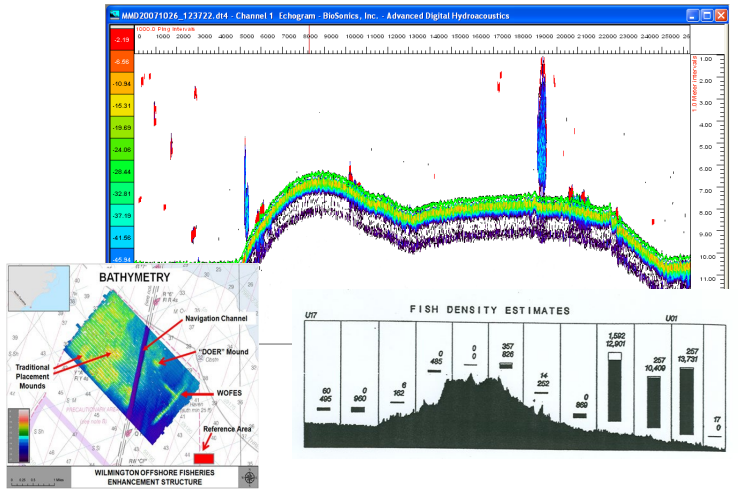
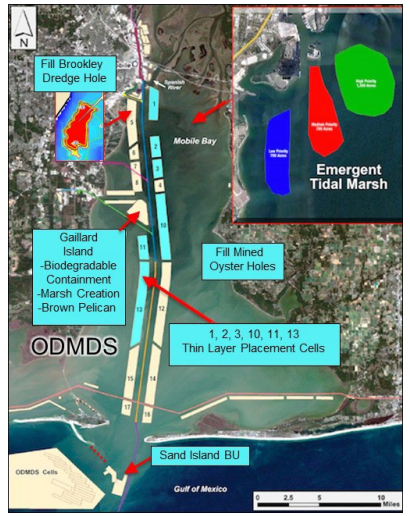


Positive "reef effect" of offshore dredged material management areas on local fisheries



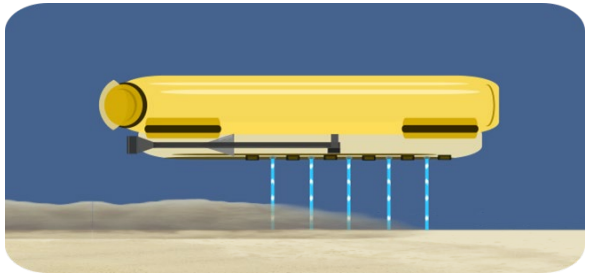
Collaboration on reversal of WRDA 1986 prohibition on in-bay placement in Mobile Bay

Partnership for Construction and Operations Innovation

- Goal: Develop and deliver innovative, leap-ahead technologies and business practices to dramatically accelerate schedules, reduce costs, increase channel and infrastructure reliability, and increase value through expanded beneficial use of sediments.
  - Revolutionize dredging technology and operations.
  - Expand and nationally diversify dredging capacity.
  - Develop technologies to expand the creation of beneficial use value.

Mini-Robotic Submersible Dredge (MRS-D)

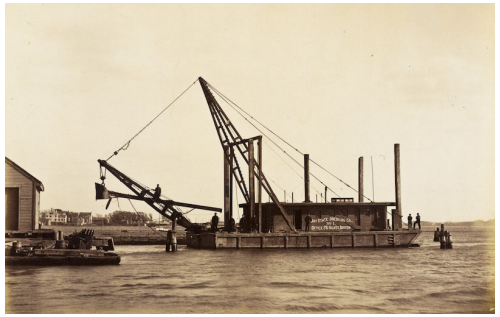
Sediment Distribution Pipe, Seven Mile Island Innovation Laboratory; with Barnegat Bay Dredging Company



Autonomous Hydrodynamic Dredging Drones

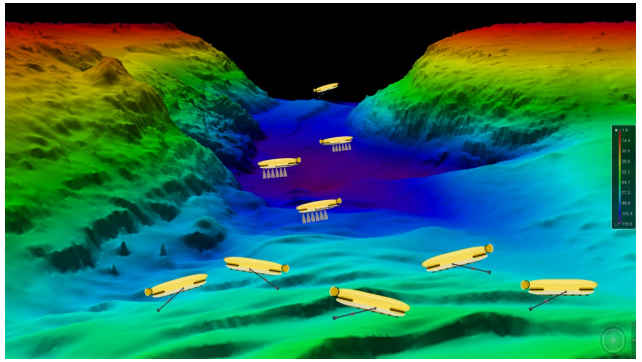
Bed Load Collector; Cuyahoga River, OH

Thin-Layer Placement; Avalon, NJ



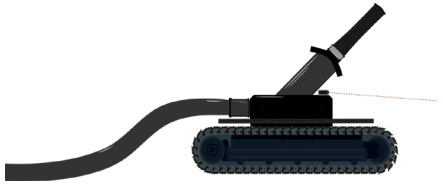
Bay State Dredging Company, 1884

"Dredging by Roomba, 2030"



"Swarms" of networked dredging drones for 24-7-365 dredging

Thin-layer capping of contaminated sediment



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The Institute for Resilient Infrastructure Systems

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Institute for Resilient Infrastructure Systems

Vision: *Natural and conventional infrastructure working together for thriving communities, businesses and natural systems.*

- >50 faculty, researchers, staff spanning 15 colleges, public service organizations, and extension programs at UGA.
- >60 graduate students focused on resilient infrastructure.
- >10 collaborative research and implementation projects with communities and military installations.
- Partnering across sectors.
- Producing high-impact products, education, and training for a new wave of 21st century professionals.
- The Network for Engineering With Nature (N-EWN), https://n-ewn.org/.
- Natural Infrastructure Graduate Certificate, https://iris.uga.edu/natural-infrastructure-certificate/.

iris.uga.edu

The Institute for Resilient Infrastructure Systems: *Sustainable Sediment Management Program (S2M)*

UNIVERSITY OF GEORGIA
Institute for Resilient Infrastructure Systems

IRIS Sustainable Sediment Management Program

Advancing policy and practice to expand and diversify the benefits achieved through sediment management, reduce the costs and impacts of sediment management operations, and create resilient riverine and coastal landscapes and infrastructure.

S2M will convene interdisciplinary expertise and experience across sectors to:

1 *Support*

Support our nation's focus on beneficial use (BU) of dredged sediment as reflected by the U.S. Army Corps of Engineers' goal of 70% beneficial use by 2030;

2 *Advance*

Advance Nature-based Solutions (NbS) implementation to create sustainable infrastructure and more resilient systems;

3 *Restore*

Restore natural processes and systems to reduce long-term costs and impacts to infrastructure, the environment, and communities;

4 *Diversify*

Diversify the benefits achieved through infrastructure investment for expanded economic, environmental, and social value.

S2M

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THE INSTITUTE FOR RESILIENT INFRASTRUCTURE SYSTEMS

S2M Sustainable Sediment Management Program

VIRTUAL SHORT COURSE

ADVANCING POLICY AND PRACTICE FOR RESILIENT LANDSCAPES

LEARN MORE AND REGISTER HERE

DECEMBER 9, 11, 16, 18
1:00 - 3:00 PM EST

JANUARY 6, 8, 13, 15, 20, 22
1:00 - 3:00 PM EST

SEDIMENT MANAGEMENT ISN'T "DIRTY" WORK.

Join us for a series of two-hour long virtual sessions, where you'll have the opportunity to explore the principles and practices of sustainable sediment management in coastal and riverine contexts through in-depth presentations on concepts; engineering and operational practices; methods, modeling, and technologies; and detailed case study examinations of design, construction methods and projects, all taught by leading experts from academia, industry, contractors, government, and non-profits.

Participants will receive 20 hours of content and professional development hours, electronic copies of all presentation materials, access to video recordings of all sessions for three months following the conclusion of the course, and a course certificate documenting participation and completion of the course for professional development hours.

Creating the Conditions for Innovation…

- Innovation is the key to progress and value creation in the 21st century!
- Leadership's role
  - Incentivizing innovation across the vertical team
  - Enabling co-development through effective partnering and stakeholder engagement
  - Creating opportunities to "learn through demonstration"
  - Building momentum through "the power of the story"

Restored confluence of Clark Fork and Blackfoot Rivers, Missoula, MT

"Everything that depends on the action of nature is by nature as good as it can be."

— Aristotle

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ESA