

# DOTS Webinar

## Thin Layer Placement



***By: Tim Welp, Coraggio Maglio, Trudy Estes, Damarys Acevedo-Acevedo***

<http://el.erdc.usace.army.mil/thinlayer/>

30 July 2014 at 1 PM CDT



US Army Corps of Engineers  
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# DOTS Request

“An increasing interest in thin layer placement of O&M dredged materials for environmental enhancement warrants a webinar to provide information on current placement technology, applications, permitting issues, and case studies. Ways to maximize interagency cooperation and accomplishment of goals while limiting detrimental effects of a thin layer placement event could also be discussed. As an extension, rainbow placement into the nearshore waters to supplement shore protection project material could be covered as well and link up with active nearshore berm research...”

Kevin Hodgens



# Outline

- Definitions
- History
- Current Placement Techniques
- Containment and Water Control
- Case Studies
- Regulatory Considerations
- Engineering and Construction
- Thin Layer Placement Website



# What is thin-layer placement?

- Deposition of dredged material in thin, uniform layers over emergent vegetation or shallow bay bottom
- Alternative to conventional disposal or placement methods to minimize impacts due to “thick-layer” deposition
- “Limited-thickness” placement of dredged material for beneficial use
- Environmental enhancement objectives
  - ▶ Wetland (or marsh) nourishment
  - ▶ Wetland creation/restoration
  - ▶ Sustainable sediment management



# Definition of Thin Layer Depends on User

- Wetlands nourishment approx 6 inches thick
- Mobile Bay thin layer – 6 to 12 inches thick
- Wetlands creation > 12 in.



# History – Thin Layer Placement



- Oil and gas exploration in Louisiana - dredging of access canals
- Mechanical (bucket) dredging vs. hydraulic dredging (low pressure spray)
- High pressure spray placement first applied southern Louisiana 1979\*



\*Cahoon and Cowan 1988



# What do we know about thin-layer placement?

- Similar to historic sidecasting practices but with more operational controls
- Growing alternative to customary disposal and placement methods
- History of use in some areas of US
  - ▶ Relatively limited number of US thin layer projects
  - ▶ Relatively limited number of well-documented case studies
  - ▶ Little formal guidance

# Current placement technologies

- Traditional open pipeline (low pressure spray) discharge
- Spreader plate for hydraulic pipeline discharge
- High pressure spray placement





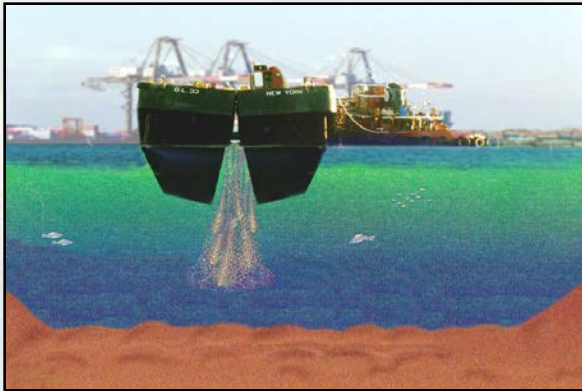
# Current placement technologies

- Continuous outfall repositioning

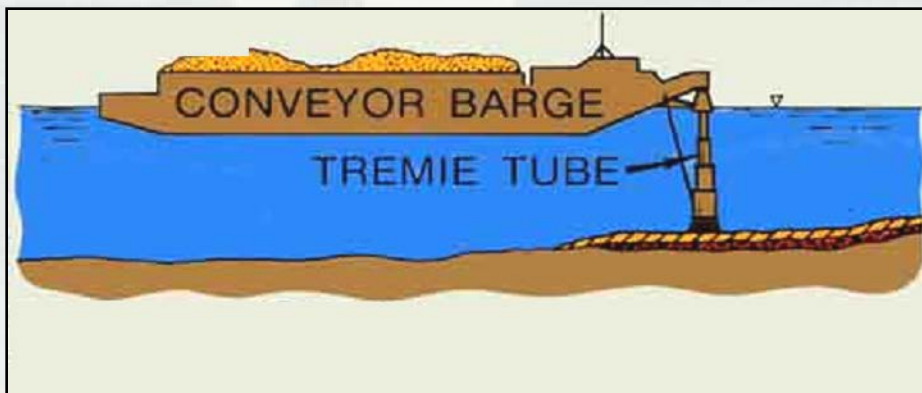


# Current placement technologies

- Split hull hopper barge

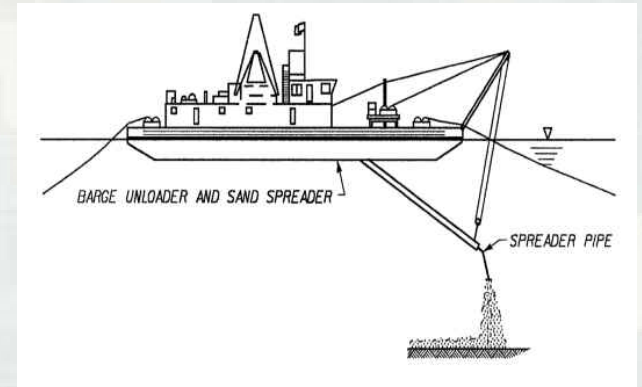
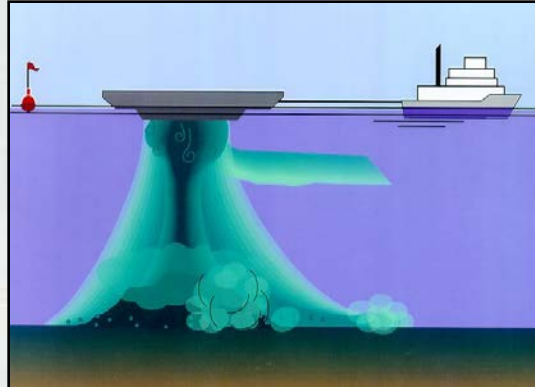
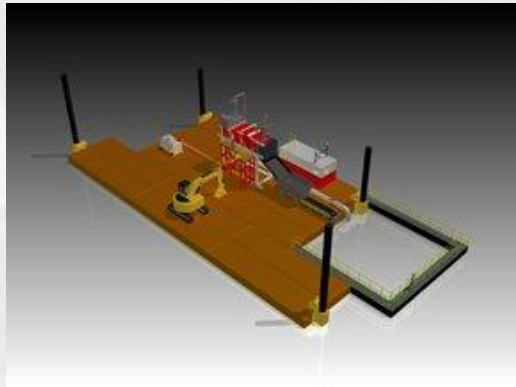


- Underwater discharge using Tremie tube



# Current placement technologies

- Spreader barge



- Hydraulic washing of material from a barge





# Containment and water control structures

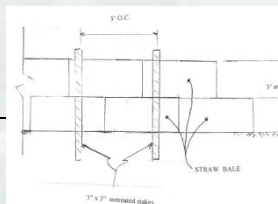
- Bathy/Topo
- Berms
- Geotubes
- Sheetpiling
- Breakwater





# Containment and water control structures

- Hay bales
- Coir (coconut) logs
- Silt curtains



# Blackwater NWF Maryland - NAB

- **Demonstration Project – Restoration techniques**
- **Cost \$300K**
- **4 sites sprayed**
- **2 Lift placement (1 to 2 acres each)**



## Vegetation Establishment

- **Planting Schemes**
- **Spacing**
- **Row gaps**
- **Hydro-Seeding**
- **No Planting**





# Blackwater NWF Maryland

Lift Placement

Hay bale  
confinement

May 2003



# Blackwater NWF Maryland

**August 2003**



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# Anacostia River - NAB

- Maintenance dredging – freshwater fringe wetland creation
- Cost \$3.3M
- 2 sites created – lift placement (4 & 13 ac.)
- 74k cy of material placed
- 4,300 ft of vinyl sheetpile
- 350k plant plugs

08.19.2003 11:35





# Honga River - NAB

- **Maintenance dredging – wetland creation**
- **Multiple events**
  - 2008 – \$873k, 52k cy and 33k plants
  - 2003 – \$3.6M, 300k cy, 10 acres created
  - 2000 – \$3.6M, 3,400' breakwater 273k cy & 150k plants
- **Initial geotube containment – then armored**
- **Bulldozers achieved final grading**





# Heritage Island - NAB

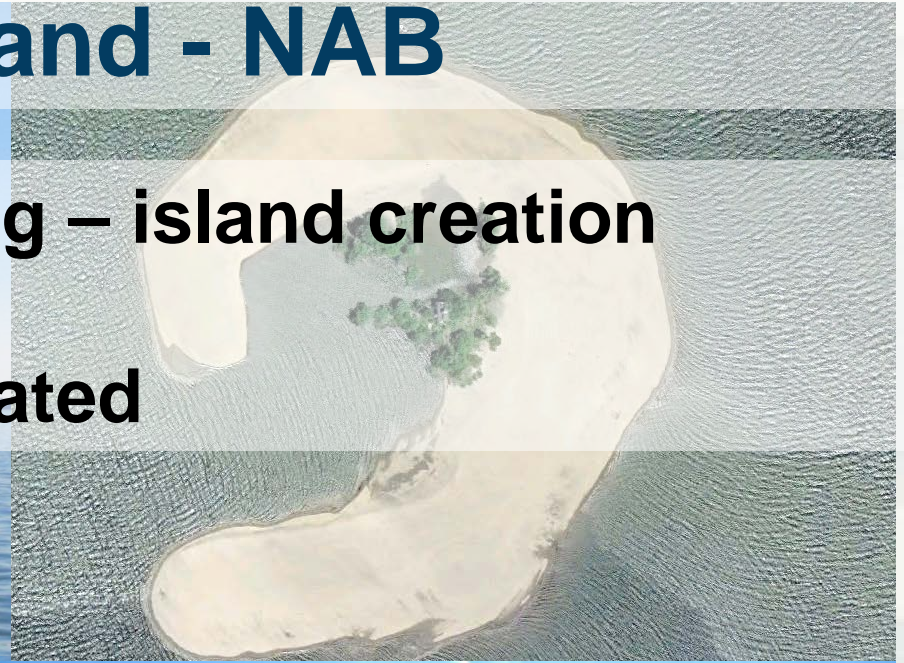
- Maintenance dredging – wetland creation
- Cost \$1.3M
- 43k cy, 6 acres created
- Goose fencing, coir log, sheet piling





# Battery Island - NAB

- Maintenance dredging – island creation
- Cost \$1.7M
- 200k cy, 11 acres created





# Galveston Bay, TX

- Maintenance dredging – marsh restoration of intertidal habitat fringe marsh
- Unconfined placement – mound building
  - Hydraulic placement
  - Settlement 0.3 to 0.7 ft

2005

2004

2014



2010

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[www.hdrinc.com](http://www.hdrinc.com)

[https://www.estuaries.org/pdf/2012posters/Augustin\\_RAE\\_2012\\_poster.pdf](https://www.estuaries.org/pdf/2012posters/Augustin_RAE_2012_poster.pdf)

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# Bolivar Marsh Project, TX

- Maintenance dredging – marsh creation
- Semi-unconfined hydraulic placement
  - Sacrificial berm containment
- 788 acres restored, shoreline edge focus
- Planting via seeding





# Golden Pass LNG – Port Arthur, TX

- Maintenance dredging – Marsh Restoration
- Unconfined placement – over subsided marsh
- 2M cy placed at 24 in. lift w/ hydraulic dredge
- 2000 acres restored, 3-5 mi. pumping required
- 200 grade elevation control sites



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<http://www.ducks.org>



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<http://streamwetlands.com/golden-pass-lng-beneficial-use-project.html>



# Goose Point/Point Platte Marsh Creation Lacombe La

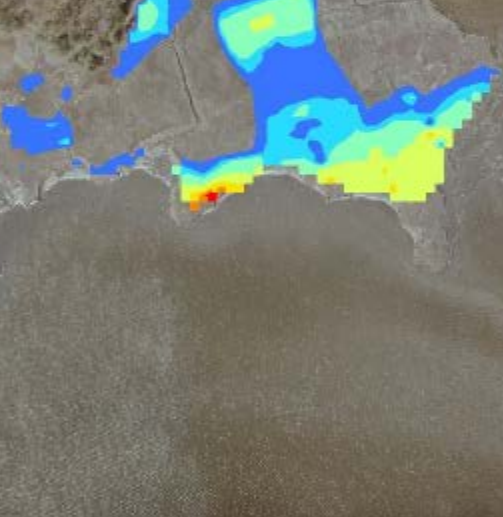
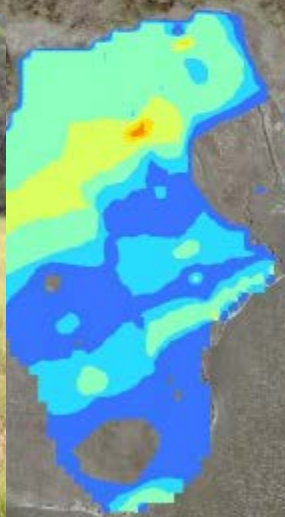
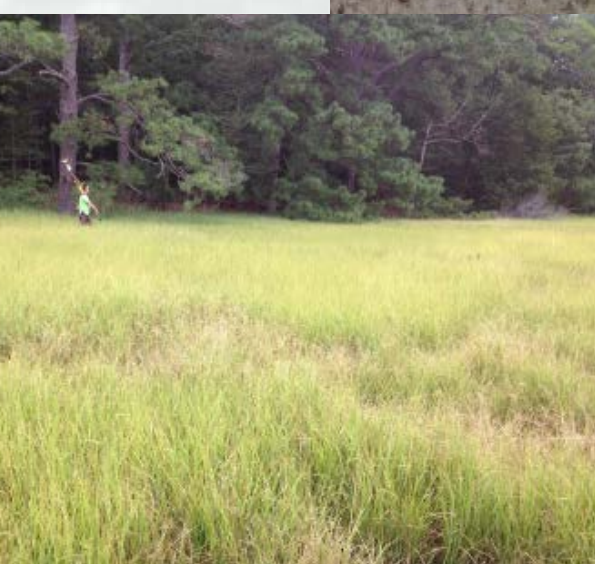
- Marsh Restoration
- Confined placement – 5 sites (49,557 ft earthen perimeter containment dikes)
- 3.1M cy placed from borrow sites w/ 24 in. hydraulic dredge
- 566 acres created, 155 acres nourished





# Pepper Creek – Delaware

- Maintenance dredging – Marsh Restoration
- Unconfined placement – sprayed over marsh
- Cost \$125k for 35k cy
- 4 in. high-pressure nozzle



## Legend

### Proposed Thickness of Thin Layer Application

- 6 or More Inches
- 5 Inches
- 4 Inches
- 3 - 4 Inches
- 2 - 3 Inches
- 2 Inches
- 1 Inch
- Not Needed





# Mobile Bay - SAM

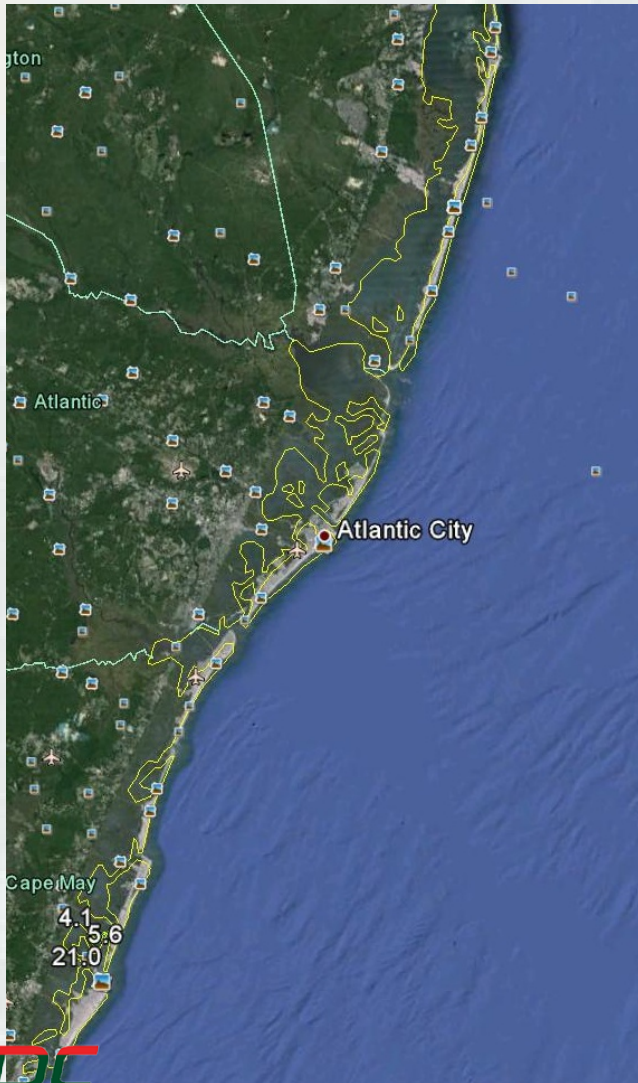
- 40 mi. to ODMDS
- Thin Layer in bay placement
- 9 M cy – 2012
- 6 to 12 in.
- Spill barge
- 2,500 ft from channel
- 35% of material back in channel
- 65% spreads around the bay
- x M cy – 2015





# Planned Thin Layer Projects East Coast

Philadelphia District, State of New Jersey, National Refuges, etc.





# Regulatory Aspects and Considerations

- USACE Maintenance dredging events - typically only require WQC, NEPA 404.b1, EFH, and ESA, when placed on private or federal lands
- Sovereign submerged lands if on state property
- Interagency Working Group – instrumental
  - Gov't
  - NGO's
  - Stakeholders
- Resiliency - sea level rise
- Living shorelines
- Intertidal wetland building
- Marsh nourishment
- Smart sediment management



# Regulatory Aspects and Considerations Teamwork!

## Mobile Bay Thin Layer Placement

An Interagency Working Group (IWG) was established to evaluate and provide guidance pertaining to alternative sediment management practices in Mobile Bay. The IWG consists of the following local, State and Federal agencies:

- ☐ Alabama State Port Authority
- ☐ U.S. Army Corps of Engineers, Mobile District
- ☐ U.S. Army, Engineer Research and Development Center
- ☐ Alabama Dept. of Environmental Management
- ☐ Alabama Dept. of Conservation and Natural Resources, State Lands Division
- ☐ Alabama Dept. of Conservation and Natural Resources, Marine Resources Division
- ☐ Geological Survey of Alabama
- ☐ U.S. Fish and Wildlife Service
- ☐ National Marine Fisheries Service, Habitat Conservation Division
- ☐ Mobile Bay National Estuarine Preserve
- ☐ Dauphin Island Sea Lab
- ☐ The Nature Conservancy
- ☐ Mobile County Environmental Department
- ☐ Federal Aviation Authority

# Engineering Design & Construction Monitoring

- Production - ~50 cy/hr spraying
  - Spraying – dist. 50 to 300 ft
  - Placement (rules of thumb NAB)
    - 800 cy/acre-ft silt
    - 1000 cy/acre-ft mixed
    - 1200 cy/acre-ft sand
- Time and costs drawbacks
  - Production reduced (cy/hr)
  - Duration increases
  - Cost per cy increases
- Thin layer placement benefits – selective & homogenous
  - No real estate acquisition
  - Minor site development required – minimal containment
  - Overall inclusive life cycle dredging and placement costs can be competitive with traditional operations





# Engineering Design & Construction Monitoring

- Elevation - grade control
  - Invasive specie management
    - Brazilian pepper
    - Salt Cedar
  - Consolidation
    - Est. to achieve desired grade
    - Adaptive process
      - Multiple placements events
  - Sampling
    - Push probes
    - Cores
  - Quality control
    - Grade stakes
    - Eyeballing against existing vegetation
    - RTK
    - Land based lidar





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## Thin Layer Placement of Dredged Material for Beneficial Use

The purpose of this site is to compile all of the information currently available regarding thin layer placement of dredged material for purposes of beneficial use. This site contains a variety of resources pertaining to design, construction, cost estimation. You will also find points of contact for technical assistance, and links to supporting documents. At present, much of the published information with relevance to thin layer placement of dredged material is found in the capping and remediation literature; despite the disparity in objectives, these resources contain information pertaining to all aspects of project implementation adaptable, to thin layer placement of dredged material. In the process of preparing summary paragraphs for these resources so that you will be able to obtain information relevant to thin layer placement. As we complete these, the resources will be uploaded to this site, so that you can access them. Over time, our goal for the site is to collect information on all applications of thin layer placement for beneficial use; ultimately, we expect a very robust information base, and thin layer placement from art to science, and ensure more, and more successful, projects.

*There are a variety of considerations relevant to implementing thin layer placement of DM, including but not limited to, placement method- **temporary or permanent containment structures**-*



Additional information and case studies would be welcomed; click the [link here](#) (CAC required to access) to fill out a brief survey with information of your project, input attachments and your contact information. We will follow up with you to obtain additional information. If you need assistance or have questions about the survey please [contact us](#).

### Points of Contact Resources

- \* Planning
- \* Regulatory
- \* Design
- \* Construction
- \* Monitoring
- \* Cost

### References

Under Development

Access thin-layer placement  
survey





# Thin-layer Placement Website

## Primary Objectives

- Create a web-based portal to aggregate the present state of the art practices
- Compile all available literature and resources
- Solicit and populate site with case studies
- Develop or link to useful tools for all project stages
  - ▶ Design, Construction, Cost, Planting, Monitoring



# Thin-layer Placement Website

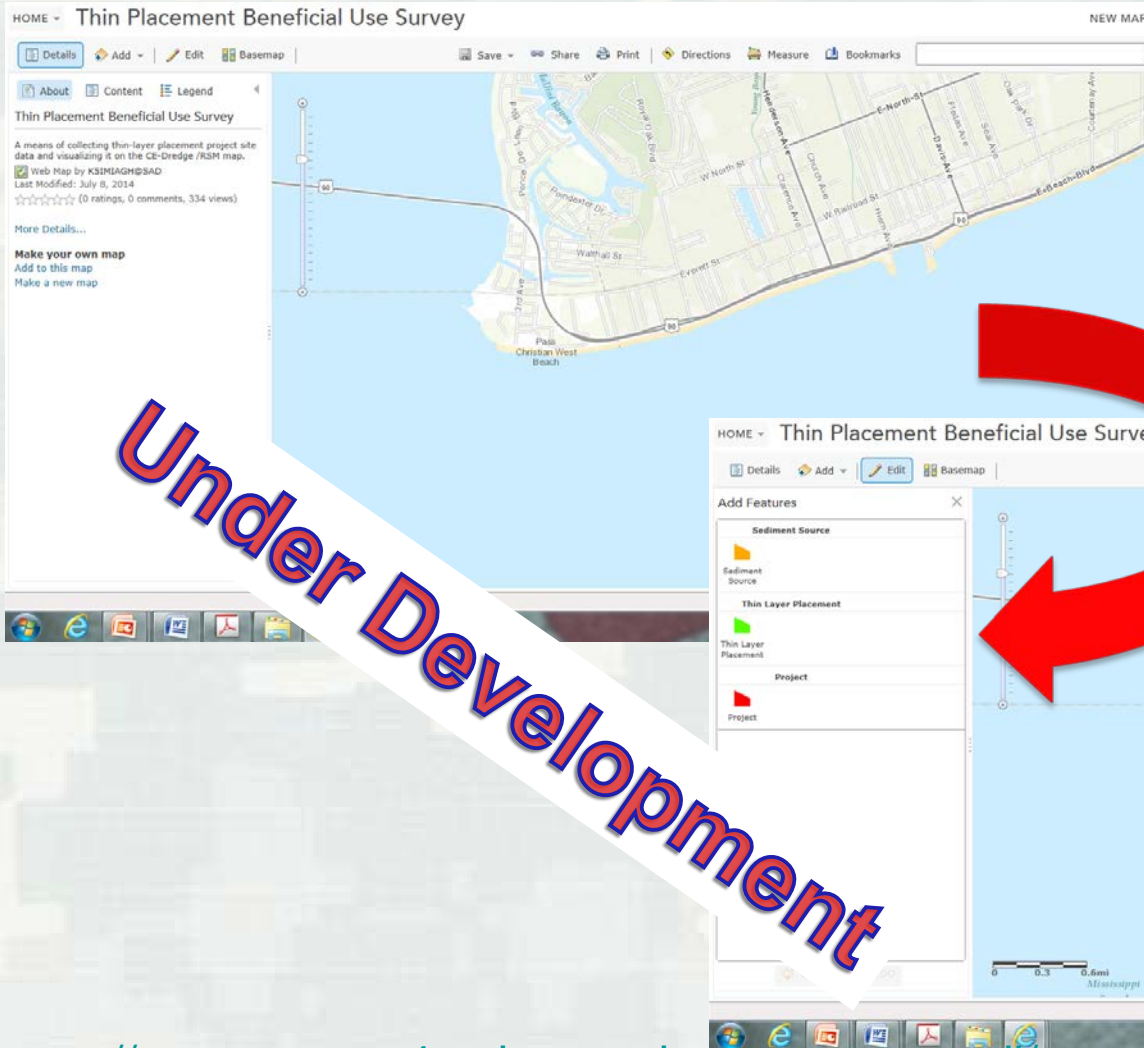
## Secondary objectives

- Establish a database in conformance with the Data Integration Initiative
  - ▶ Uniform data formatting
  - ▶ Accessible/utilizable by compatible models
- GIS based interface
  - ▶ Warehouse available project information and data
  - ▶ Facilitate project planning and robust design
  - ▶ Facilitate coordination with dredging efforts





# Thin-layer Placement Survey



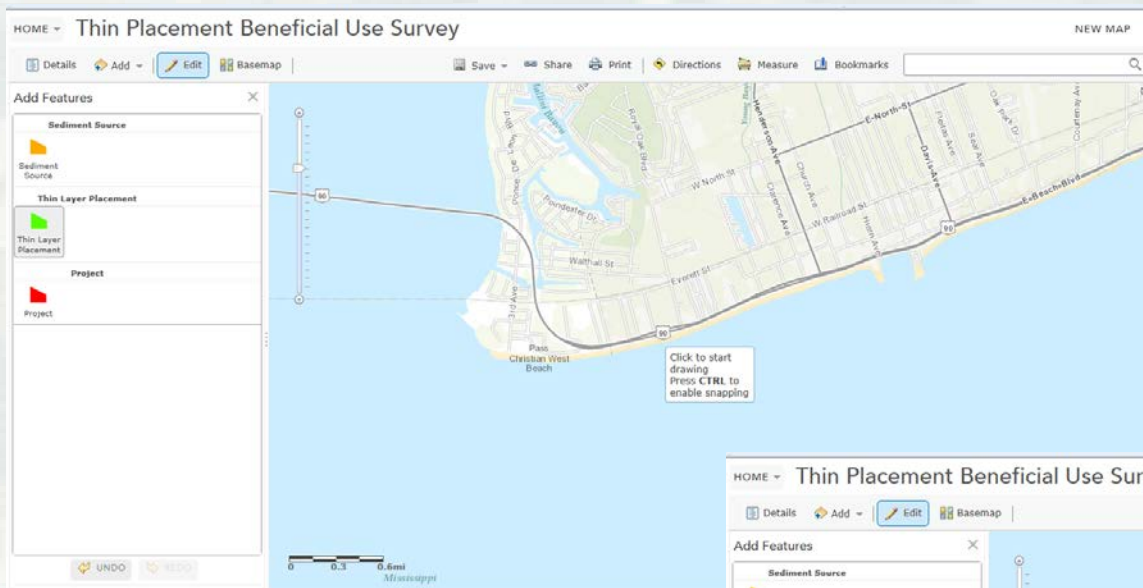
Click edit and the following “layers” are displayed:

- Sediment Source
- Thin Layer Placement
- Project

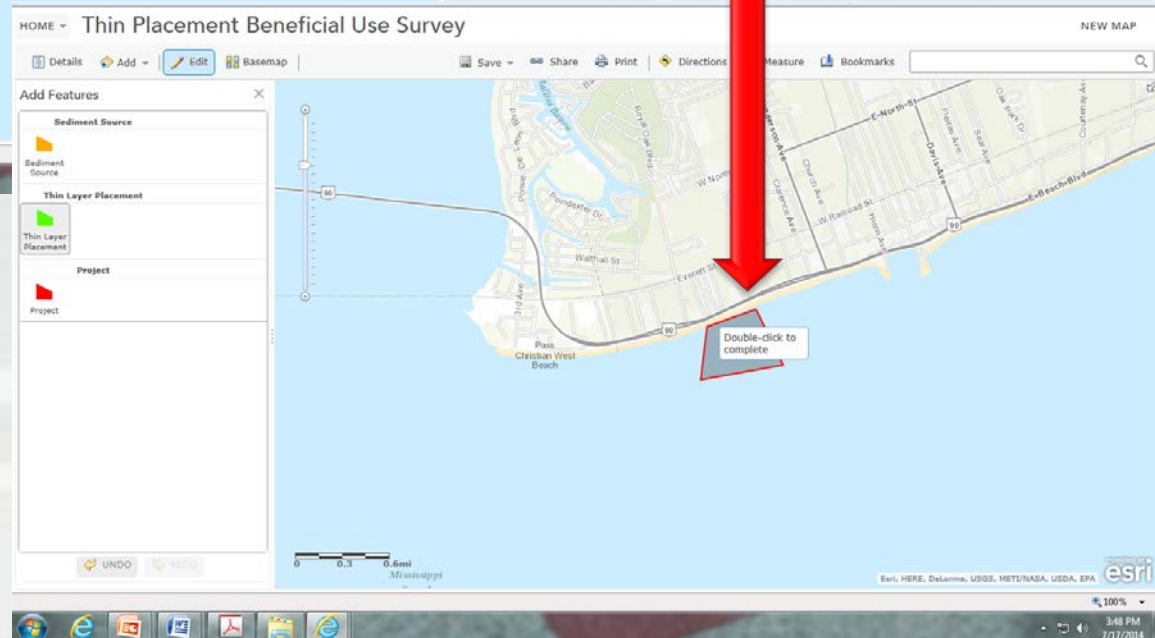
**Under Development**

<https://sam-ap-map4mob.sam.ds.usace.army.mil/portal/home/webmap/viewer.html?webmap=1085411e5c7941b985d118a0d10814fd>

# Thin-layer Placement Survey

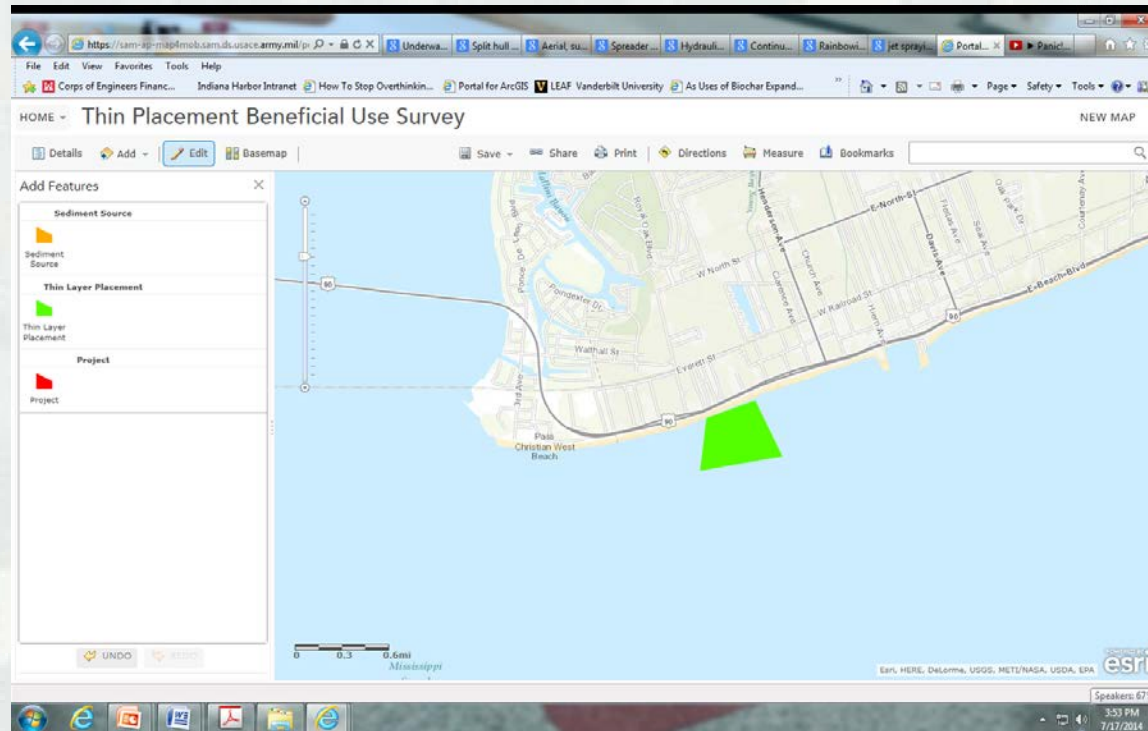


Click “layer” to start drawing polygon





# Thin-layer placement survey



Once the polygon is drawn, the user can start filling out the survey pertaining to each layer.



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# Thin-layer placement survey

- Sediment Source Survey

Thin Layer Placement

Permit Type	
Date Start	
Date End	
Volume	
VolumeUOM	
County	
City	
State	
Dredging Contract Number	
Confined Disposal Facility Identifier	
Other Location Identifier	
projectReferenceIDFK	
Chemical Characteristics of source/fill material	
Physical Characteristics of source/fill material	
Author	
Placement Footprint	
Contact Email	
Sediment Source ID	

Attachments:

None

Add:

- Project Survey

Project

projectReferenceIDPK	
Project Name	
Description	
Project Purpose	
County	
District	
State	
Approved by Project Manager	
Project Cost	
Pre-construction: Site description	
Containment or Water Control Structures	
Design/Estimating Tools	
Construction: General construction details	
Construction: Dredging Operations Details	
Construction: Offloading Method	
Construction: Staging or Dewatering Area	
Construction: Placement Details	
Post Construction: Placed/Fill Material Details	
Post Construction: Site Description	
Pictures or Images	
Monitoring	
Project Funding	
Regulatory Aspects	
Lessons Learned	
Construction: Dredging Operations Details	
Construction: Offloading Method	
Construction: Staging or Dewatering Area	
Construction: Placement Details	
Post Construction: Placed/Fill Material Details	
Post Construction: Site Description	
Pictures or Images	
Monitoring	
Project Funding	
Regulatory Aspects	
Lessons Learned	
Resources	
Additional Information	
Author	
Project Footprint	
Contact Email	
Project ID	1607

Attachments:

None

Add:

0.3 0.6mi Mississippi

ESRI, HERE, DeLorme, USGS, METI/NASA, USDA, ERS

- Thin Layer Placement Survey

Thin Layer Placement

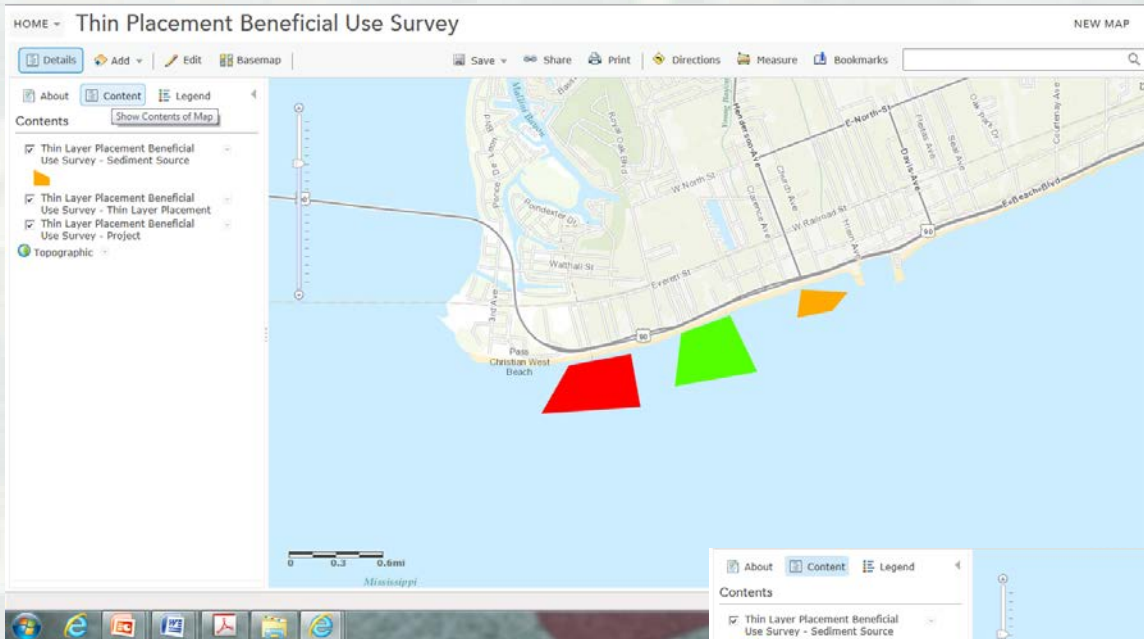
Name	
Description	
projectID	
Placement Type	Planned placement at a thickness to reduce impacts to biota or hasten recruitment of biota to the material without ts
Activity Type	
Permit Type	
Date Start	
Date End	
Volume	
VolumeUOM	
County	
City	
State	
Dredging Contract Number	
Confined Disposal Facility Identifier	
Other Location Identifier	
projectReferenceIDFK	
Chemical Characteristics of source/fill material	
Physical Characteristics of source/fill material	
Author	
Placement Footprint	
Contact Email	
Sediment Source ID	

Attachments:

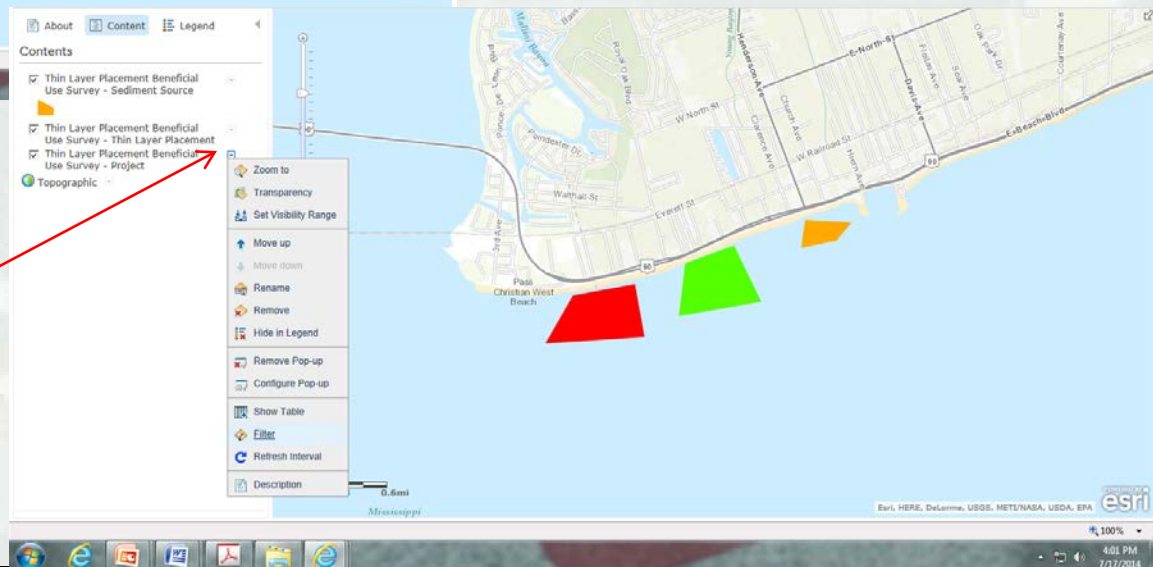




# Thin-layer placement survey



Click content (capability of filtering layers)



Click arrow for other options.

# Thank You! Questions?

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<http://el.erdcl.usace.army.mil/thinlayer/>

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