

# Navigation R&D

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National Dredging Meeting  
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US Army Corps of Engineers  
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## Navigation R&D Programs

Dredging Operations and Environmental Research

Coastal Inlets Research Program

Navigation Systems

Regional Sediment Management

Monitoring Completed Navigation Projects

Dredging Operations Technical Support

Inland Electronic Navigation Charts

Coastal Zone Mapping and Imaging Lidar

ARRA Improving Throughput & Safety

Inland Navigation Safety Initiative

Navigation Structures

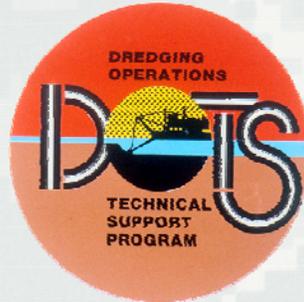


<http://operations.usace.army.mil/navigation.cfm>

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## Dredging Operations Technical Support

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Reach-back for ALL Navigation R&D

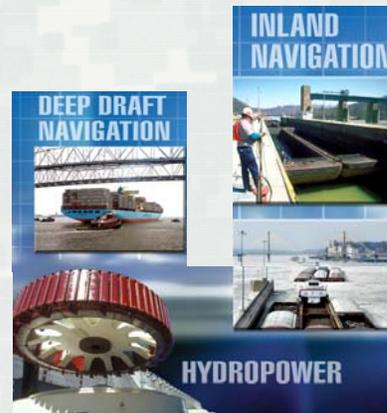


PM: Dr. Doug Clarke

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## Navigation Systems Research Program

Meet marine transportation, hydropower and infrastructure challenges through research that incorporates engineering, economic, and environmental solutions.



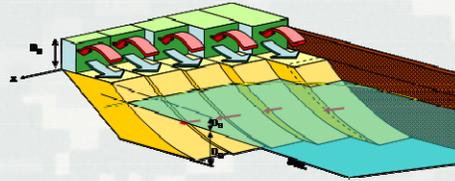
PM: Eddie Wiggins

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## Coastal Inlets Research Program

- Conduct R&D to reduce O&M costs at inlet navigation projects.
- Develop tools to support O&M practice.
  - ▶ Put technology in hands of District engineers and scientists.
  - ▶ Treat inlet channels, adjacent beaches, dredging, and placement within a regional system.
- Transfer technology.
  - Guidance documents, Workshops, Engineering models, Web site, Wiki-pages, PC software



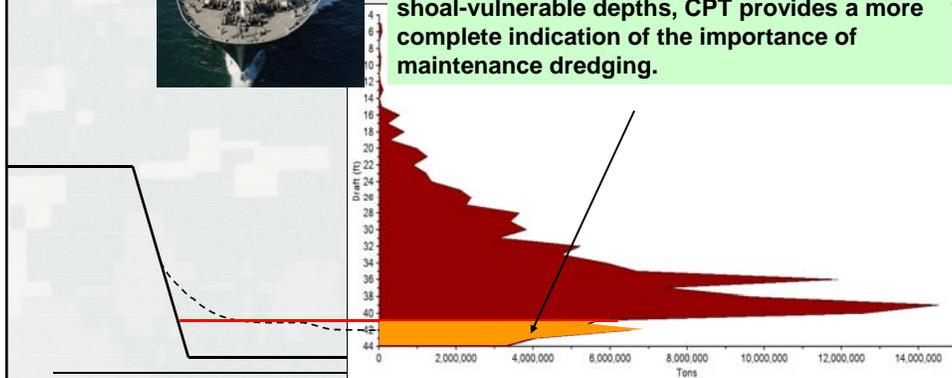
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## Channel Portfolio Tool (CPT)



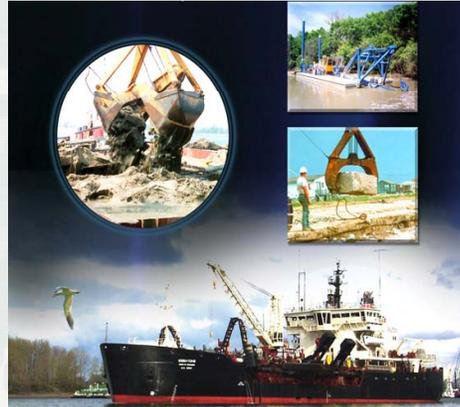
- Portfolio management for USACE navigation channels should consider both physical condition and depth utilization when prioritizing projects for O&M funding.
- By focusing on the cargo at the marginal, shoal-vulnerable depths, CPT provides a more complete indication of the importance of maintenance dredging.



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## Dredging Operations and Environmental Research

Support sound environmental management and engineering practice by advancing the science and technology applied to navigation dredging operations



PM: Dr. Todd Bridges

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## Operations Technologies Products Diesel Fuel Additive/Alternatives Performance Investigations

- **Problem/Purpose**
  - Rising dredging costs a function of rising diesel fuel costs.
  - Fuel additives and alternatives available but not objectively tested by USACE.
- **Solution/Approach**
  - Evaluate additives and/or fuel alternatives performance and use on USACE diesel plants.
  - ~~Optimize USACE fuel management practices.~~



- **Products**
  - Diesel fuel additive performance test results report.
  - Biodiesel demonstrations.
  - Draft USACE Fuel Management Practices Report.

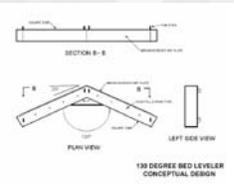


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## Operations Technologies Products Bed Leveler Studies for TES Protection

▪ **Problem/Purpose**

- Certain regulatory agencies believe bed levelers impact turtles
- USACE has not addressed any further evaluations of dredging equipment for TES protection since the original inception of the turtle deflector in 1994.



▪ **Solution/Approach**

- To conduct engineering and biological evaluations with innovative dredging technologies for increased TES protection while minimizing impacts on dredge production rates.

▪ **Products**

- Report on model bed leveler study.
- Contract specifications for turtle-friendly bed leveler (design drawings and text).
- Looking for field demonstration.



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## Operations Technologies Products High Resolution Fluid Mud/Residuals Survey System

▪ **Problem/Purpose**

- Sounding pole, lead line, and acoustic echo sounding will generally not correlate with one another, or give consistent readings from one time to the next when the same type of instrument is used in fluid mud.
- This measurement ambiguity has hindered Corps management of fluid mud projects



▪ **Solution/Approach**

- Improve USACE capability to more accurately characterize fluid mud and dredging residuals with increased resolution density probe that doesn't require calibration.

▪ **Products**

- TN: World-wide Fluid mud Surveying Systems and Nautical Depth Definitions.
- White Paper discussing engineering feasibility of Corps implementation of a nautical depth policy.
- High-resolution prototype probe and testing report.



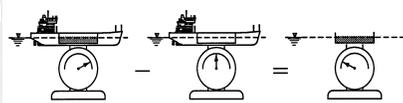
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## Operations Technologies Products Bin Measure Technologies and Tons Dry Solids (TDS) as Potential Payment Basis



- **Purpose**

- ▶ Investigate alternative bin measure technologies and TDS accuracies and precisions for potential contract payment bases.



- **Solution/Approach**

- Conduct field demonstrations and evaluate bin measurement technologies (e.g. automated leadline).
  - Conduct field demonstrations on TDS measurement with Industry to evaluate together.

- **Products**

- Determined if feasible

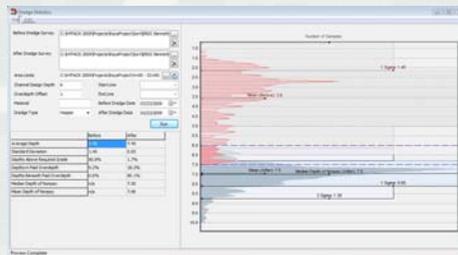


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## Operations Technologies Products Overdepth Dredging Tools

- **Problem/Purpose**

- The EPA has raised concerns related to the dredging of material from outside authorized channel dimensions.



- **Solution/Approach**

- Provide quantitative understanding of overdepth dredging.
  - Provide operations managers with tools to monitor overdepth dredging.

- **Products**

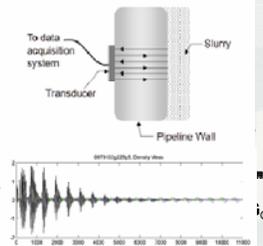
- Overdepth Characterization Technote.
  - HYPACK overdredge dredging statistics module.
  - Statistical analyses of different dredge type excavation/overdepth accuracies.



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## Operations Technologies Products Non -Nuclear Velocity / Density Measurement for Dredging Production Process

- MDC conducted final "Proof off Concept" testing on board ESSAYONS.
- Pacific Northwest National Lab Testing concluded that the self calibrating system was accurate for measuring pumped density aboard a dredge.
- In coordination with MDC, currently investigating:
  - Potential of advancing this technology,
  - Corps/Industry interest levels, and
  - Possible leveraging opportunities.



## PTM for environmental resources

- Problem/Purpose
  - ▶ Rapid evaluation for fate of dredged material
  - ▶ Quantify constituent and living resource transport
  - ▶ Expand PTM to include chemicals and larvae transport
- Solution/Approach
  - ▶ Incorporate non-conservative constituent transport into PTM
  - ▶ Incorporate larvae behavior into PTM parcels
  - ▶ Demonstrate applicability



### Products

- ▶ TN: Volatization/chemical reaction TN
- ▶ TN: Larvae behavior
- ▶ TR: Demonstration of larvae behavior



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## Lock Operator Management Application

- Improve Safety, Reliability, Efficiency
- Non-structural improvement
- Features and capabilities
  - ▶ AIS foundation
  - ▶ Architecture
  - ▶ Applications
- Enabling technology for modernizing inland waterway transportation



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## Research Area Review Group Changes this FY

1. Greatly expanded RARG
2. Initiate R&D next Fiscal Year
3. Adding a strategic discussion



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## Research Area Review Group Responsibilities

1. Attend annual RARG meeting and prioritize Statements of Need
2. Learn about Nav R&D Program technologies & tools and take them back with you
3. Submit Statements of Need (colleagues too)
4. Collaborate year round with Principal Investigators
5. Provide your thoughts



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**Thank You**



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