



INCREASING BENEFICIAL USE OF DREDGED MATERIAL IN THE USACE

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Increase Beneficial Use to 70% by 2030

HOW DO WE GET THERE?

Convert
70%
 of sediments to
 beneficial use
 versus
30-40%
 today

Enterprise-wide efforts

- Beneficial Use Tiger Team
- Beneficial Use Workshop
 - ERDC-led workshop July 2021
 - Create an enterprise-wide BU Working Group
 - Publish TR Series on “how to guide” for implementing BU
- **Beneficial Use Hurdles Focus Group**
 - Small focus group to identify and address hurdles to BU implementation
 - Geographic diversity – representation from across the field, ERDC, and HQ
- **Examine and update our existing policies to support BU**

Technical/R&D efforts

- **Develop innovative solutions and partnerships for beneficial use**
 - Innovation in Sediment Management Strategic Focus Area
 - ERDC R&D Programs
 - Regional Sediment Management, Engineering with Nature, etc.
 - Advancement of BU approaches through R&D efforts
- **Quantify and document current beneficial use practices in Navigation projects to showcase success and highlight potential opportunities to increase BU**
 - Beneficial Use Database
 - Example at the Mouth of Columbia River (RSM/NWP)

NATIONAL CHALLENGE

- Sedimentation in navigation channels and reservoirs represents **>\$1B/year cost**, dredging costs continue to rise, and all dredging needs are not met
- **Loss of water/flood storage capacity** due to sedimentation
- **Shoreline erosion** and loss of function and value of natural features
- **Only 30% of dredged sediment** is used beneficially

CAPABILITY NEEDS

- Leap-ahead construction and operation technologies to **lower costs** and accelerate schedules
- **Next generation sensors**, monitoring and modeling technologies to reduce sediment imbalances, channel in-filling and dredging needs
- **National physical modeling facility** to test new marine/aquatic dredging and construction techniques
- **Engineering With Nature® solutions** for sediment that deliver multi-purpose value

OUTCOMES

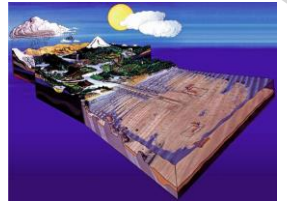
- \$80M annual investment in sediment innovation over five years delivers **\$10B in cost savings and added value** over the first 15 years
- Increase national beneficial use from **30% to >70%** over 10 years
- Advance USACE sustainability by expanding environmental and social benefits at navigation projects by **50% over 10 years**

INNOVATION IN SEDIMENT MANAGEMENT



Regional Sediment Management Program

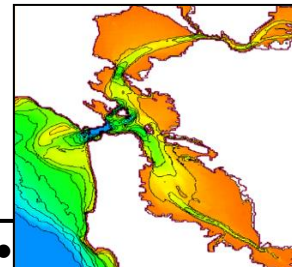
Established 1999, CERB Charge



“A systems approach using best management practices for more efficient and effective use of sediments in coastal, estuarine, and inland environments for healthier and more resilient systems.”

The Program Funds Projects that:

- Recognize sediment as a valuable resource
- Work across business lines, projects, and authorities to create short and long-term economically viable and environmentally sustainable solutions
- Improve operational efficiencies and natural exchange of sediments
- Consider regional implications of project scale actions and benefits
- Apply/Enhance tools and technologies for regional approaches
- Share lessons learned, information, data, tools, and technologies
- Communicate and collaborate



Engineering With Nature®

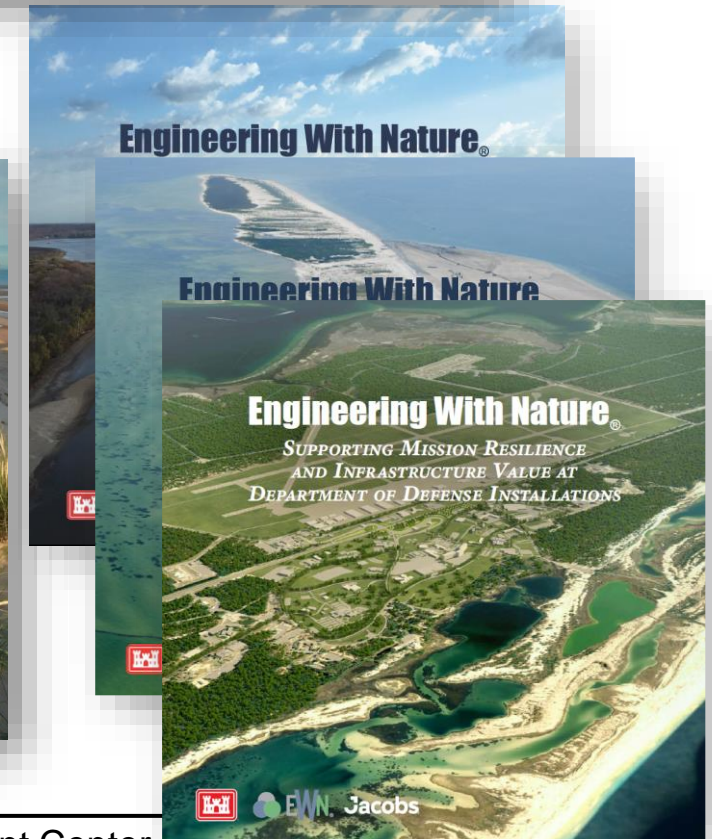
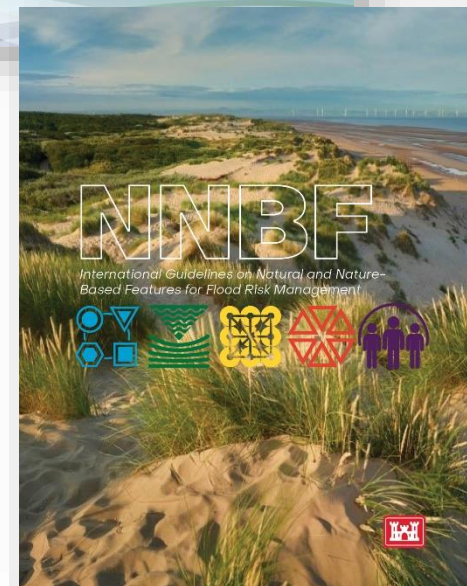


...the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits through collaboration.

Key Elements:

- Science and engineering that produces operational efficiencies
- Using natural process to maximum benefit
- Broaden and extend the benefits provided by projects
- Science-based collaborative processes to organize and focus interests, stakeholders, and partners

www.engineeringwithnature.org



PROBLEM

- Coastal erosion costs ~\$500M/yr across the US, and the federal government spends \$150M/yr for traditional beach nourishment
- Sediment deficits are an important contributor to erosion
- The USACE places 48Myd³/yr of dredged sediment in offshore disposal areas, much of which could be beneficially used
- Isolated nearshore nourishment documentation could impede & limit dredged sediment beneficial use opportunities

SOLUTION

- Develop Sediment Mobility Tool for rapid evaluation of potential placement sites
- Consolidate the current state of knowledge and practice for nearshore nourishment
- Develop best practices for nearshore nourishment

IMPACT

- Improve nearshore nourishment information availability on larger scales than previously feasible
- Increase nearshore nourishment projects for improved coastal sustainability and resilience

Beneficial Use of Dredged Sediment for Nearshore Nourishment

CONSTRUCTION



AFTER CONSTRUCTION



ECOSYSTEM RESTORATION BY THIN LAYER PLACEMENT OF SEDIMENT

PROBLEM

- 1986 WRDA dictated dredged material in Mobile Bay navigation channel be disposed at sites as far as 40 miles from the bay
- Limited dredge type to ocean-going vessels and nearly tripled dredging costs

SOLUTION

- Thin Layer Placement demo in Mobile Bay included 9M cubic yards of sediment
- ERDC used multiple data collection and modeling tools to determine sediment transport directions after placement

IMPACT

- Modeling/monitoring results brought unanimous decision for in-bay placement
- Environmentally-acceptable alternative to ocean disposal
- **\$6M/year cost savings** for Mobile Bay



ECOSYSTEM RESTORATION BY THIN LAYER PLACEMENT OF SEDIMENT

APPLICATIONS

- TLP has been implemented across the nation
- Though TLP can be completed with any sediment type, it is an innovative way to beneficially use fine sediment

STATUS

- More R&D on morphologic evolution of TLPs continues
- Models are being developed to predict evolution

BENEFITS

- Allows for beneficial use of dredged material
- Creates more sustainable and resilient coast lines
- Increases beneficial use of fine dredged material



Innovative Sediment Placement Technology: Sediment Distribution Pipe

PROBLEM

- Beneficial use of Dredge Material (BUDM) projects in wetlands provide a suite of ecosystem and flood risk reduction benefits.
- Wetland nourishing often requires movement of the discharge pipe, which is time consuming, costly, and can damage the marsh surface.

SOLUTION

- Sediment Distribution Pipe can:
 - Place sediment over a larger region
 - Potentially separate sand from fine material for targeted placement

IMPACT

- Increase BUDM for USACE wetland projects by:
 - More efficient wetland nourishment
 - Reduced impact to marsh surface
 - Increased dredge production rates



Innovative Sediment Placement Technology: Sediment Distribution Pipe

WHAT'S NEXT

With additional resources, we will demonstrate the applications for using the SDP to increase efficiency in BUDM projects.

APPLICATIONS

- Wetland nourishment at Sturgeon Island, NJ :
 - Elevated pipe – allows sediment to flow in multiple directions
 - Non-elevated pipe – uses pipe as containment and places sediment on one side
 - Marsh edge nourishment – can place a dynamic layer of sediment on the marsh edge for protection

STATUS

- Success at Sturgeon Island, NJ being written in a technical report for future projects
- Laboratory experiments ongoing to evaluate sorting and placement efficiencies

BENEFITS

- Increased beneficial use of dredged sediment to nourish wetlands by:
 - Efficiently placing sediment over larger area
 - Optimizing engineering properties of sediment directly placed
 - Reducing containment costs
 - Reducing construction-related damage to the wetland

Innovative Dredging

PROBLEM

- Understanding density current dynamics such as fluidization, transport, and deposition.
- Inefficient dredging operations at active ports & in close proximity to wharfs and berthed ships
- USACE reservoirs with excessive sedimentation reducing flood control capacity.

SOLUTION

- Field observation and data collection of water injection dredging (WID) operations.
- Development of innovative dredging methods for targeting critical shoals and sustaining port operations.
- Dredging in non-traditional environments (reservoirs) in need.

IMPACT

- Improved predictive capability of dredging production rate & density current dynamics.
- Cheaper and faster dredging at critical port infrastructure.
- Dredging USACE flood-control infrastructure (reservoirs) to increase capacity.



Innovative Dredging



APPLICATIONS

- Dredging in close proximity to harbor and port infrastructure without impeding port or dredge operations.
- Federal and non-federal port operators in need of flexible and timely dredging of critical shoals to prevent draft restrictions.
- Deep and shallow draft channel and port managers that have chronic draft restrictions and/or inadequate disposal capacity

STATUS

- Field data collection of water injection dredging operations in Wilmington NC.
- PORTS 2022 Conference Article, *Water Injection Dredging, a Cost-Effective Force of Nature*, published October 2022

BENEFITS

- Reduction or elimination of channel and harbor draft restrictions
- Reduced cost and time required to dredge channels and ports
- Reduced need for confined or offshore disposal
- Increase lifespan of reservoirs and sustainable flood-control capacity

WHAT'S NEXT

With additional resources, transition to innovative reservoir dredging earlier than planned.

FINE SEDIMENT REMOVAL DURING HOPPER DREDGING

WHAT'S NEXT

Pilot applications to demonstrate technology to local stakeholders could be conducted

APPLICATIONS

- Planned proof-of-concept application for upcoming beach nourishment project
- Coastal districts can apply research findings to better estimate sediment compatibility, expand available offshore sand resources for beach nourishment, and support beneficial use of navigation dredged material

STATUS

- Phase 1 research is complete, demonstrated nearly 90% removal of fine sediment content from borrow area to beach; Technical report published in 2019 and results presented at two technical conferences
- Florida DEP engaged with Phase 2 research and proof-of-concept application (scheduled for 2023)
- Navigation dredging research delayed by COVID-19 restrictions on hopper dredging fleet

BENEFITS

- Reduced costs for searching for offshore sand sources
- Reduced time and cost of beach nourishment projects
- Increased sand retained in the littoral system
- Reduced costs for permitting offshore placement sites



PROBLEM

- Disposal of dredged material offshore or upland can lead to a lack of sediment along critically eroding shorelines and riverbanks
- Sediment is a resource and therefore there is a need to increase beneficial use (BU) across the nation
- Currently unclear how much BU is being done and where

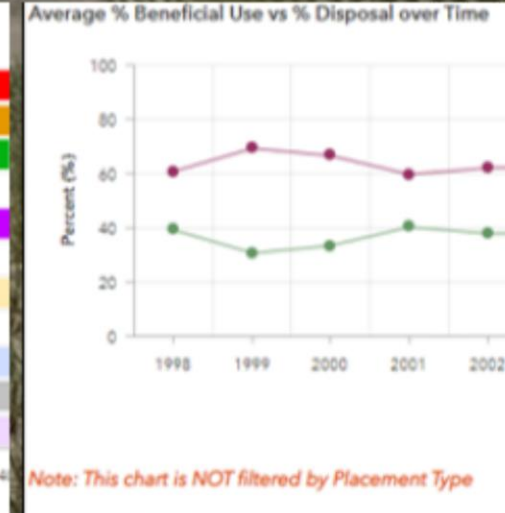
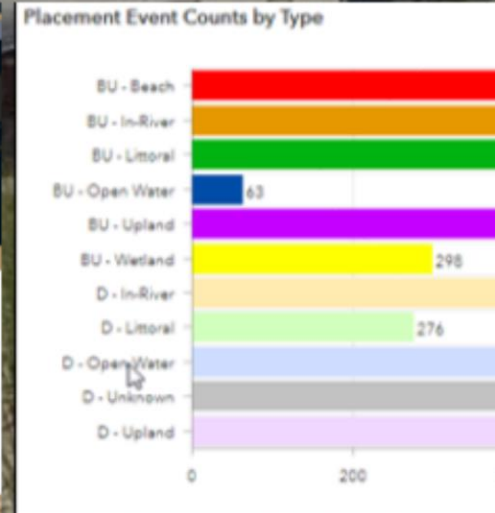
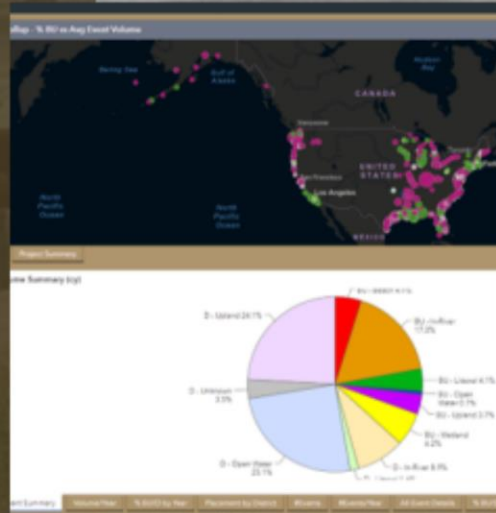
SOLUTION

- RSM Beneficial Use Database was created to visually display BU data from across the USACE
- Understand trends in BU in time
- Identify areas of improvement

IMPACT

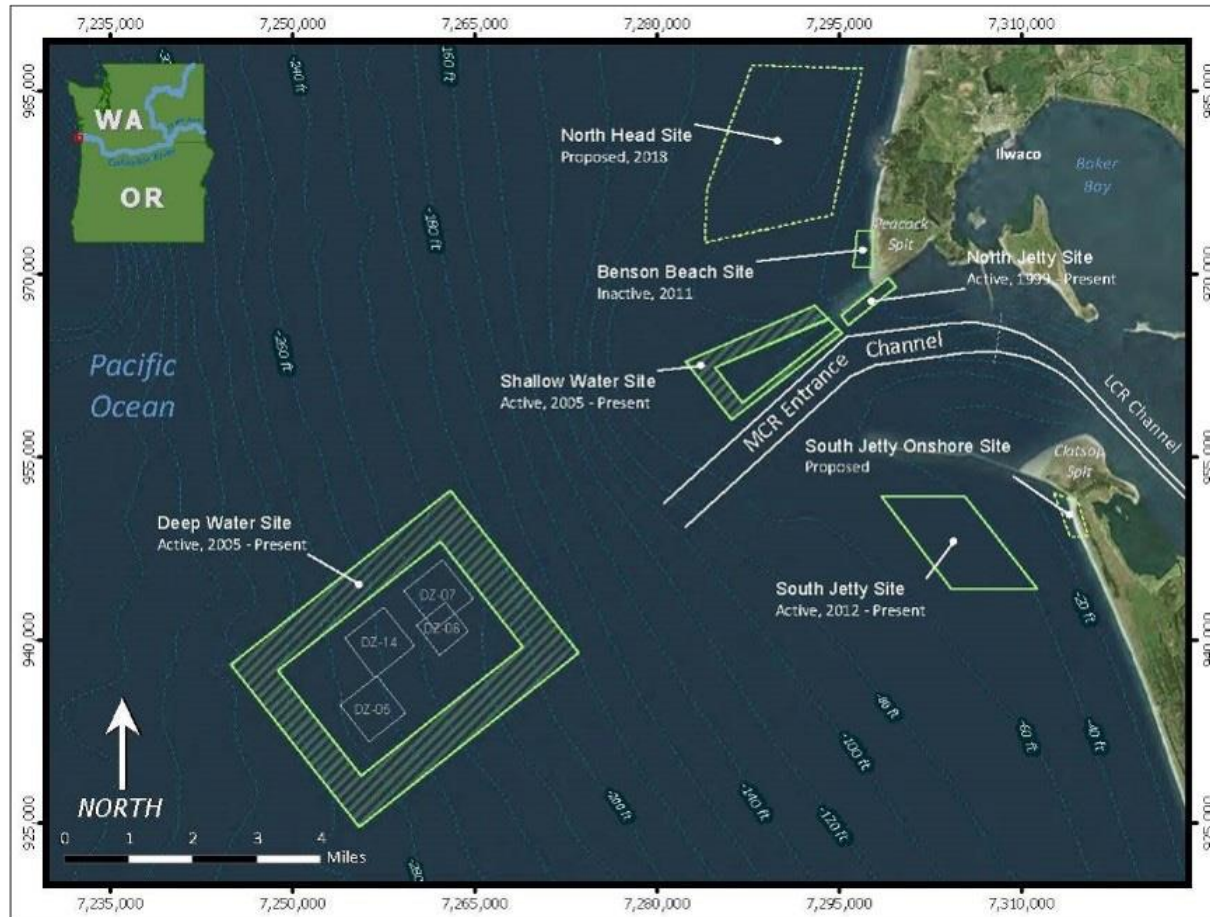
- By visualizing BU across USACE, we can increase the amount of BU incorporated in projects
- Can lead to healthier systems and a more resilient environment

RSM BENEFICIAL USE DATABASE





RSM Example: Mouth of the Columbia River



Courtesy USACE Portland District

Challenge

- Prevent “wasting” sediment to the DWS
- Protecting public investment (Jetty)
- Shoreline erosion
- Protect benthic habitat

Goals

Implement NWP RSM Strategy

- Keep sediment in the littoral cell (BU)
- Obtain/place new nearshore sites
- Protect South Jetty Root
- Dune Building: Sand Fencing
- Lower Maintenance Dredging Costs/Cycle Time
- Increased Habitat Opportunities for Benthics
- Stakeholder collaboration
- \$110,000 cost savings/season South Jetty Site
- Additional Cost Savings/Environmental Benefits TBD

Summary About this Application

Filters

To CLEAR all filters, press F5

- NWD
- POD
- SAD
- SPD
- SWD

District(s)
NWP

Show All

NWK

NWO

NWP

NWS

NWW

Reset

Navigation O&M Projects
Mouth of Columbia River

Filter...

Coquille (@ bandon)

Cowlitz River

Depoe Bay

Mouth of Columbia River

Note:
2020 & 2021 datasets are currently under review.
Data last updated 6/1/2021

BU = Beneficial Use D = Disposal

Dredge Events

 **147**

Total Volume
79.93M cy

Beneficial Use
43%
34.49M cy of 79.93M cy

72
BU Events

Disposal
57%
45.45M cy of 79.93M cy

75
Disposal Events

Project Summary Totals, 1998 - 2021

Mouth of Columbia River - NWP

Year(s) Authorized:	Volume	Volume Type	# Events
1998-2021	79,932,015 cy	Total Volume	147
22 Year(s) Active	3,633,273 cy	Avg Vol/Active Year	
	543,755 cy	Avg Vol/Event	
24 Year(s) Authorized	3,330,501 cy	Avg Vol/Authorized Year	
Beneficial Use	34,485,532 cy	43%	72
Disposal	46,108,786 cy	58%	70

CENWP_MC_RSM

This list is NOT filtered by FY or Placement. Click on Project to filter items below

Last update: 2 minutes ago

Map Project Summary

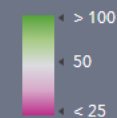
O&M Projects*

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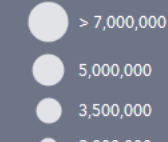
*Not filtered by Date or Placement

Project Summary

PercentBU



AvgEventVolume



Total Volume by Year 1998-2004: 12% BU

2005-2021: 62% BU



Last update: 2 minutes ago

Placement Summary Volume/Year % BU/D by Year Placement by District #Events #Events/Year All Event Details

WRDA 2020 section 125

- This section renews the Congressional commitment to beneficial use (BU) of dredged material by:
 - (a) establishing a national policy to maximize the beneficial use of material obtained from Corps projects; requiring the Corps to calculate the economic and environmental benefits of the beneficial use of dredged material when calculating the Federal Standard,
 - (b) amending section 204(d) of WRDA 1992 to direct that other-than-least-cost placements of dredged material for certain purposes be funded using appropriations available for construction or operation and maintenance of the water resources development project producing the dredged material
 - (c) increasing the number of beneficial use of dredged material demonstration projects to 35 projects,
 - (d) directing the Corps to develop five-year regional dredged material management plans, and
 - (e) emphasizing greater coordination across the Corps' dredging contracts.

What else??





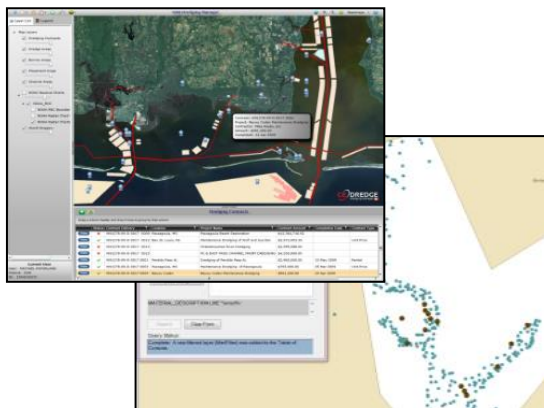
Regional Sediment Management = Resilient Healthy Systems

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Regional Sediment Budgets
Local Actions=Regional Benefits



Data Management and Access



ODMDS
Regional Strategies



Improved Relationships
Outreach & Training



Riverine & Reservoir Mgmt



Ecosystem/Aquatic Habitat