SUSTAINABLE SEDIMENT MANAGEMENT AND DREDGING SEMINAR
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Overview of Sediment Management Strategies

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Dredging Program Goals

- Maintain or improve navigability within time and budget
- Minimize environmental impacts (beyond permit compliance)
- Minimize impact on long-term storage capacity
- Maximize environmental and economic benefits

Traditional Sediment Placement Options

DIFFICULT TO SUSTAIN

- Upland/Nearshore
  - Unconfined placement
  - Confined placement
- Open Water
  - Side Casting
  - Aquatic Disposal

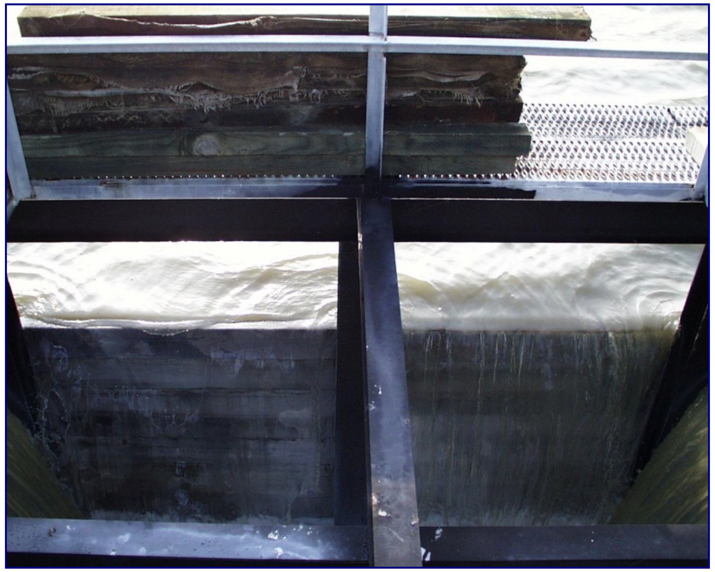
Beneficial Use Options

INCREASED SUSTAINABILITY

- Beach nourishment
- Marsh nourishment, restoration, establishment
- EWN features
- Thin-layer placement
- Construction projects
- Off-site uses – fill material, etc.
- Many others

Related ADDAMS Models

SITE	DREDGING/ PLACEMENT	LONG-TERM MANAGEMENT
CONFINED	SETTLE/CDF	PSDDF
OPEN WATER	STFATE, MDFATE, CDFATE	LTFATE

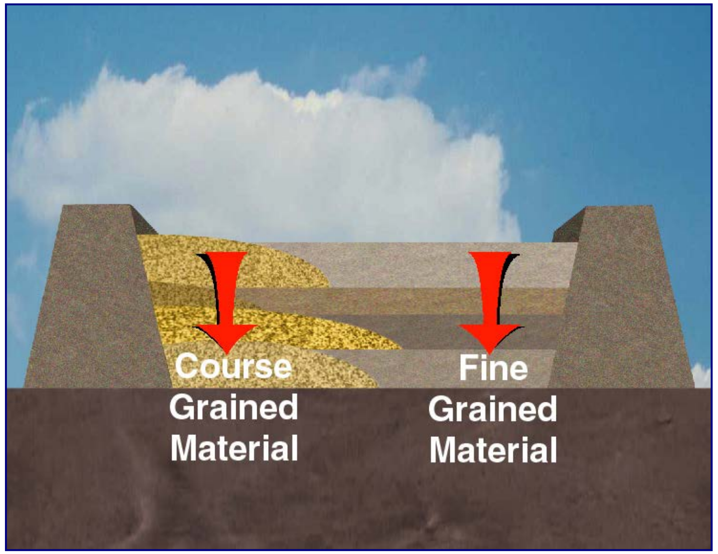


Sediment Properties

- Sediment properties significantly impact sediment management options
- Coarse materials – sand, gravel, cobble
    - Dewater easily
    - Quickly regain bearing capacity
    - Potential off-site uses
    - Workable
- Fine materials – silts and clays
    - May contain beneficial nutrients
    - Difficult to dewater
    - Very low bearing capacity
    - Off-site uses require dewatering ($) and still limited
    - Undesirable constituents more likely an issue

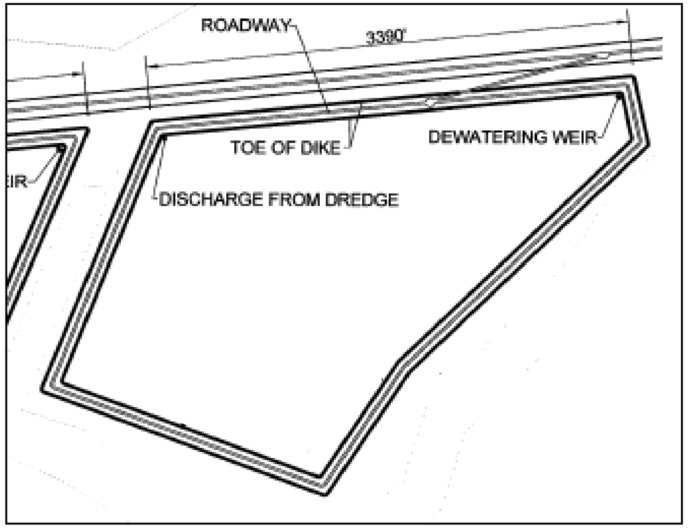
Sedimentation Patterns - Complicating Factors

- Hydraulically placed sediments segregate by settling velocity (grain size) after discharge
- Coarse materials (sands) deposit near the point of discharge
  - Recover bearing capacity quickly; usually can support equipment
- Fines settle into a nearly homogenous “pie filling” with gradual slope to outlet
  - Very limited bearing capacity; can’t support conventional earthmoving equipment
  - Difficult to dewater
  - Difficult to remove



Sediment Management During Placement

- Objectives
  - Meet discharge requirements
  - Minimize the loss of solids from the site
  - Maximize life of placement area
- General rules of thumb:
  - Maintain 2 ft of ponding at the weir
  - Retention time ≥ 24 hrs
- Column settling tests provide more accurate requirements
- Actively managing the location and direction of the dredged material influent can be beneficial



Sand Separation During Dredging

- Sand separation during dredging has proven successful
  - Coarse organic matter and associated contamination may be a concern

- Cost effectiveness depends on
  - Amount of sand available
  - Market for sand
  - Value of space sand would have occupied

Post-dredging Sediment Management

Objective: Expedite and enhance capacity recovery

- Gradually remove ponded water to expose surface immediately post dredging to facilitate drying and consolidation
- Manage site to minimize precipitation/runoff impacts
- Implement active dewatering strategies
- Vegetation control

Dewatering Strategies

- Perimeter trenching
  - Long reach excavator
- Cross trenching
  - Typically 100’-200’ on center
  - Low pressure tracked vehicles
  - Requires crust formation
- Active Drainage Systems
  - Vertical drains
  - Underdrains
- Low permeability of the settled fine material limits porewater movement

Material Recovery

- Sediment is commonly used to raise dikes
- Removing material for other uses seems like an obvious way to recover volume
- Sand can often be recovered and may have some market value
- Fine material removal/reuse challenging
  - Designs seldom facilitate material recovery
  - Limited reach from dikes for excavation equipment
  - Most require additional dewatering prior to use
  - Limited market value

Maximizing Confined Storage Volumes

- Place material in thin lifts (2 ft or less)
- Promptly remove ponded water
- Ditch for surface drainage as soon as bearing capacity allows
- Implement other dewatering methods as possible
- Vegetation can assist with dewatering, but has negatives as well
- Provide sufficient time between disposal actions for complete desiccation
- Craney Island example

Dredging and Sediment Management Plan

- Multi-year, adaptive plan for managing dredging projects and sediment placement areas can help maximize capacity
- Purpose
  - Match project timing with placement area management
  - Rotate placement areas into and out of service to maximize capacity gains
  - Identify areas ripe for beneficial use; initiate data collection, agency coordination, and permitting (to the extent possible)
  - Implement cost-effective dewatering strategies
  - Develop material reuse strategies
- D2M2 may provide useful guidance for complex systems

Increasing Beneficial Use Opportunities

- Beneficial uses offer many benefits
  - New capacity
  - Positive environmental benefits
  - Possible monetary benefits (rare cases!)

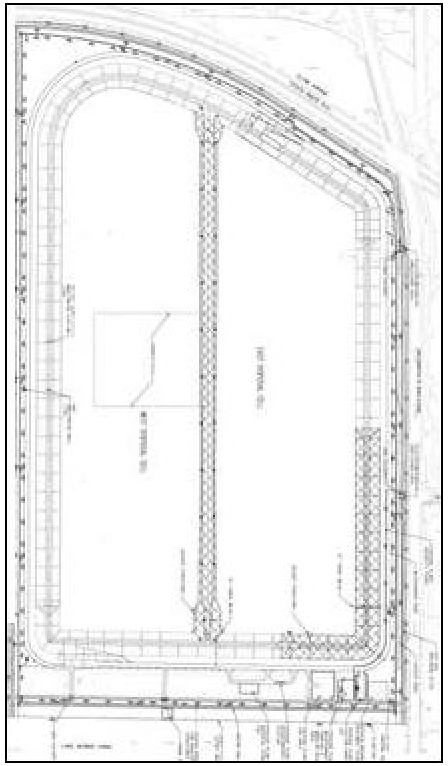
- Why is it not more common?
  - Sediment availability mismatches
  - Usually involves additional costs
  - Federal Standard limitations
  - Requires additional permits
  - Motivation

Can we overcome BU obstacles?

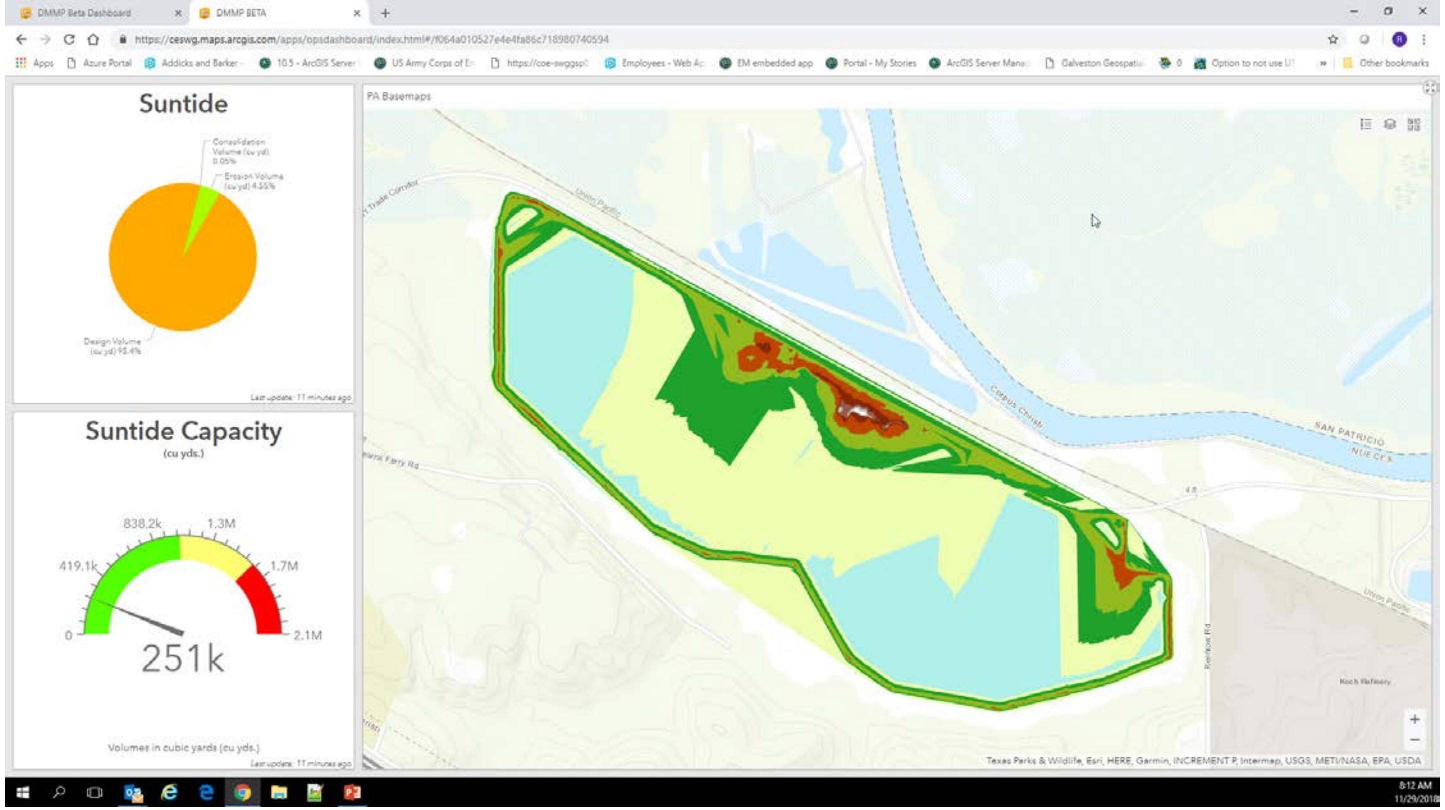
- Spatial and temporal sediment availability
  - Proactively identify potential BU sites
  - Aggregate smaller projects into larger projects that have a greater impact
  - Develop designs that do not require single-placement events
- Cost
  - Local sponsors
  - Consider replacement cost of disposal volume
  - Broader view of Federal Standard
- Motivation
  - Must become a priority
- Permits
  - Pursue broad permits for larger sites
  - Increased interagency cooperation

Sustainable Upland Placement Sites?

- Some upland placement will likely always be required
- Can we envision sustainable placement sites that never fill?
- Basic Requirements
    - Multiple cells (not necessarily co-located) to allow “fallow” years
    - Sufficient area for manageable annual placement depths
    - Subsurface drains to accelerate dewatering
    - Firm bottom to support mechanical equipment at all times
    - Reliable market for dewatered sediment
    - Possible combination with dewatered sewage sludge

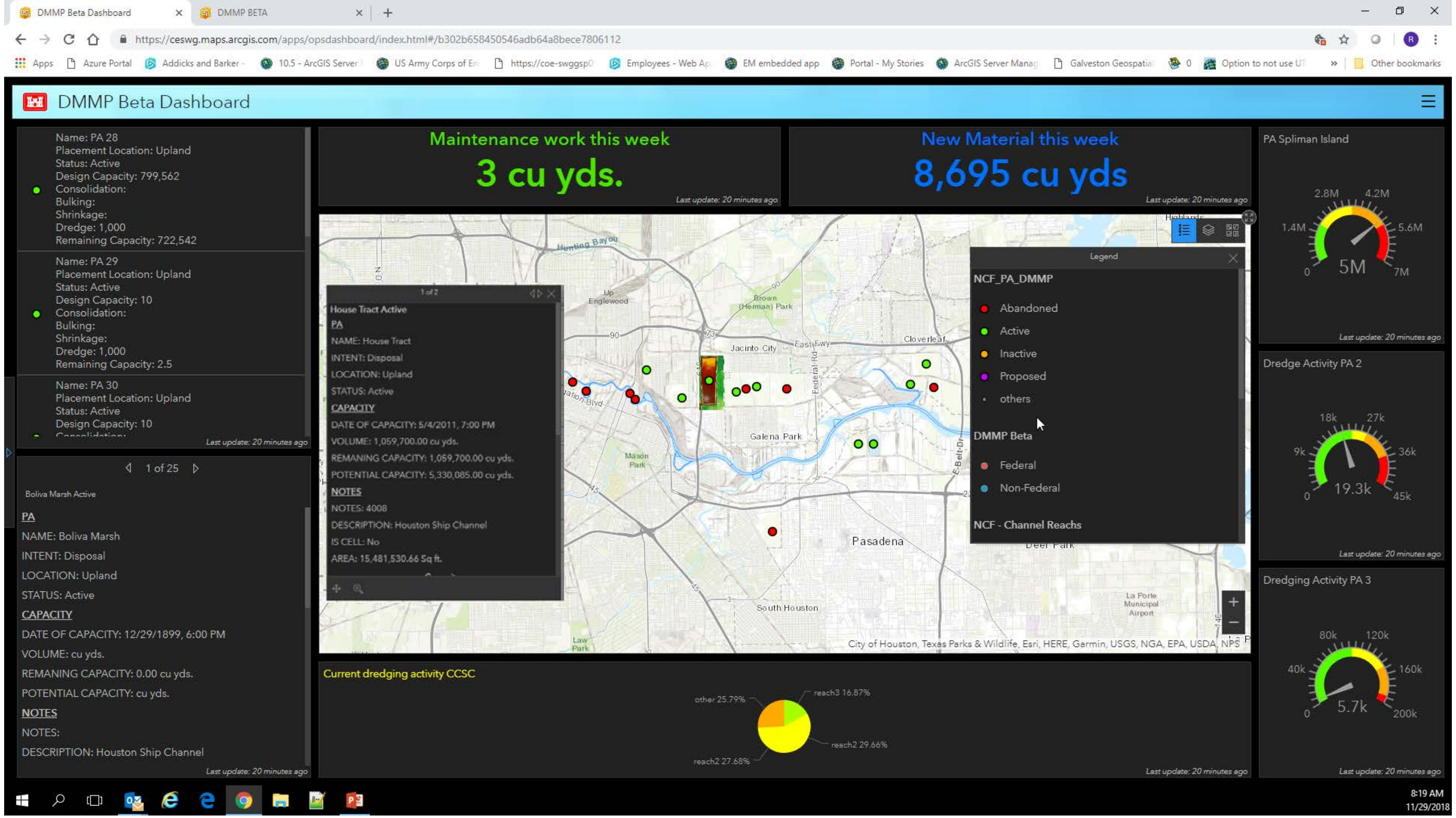


Placement Area Preliminary Assessment - Concept



- Utilize existing data and feeds
- Dashboard component for visualization (ArcGIS Portal)
- Fully Customizable
- Requirements
  - Initial Surveys (Cross-Section, Airborne LiDAR, Mobile LiDAR and UAS)
  - Interface for dredging quantities
  - Periodic assessments

Visualize Placement Area Data



- Common Dashboard(s)
- Information at-a-glance
  - Status
  - Capacity
  - Filters
  - Consolidation Info

External Form for Partners

- ArcGIS (Survey123) interface for Dredging reporting
- Simple form requiring location and volume(s)
- Customizable reporting