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

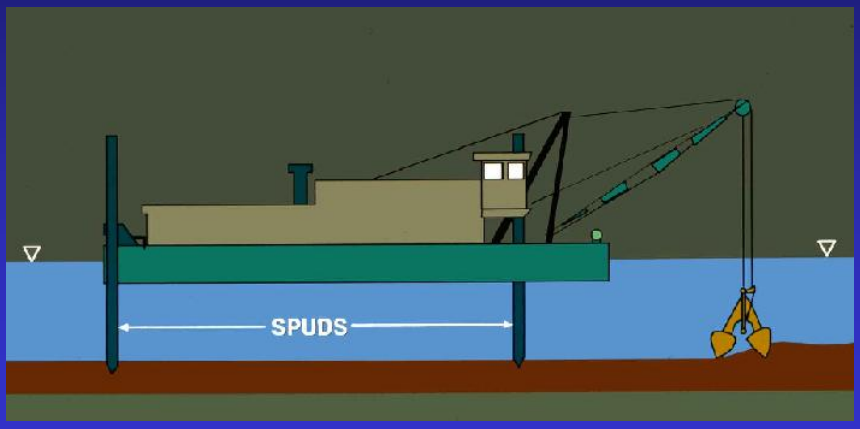
Basic Dredge Types

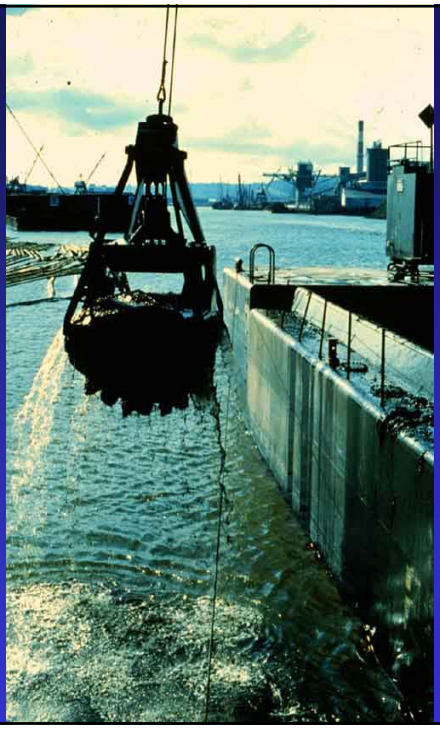
- Hydraulic
  - Pipeline
  - Hopper
- Mechanical
  - Clamshell
- Other/ Combinations

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

Clamshell or Bucket Dredge





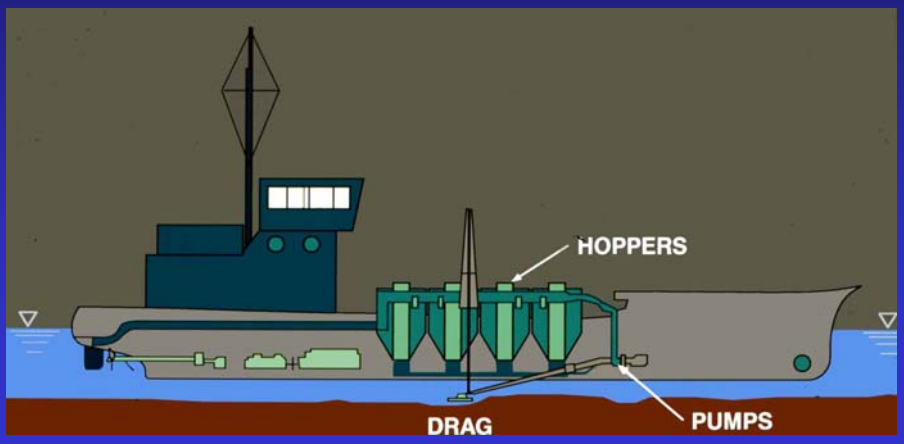
Advantages of Mechanical Dredges

- 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

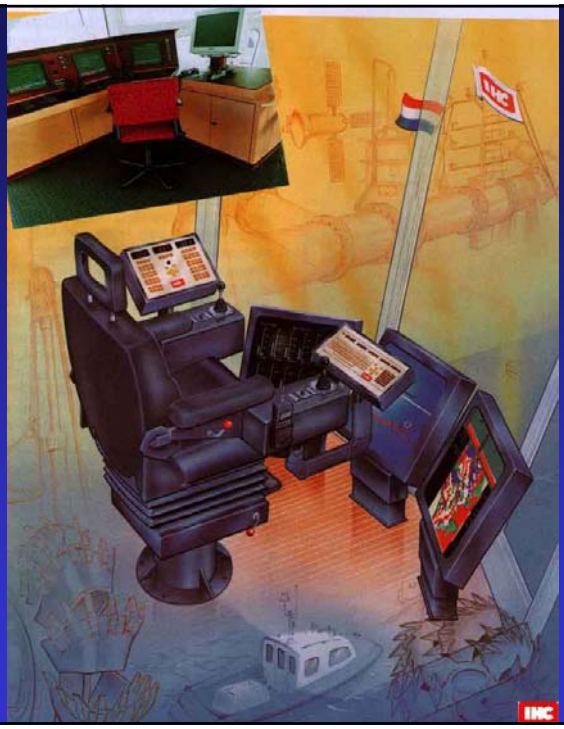


Advantages of Hopper Dredges

- 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

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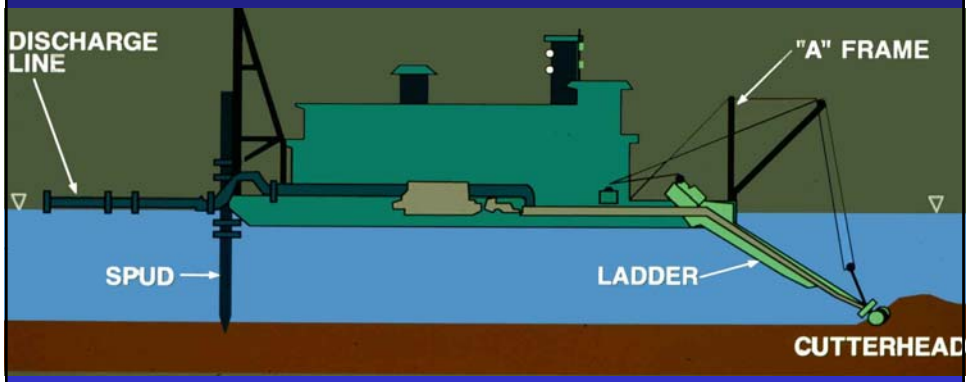
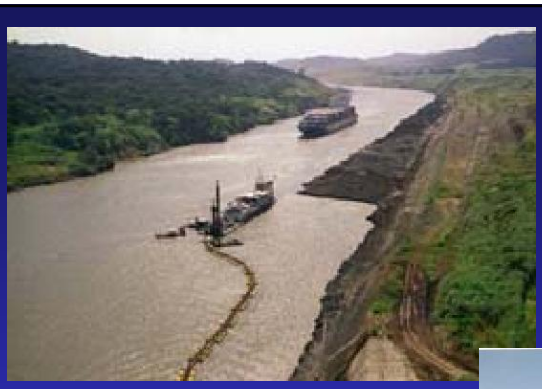
Hydraulic Pipeline/ Cutterhead Dredge





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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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 Contraints
- Regulatory requirements vary
  - CWA/ MPRSA
  - Other

DREDGED MATERIAL:

A RECOGNIZED RESOURCE

Slides for Bob Engler for dredging workshop 2005

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

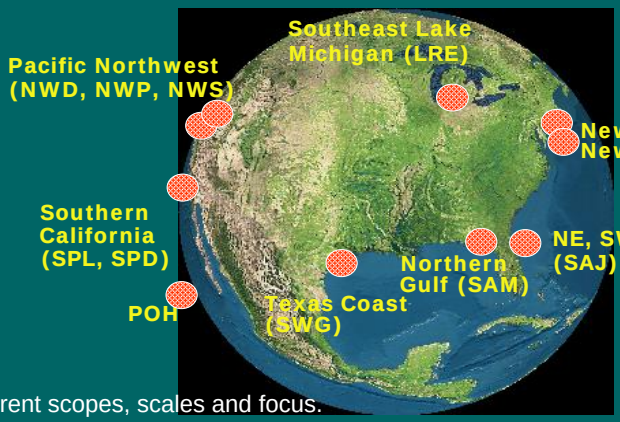
- **Director of Civil Works** endorsed - (**CERB**)
- **CW Strategic Plan** emphasizes "watershed" and "integrated approaches" – RSM is an example
- **National Dredging Team Action agenda –** strengthen and accelerate RSM

"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 mob-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