Dredging and Dredged Material Disposal Overview

Tab A2
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E2D2 KEYWORDS: Manual; Technical Framework

Outline

• Basic dredge types
  – How they work
  – Advantages and Disadvantages
• Basic dredged material management alternatives
  – Descriptions
  – Examples
Basic Dredge Types

- Hydraulic
  - Pipeline
  - Hopper
- Mechanical
  - Clamshell
- Other/ Combinations

Factors in Selection of Dredging Equipment

- Physical characteristics of sediments
- Quantities to be dredged
- Dredging depth
- Distance to disposal area
- Physical environment of and between areas
- Contamination level of sediments
- Method of disposal
- Production required
- Types of dredges available
Advantages of Mechanical Dredges

- Rugged and capable of removing hard packed materials
- Can remove debris
- Can work tight areas
- Efficient for disposal at long haul distances

Limitations of Mechanical Dredges

- Difficult to retain fine loose material in conventional buckets
- Production low compared to pipeline dredges
- Not recommended for contaminated sediments without controls
Self-Propelled Hopper Dredge
Advantages of Hopper Dredges

- Only dredge type for rough open water
- Can move quickly to job under its own power
- Does not interfere with other traffic
- Improves navigation depth quickly
- Economical for long haul distance
Limitations of Hopper Dredges

• Cannot work in shallow depths
• Cannot dredge continuously
• Excavates with less precision
• Economic load reduced with contaminated sediments
• Difficult dredging hard banks
• Difficulty dredging consolidated materials
Advantages of Cutterhead Pipeline Dredges

• Capable of excavating most types of materials
• Can pump directly to disposal sites
• Can dredge almost continuously
• Can dredge some rock types without blasting
Limitations of Cutterhead Pipeline Dredges

• Limited capability in rough open water
• Most are not self-propelled
• Difficulty with coarse sand in high currents
• Pipeline is an obstruction to navigation
• Debris and sediment can reduce efficiency

Dredged Material Disposal Alternatives

• Open Water Placement
  – Ocean ~ Estuarine ~ Lakes ~ Rivers
• Confined Disposal Facilities (CDFs)
  – diked containment
• Beneficial Use Applications
Planning Considerations

• Project Requirements
  – Volumes and frequency of dredging
  – Planning horizon
  – Stage of evaluation
• Material Characterization
  – Physical and Dredgability
  – Chemical/ Biological
• Regulatory or other constraints

Open Water Placement

• Site Characterization
• Site Designation/ Selection
• Material Suitability
• Design Evaluations
• Operational Considerations
• Control Measures/ Management Actions
• Monitoring
• Site Management Plan
Confined Disposal Facilities

• CDFs used because:
  – More economical for some projects
  – Most common option for material unsuitable for open water

• Regulated under CWA
  – discharge to US waters by definition
  – 404 permit
  – 401 State water quality certification
Confined Disposal Facilities

- Site characterization/selection
- Engineering design
- Operational considerations
- Contaminant pathways and controls
- Long term management
- Monitoring
Beneficial Use (BU) Applications

- BU is alternative of first choice
- Needs and Opportunities
- Material Suitability
- Logistical Constraints
- Regulatory requirements vary
  - CWA/ MPRSA
  - Other
DREDGED MATERIAL:

A RECOGNIZED RESOURCE

Regional Sediment Management (RSM)

From Lynn Martin
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Regional Sediment Management (RSM) is an Approach that:

- Integrates management of projects/activities involving sand & other sediments within the context of coastal, river & estuarine systems
- Coordinates sediment management activities within a regional sediment system
- Recognizes Sediment as a Resource
  - Integral to economic and environmental vitality
  - Consider the multiple inter-related resource needs and opportunities
- Uses
  - Knowledge about the sediment system as context for local project decisions and consideration of long range implications
  - Partnerships across government levels and w/ private sector to balance objectives and leverage resources

Sediment Management Activities

- Actions that affect the transport, erosion, removal, and deposition of sediment in a region*; e.g.:
  - Dredging and placement
  - Structures that divert or trap sediment
  - Erosion protection structures or methods for riverbanks, shorelines, sea beds, and channel bottoms
  - Habitat stabilization and restoration
  - Sand and gravel mining for construction or other purposes
  - Other

*The Corps is involved in many of these
What is the “Region”?  

- *First defined in terms of sediment system*
  - Includes the sediment sources, sinks and influencing features (e.g. jetties)

- Then, overlay geopolitical, regulatory and management jurisdictions.

RSM Integrates

- Corps projects & programs related to sediment
- Corps and other public and private projects/programs related by sediment system
- Sediment needs and opportunities as expressed by Federal and non-federal stakeholders
Support for RSM Approach

- **Director of Civil Works** endorsed - (CERB)
- **CW Strategic Plan** emphasizes “watershed” and “integrated approaches” – RSM is an example
- **National Dredging Team Action agenda** – strengthen and accelerate RSM

“Sediment-shed” Approach

Larger scale context for project scale decisions
RSM Demonstration Projects

- To examine, apply and evaluate RSM opportunities, practices, tools, benefits and impediments

- Different scopes, scales and focus.
  - Originally coastal focus, now some include related river systems
- Components in each: Technical, Programmatic/Procedural, Institutional

RSM Benefits

- Cost savings – reduced rehandling of material, leveraging across projects (e.g. joint disposal sites, off loading/stockpiling for future use, combining mobil-demobilization
- Reintroduction of sand to starved littoral systems – habitat, reduced erosion
- Material availability for reuse
- Future problem solving readiness - Data, models, info for future uses in region – reduced duplication
- Improved agency and institutional relationships – quicker processes, leveraging potential
- Improved decisions; greater consistency in analytical results