

# Navigation RD&T Status 2015

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U.S. Army Corps of Engineers

7 - 9 April 2015  
Vicksburg, MS



US Army Corps of Engineers

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# Navigation RD&T Portfolio

## Dredging Operations and Environmental Research

Dr. Todd Bridges

## Coastal Inlets Research Program

Dr. Julie Rosati

## Navigation Systems

Mr. Eddie Wiggins

## Regional Sediment Management

Ms. Linda Lillycrop

## Monitoring Completed Navigation Projects

Dr. Lyn Hales

## Dredging Operations Technical Support

Ms. Cynthia Banks

## Dredging Innovations Group

Dr. Ned Mitchell

## Inland Electronic Navigation Charts

Dr. Bob Mann / Ms. Denise LaDue

## National Coastal Mapping Program

Ms. Jennifer Wozencraft



# Navigation RD&T Strategic Needs & Priorities

## FY15

- Extend the useful life of existing navigation infrastructure
- Operate and manage national waterborne transportation assets as an integrated system
- Optimize and prioritize channel availability for commercial freight movement
- Engineering with nature to enhance ecosystem and project processes, benefits and services
- Implement eNavigation throughout the National MTS
- Deliver sound engineering and scientific solutions to align with the Planning Modernization initiative



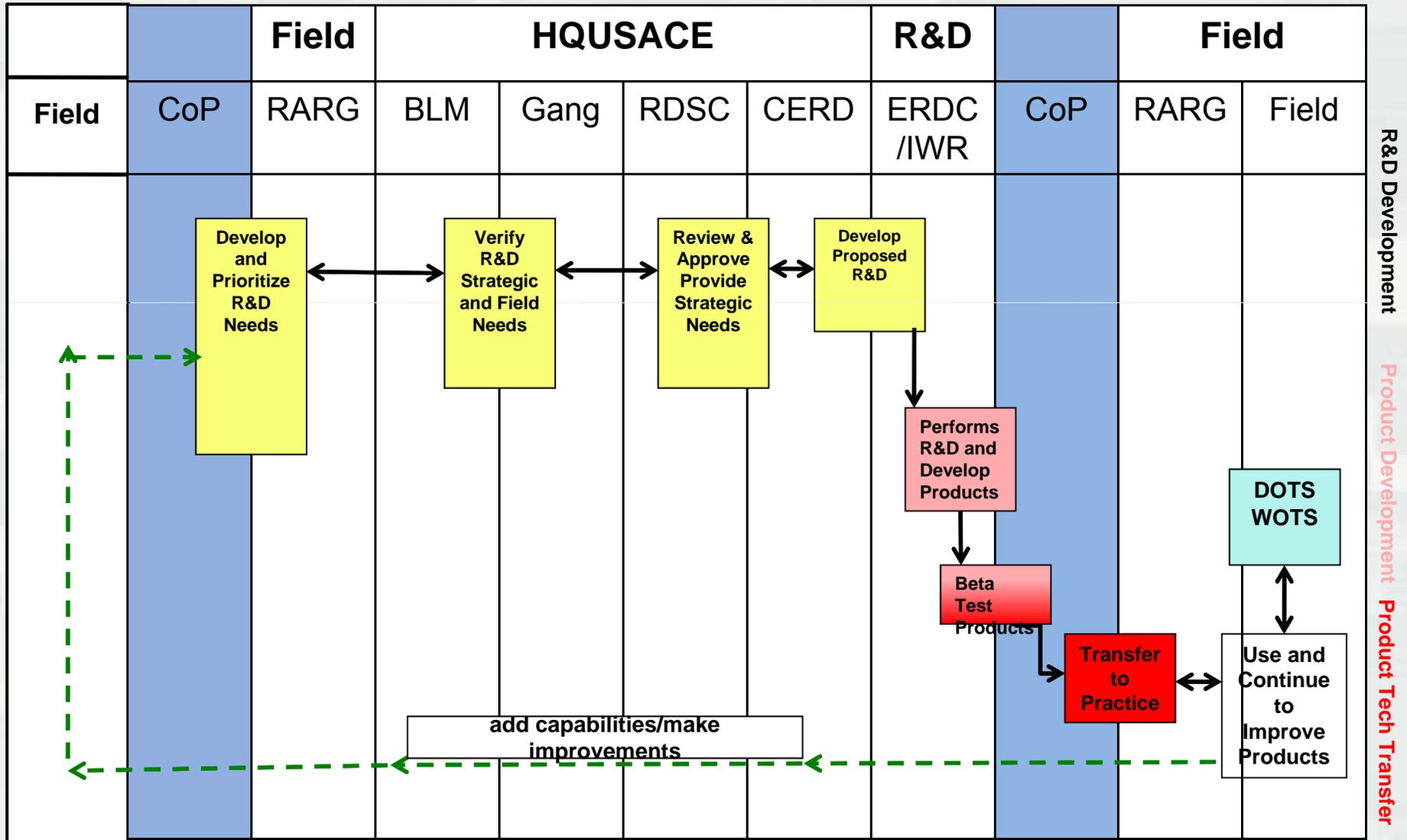
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# FY14 Highlights

- **CoP participation in the R&D process**
- **RSM Technical Center of Expertise**
- **Marine Transportation System Performance**
- **Engineering With Nature**
- **Navigation Data Integration Framework**
- **Coastal Systems**
  - ▶ **Coastal Structures, Channels, and FRM Asset Management**
  - ▶ **Coastal System Resilience**
- **Inland Structures**
  - ▶ **Smart Gate 2 / Structural Health Monitoring**
  - ▶ **Lock Operations Management Application**
  - ▶ **Leveraging Military RD&T**
  - ▶ **Composite Materials**
  - ▶ **RD&T Collaboration with US Bureau of Reclamation**



# CoP Participation in the Civil Works R&D Process



R&D Development  
Product Development  
Product Tech Transfer

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# Regional Sediment Management CX

## WHY RSM?

- Dredging contract savings
- Cross Business Line value
- Programmatic savings
- USACE as valuable partner
- Resilient, sustainable systems approach

## WHY CX?

- Implementation branch of RSM
- Measure & communicate value
- One door to consistent guidance
- Leverage tools and initiatives
- Requests for help
- National SMEs

## WHY SAJ/SAD?

- Passion, experience, motivation
- Humble – We don't know it all
- Subject Matter Experts Nationwide

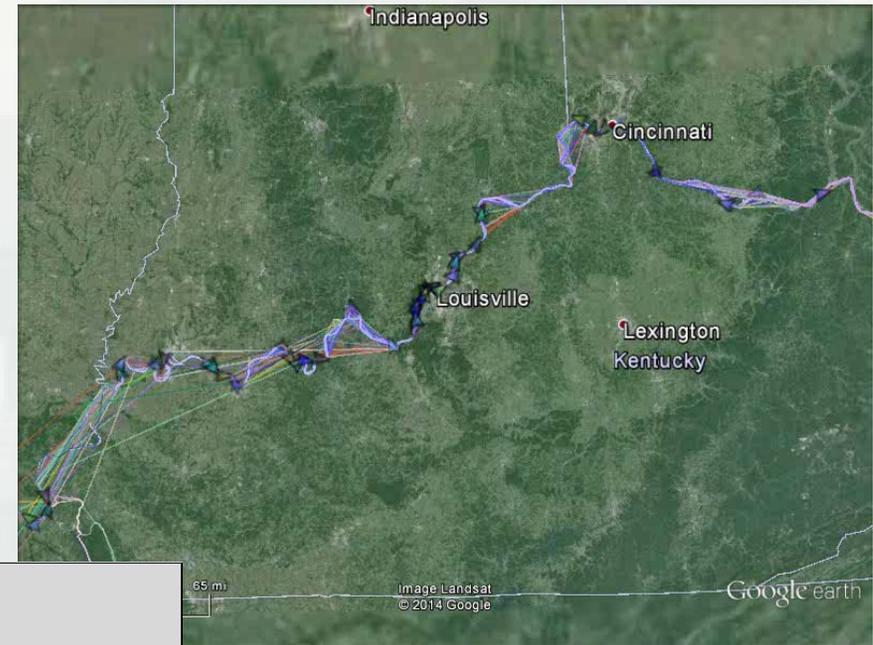


U.S. ARMY



# Marine Transportation System Performance

Selected Preliminary Findings:  
*Ohio River Travel Times, 2013*



travel time (hrs)		Destination / To (Ohio River Mile)				
low 25 <sup>th</sup> percentile	median 50 <sup>th</sup> percentile					
		high 75 <sup>th</sup> percentile				
Origin / From (Ohio River Mile)	Cairo, IL (981)	-----	8 10 16	38 46 63	75 91 120	100 123 159
	Paducah, KY (934)	7 13	-----	36 47	81 103	92 143
	Evansville, IN (781)	26 33	20 26	-----	37 45	63 77
	Louisville, OH (602)	51 62	45 55	25 29	-----	25 32
	Cincinnati, OH (470)	68 84	63 77	42 51	18 22	-----
	120	108	69	31		

Upstream Direction

Downstream Direction

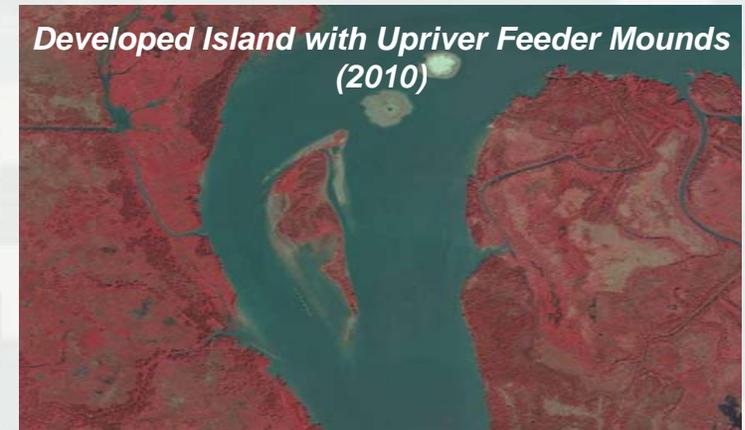
- Economic Benefits to the Nation
- Capacity & Reliability
- Safety & Security
- Environmental Stewardship
- Resilience



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# Engineering With Nature

- Objective: Demonstrate Engineering With Nature (EWN) offers sustainable solutions for navigation project delivery
- Demo Project: Evaluated Beneficial Use project at Horseshoe Bend on the Atchafalaya River resulted in reduced dredging requirements, and formation of >90 acres habitat area
- Interim Product: Understanding and quantification of physical processes of a successful EWN project that will lead to design guidance for future EWN efforts
- Campaign Plan: Objectives 2c & 2d



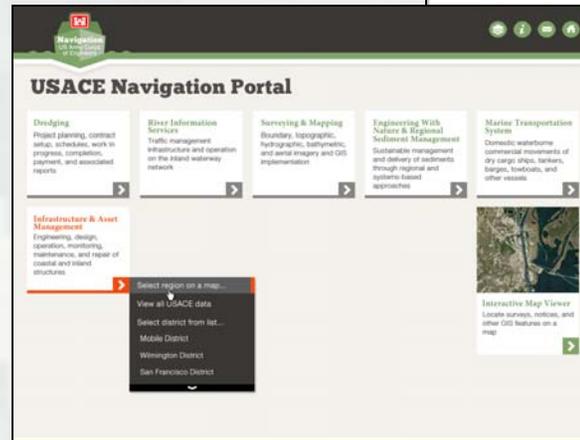
# Navigation Data Integration Framework

## Navigation DIF Components

- Source Databases
- Hub Catalog
- Tools
- Web Services
- Portals

## Navigation Sub-categories

- Dredging
- River Information Services
- Surveying & Mapping
- Infrastructure & Asset Management
- Engineering With Nature & Regional Sediment Management
- Marine Transportation System

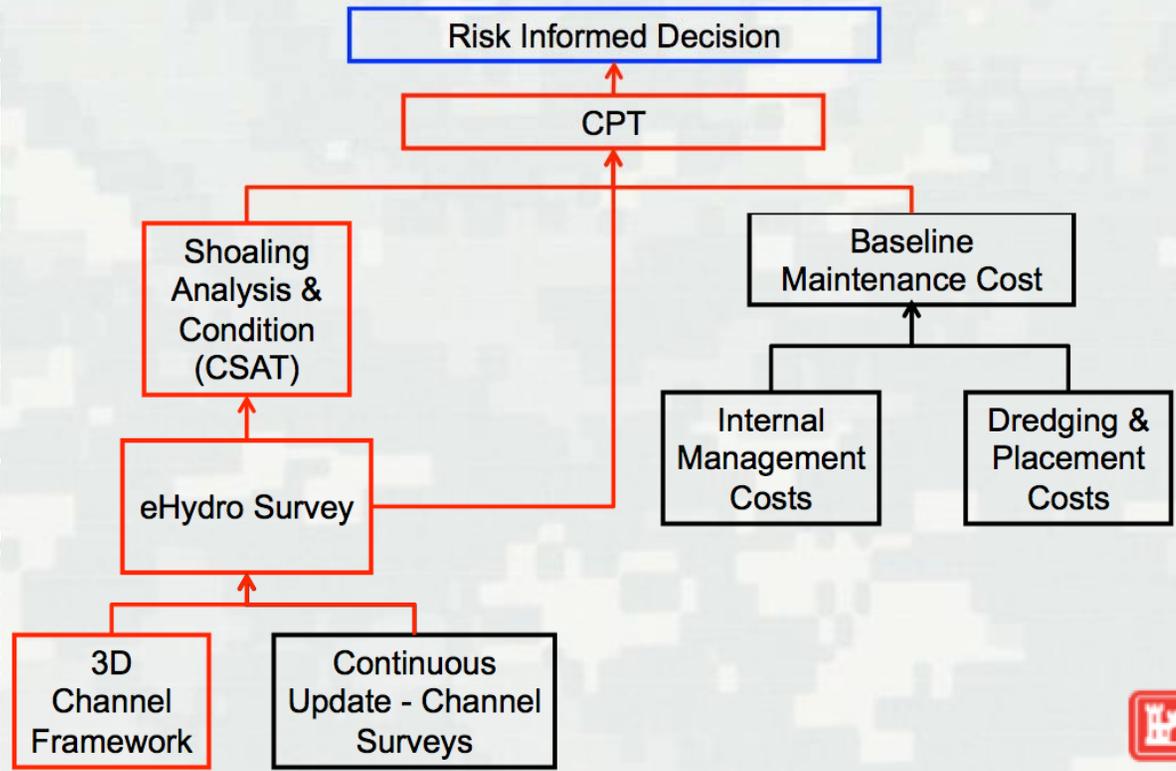


# Coastal Systems

## eHydro Application and Reporting Process

Condition Plots    HQ Channel Indices    NOAA Reports    Metadata

## AM Nav Channel Work Flow



## Channel

ization profiles  
argo across the  
for any system

nnage-draft profiles  
epts resulting from

NWP -

Targ  
Elev

31	7,270	10,905	14,467	14,660	7,740	3,994	2,549
30	5,982	8,973	11,926	12,968	7,729	3,946	2,440
29	4,629	6,944	9,245	10,850	7,605	3,819	2,257
28	3,869	5,603	7,731	9,281	7,321	3,842	2,219
27	3,341	5,011	6,680	8,209	7,453	4,166	2,326
26	2,792	4,188	5,583	6,899	6,754	4,137	2,303
25	2,317	3,475	4,633	5,757	6,121	4,230	2,345
24	1,991	2,942	3,922	4,883	5,362	4,091	2,359
23	1,579	2,369	3,158	3,939	4,507	3,842	2,340
22	1,355	2,033	2,711	3,383	3,925	3,697	2,360
21	1,206	1,810	2,413	3,014	3,545	3,522	2,547
20	1,000	1,500	2,000	2,499	2,955	3,086	2,405



ERDC  
a safer, better world



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# Plan for Coastal Systems Resilience R&D

**Julie Dean Rosati, PhD, PE**  
Coastal & Hydraulics Laboratory  
Engineer Research & Development Center

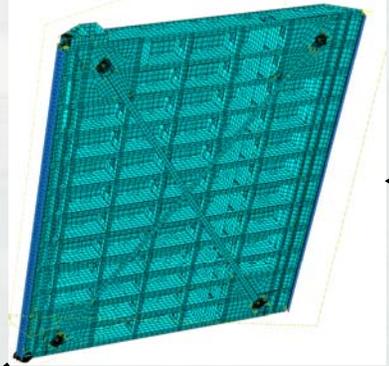


# Structural Health Monitoring



**Sensors at Lock**

Validation Data



**High-Fidelity FEM**

**Surrogate Model**

**Decision Support**  
-Warning Lights  
-Data Archival/Retrieval  
-Email/Text Alerting



Reachback Capability



# LOMA Current capabilities

- Lock operator situational display
- AIS vessel information
- Zone management
- Playback capability

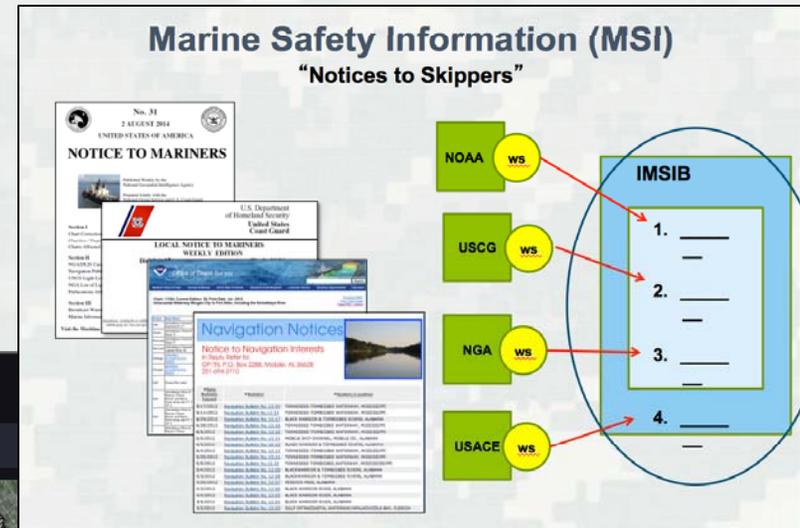
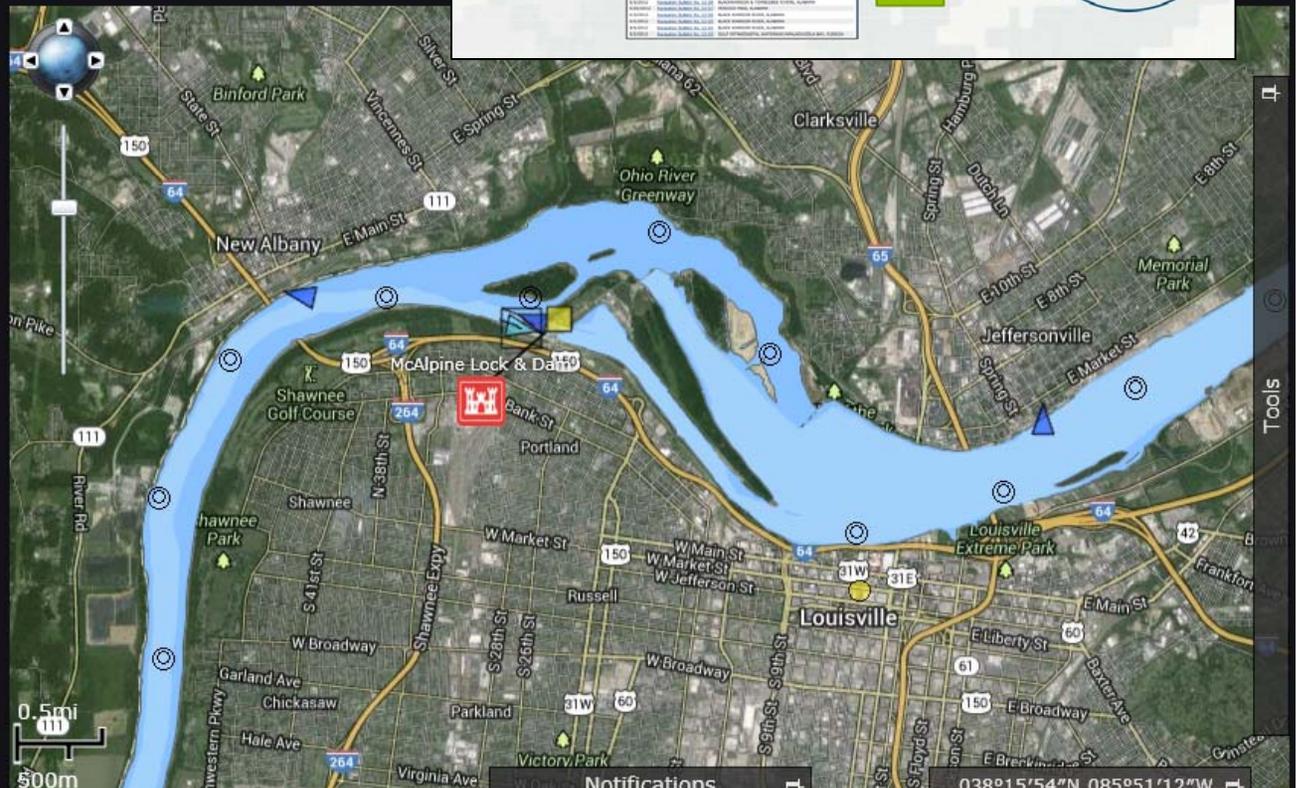
## Lock Operations Management Application (LOMA) v1.0.340

LPMS Support Logout (tetreault)

Live Plotter Playback Plotter Zone Configuration Zone Reports Gadgets

### Target Information

Name	M/V WALLY ROLLER
MMSI	367143710
Callsign	WDD4358
Latitude	038°16'41"N
Longitude	085°47'44"W
SOG	0.4 kts
Heading	Not available
COG	100.9°
Nav Status	Under Way Engine
Operating Mode	Autonomous
Rate Of Turn	Not available
Length	164.00 ft
Beam	65.60 ft
Type of Ship	Vessel - Fishing
Type of Cargo	N/A
CargoType	30
IMO Number	0
Draught	0.00 ft
Nav Sensor	GPS
DTE Status	Available
Nationality	United States of America
LockETA	7/2/2013 8:30:56 AM
Lock	McAlpine Lock & Dam
Mile	607
PreviousMile	608
River	Ohio River
Time since last update	00:00:00



Corps  
eers

Tools

Notifications 038°15'54"N 085°51'12"W

# Leveraging Military RD&T

Inspection: Carter's Dam, Georgia



# Innovative Use of Composite Materials

## Replace Frozen Rollers on Lift Gates at Bankhead Lock & Dam in AL.

The reaction rollers cease up due to corrosion and drag when gate is raised or lowered. Design a repair using polymer composite glides with no moving parts.



# US Bureau of Reclamation Engineer Research and Development Center Infrastructure Workshop

**Meeting outcome - identification of 65 high priority areas for collaboration on research, testing, demonstrations, and technology transfer:**

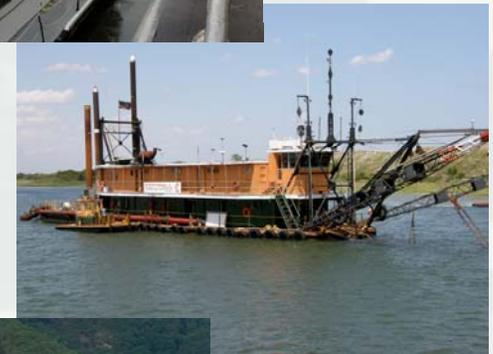
**Infrastructure – 22**  
**Invasive Species -18**  
**Ecohydraulics - 18**  
**Technology Transfer - 4**  
**Technology Challenges – 3**



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# Research Area Review Group Responsibilities

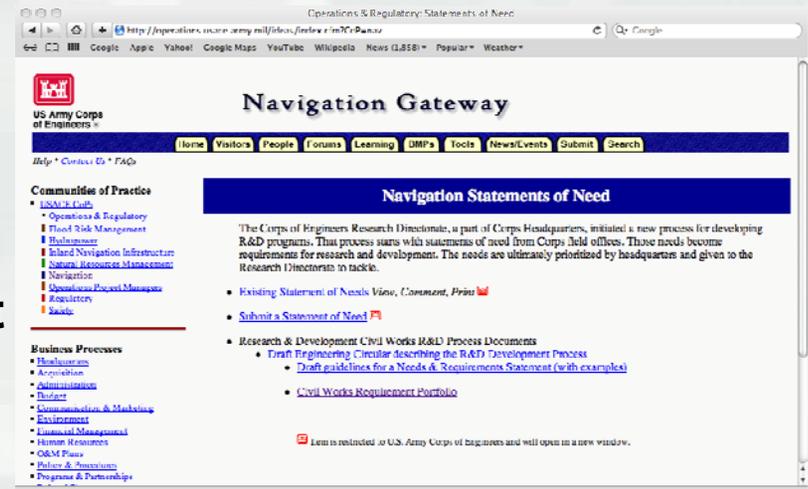
- Provide Statements of Need
- Participate in RARG 3-day Meeting  
Program status  
Technology Transfer  
Discuss & Prioritize
- Collaborate with an ERDC PI
- Help with Tech Transfer !



# Statements of Need

## how it all begins

- Title
- Need that Drives Requirement
- Extent of Need Across USACE
- Requirement
- Consequences if Requirement Not Met
- Product Recommendation
- Originator



# Research Area Review Group FY2016

**5-7 April 2016**  
**Venue TBD**





# Thank You !

