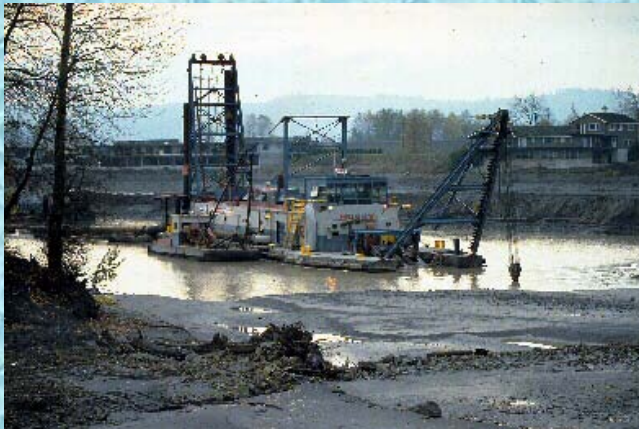


# Beneficial Use of Dredged Material

**Richard A Price**

***USAERDC-Environmental Laboratory***



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## Dredging Quick Facts

- USACE is not the regulatory authority for agricultural, industrial and urban discharges of soil and their associated contaminants.
- Unfortunately, these activities impair the USACE mission to maintain commercial and recreational navigation to federally authorized depths
- Watershed erosion, left unabated, will remain the main contributor for the need to dredge

## *Sources of sediment*



## *Viable Solutions Require Partnerships*



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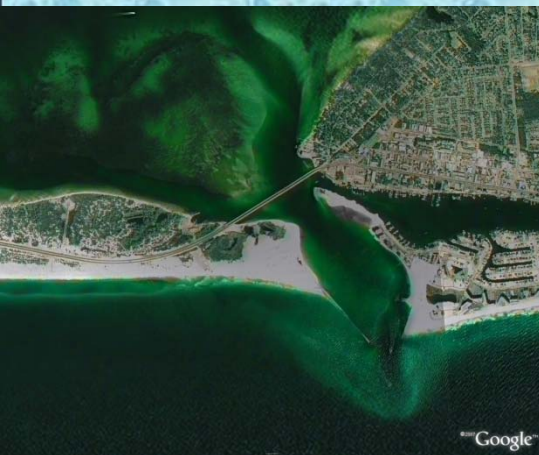
# Beneficial Use

- What is it?

## *Regional Sediment Management*

- The use of sediment resources removed in dredging operations for shoreline habitat or structure, land development or as raw material in construction and soil material products.

*Keeping a productive resource in the watershed system*



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# Dredged Material Disposal - 2008

- "Of the 300 million cubic yards of sediment the USACE dredges annually to facilitate navigation, an estimated 5 to 10 percent is contaminated." NRC, Committee on Contaminated Marine Sediments, National Academy Press. 1997.
- At least 40% was used beneficially in 2008
- At least 68% was placed in open water or wetlands

Disposal Type	Cubic yds	% of Total
Beach Nourishment	4,833,125	3.3
<b>Confined</b>	<b>12,565,711</b>	<b>8.6</b>
Underwater Confined	2,926,000	2.0
Mixed Types	5,186,694	3.5
<b>Overboard &amp; Open Water</b>	<b>50,050,381</b>	<b>34.2</b>
Open & Upland	3,435,000	2.3
Beach & Upland	929,000	0.6
Upland	3,897,019	2.7
<b>Wetland Nourishment</b>	<b>49,075,000</b>	<b>33.5</b>
Undefined	13,385,700	9.2



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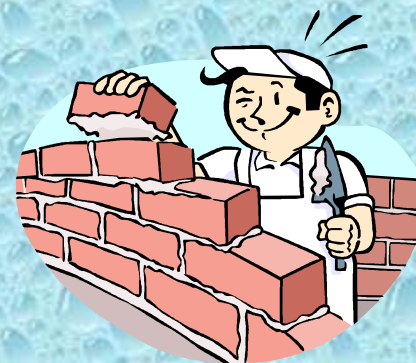
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# Beneficial Uses

## *The Key to Sustainable Ports*



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# Beach Nourishment



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# Construction Fill



**Dike 10B,  
Cleveland**



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# Agriculture/Forestry



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# Recreation



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# Wetland Habitat and Shoreline Protection



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# Island Habitat



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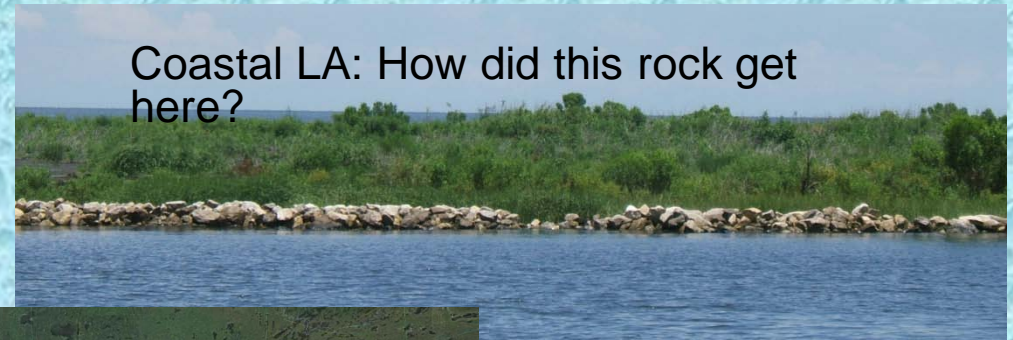




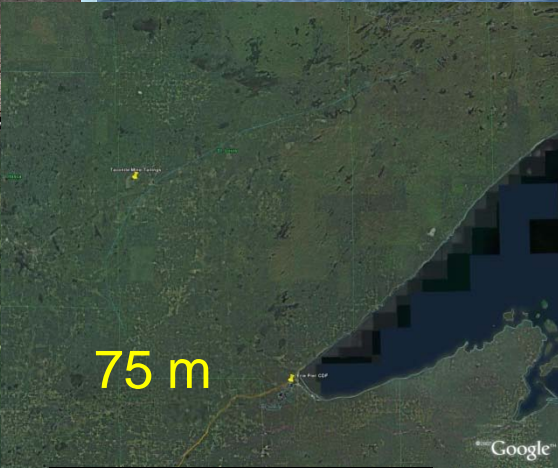
# Mineland Reclamation



NY Harbor Dredged Material,  
Bark Camp



Coastal LA: How did this rock get here?



Erie Pier CDF  
Taconite Mines



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# Dredged Material Recycling



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# Construction Materials



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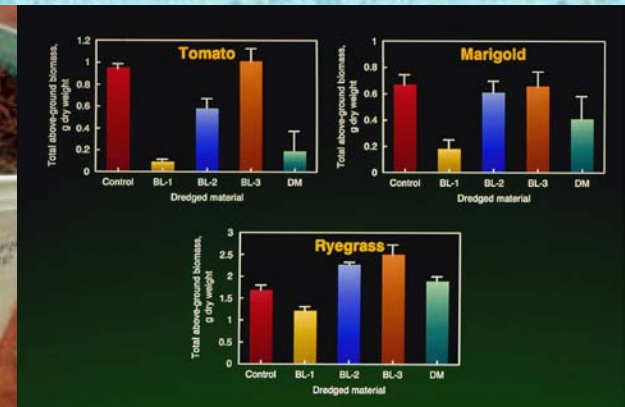




# Blending to Meet Needs



- Cellulose
  - Yard wastes, paper wastes
- Biosolids
  - Sewage sludge, animal wastes
- Industrial by-products
  - Red mud, fly ash



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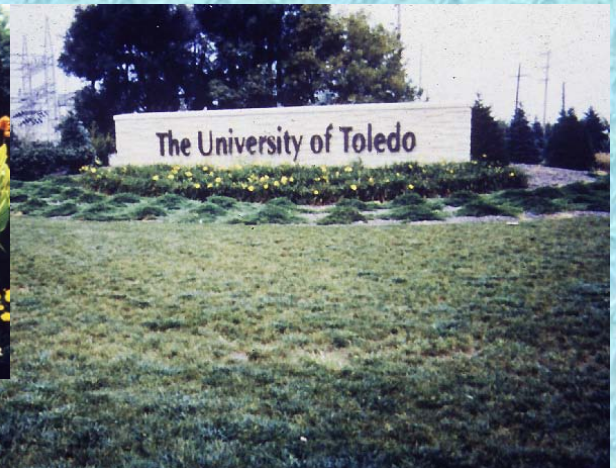
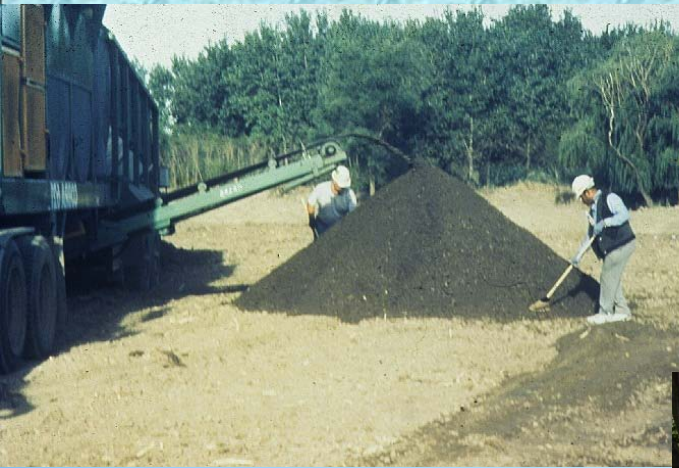
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# Dredged Material to Landscapes



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# Grand Haven, MI



**bottomsUp**  
topsoil  
All Dredged Up and Nowhere to Go!  
Call 616-842-1448 for info



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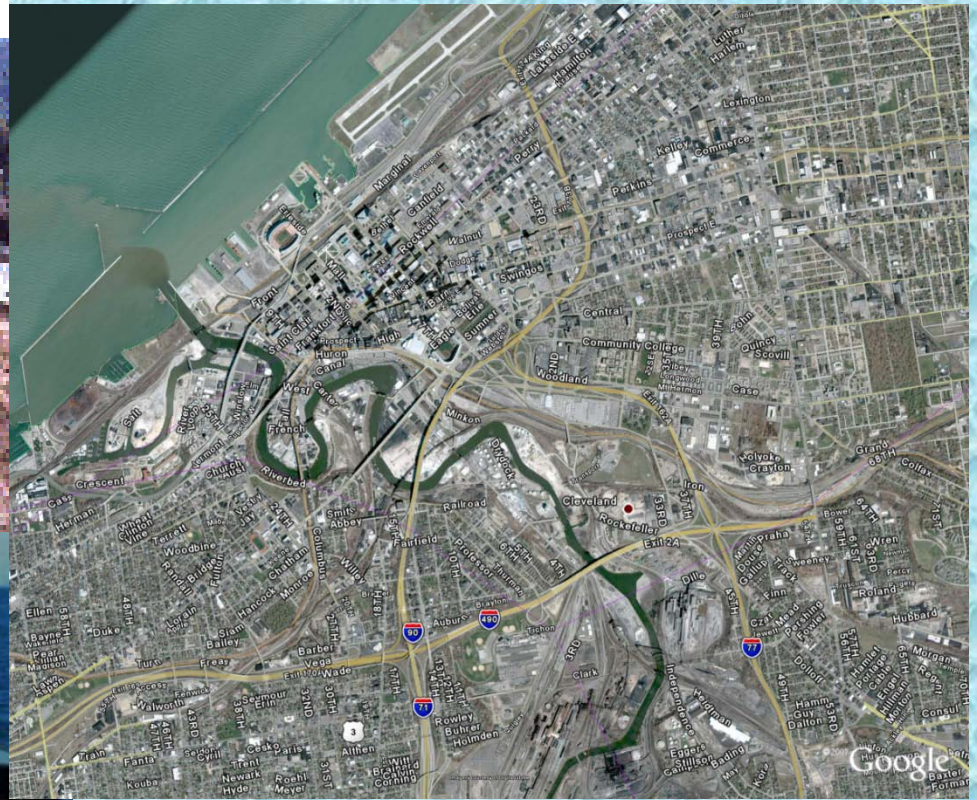
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# Sand Separation – Strategic Dredging



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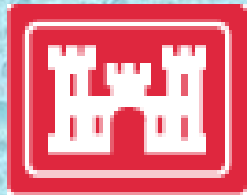


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# OK, we know it's useful so why don't we use it?



Joe Public



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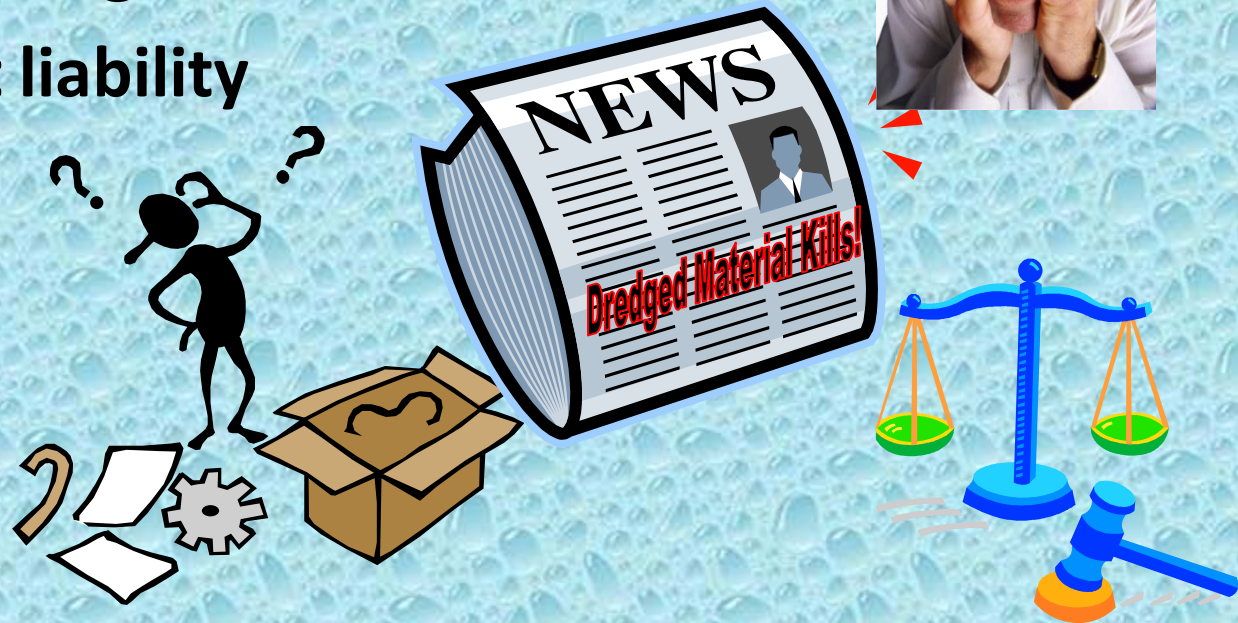
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# Issues

- Perceptions w/o scientific basis
- Lack of clear regulatory guidance
- **Uncertainty** dealing with contaminants
- **Fear** of product liability



***Dredged Material is not Toxic Waste!***



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# Consumer Products and Toxic Materials: Benefits and Acceptable Risks

- **"WARNING: Keep out of reach of children under 6 years of age. If you accidentally swallow more than used for brushing, seek professional help or contact a poison control center immediately."**
  - FDA Mandated Warning on Fluoride Toothpaste Labels
- **Benzo(a)pyrene in foods**
  - 0.2 – 60  $\mu\text{g kg}^{-1}$  in fruits and vegetables
  - 0.1-212  $\mu\text{g kg}^{-1}$  in grilled/smoked meats
    - J.C. Larsen (<http://www.inchem.org/documents/jecfa/jecmono/v28je18.htm>)
- **Arsenic in foods**
  - 0.390  $\text{mg kg}^{-1}$  in chicken – Lasky (2004)
  - 0.5 – 2  $\text{mg kg}^{-1}$  inorganic As (FDA Standard for animal products treated with veterinary medicines)

*Products from Dredged Material – evaluate the risks of toxic ingredients and restrict use where risks not acceptable*



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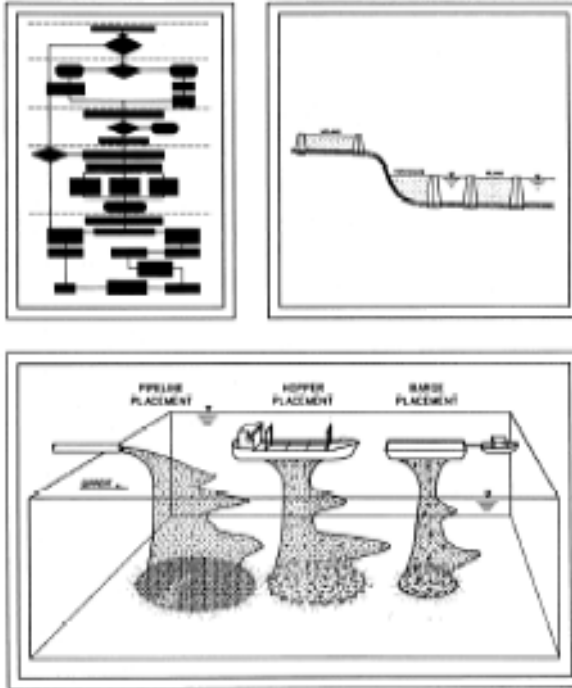






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## Evaluating Environmental Effects of Dredged Material Management Alternatives— A Technical Framework



## EPA/USACE Guidance

- BU opportunities
- Physical suitability
- Logistics & Mgt needs
- Environmental suitability –  
no testing methods specified
  - State/Fed screening criteria
  - Physical & biological tests



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# Testing Guidance for Environmental Suitability

- **Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual (Inland Testing Manual)**
  - Section 404 CWA (1977)
  - Pass/fail testing for suitability – *Generally applies to BU*
- **Evaluation of Dredged Material Proposed for Disposal at Island, Nearshore, or Upland Confined Disposal Facilities – Testing Manual (Upland Testing Manual)**
  - NEPA and CWA



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ERDC/EL TR-07-27



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Engineer Research and  
Development Center

*Dredging Operations and Environmental Research Program*

## **Summary of Available Guidance and Best Practices for Determining Suitability of Dredged Material for Beneficial Uses**

Dennis L. Brandon and Richard A. Price

November 2007

Recommended comprehensive guidance (BUTM) and adequate decision support tools to enhance beneficial use



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# Physical Suitability

Table 2. Suitability of dredged material for various BUs.

Beneficial Use Options	Dredged Material Sediment Type				
	Rock	Gravel & Sand	Consolidated Clay	Silt/Soft Clay	Mixture
<b>Engineered Uses</b>					
Land creation	X	X	X	X	X
Land improvement	X	X	X	X	X
Berm creation	X	X	X		X
Shore protection	X	X	X		
Replacement fill	X	X			X
Beach nourishment		X			
Capping		X	X		X
<b>Agricultural/Product Uses</b>					
Construction materials	X	X	X	X	X
Aquaculture			X	X	X
Topsoil				X	X
<b>Environmental Enhancements</b>					
Wildlife habitats	X	X	X	X	X
Fisheries improvement	X	X	X	X	X
Wetland restoration			X	X	X

Source: <http://el.erdc.usace.army.mil/dots/budm/types.html#mixture>.



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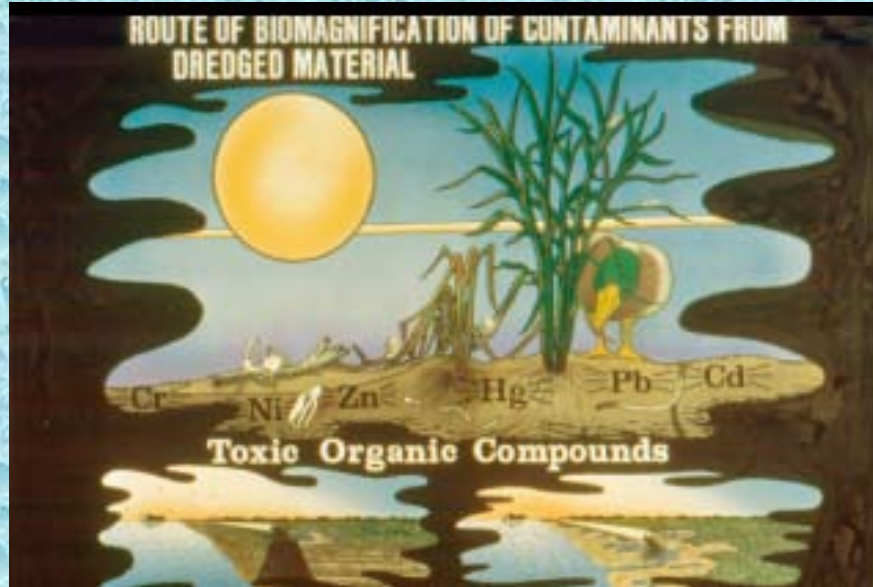
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# Environmental Suitability



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# ISSUES: Dredging and RSM

- Excess erosion and contaminant discharges impair beneficial use of dredged sediments
- Watershed management at the dredging end rather than in the watershed
- State and federal restrictions on dredged material placement in littoral zone
- Returning dredged sediments to upland reuse is often prohibited by cost



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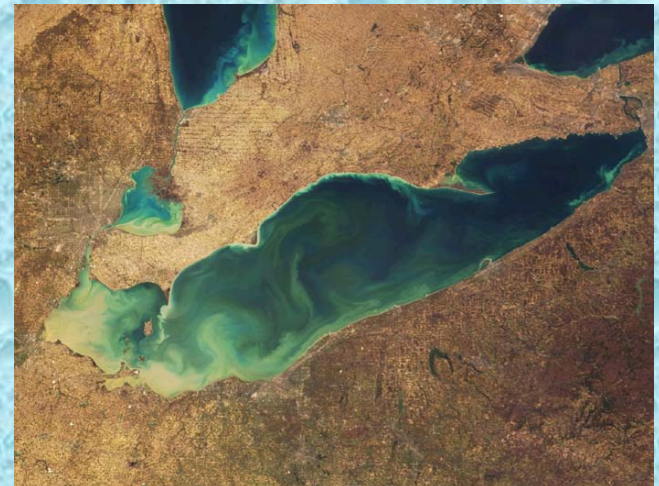
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# BU - Formula for Success

- Technical feasibility
- Legal / regulatory concerns
- Public support
- Economical
  - Sharing cost and responsibility



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# Web Resources

- Dredging Operations Technical Support  
<http://el.erdc.usace.army.mil/dots/dots.html>
- Beneficial Uses of Dredged Material  
<http://el.erdc.usace.army.mil/dots/budm/budm.cfm>
- Dredging Operations and Environmental Research Program  
<http://el.erdc.usace.army.mil/dots/doer/doer.html>



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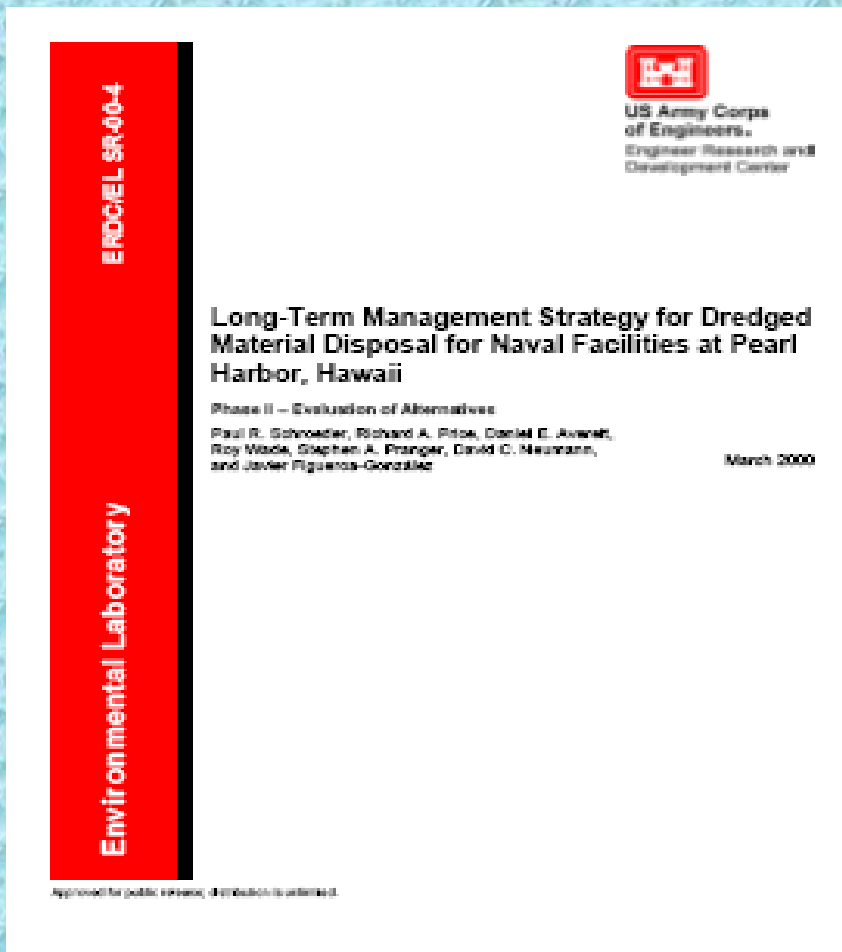
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# Dredged Material Management – Issues for Discussion



- **Federal Standard for Selection of Disposal Alternatives**
  - Least Cost
  - Meets environmental compliance
  - Meets sound engineering practice
- **Beneficial Use**
  - Costs above the federal standard requires cost share
- **Acceptable risks**
  - Short-term risks vs long-term benefits



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