The Connection of Navigation Infrastructure with the Environment

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Presentation
• USACE & National Infrastructure
• Navigation Challenges
• Research Initiatives

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New Orleans, LA
USACE Navigation Mission

Provide safe, reliable, efficient, effective and environmentally sustainable waterborne transportation systems for movement of commerce, national security needs, and recreation.
USACE Navigation Assets

COASTAL NAVIGATION
1067 Navigation Projects
19 lock chambers
13,000 miles of channels
929 navigation structures
844 bridges

INLAND NAVIGATION
27 Inland River Systems
207 lock chambers @ 171 lock sites
12,000 miles of inland river channels
U.S. Ports: Vital to Trade and US National Economy

COASTAL NAVIGATION

1067 Navigation Projects
13,000 miles of channels
929 navigation structures

53 harbors – coastal, inland, Great Lakes - handled over 10 million tons each in 2008...
Regional Movement

Rollup Division Commodity Draft vs. Average Yearly Tons for All Shipments

- Other Commodities
- All Manufactured Equipment, Machinery and Products (70)
- Gasoline, Jet Fuel, Kerosene (22)
- Coal, Lignite & Coal Coke (10)
- Distillate, Residual & Other (23)
- Fuel Oils, Lube Oil & Greases (23)
- Crude Petroleum (21)

Tons (x1k)

Draft (ft)
The U.S. Navigation System
Corps O&M activities must be coordinated in order to realize system-level efficiencies and maximize benefits to the Nation.
Navigation Value to the Nation

• MTS is a vital component of the US supply chain
• Supports more than 8 million US jobs
• 63,800 vessel calls at US ports
• 77% by weight of all imports
• Connects to 152,000 miles of RR and 45,000 miles of highway
• $9.9 Billion contributed to US Gross Domestic Product (GDP)
• 147 million ferry passengers
• 18 million recreational boaters
Corps invests hundreds of millions of dollars annually in maintenance of our *hidden* national waterway infrastructure.

National dependence upon this vital infrastructure has not translated into full public awareness.
Channel Performance

- High Use Projects, >10M tons/year
- Goal: Half channel width, 95% of time
- Actual: 35% of time
- Analogy to building a 2-lane road; Present funding allows one lane, one-third of the year
Cargo Through a Channel

CPT can generate depth-utilization profiles showing the distribution of cargo across the range of maintained depths for any system of navigation channels.

CPT then compares these tonnage-draft profiles to the segment controlling depths resulting from present shoaling conditions.
## National Summary

<table>
<thead>
<tr>
<th>Vessel Type</th>
<th>Imports/Exports</th>
<th># of Additional Voyages Needed to Transport Disrupted Cargo (2-ft Shoaling Scenario)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tanker</td>
<td>Imports</td>
<td>139</td>
</tr>
<tr>
<td>Tanker</td>
<td>Exports</td>
<td>15</td>
</tr>
<tr>
<td>Dry Bulk</td>
<td>Imports</td>
<td>83</td>
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<tr>
<td>Dry Bulk</td>
<td>Exports</td>
<td>58</td>
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<tr>
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<tr>
<td>Container</td>
<td>Exports</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td><strong>Total:</strong></td>
<td><strong>452</strong></td>
</tr>
</tbody>
</table>
Corps Dredging Program

- 237.9 MCY dredged (FY12)
- $1.2B cost
  (O&M, Sandy, New Construction)
- $3.99/CY avg cost
- 138 contracts
- 52% cutterhead
- 37% hopper
- 10% mechanical
Coastal Dredging Challenges

• Estimated 450 MCY needed annually over 5 years to restore to authorized dimensions for top commercial use projects.

• Additional 125 MCY needed annually over 5 years for low use commercial projects.

• Estimated 450 MCY needed annually after that to maintain authorized dimensions of both
Current Dredged Material Management Conditions

DREDGED MATERIAL MANAGEMENT STATUS
- Critical – Dredged Material capacity issues could severely restrict channel availability within 5 years.
- Pressing – Dredged Material capacity issues could severely restrict channel availability within 10 years.
- No pressing issues within next 10 years; continue to work on long range planning such as DMMPs.

ANNUAL DREDGING REQUIREMENT (CY)
- 800K
- 100K – 250K
- 50K – 95K
- <50K
Coastal Dredging Challenges

- Dredging costs are increasing
- Dredged material placement capacity decreasing
- Beneficial use of dredged material Corps policy says determine the least costly, environmentally acceptable method of dredged material placement. This is the Federal Standard
- Corps is willing to place the material at other locations, but someone must pay/or cost share the increased cost over the Federal Standard method
- Panama & Arctic global shipping patterns
- Environmental ‘Windows’ are increasing restrictions on when dredging can be performed
- Opportunity to partner for innovative solutions
Navigation RD&T Strategic Needs & Priorities
FY14

- 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
Coastal Engineering Resilience

**Resilience:** the ability of a *system* to anticipate, resist, recover, and adapt to achieve functional performance under the stress of disturbances.

Quantified as the joint probability of achieving two objectives:
- Functional (design) objective (e.g., 100-year CSDR)
- Recovery (temporal) objective (e.g., operational 1 week after disturbance)

*System defined in context of…
- components of a project
- a specific project
- reinforcing elements and projects within a coastal watershed
- USACE operations – Planning, Design, O&M
- ecosystem and communities within the coastal watershed
Engineering With Nature is the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits.

Use of Natural and nature-Based Features in the USACE North Atlantic Coast Comprehensive Study – Todd Bridges

The USACE Engineering With Nature Program – Cynthia Banks
Objective

To improve sediment management practices within the Corps by demonstrating how to implement a system-based approach and how such an approach provides opportunities to achieve greater effectiveness and efficiency.
Coastal Zone Mapping

- Data to Knowledge and Decisions
- Assess condition, measure change, quantify rate of change
- Technical Challenges in Coastal Mapping – Jennifer Wozencraft & Mike Aslaksen
Innovative Technologies for a Resilient Marine Transportation System

3rd Biennial Research & Development Conference
June 24-26, 2014 • Washington, DC

Conference website and registration:

The conference will include three plenary sessions:
• Innovative Technology for a Resilient Marine Transportation System
• Impacts of eNavigation on the Marine Transportation System
• Optimizing Freight Transportation System Performance

Three breakout sessions will feature presenters on the following themes as they relate to innovative technologies and resilience:
• System Performance • Asset Management and Maintenance Management • Safety and Security
• Environmental Stewardship • eNavigation
• Data Management and Sharing
• MTS Resilience

This conference will serve as a forum to examine the use of emerging and innovative technologies and practices in maritime transportation and waterways management. It will foster partnerships between federal, state, private sector, and academic institutions with a shared interest in technological innovations and improved performance of the Marine Transportation System.

You are invited to share your knowledge and expertise. If you are interested in submitting a paper or presenting relevant research, please submit an abstract of 300 words or less. Those selected to participate will be notified in April 2014. Submit your abstract via email to CMTSmeetings@cmts.gov.

Conference Location:
National Academy of Sciences
2101 Constitution Ave NW
Washington, DC 20418

Hotel Information:
The Melrose Georgetown
2430 Pennsylvania Ave NW
Washington, DC 20037

For more information, please contact:
Scott Brotemadde, Senior Program Officer
SBrotemadde@NAS.edu or (202) 334-2167
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