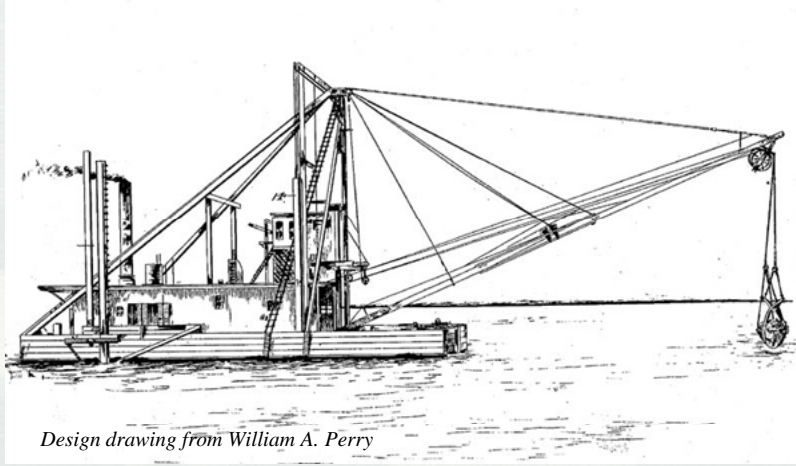


## Part 2: Overview of Dredged Material Disposal at the Proposed Penobscot Bay Site

- History of aquatic placement of dredged material
- Current techniques for placement of dredged material in the aquatic environment and tools for monitoring
- Overview of the proposed Penobscot Bay Site



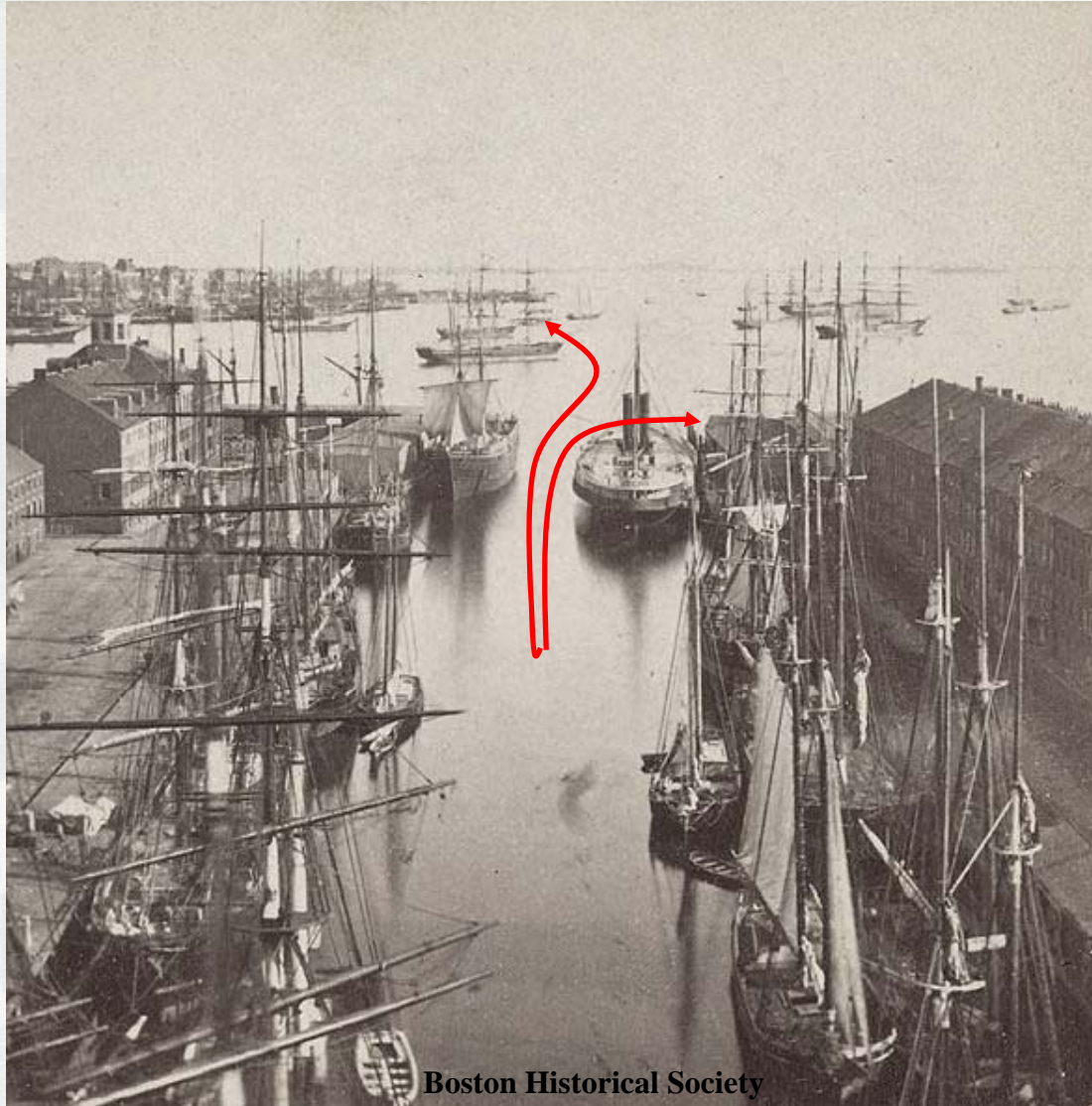
# History of Aquatic Placement of Dredged Material



- general approach to mechanical dredging has changed little, but management of the dredging and disposal operations has significantly changed



# History of Aquatic Placement of Dredged Material



Boston Historical Society

- early dredging efforts relocated dredged material only a short distance





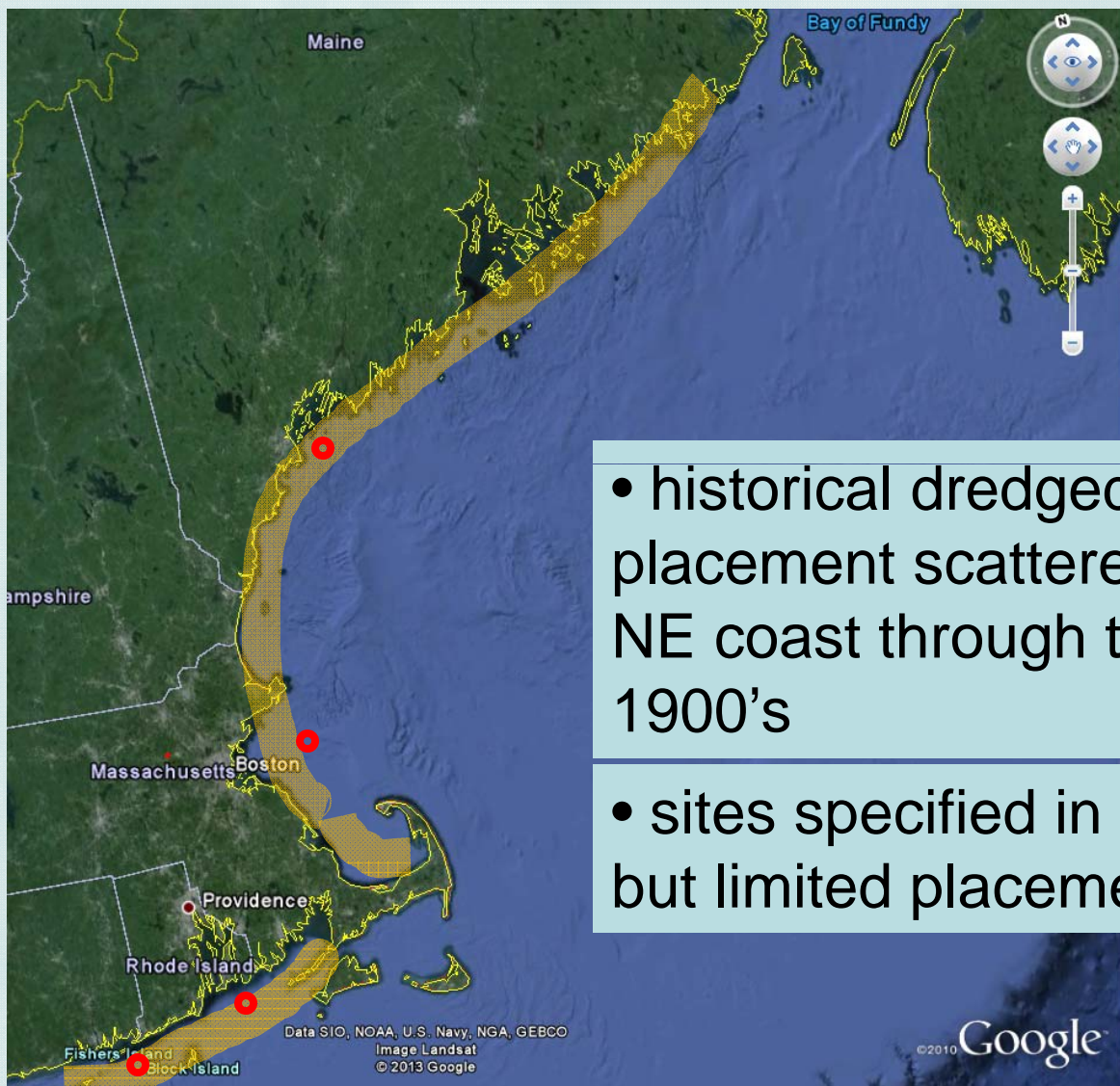
# History of Aquatic Placement of Dredged Material



- historical dredged material placement scattered along the NE coast through the early 1900's



# History of Aquatic Placement of Dredged Material

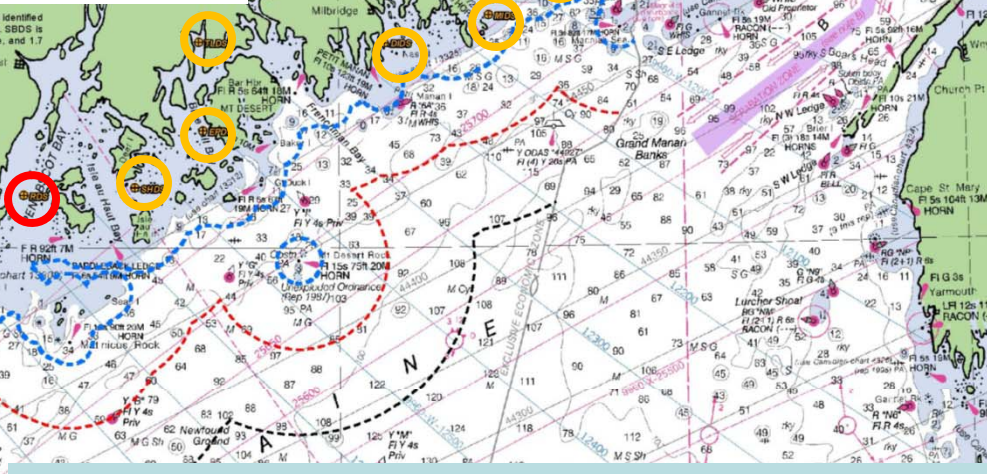
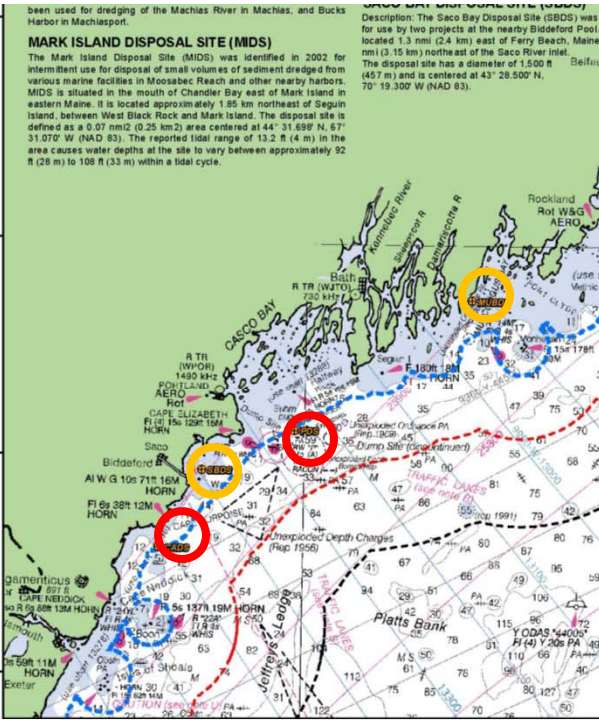
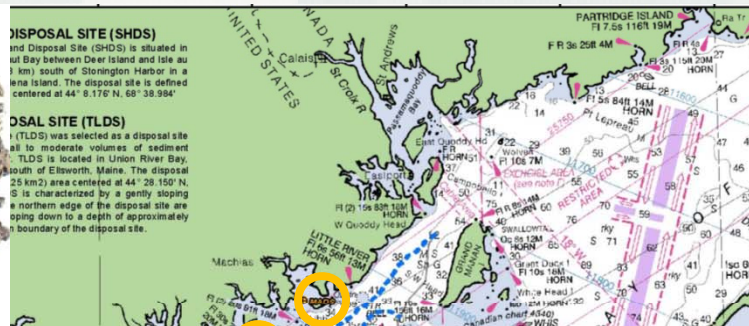


- historical dredged material placement scattered along the NE coast through the early 1900's
- sites specified in mid 1900's but limited placement guidelines





# History of Aquatic Placement of Dredged Material



- with passage of the Clean Water Act and Marine Protection Research and Sanctuaries Act, more rigorous process for selecting/designating disposal sites and controls on placed material



# History of Aquatic Placement of Dredged Material



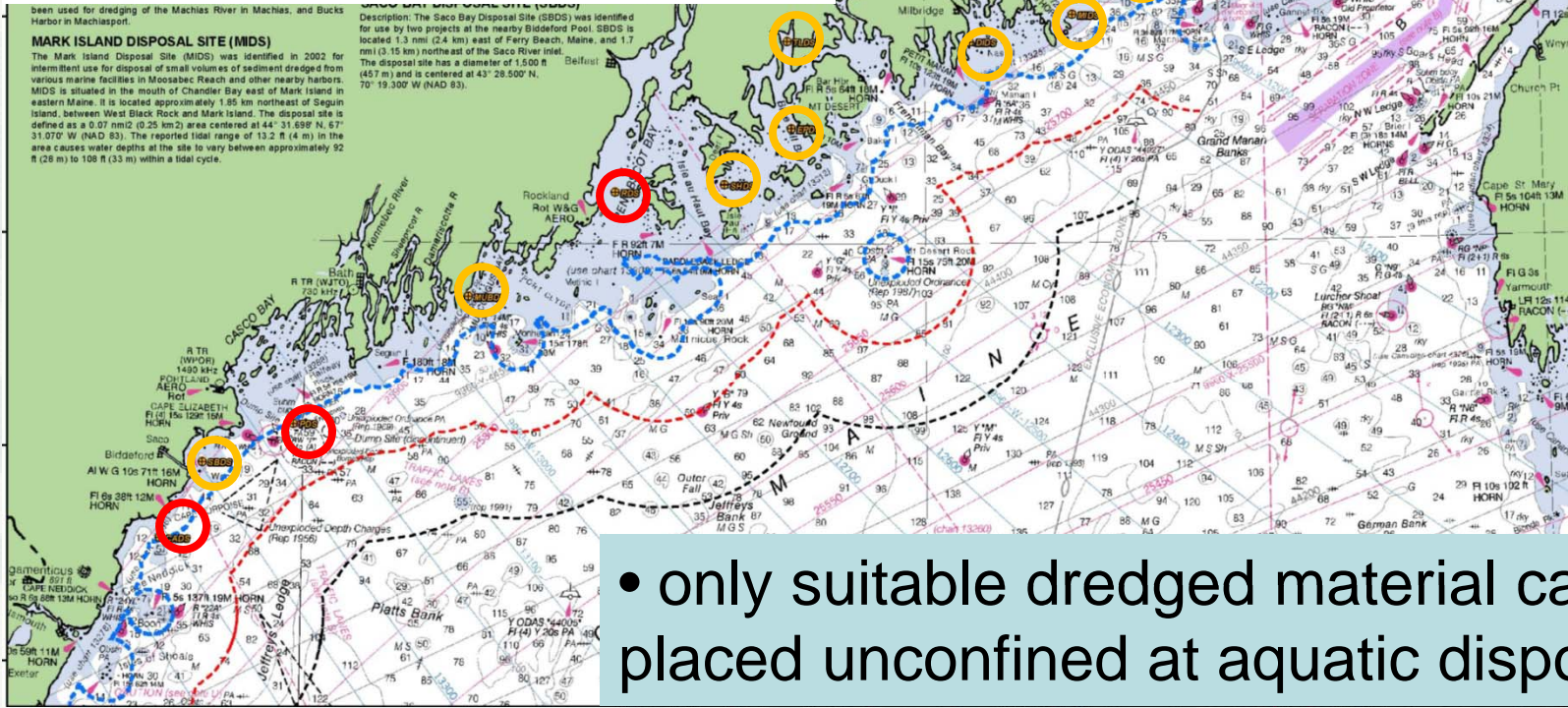
**DISPOSAL SITE (SHDS)**  
 The Shallow Harbor Disposal Site (SHDS) is situated in Cut Bay between Deer Island and Isle au Loup, south of Stormington Harbor in a new island. The disposal site is defined centered at 44° 8' 17" N, 68° 38' 98" W.

**DISPOSAL SITE (TLDS)**  
 The Tidal Lagoon Disposal Site (TLDS) was selected as a disposal site for all to moderate volumes of sediment. TLDS is located in Union River Bay, south of Ellsworth, Maine. The disposal 25 km<sup>2</sup> area centered at 44° 28' 150" N, 68° 35' 00" W is characterized by a gently sloping northern edge of the disposal site are being down to a depth of approximately 10 meters from the boundary of the disposal site.

been used for dredging of the Machias River in Machias, and Bucks Harbor in Bucksport.

**MARK ISLAND DISPOSAL SITE (MIDS)**  
 The Mark Island Disposal Site (MIDS) was identified in 2002 for intermittent use for disposal of small volumes of sediment dredged from various marine facilities in Moosabec Reach and other nearby harbors. MIDS is situated in the mouth of Chandler Bay east of Mark Island in eastern Maine. It is located approximately 1.85 km northeast of Seguin Island, between West Black Rock and Mark Island. The disposal site is defined as a 0.07 nm<sup>2</sup> (0.25 km<sup>2</sup>) area centered at 44° 31' 58" N, 67° 31' 07" W (NAD 83). The reported tidal range of 13.2 ft (4 m) in the area causes water depths at the site to vary between approximately 92 ft (28 m) to 108 ft (33 m) within a tidal cycle.

**SACO BAY DISPOSAL SITE (SBDS)**  
 Description: The Saco Bay Disposal Site (SBDS) was identified for use by two projects at the nearby Biddeford Pool. SBDS is located 1.3 nm (2.4 km) east of Ferry Beach, Maine, and 1.7 nm (3.15 km) northeast of the Saco River Inlet. The disposal site has a diameter of 1,500 ft (457 m) and is centered at 43° 28' 50" N, 70° 19' 30" W (NAD 83).



- only suitable dredged material can be placed unconfined at aquatic disposal sites



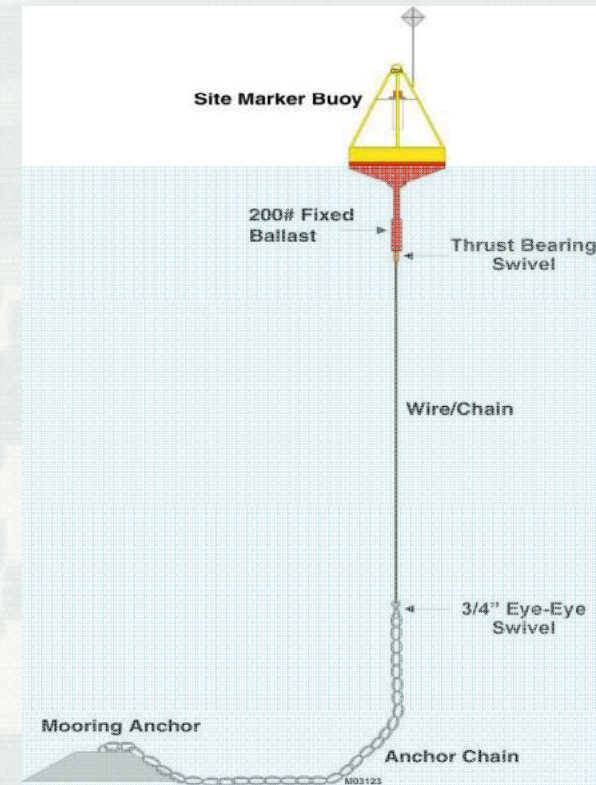


# Placement & Monitoring of Dredged Material



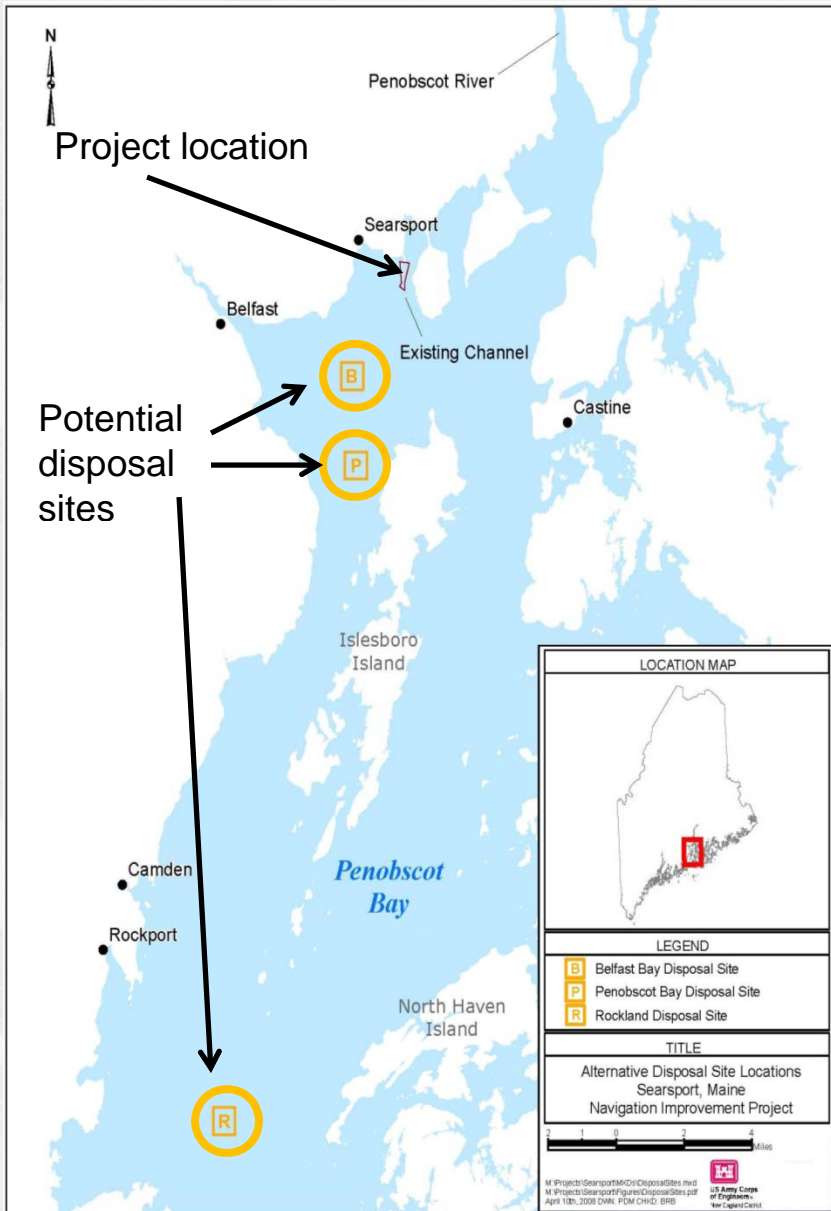
- Disposal Area Monitoring System (DAMOS) was initiated in 1977 focused on monitoring material dredged from the Trident sub base

- Targeted placement of material to minimize impacts
- Monitoring to track site recovery





# Selection of Potential Disposal Sites





- Assessment of potential sites builds on nearly 40 years of monitoring disposal sites in New England

Baseline Bathymetric Surveys at the Central and Western Long Island Sound Disposal Sites  
July 2005

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**Disposal Area Monitoring System  
DAMOS**

Contribution 177  
November 2007

**US Army Corps of Engineers**  
New England District

Disposal Area Monitoring System  
**DAMOS**



Final Reports  
Contributions 124 - 150  
February 2004

**US Army Corps of Engineers**  
New England District

[http://www.nae.usace.army.mil/environ/damos/splash\\_page.htm](http://www.nae.usace.army.mil/environ/damos/splash_page.htm)



# Concerns Addressed When Selecting a Disposal Site

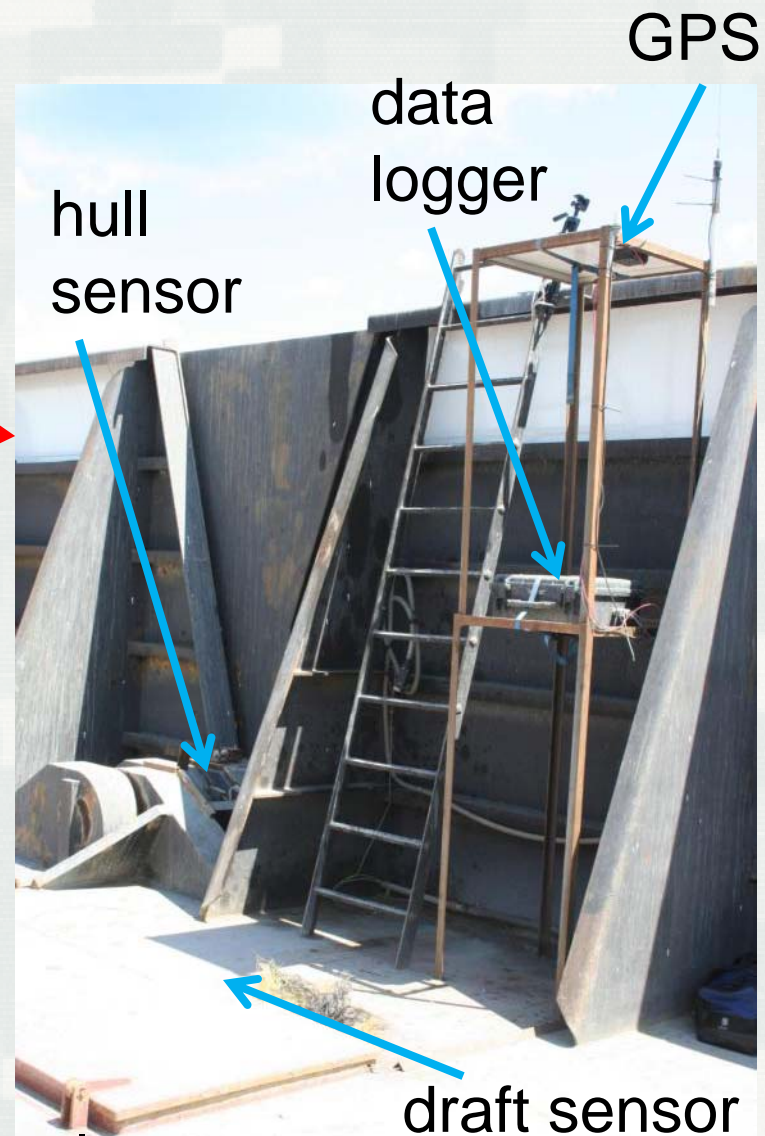


- Can the material be accurately placed at the site and will it remain there?
- Will there be an unacceptable release of material to the water column during disposal?
- Will the disposed material cause an unacceptable impact to the benthic community?
- Other site-specific concerns?





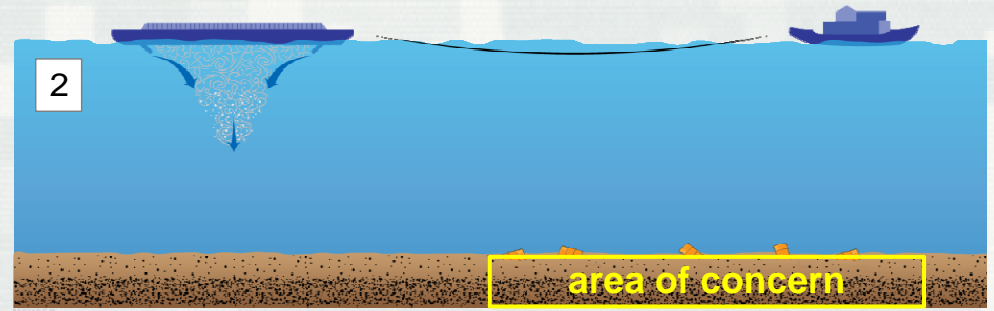
# Accurate Placement of Dredged Material



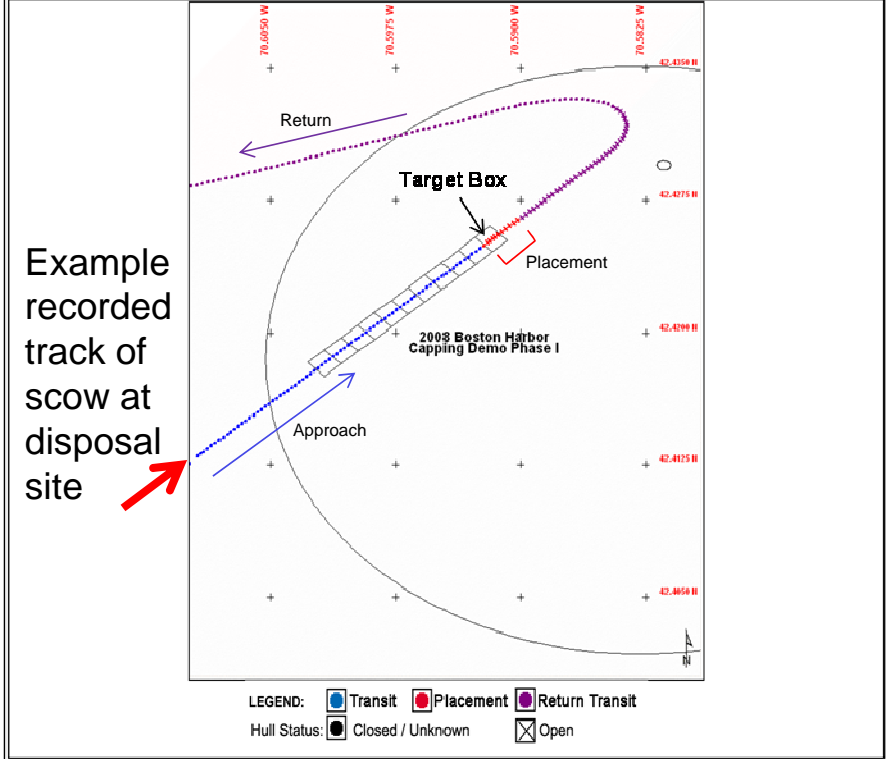
Tracking system required for all disposal

# Accurate Placement of Dredged Material

Trip Information:		Placement Information:	
Trip #:	68	Placement Start:	Placement End:
Tug:	Lemmerhirt	Time:	6/17/2008
Captain(s):	Unknown	Time:	11:30:16
Scow:	GL65	Lat:	42.424935
Type:	Split Hull Scow	Lat:	42.426364
Technique:	Bottom Dump	Long:	-70.592248
Bin Volume:	5175 cu yd	Long:	-70.590189
Start Time:	6/17/2008 08:00:28		
Init Aft Draft:	19.29 ft	Aft Draft:	17.89 ft
Init Fore Draft:	N/A	Aft Draft:	4.16 ft
Init Aft Bin:	N/A	Fore Draft:	N/A
Init Fore Bin:	N/A	Aft Bin:	N/A
		Fore Draft:	N/A
		Aft Bin:	N/A
		Fore Bin:	N/A
Material Source:	Unknown	Material Description:	Unknown
Wave Information Recorded:	6/17/2008 7:34:00 AM (Local)		
Wave Height:	Not Avail. Dominant Wave Period: Not Avail. NOAA Station: Not Avail.		



Barge releases material adjacent to target capping area

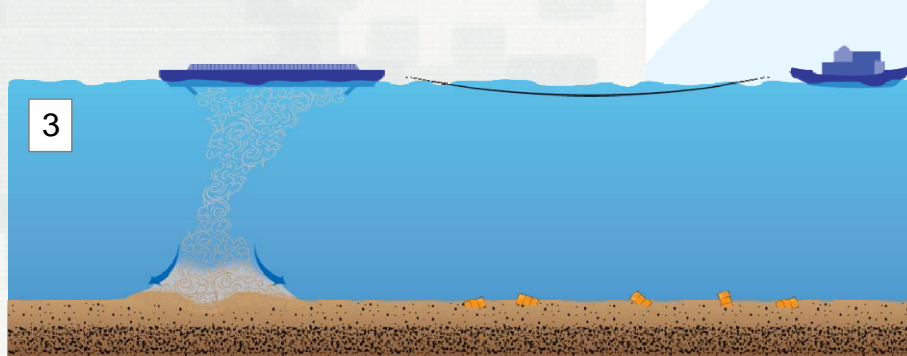


- GPS allows for tracking tug/scow over full disposal trip
- hull and draft sensors allow for tracking release of material from the scow





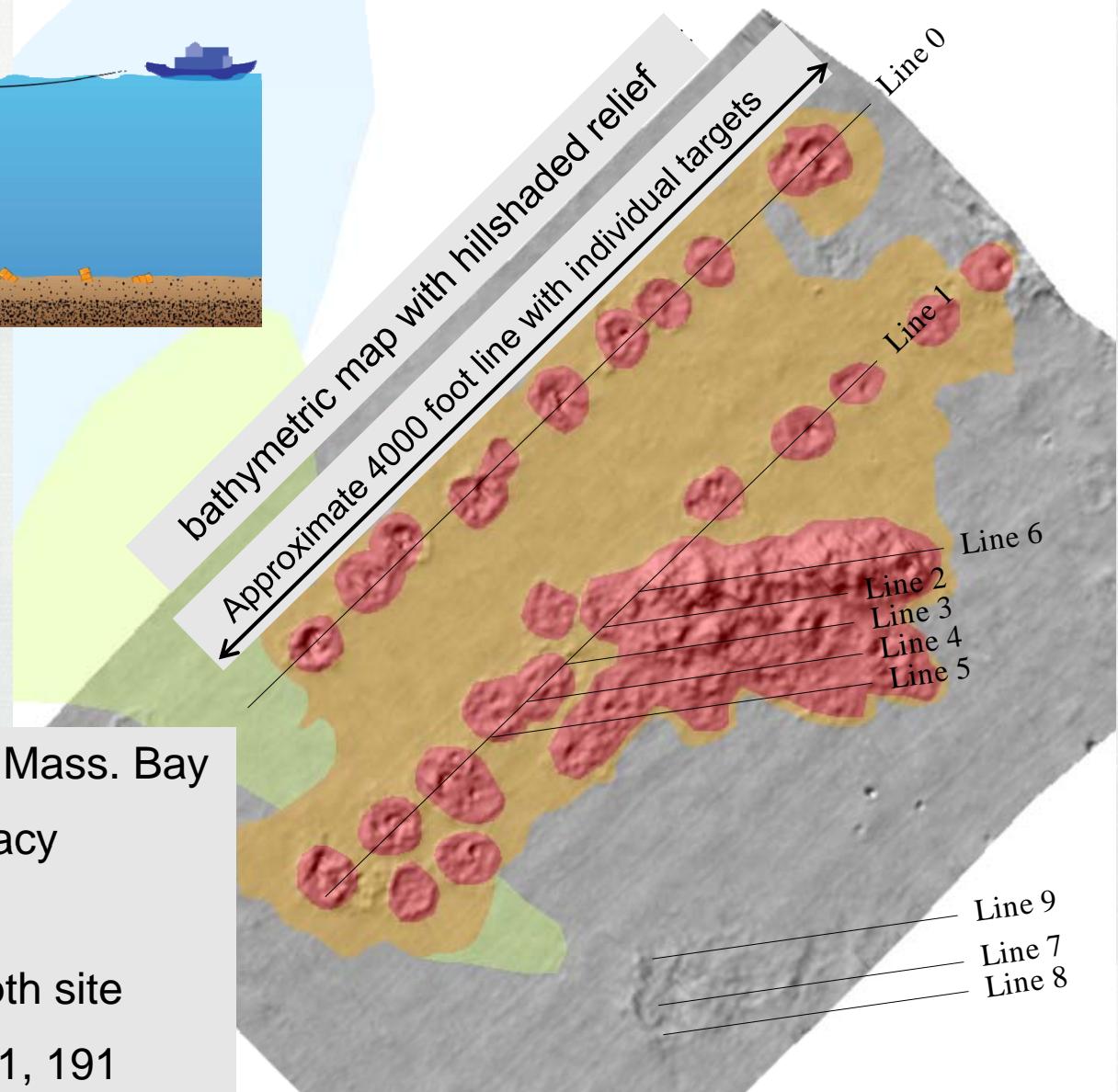
# Accurate Placement of Dredged Material



- bathymetry surveys to confirm placement locations

## Capping demonstration in Mass. Bay

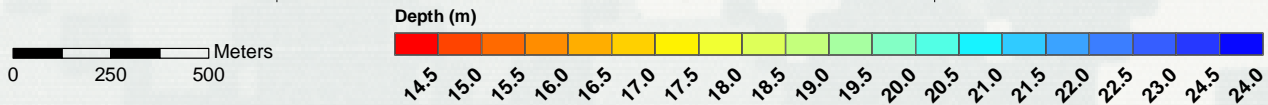
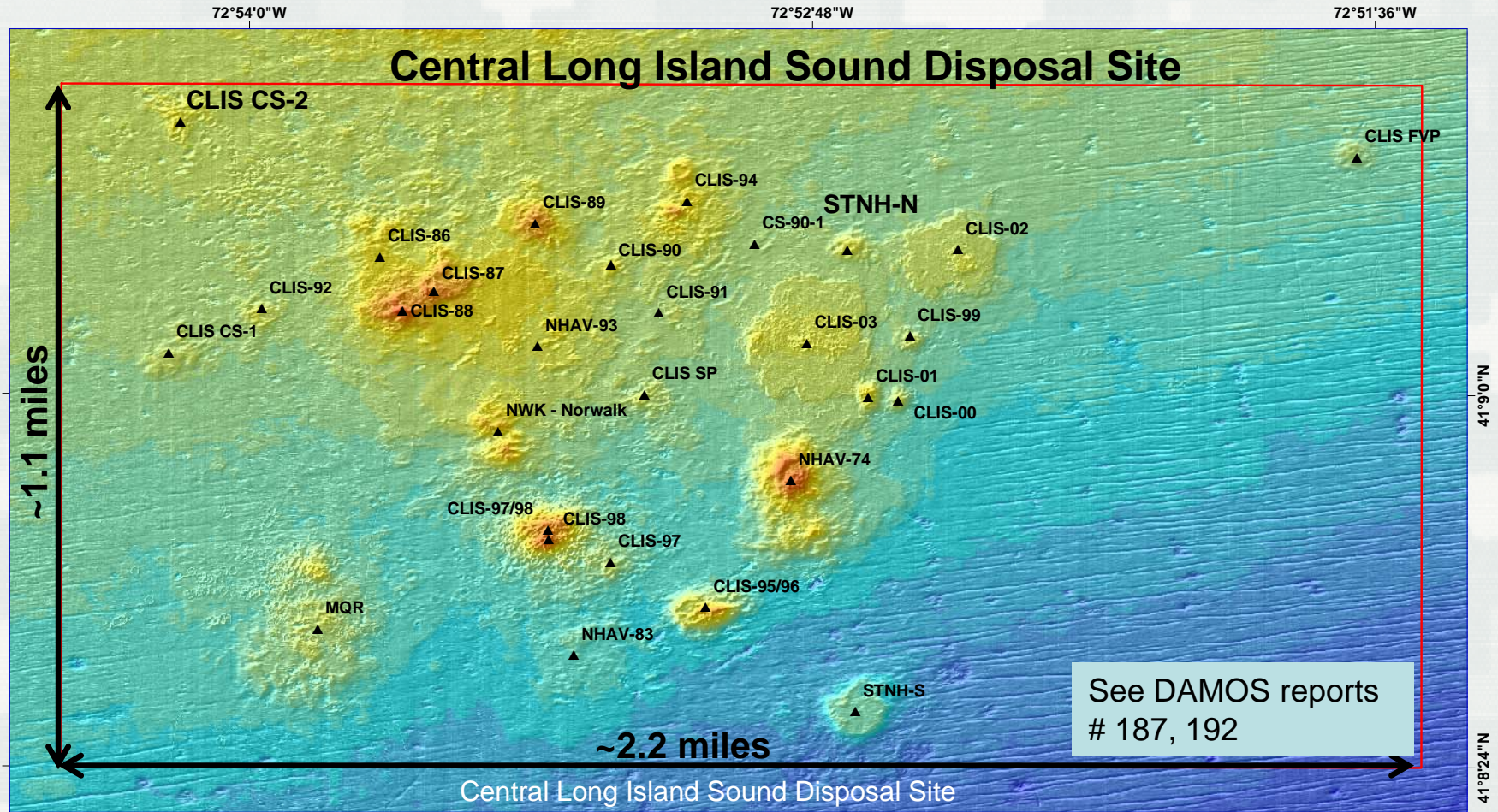
- assess placement accuracy
- track buildup of material
- open ocean, ~300 ft depth site
- see DAMOS reports #181, 191





# Tracking Long-Term Stability of Disposal Mounds

- nearly 40 years of record at multiple sites



Projection: Conformal Conic

Coordinate System: CT State Plane (m)

Datum: NAD 83

Depth in meters, MLW

Public Information Meeting – 24FEB2014: Searsport Harbor  
 Navigation Improvement Pre-Application Water Quality Certification

**BUILDING STRONG**®



# Assessing Release of Material to the Water Column

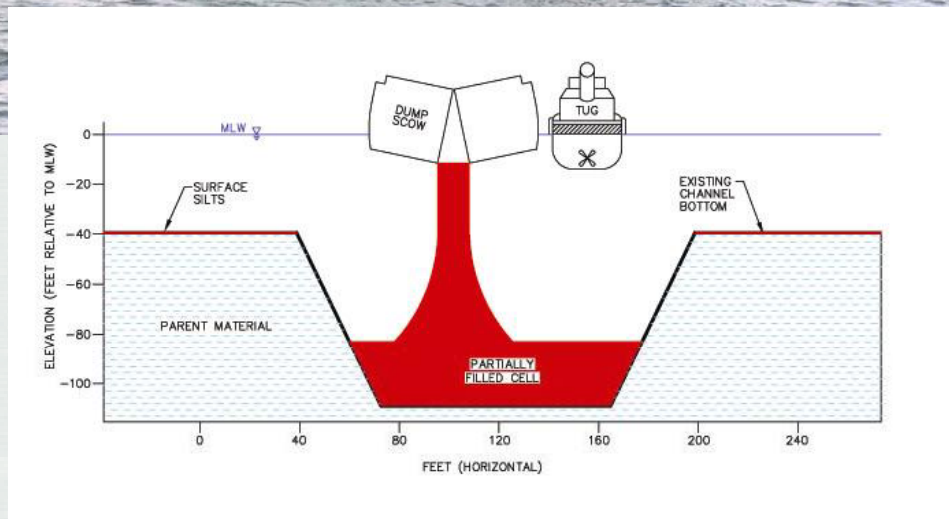
- release of 3000+ cubic yards of improvement dredged material from Boston Harbor at the Massachusetts Bay Disposal Site



# Assessing Release of Material to the Water Column

Scow releasing material over CAD cell in Providence Harbor

- concerns about release of disposed material have triggered detailed monitoring and research over the past several decades



- schematic of placement of unsuitable material into a Confined Aquatic Disposal (CAD) cell



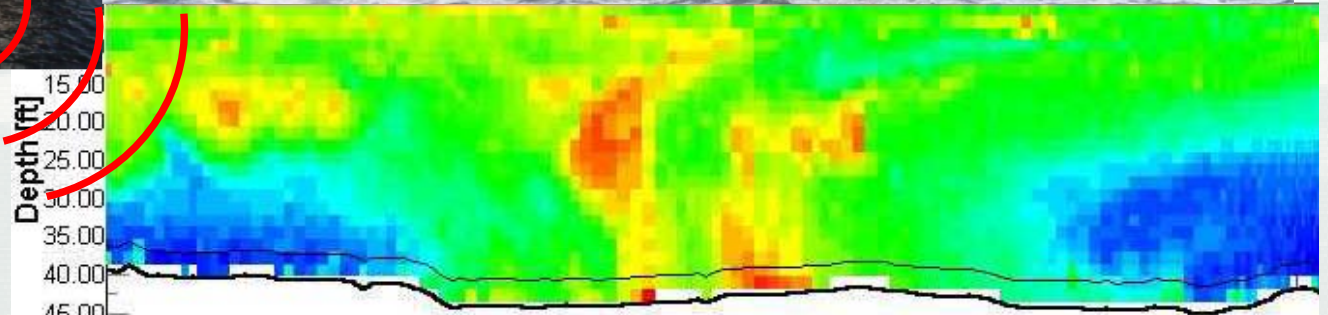


# Assessing Release of Material to the Water Column

- Field measurements and analyzed water samples support the finding of limited release to the water column



Acoustic Doppler Current Profiler used to identify suspended material and track plume movement in Providence Harbor



See DAMOS reports #166,167,168,178



# Assessing Release of Material to the Water Column

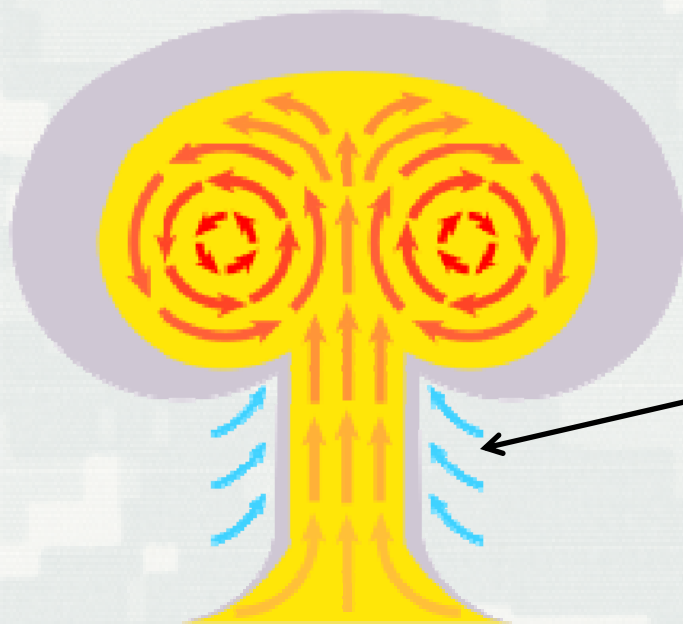


image from Wikipedia free media

- Laboratory studies and computer modeling reveal the disposal is similar to a thermal with an initial constriction of the release



MIT laboratory simulation of release of material from a scow using scaled fluorescent beads in a ~10 ft tank (Ruggaber 2000)

See DAMOS reports #166,167,168,178





# Assessing Release of Material to the Water Column

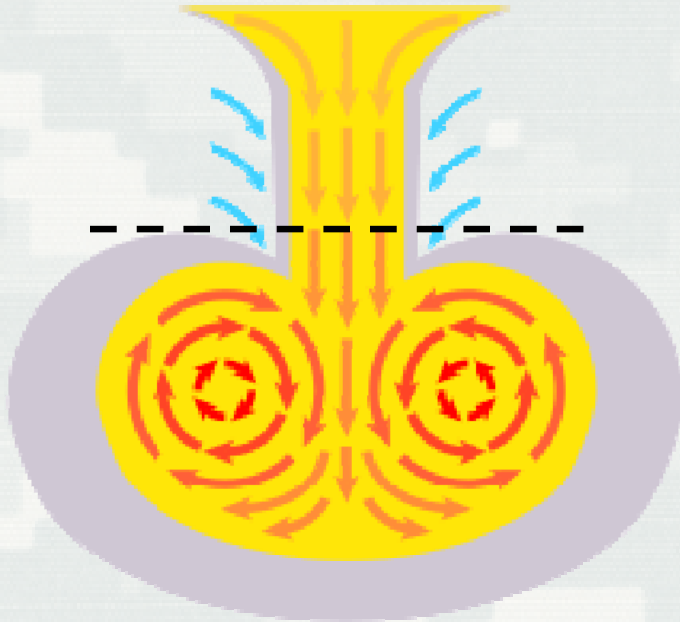


image from Wikipedia free media

- released material reaches the bottom of the relatively shallow depths of NE sites before the material spreads out through the water column
- supports the field measurements of limited release to the water column

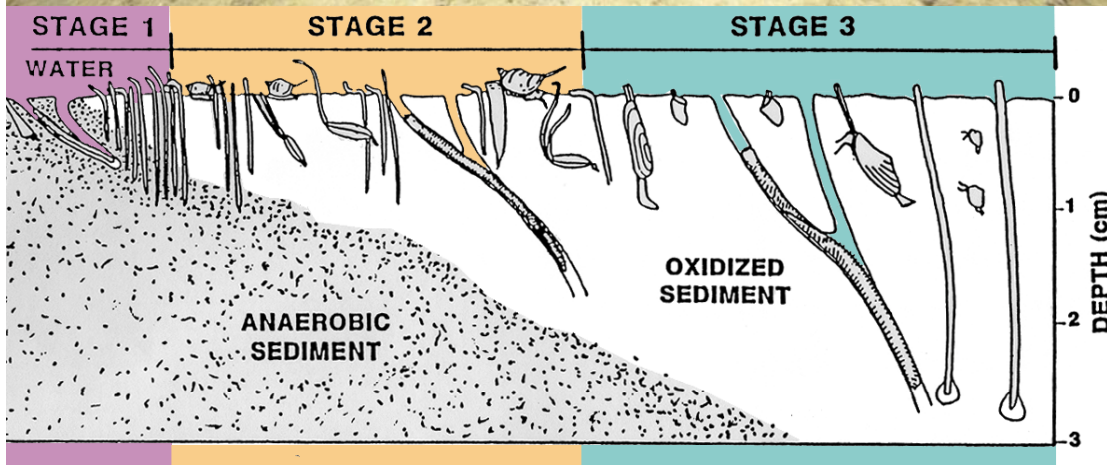


MIT laboratory simulation of release of material from a scow using scaled fluorescent beads in a ~10 ft tank (Ruggaber 2000)

See DAMOS reports #166,167,168,178



# Assessing Impacts to the Benthic System

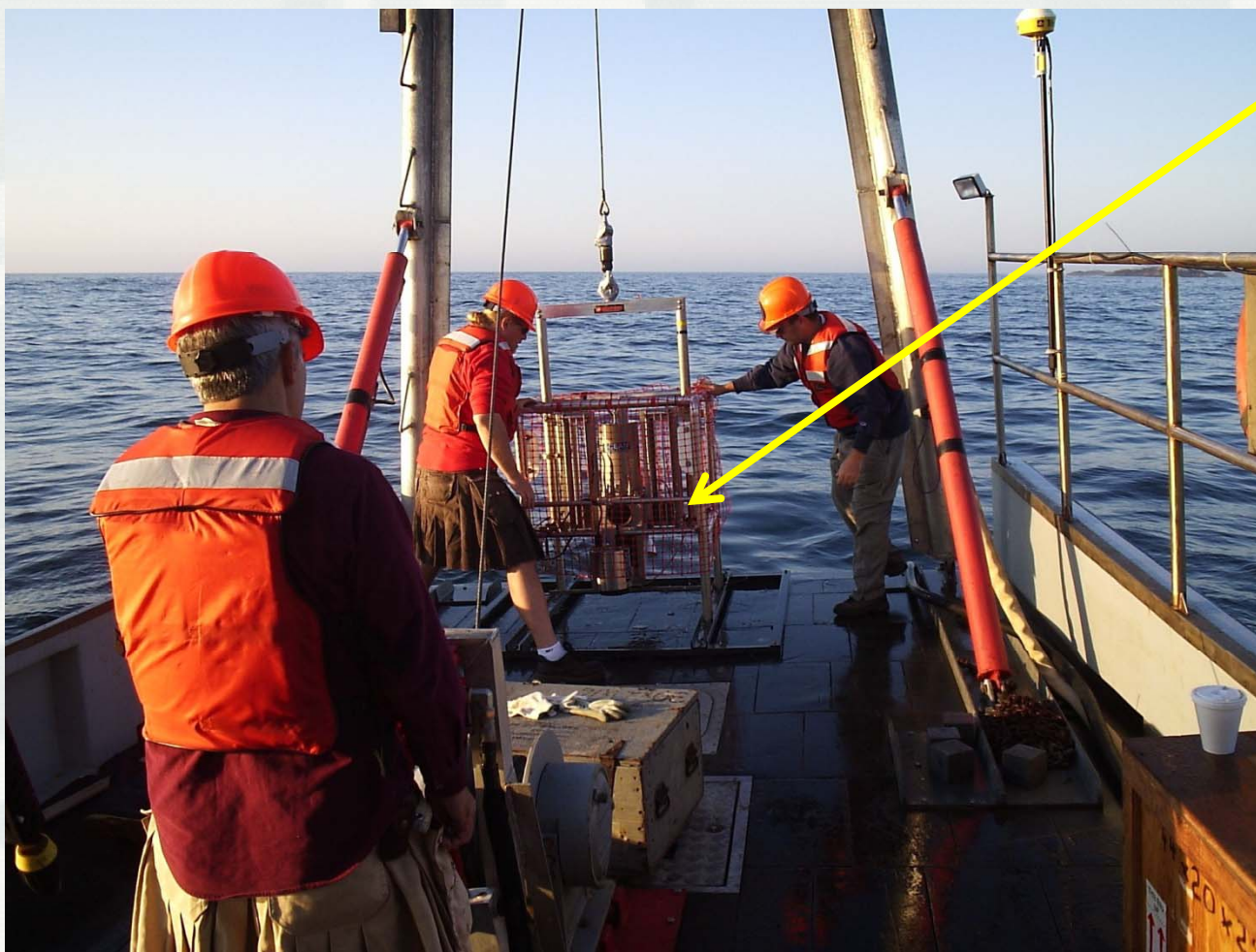


- Benthic (seabottom) impacts limited to the direct footprint of the material placement
- Following disturbance, fine-grained habitats follow a predictable sequence of recovery
- Tracking this recovery is a primary objective of the DAMOS Program (see reports #188, 191, 192, 193 for recent examples)





# Assessing Impacts to the Benthic System

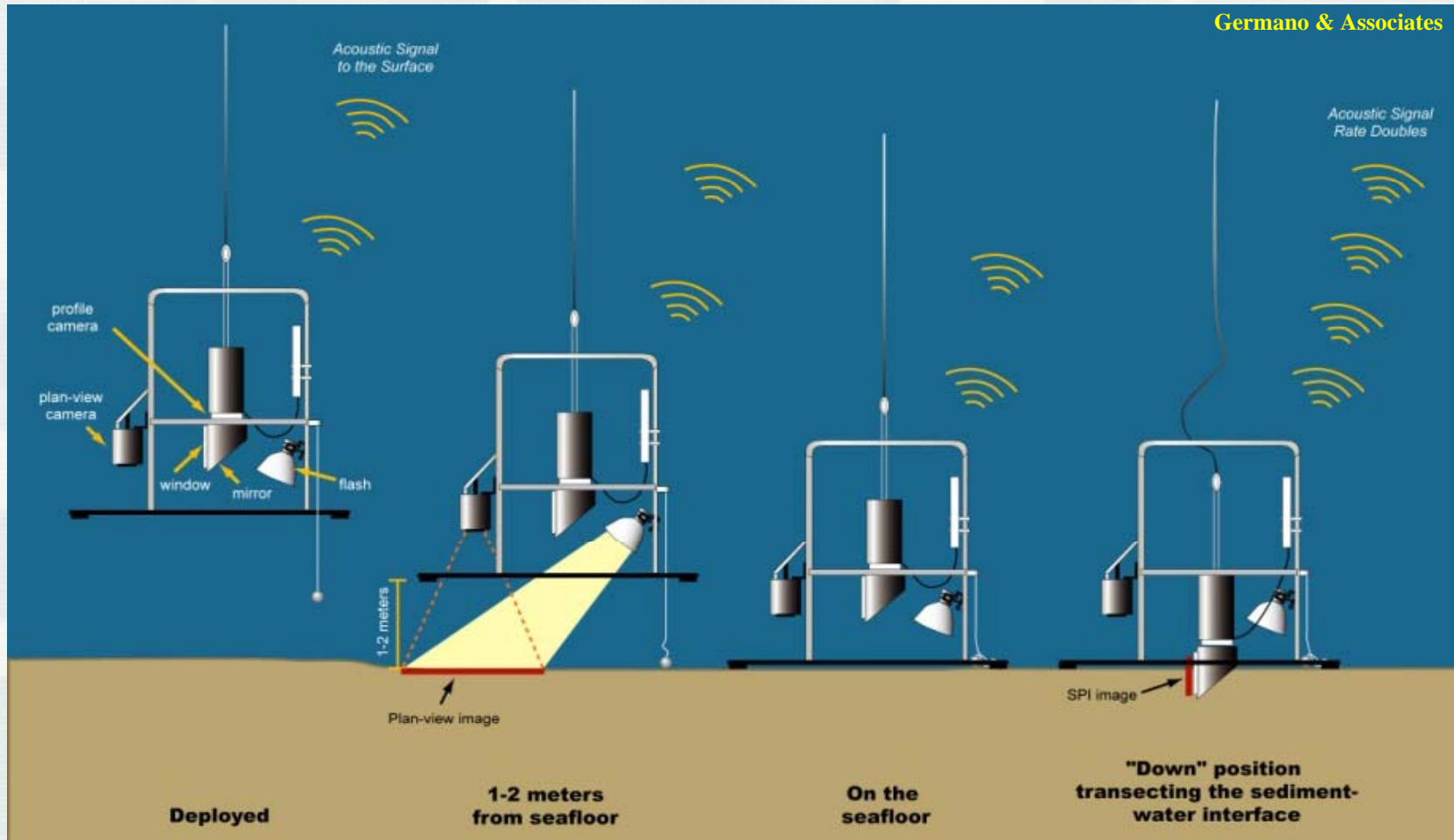


- sediment profile and plan view cameras provide images above and below the seafloor
- imaging multiple locations provides a comprehensive evaluation of a site



# Assessing Impacts to the Benthic System

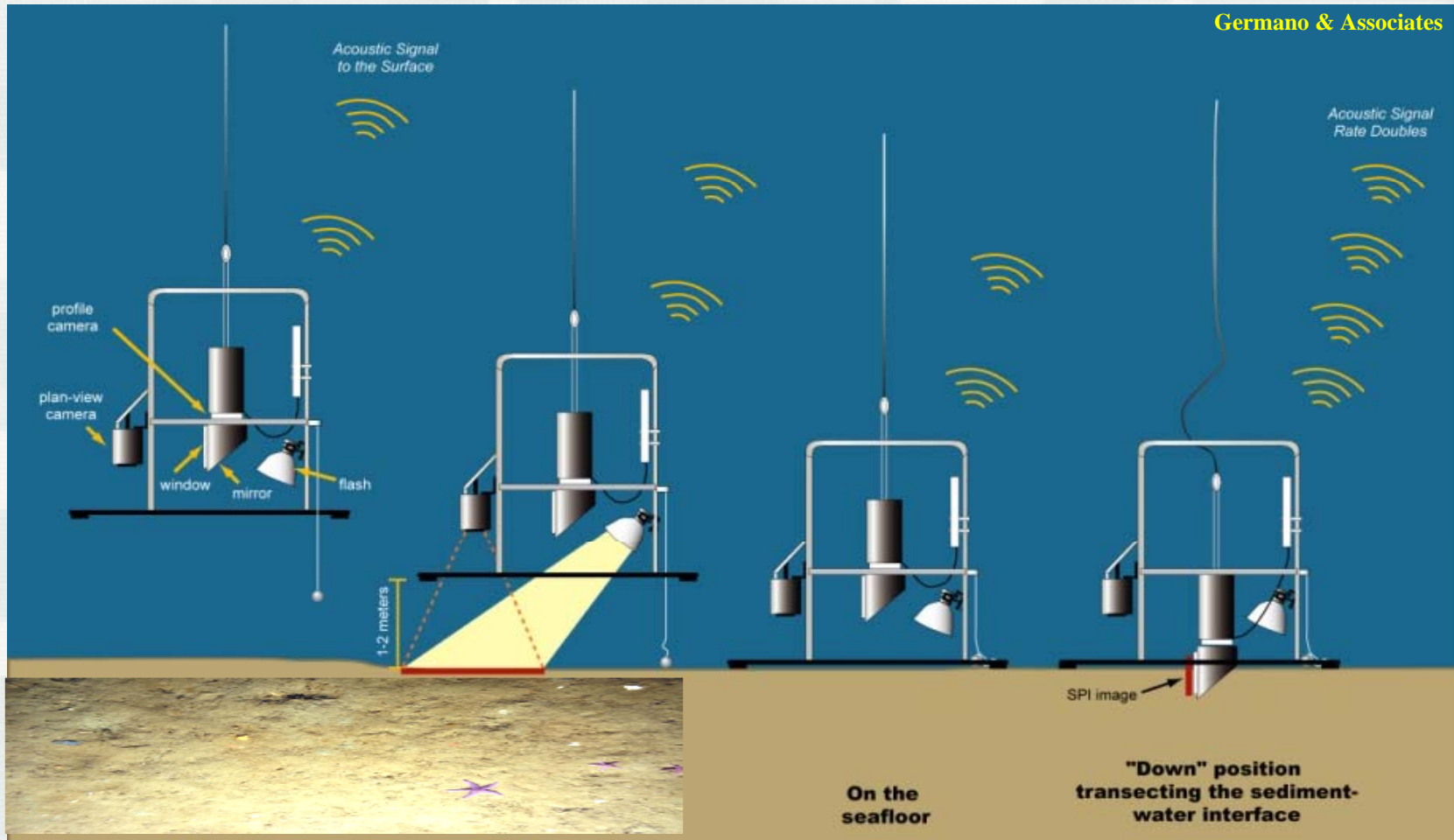
- Deployment of the seafloor imaging camera





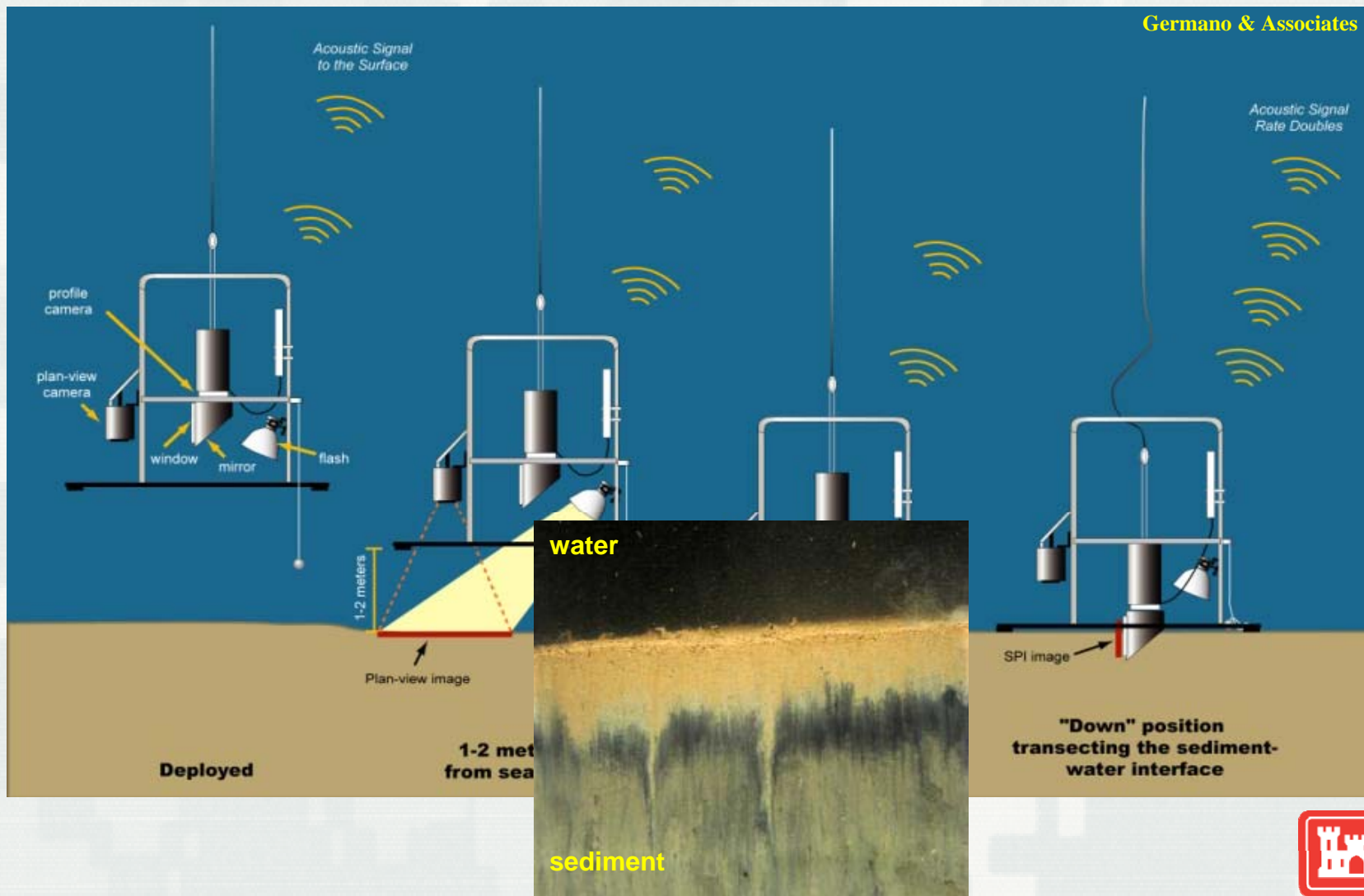
# Assessing Impacts to the Benthic System

- Deployment of the seafloor imaging camera



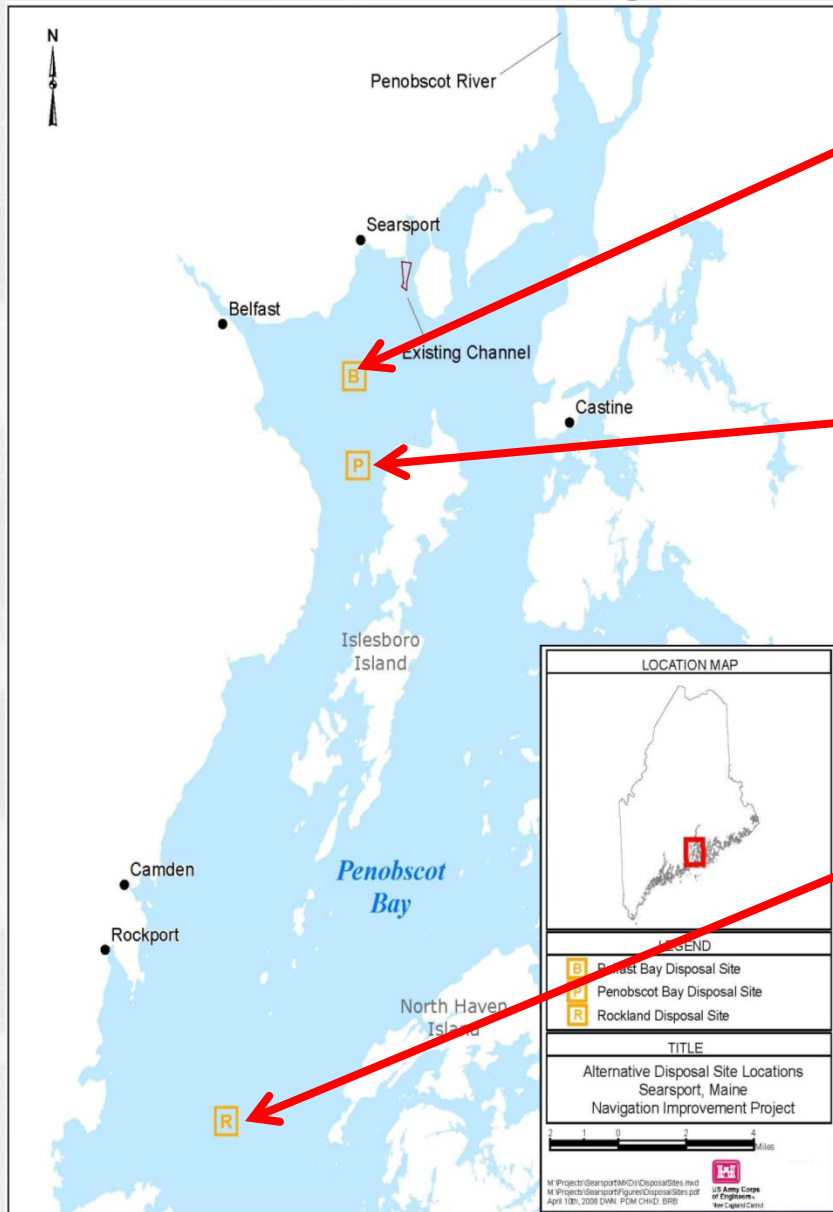
# Assessing Impacts to the Benthic System

- Deployment of the seafloor imaging camera





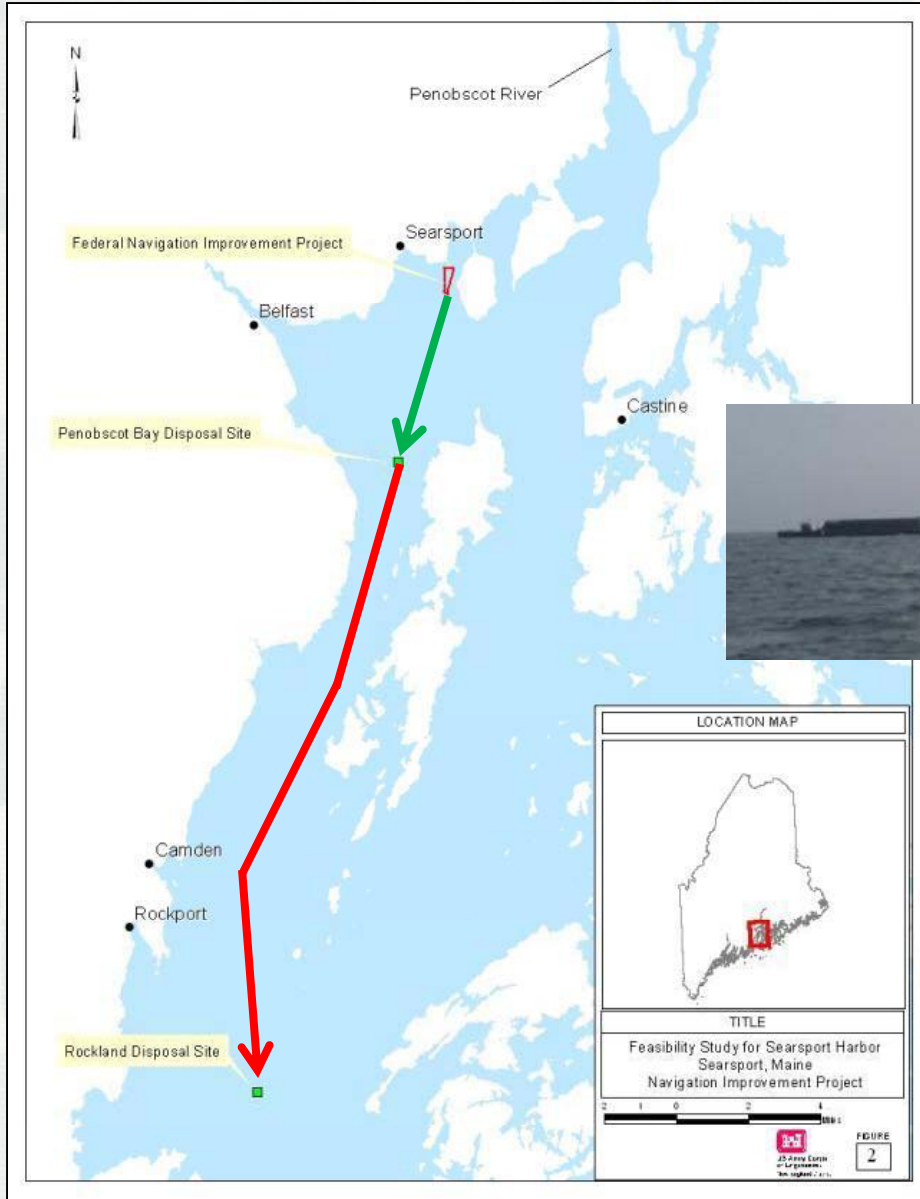
# Studies Supporting the Selection of the Disposal Site



- Belfast Bay (Steels Ledge) site - marked on charts (historical); evaluated in 2000, 2007-08 but no detailed record of use
- Penobscot site – nearby area marked on charts (historical)
  - initial sampling in 2007-08
  - bathymetry, imaging, benthic sampling in 2013
- Rockland – established regional site with use dating back to 1973



# Concerns with Use of the Rockland Disposal Site



Extended haul distance to disposal site

- approximately 38 miles additional haul for each scow round trip

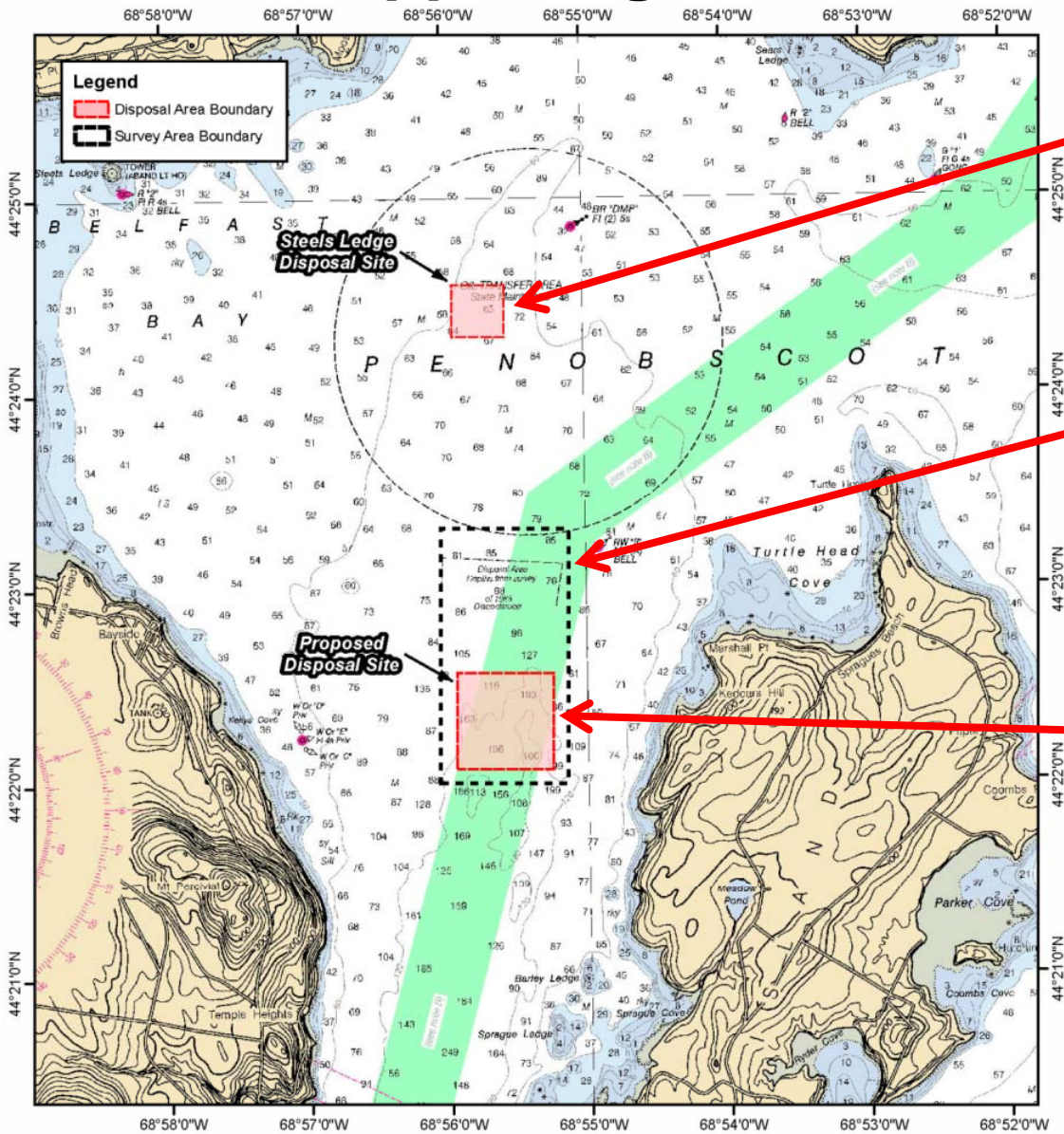


- additional 63 days of tug-scow traffic on the bay
- additional 260,000 gallons of diesel fuel usage





# Studies Supporting the Selection of the Disposal Site



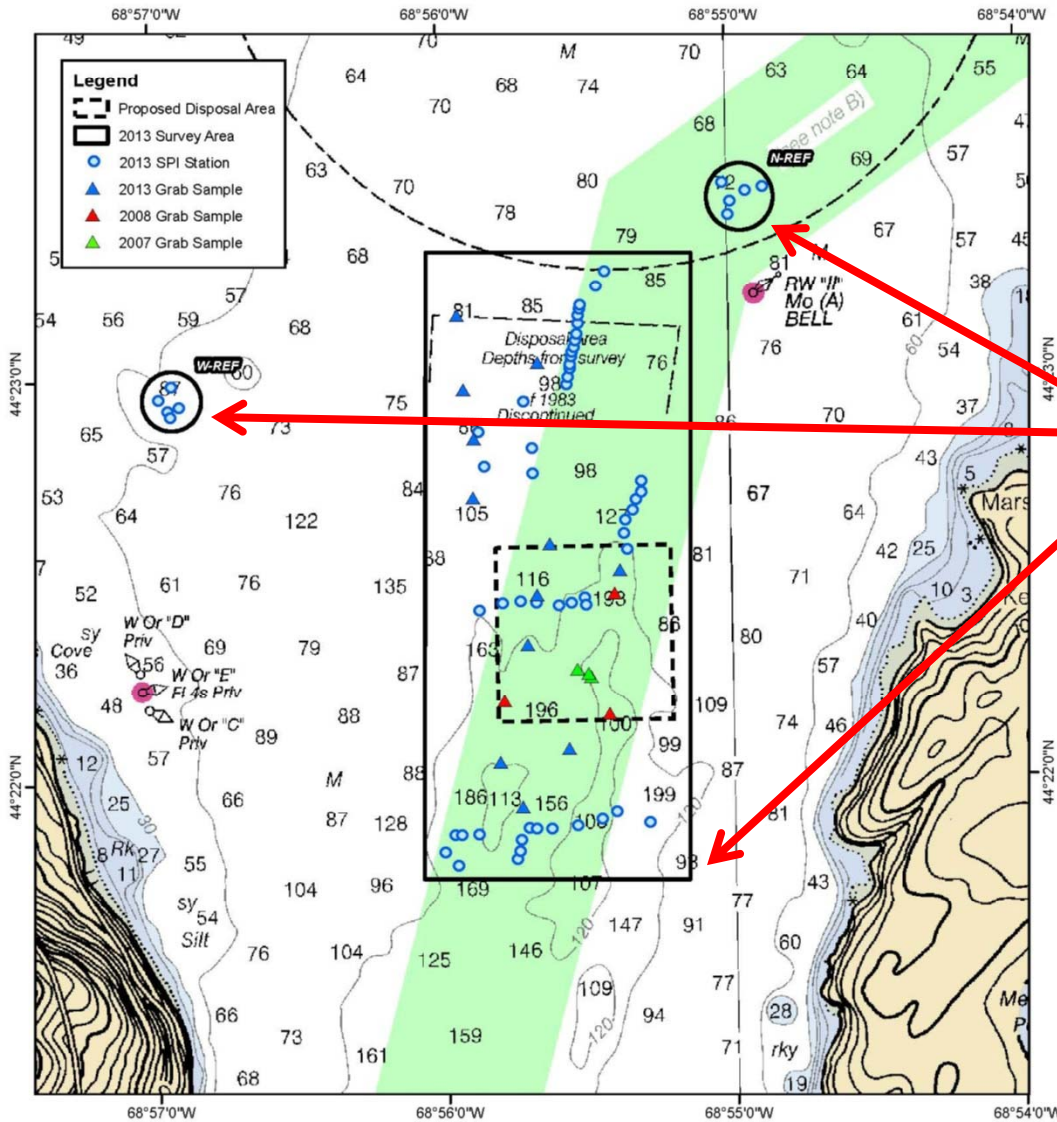
- Belfast Bay (Steels Ledge) site – averages ~60 ft deep

- 2013 survey area expanded to include charted historic disposal area

- Penobscot Bay site - depths of 100-200 ft



# Studies Supporting the Selection of the Disposal Site

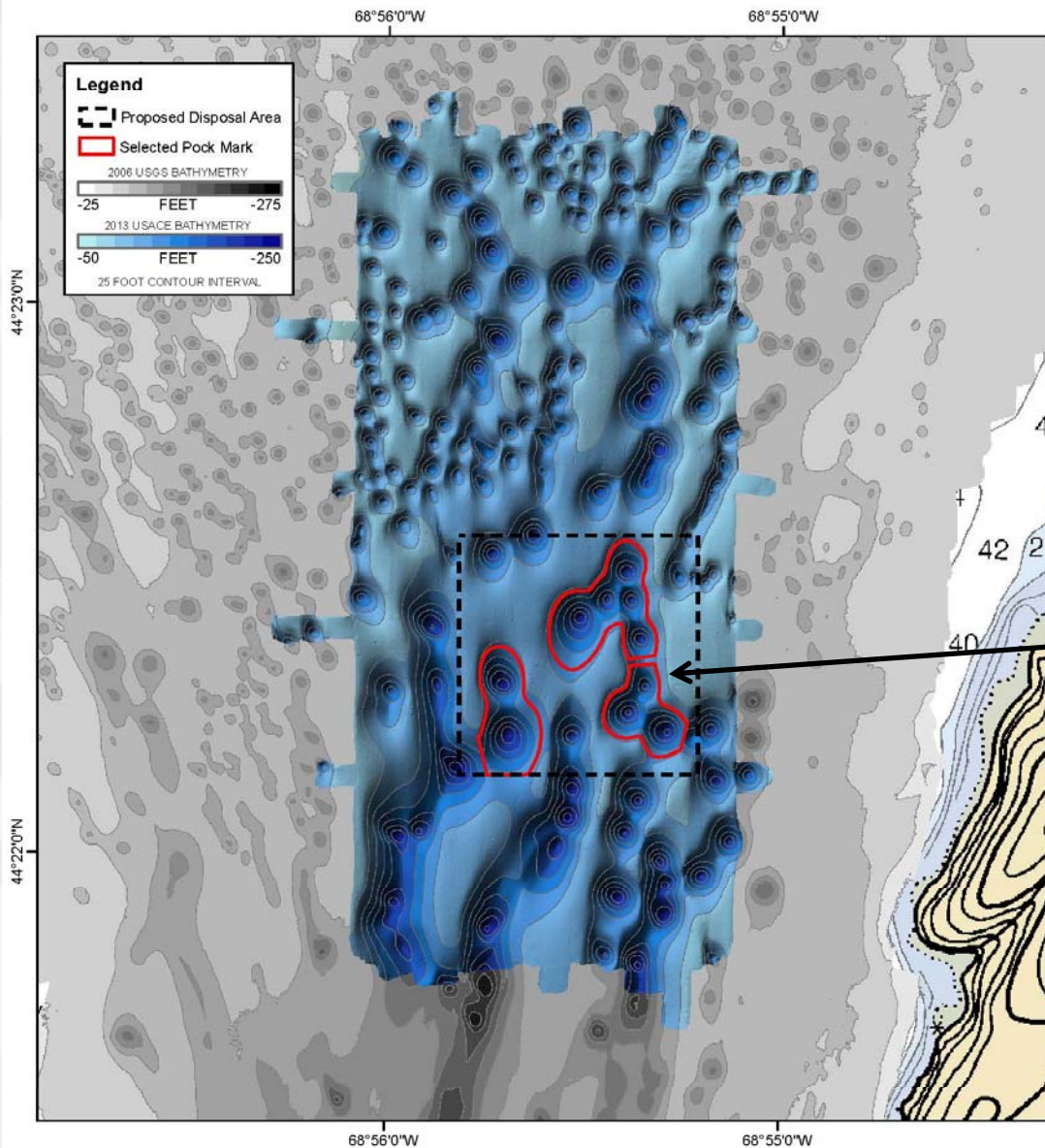


- locations of imaging and sampling stations at the Penobscot site and associated reference areas





# Studies Supporting the Selection of the Disposal Site



- bathymetry revealed pits with relatively steep sides and extending well below the surrounding seafloor
- uniform fine-grained sediments
- clusters of deep pits within the site appear ideal for limiting the footprint of the placed dredged material



# Studies Supporting the Selection of the Disposal Site



← example plan view image of seafloor in a pit within the proposed disposal area (~2 ft across)

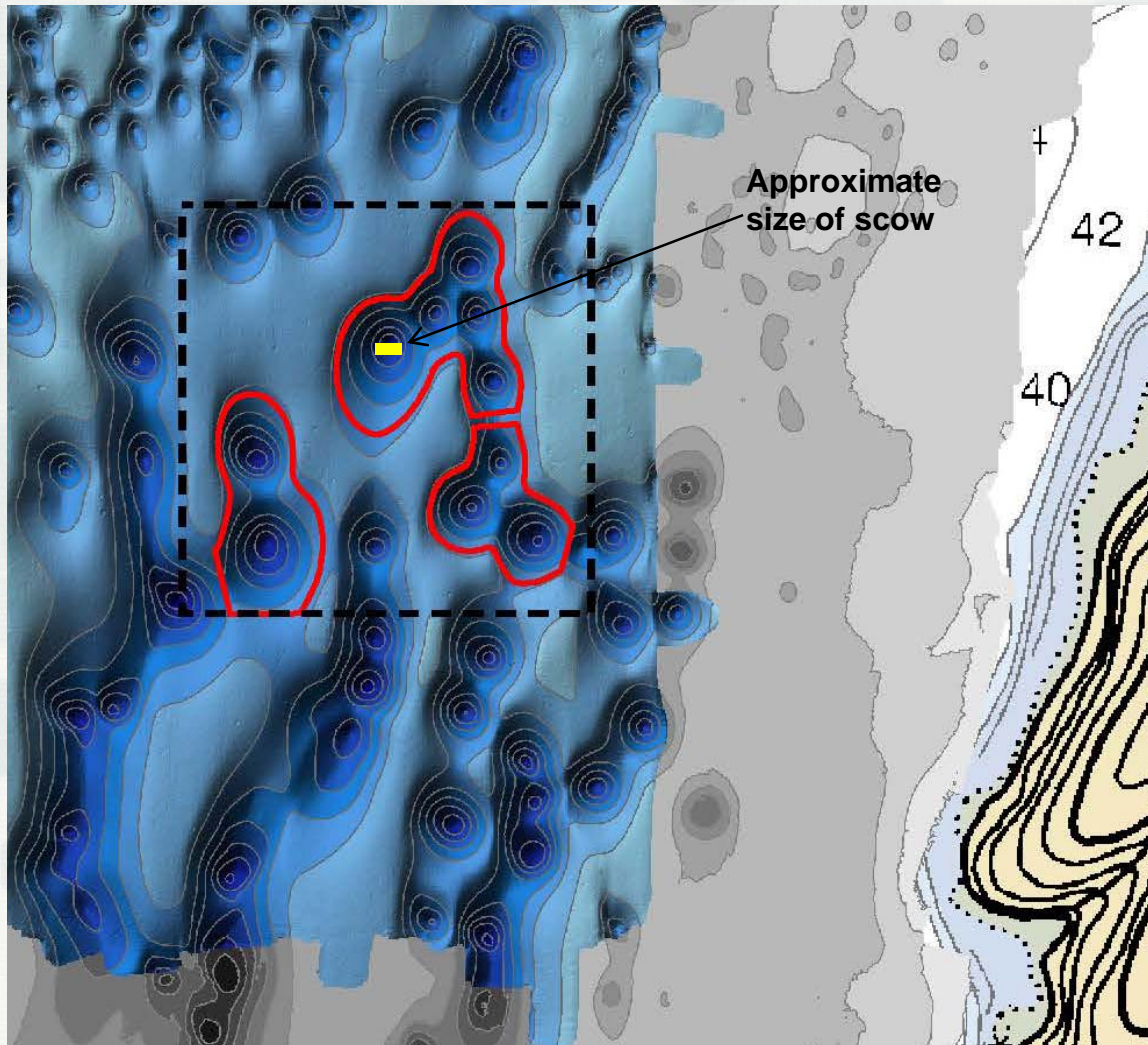
example profile view image across the sediment water interface in a pit within the proposed disposal area (~6 inches across)



Full report of the 2013 investigation available in late March



# Studies Supporting the Selection of the Disposal Site

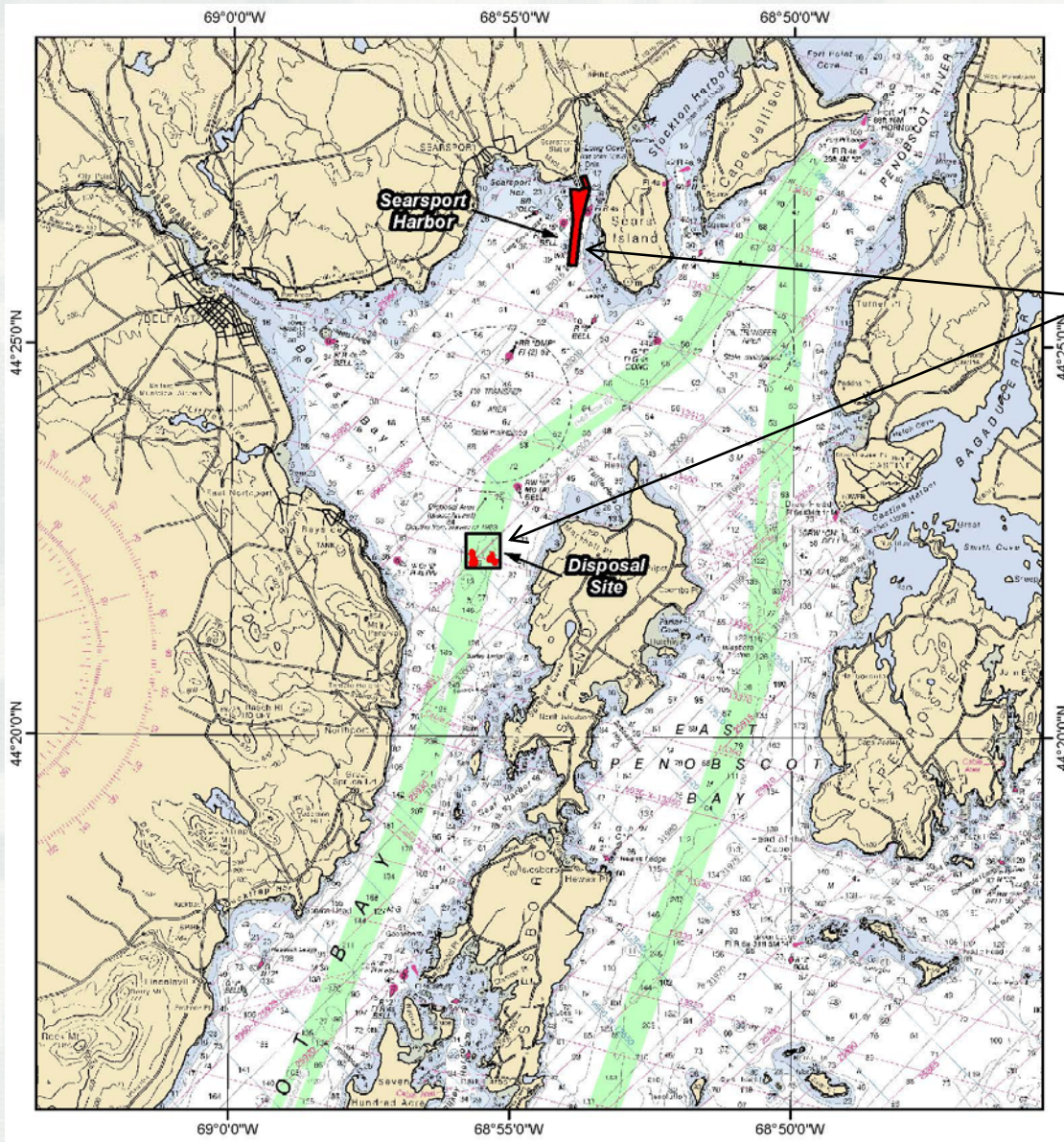


- one or two of the pit clusters will provide sufficient capacity for all the material from the project
- disposal will be targeted to cover less than  $\frac{1}{4}$  of the site





# Limited Affected Area

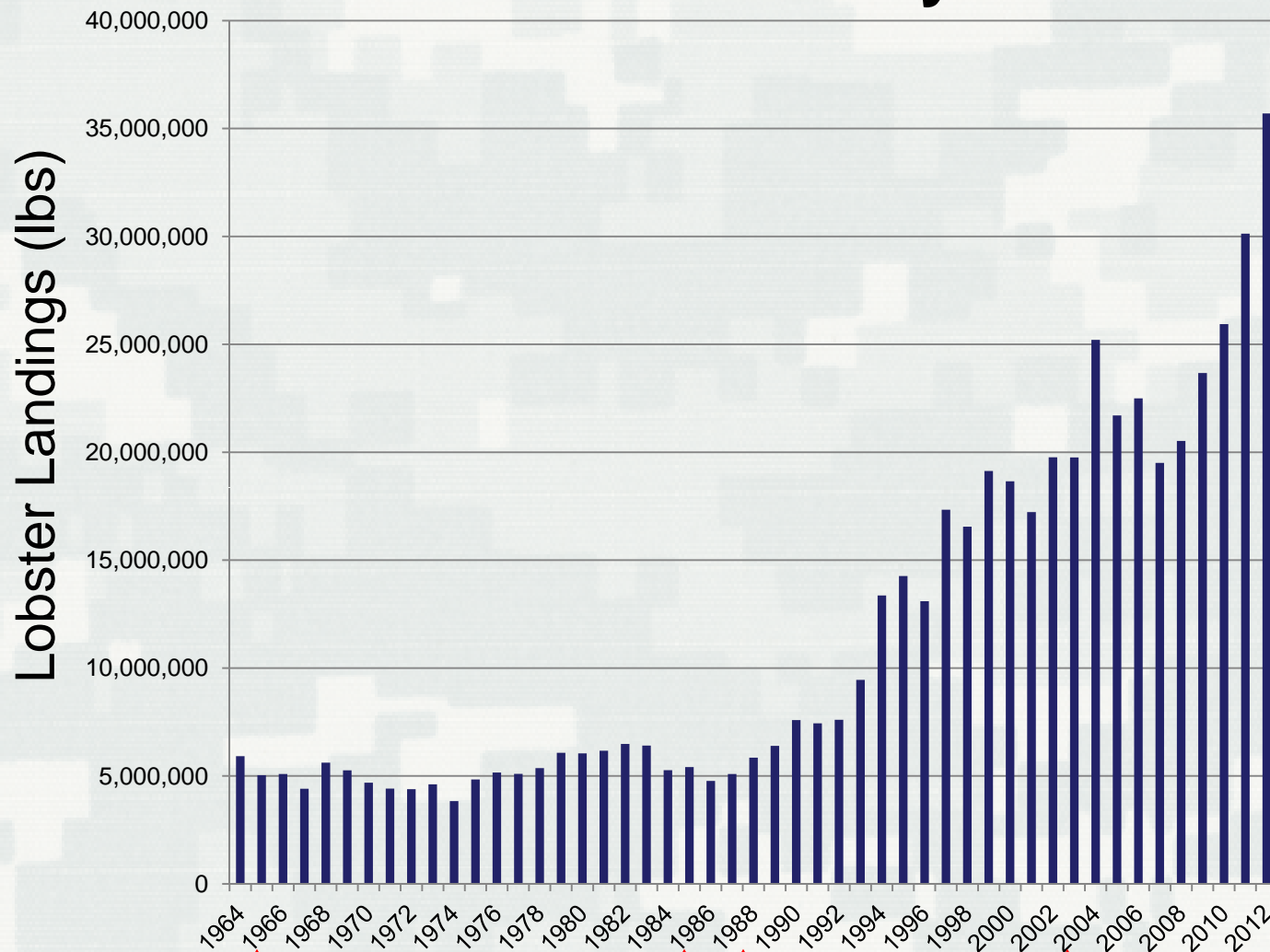


- dredging and disposal areas affect only a limited area within the bay





# Knox and Waldo County Lobster Landings



• dredging and disposal have occurred on a regular basis within the bay

↑ major projects in the mid 1960s, 1985-86, 1988, and 2002-03

\* Caution noted when comparing previous years as lobster reporting became mandatory in 2004 for all Maine dealers

\* Caution noted when comparing years 2002 and 2003 as landing may reflect increased effort by DMR to collect voluntary landings from some lobster dealers

Source: [http://www.maine.gov/dmr/commercialfishing/documents/lobster.county\\_000.pdf](http://www.maine.gov/dmr/commercialfishing/documents/lobster.county_000.pdf)



# Limiting Impacts to Water Quality and Biota



- strict seasonal windows on when the work can be performed
- electronic tracking of every scow during loading, transport, disposal, and return
- water column monitoring at the startup of the project and for any major change in operations
- periodic bathymetry to track placement at the site
- long term monitoring to track the recovery of the biological community at the disposal site





# Information

USACE Draft Feasibility Study and Environmental Assessment

<http://www.nae.usace.army.mil/missions/ProjectsTopics/Searsport.aspx>

USACE Disposal Area Monitoring System (DAMOS) reports

[http://www.nae.usace.army.mil/Missions/DisposalAreaMonitoringSystem\(DAMOS\).aspx](http://www.nae.usace.army.mil/Missions/DisposalAreaMonitoringSystem(DAMOS).aspx)

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