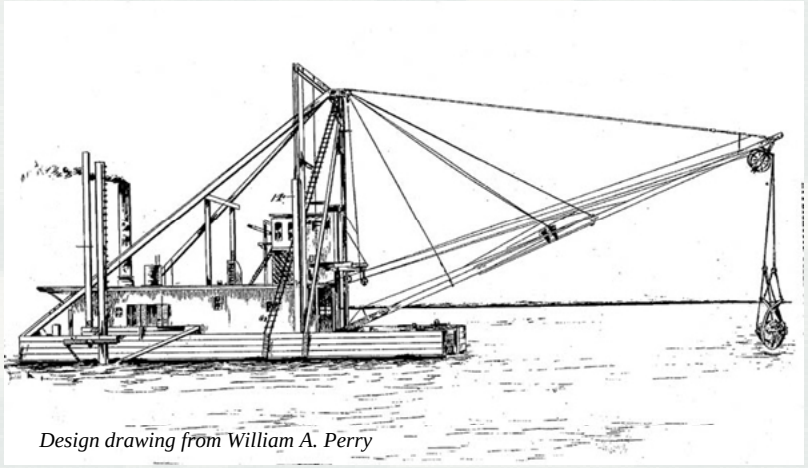
Part 2: Overview of Dredged Material Disposal at the Proposed Penobscot Bay Site

- 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

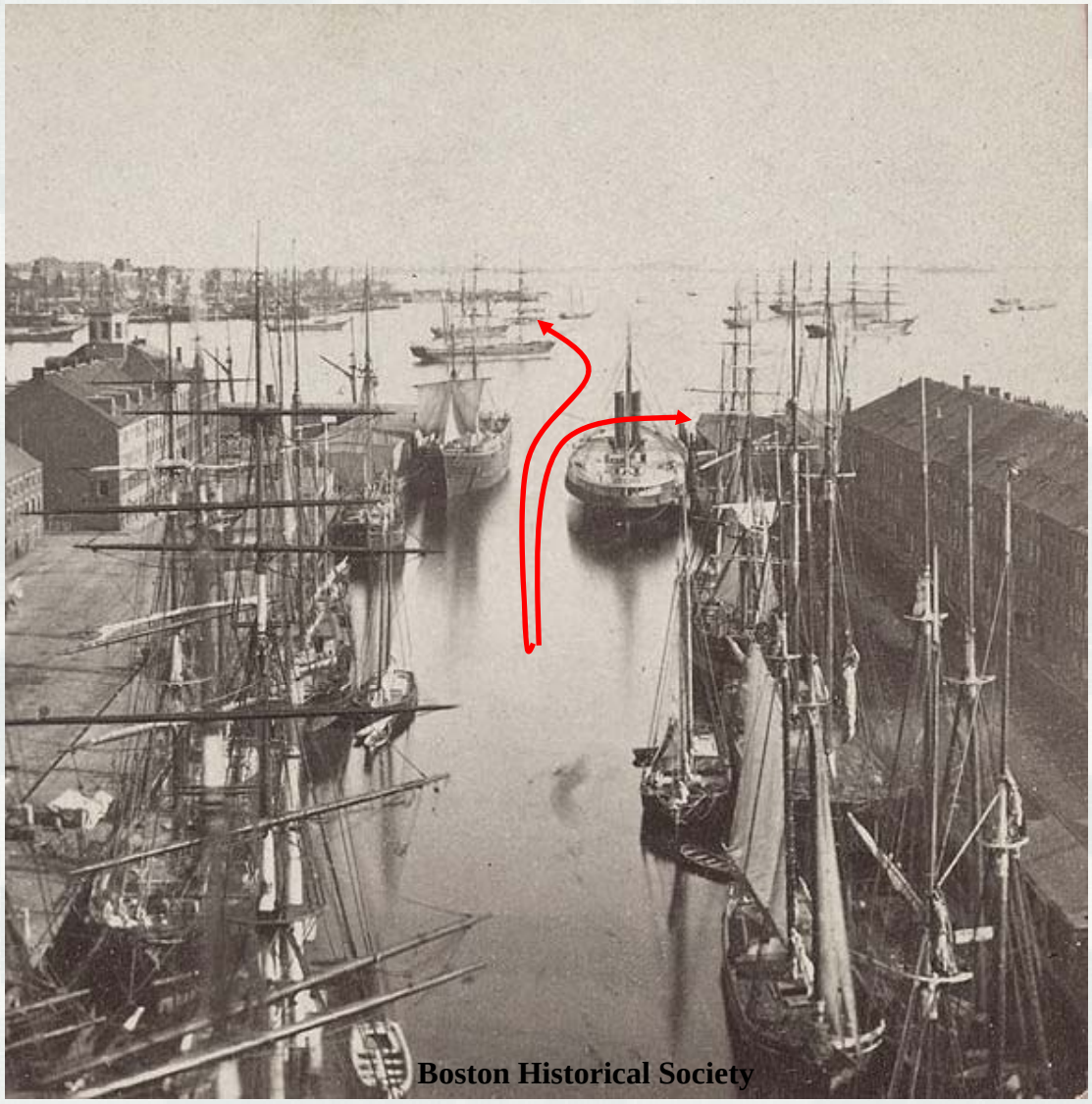
History of Aquatic Placement of Dredged Material



Design drawing from William A. Perry

- 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

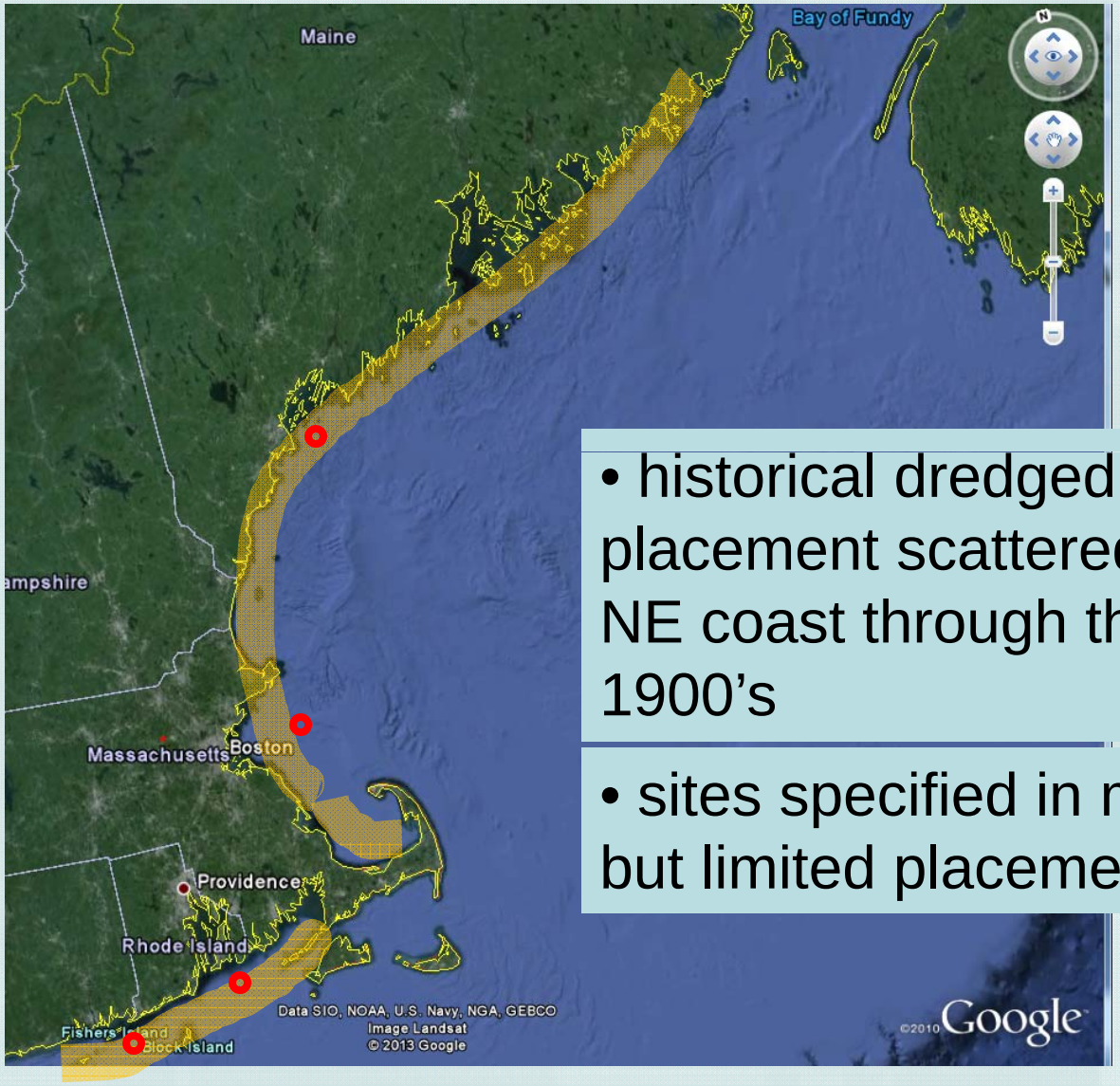


- early dredging efforts relocated dredged material only a short distance

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

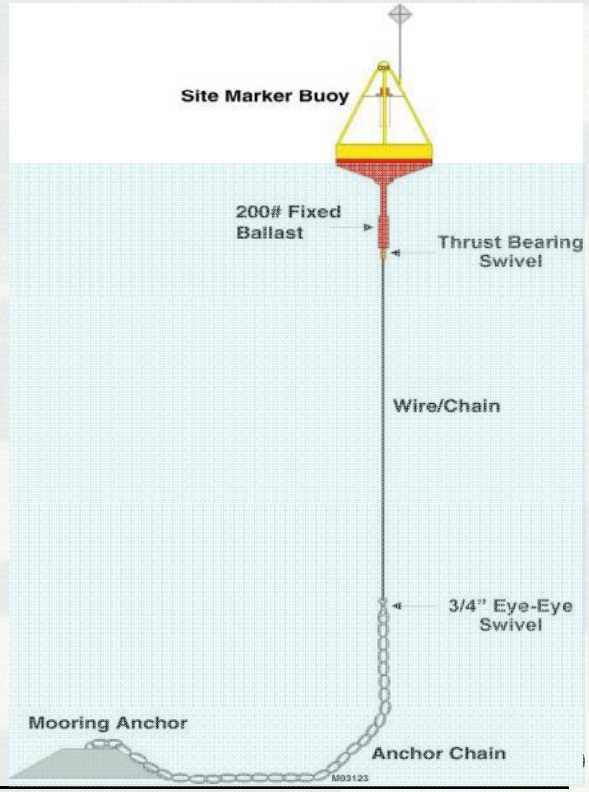
- with passage of the Clean Water Act and Marine Protection Research and Sanctuaries Act, more rigorous process for selecting/designating disposal sites and controls on placed material

History of Aquatic Placement of Dredged Material

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

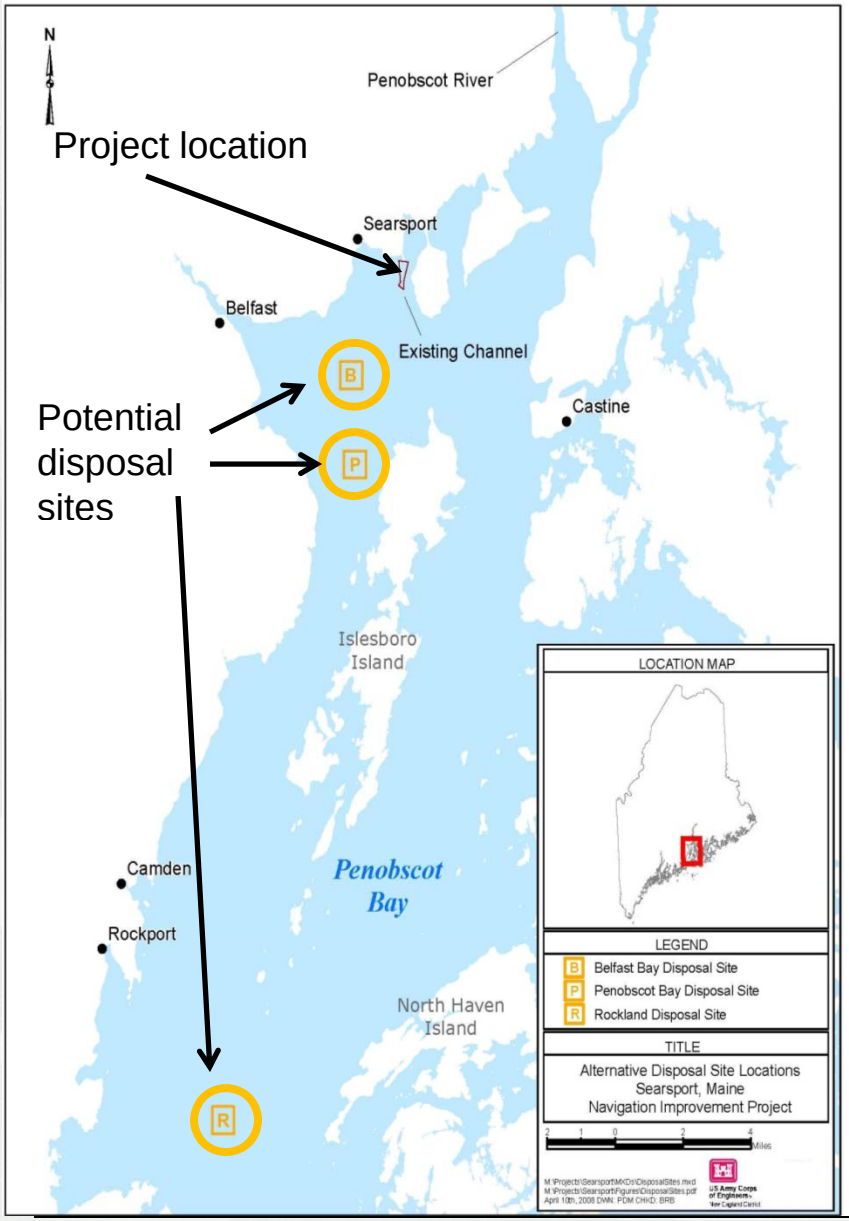
Placement & Monitoring of Dredged Material

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

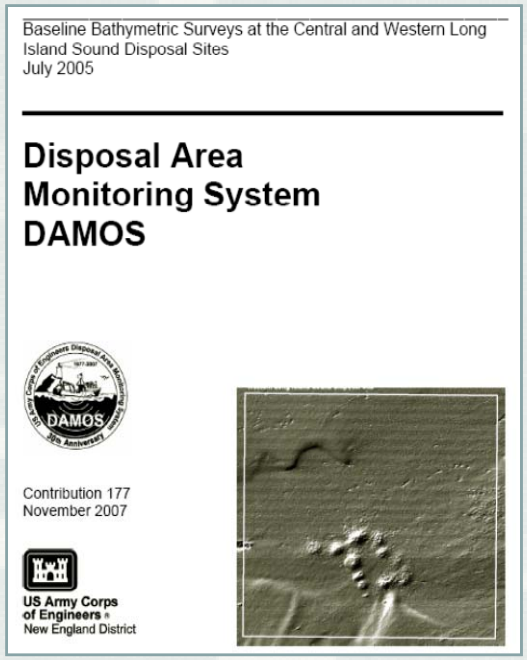


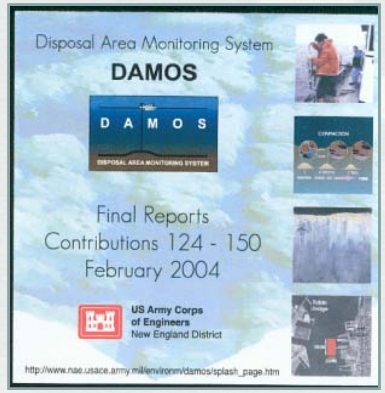
- Targeted placement of material to minimize impacts
- Monitoring to track site recovery

Selection of Potential Disposal Sites



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

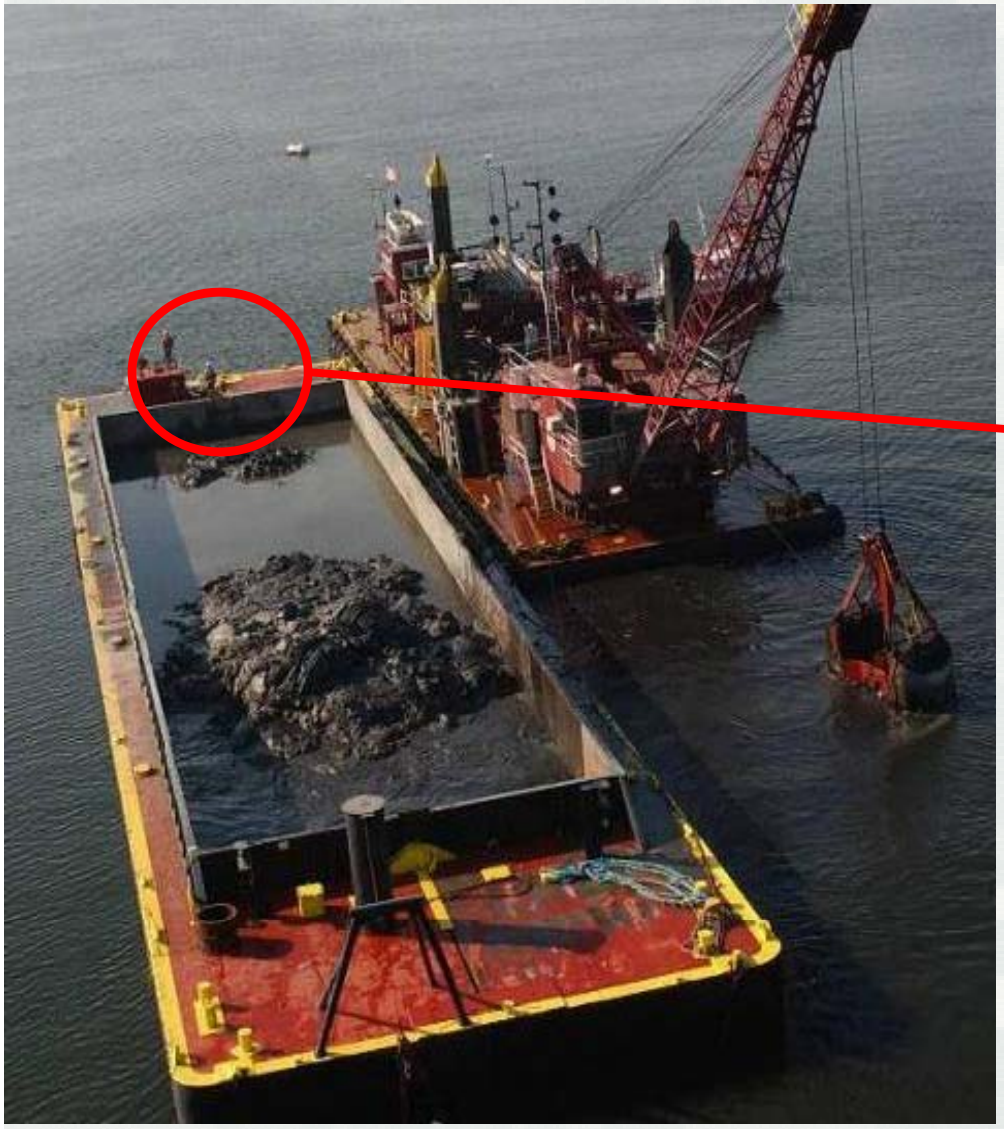




Concerns Addressed When Selecting a Disposal Site

- 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



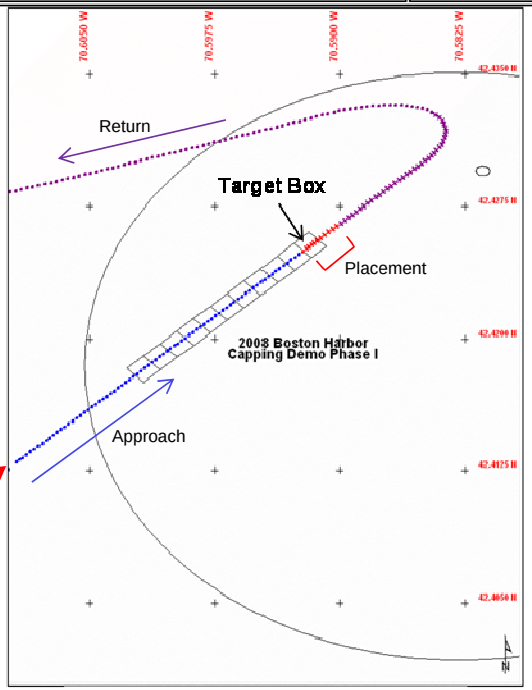
Tracking system required for all disposal

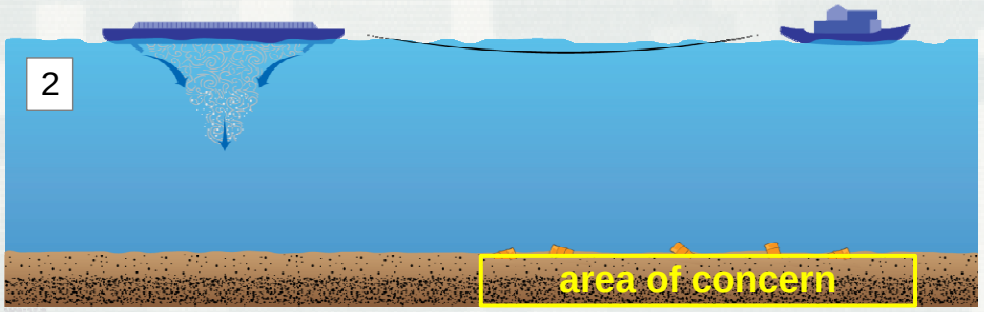
Accurate Placement of Dredged Material

Trip Information:		Placement Information:			
		Placement Start:		Placement End:	
Trip #:	68				
Tug:	Lemmerhirt	Time:	6/17/2008 11:30:16	Time:	6/17/2008 11:31:09
Captain(s):	Unknown				
Scow:	GL65	Lat:	42.424935	Lat:	42.426364
Type:	Split Hull Scow	Long:	-70.592248	Long:	-70.590189
Technique:	Bottom Dump				
Bin Volume:	5175 cu yd				
Start Time:	6/17/2008 08:00:28				
Init Aft Draft:	19.29 ft	Aft Draft:	17.89 ft	Aft Draft:	4.16 ft
Init Fore Draft:	N/A	Fore Draft:	N/A	Fore Draft:	N/A
Init Aft Bin:	N/A	Aft Bin:	N/A	Aft Bin:	N/A
Init Fore Bin:	N/A	Fore 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.

Example recorded track of scow at disposal site

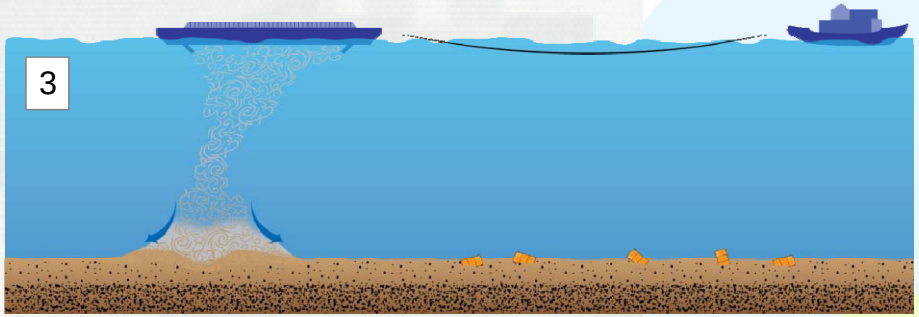




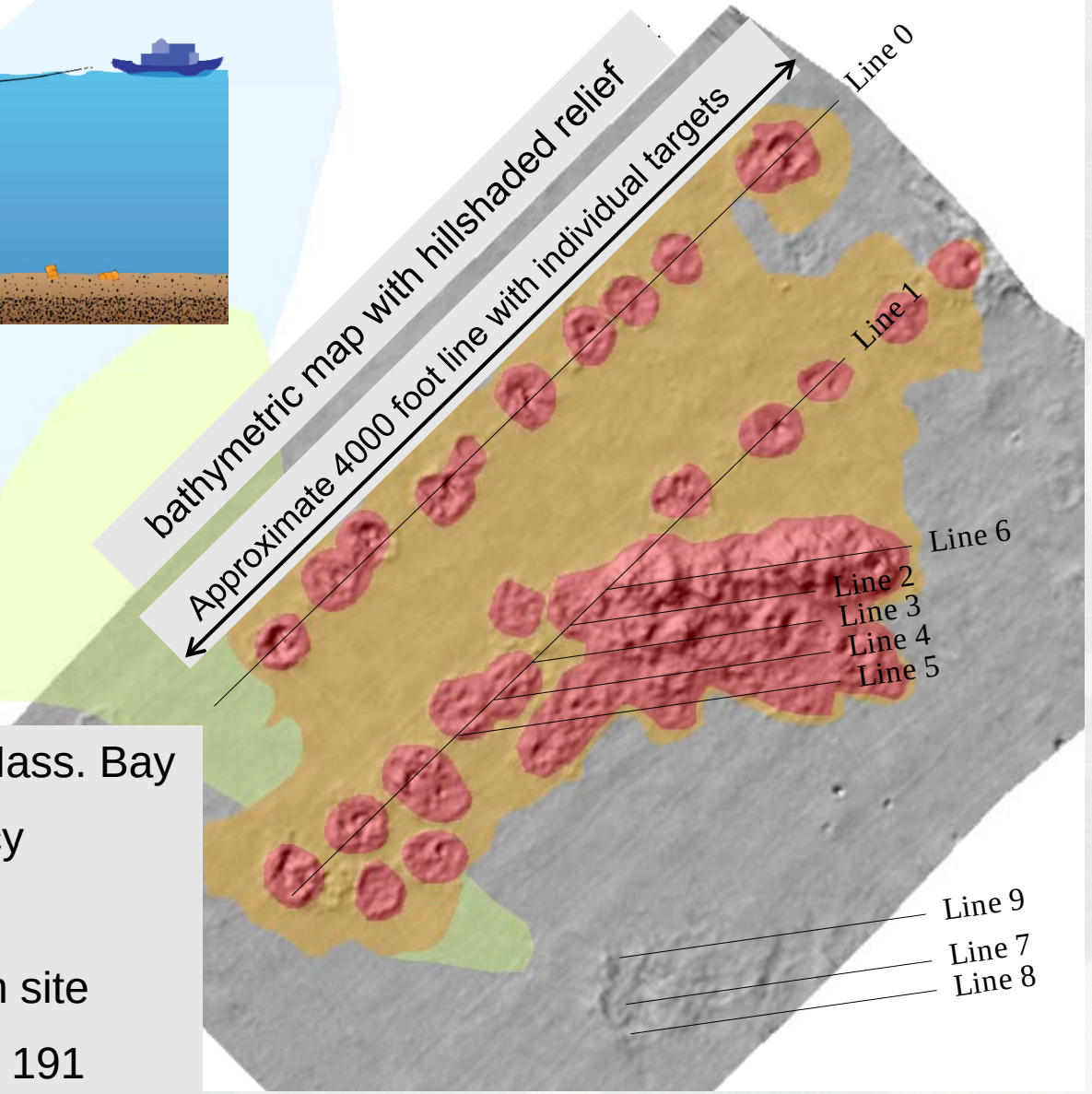
Barge releases material adjacent to target capping area

- 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

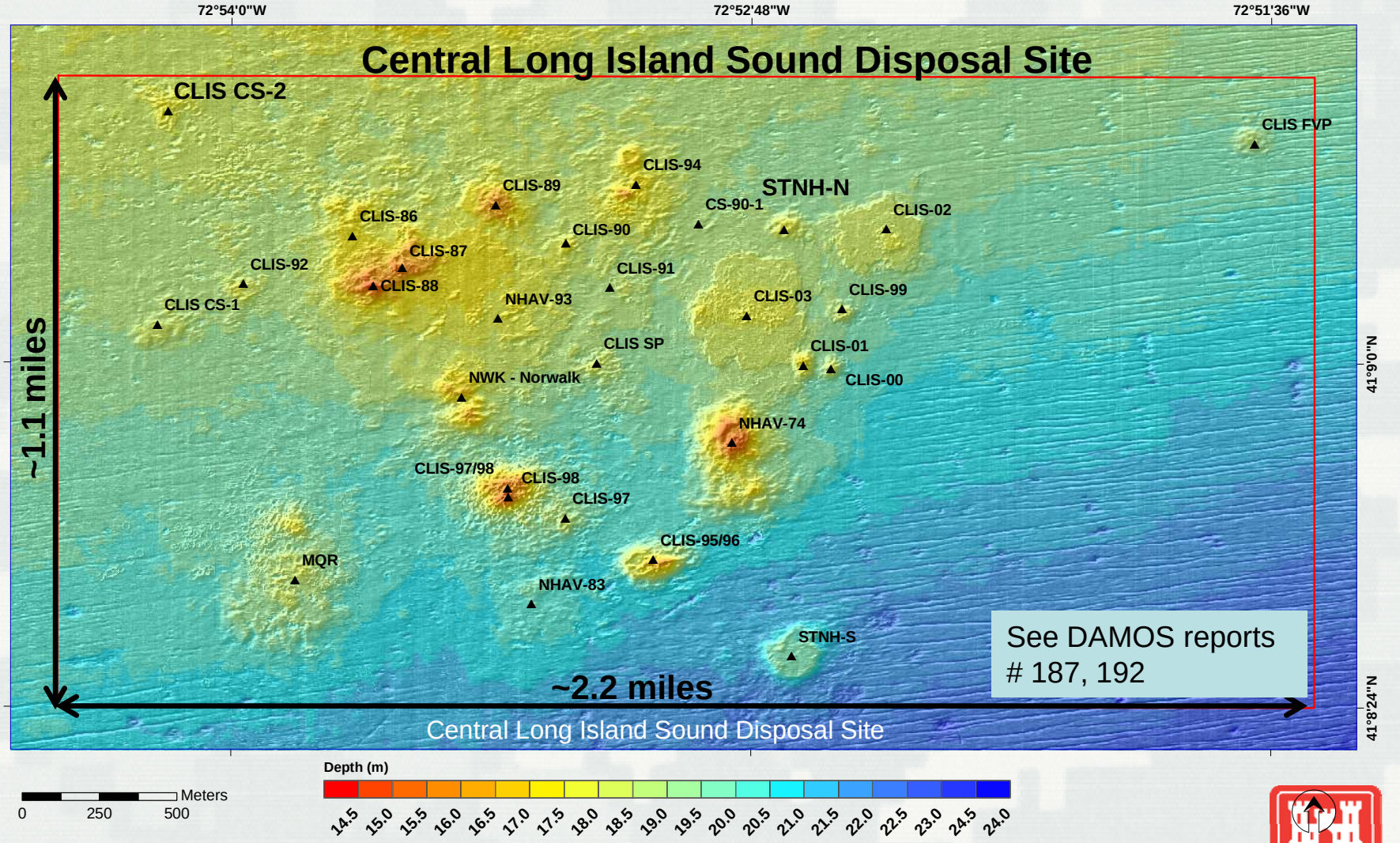


Capping demonstration in Mass. Bay

- 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



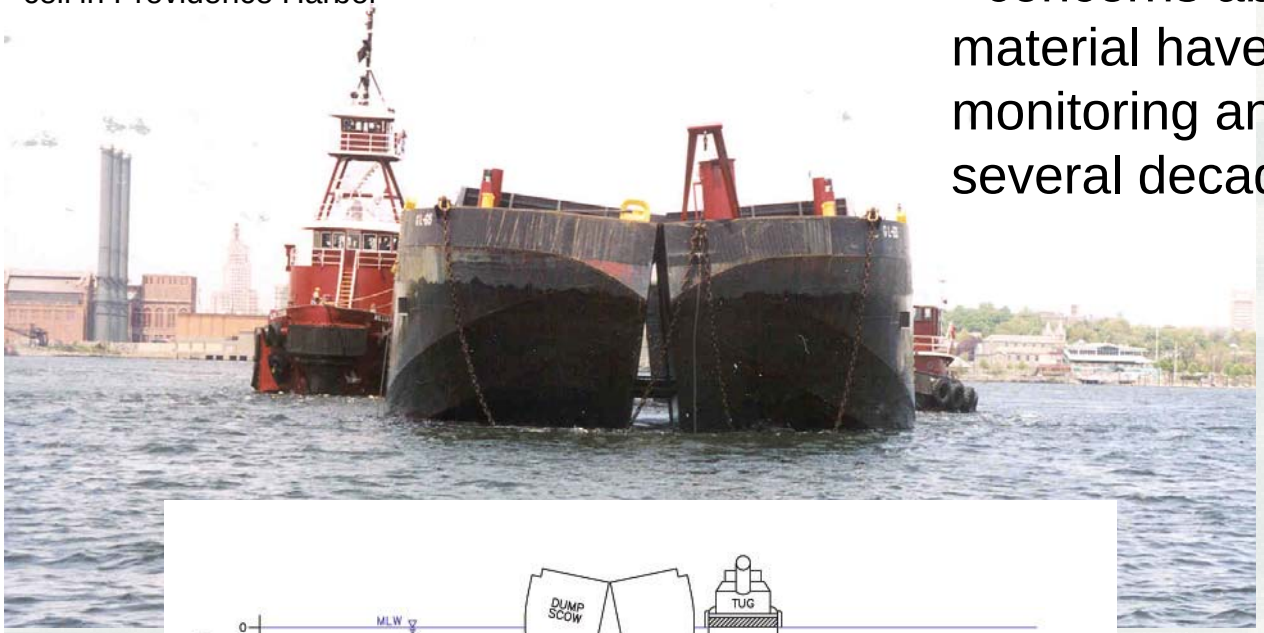
Projection: Conformal Conic *Coordinate System:* CT State Plane (m) *Datum:* NAD 83 Depth in meters, MLW

Assessing Release of Material to the Water Column

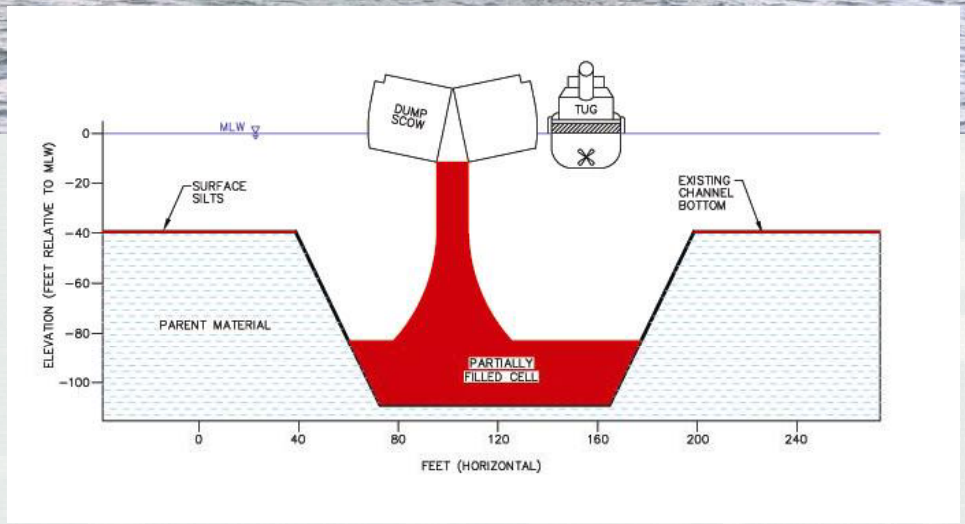
- release of 3000+ cubic yards of improvement dredged material from Boston Harbor at the Massachusetts Bay Disposal Site

Assessing Release of Material to the Water Column

Scow releasing material over CAD cell in Providence Harbor



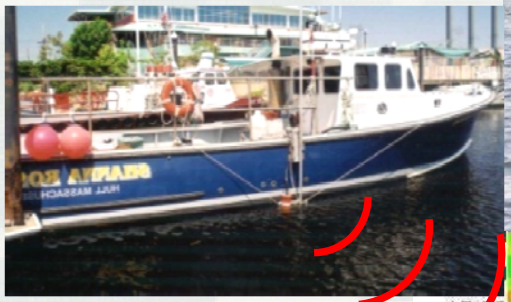
- concerns about release of disposed material have triggered detailed monitoring and research over the past several decades

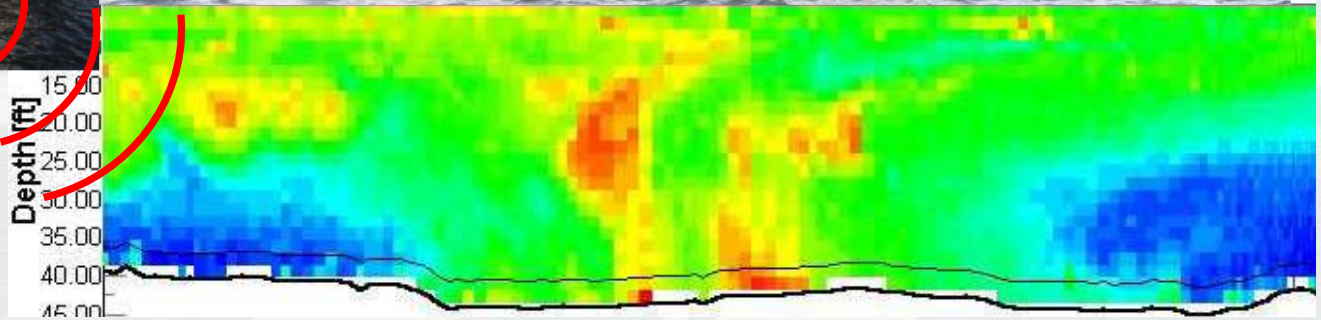


- schematic of placement of unsuitable material into a Confined Aquatic Disposal (CAD) cell

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

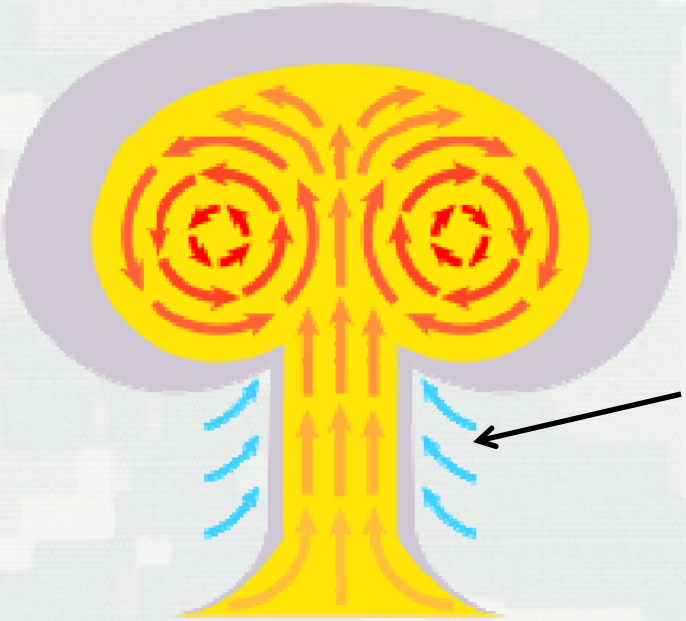


image from Wikipedia free media

- 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

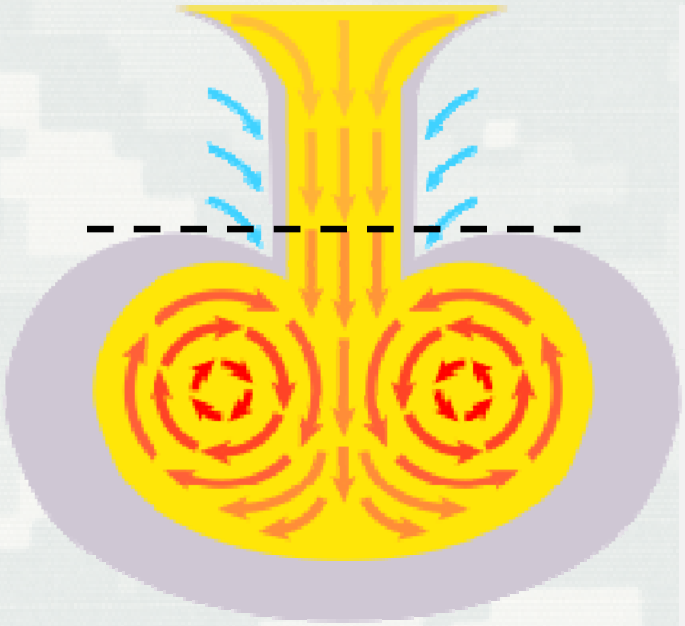


image from Wikipedia free media

- 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

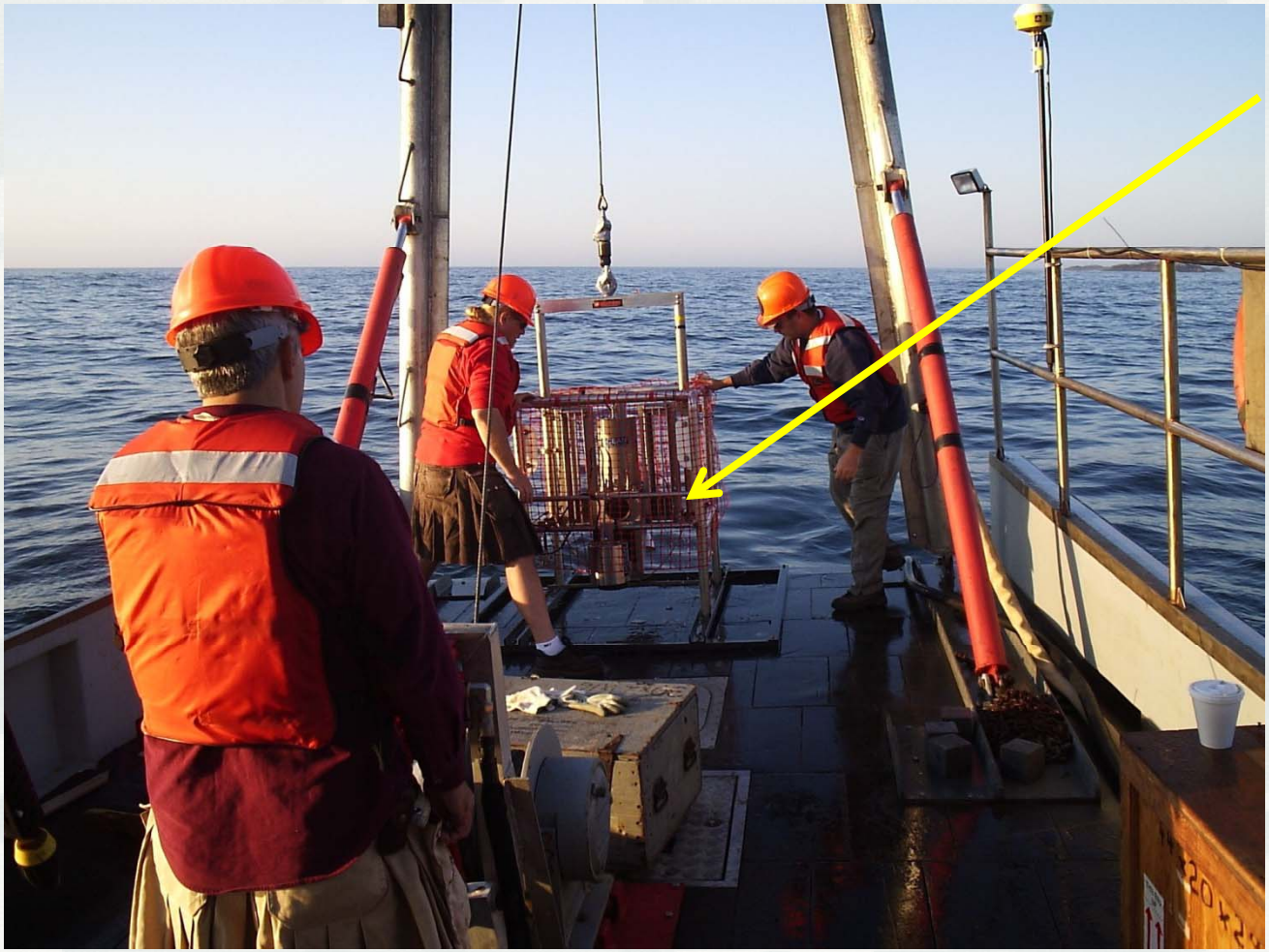
MIT laboratory simulation of release of material from a scow using scaled fluorescent beads in a ~10 ft tank (Ruggaber 2000)

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)

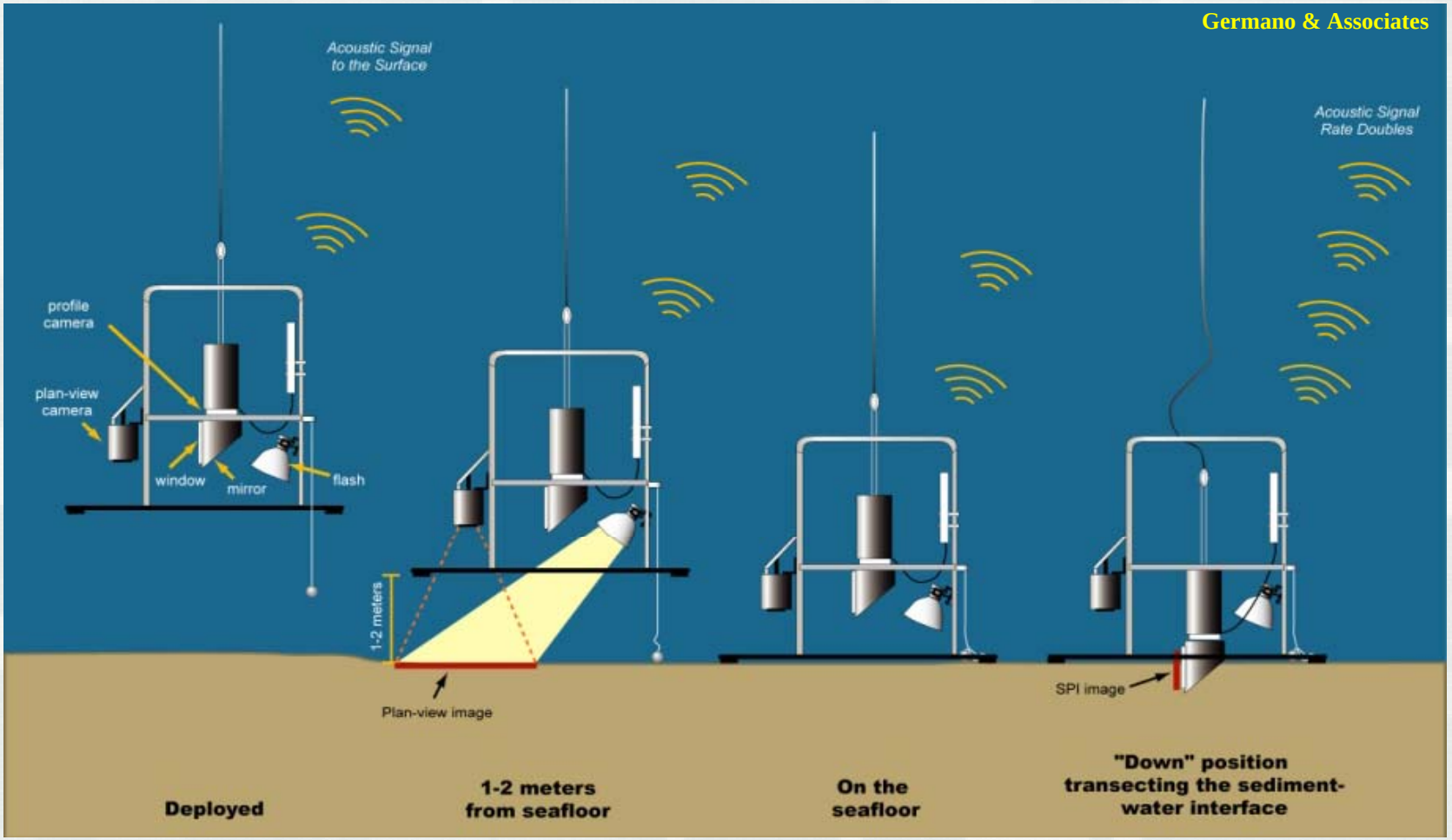
Assessing Impacts to the Benthic System



- 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

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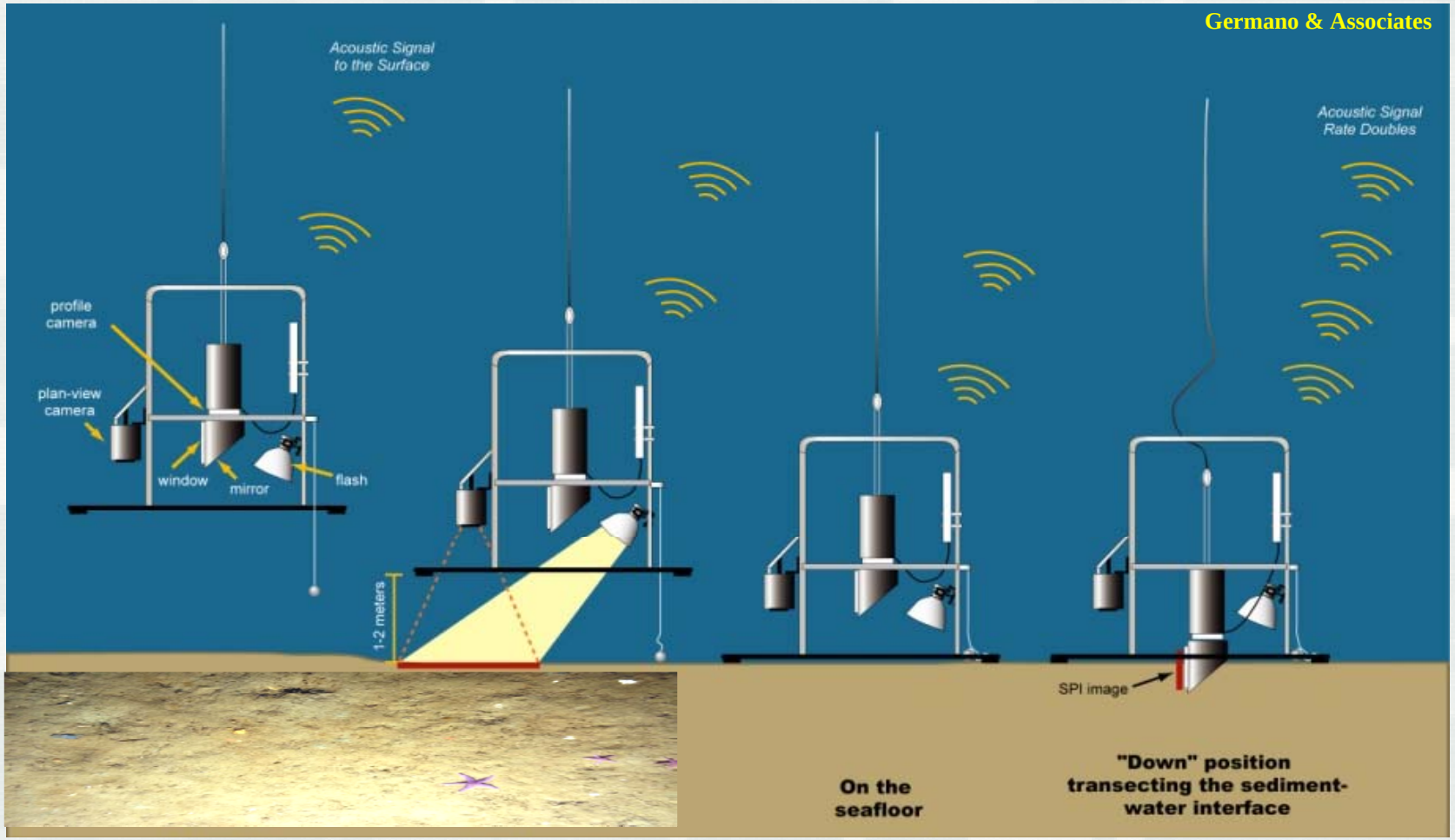

Assessing Impacts to the Benthic System

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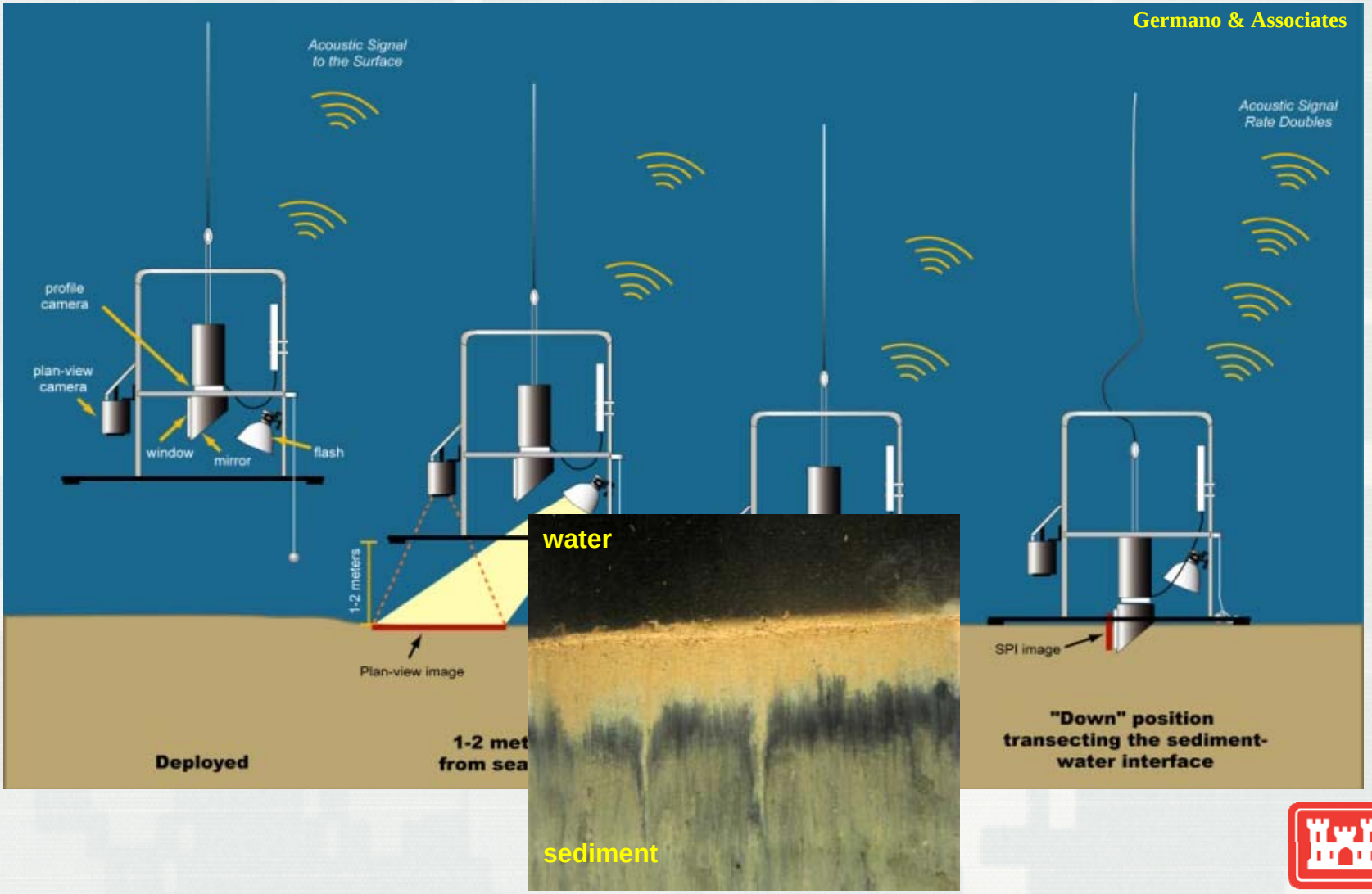
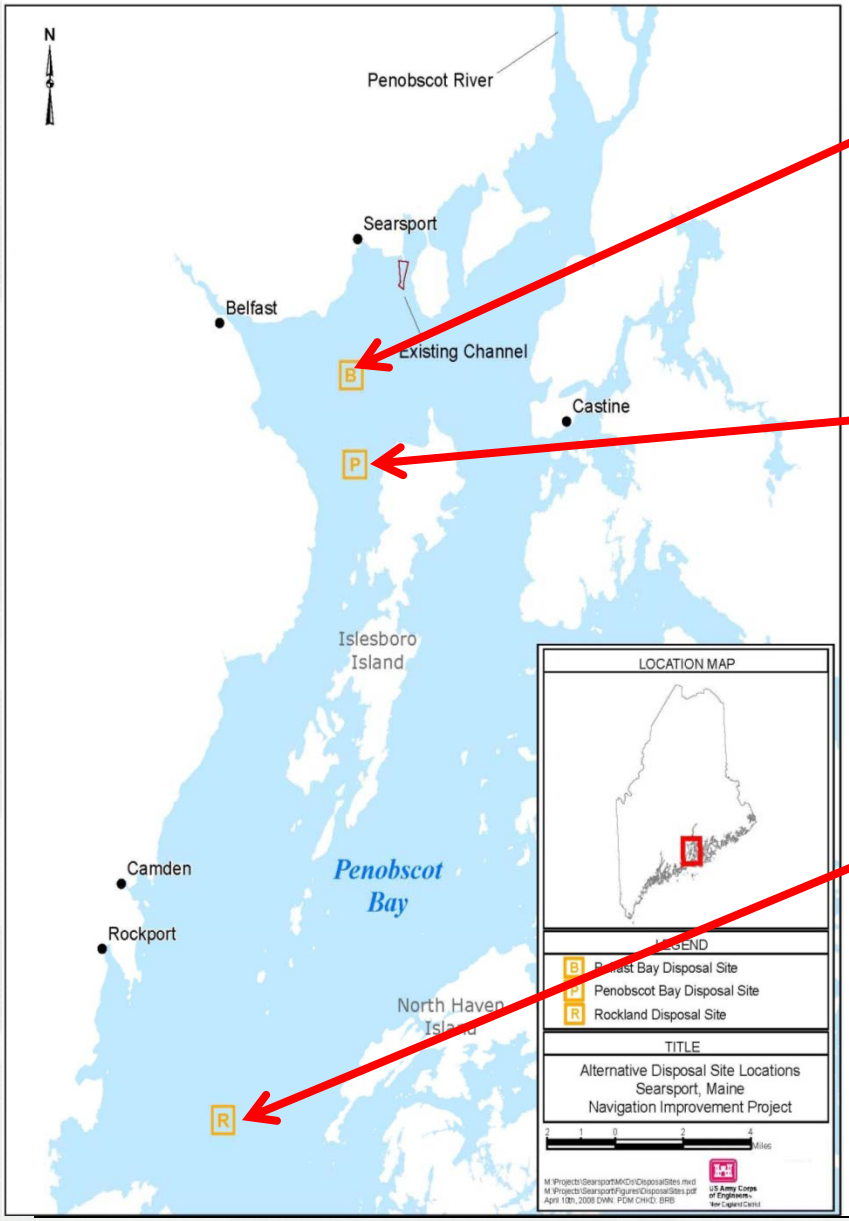
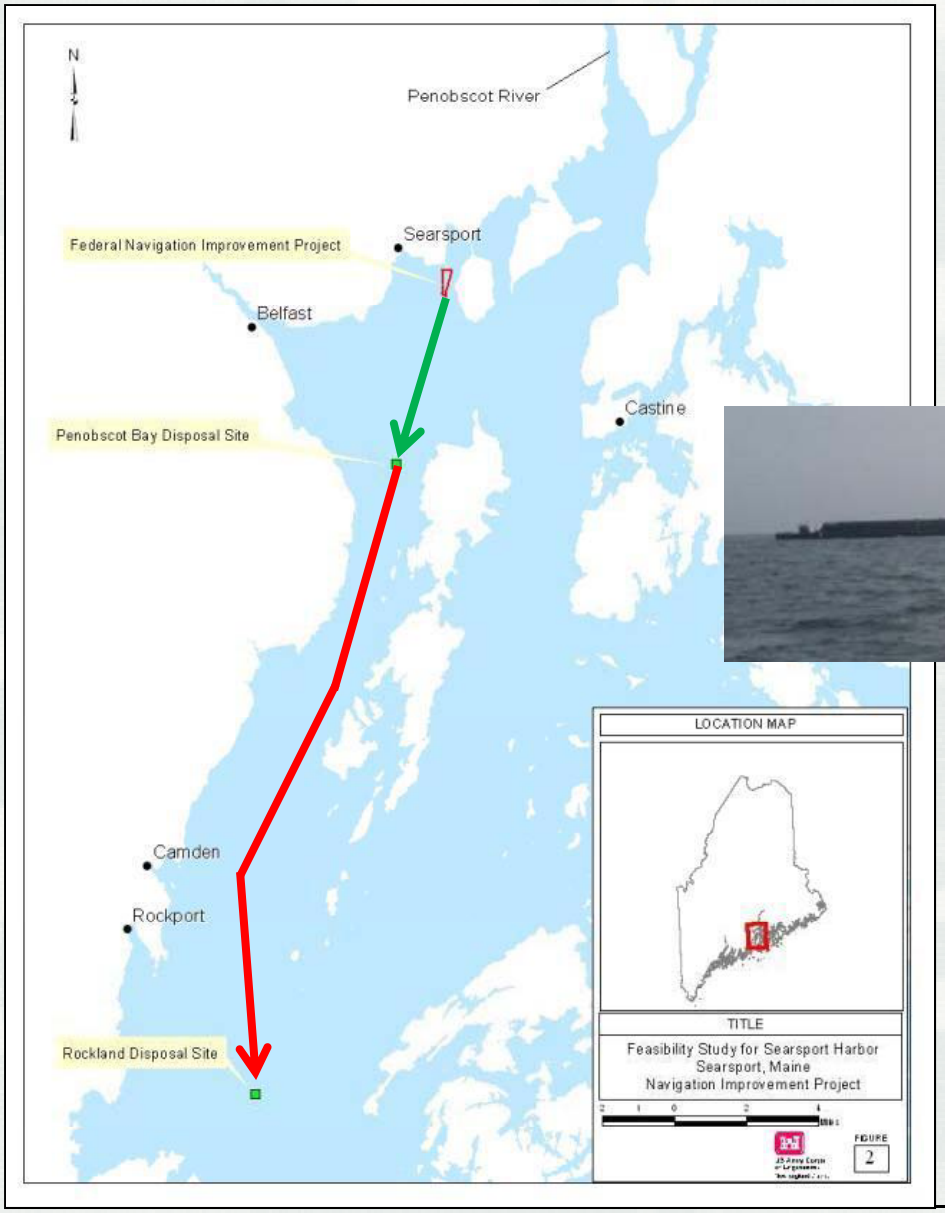


Studies Supporting the Selection of the Disposal Site



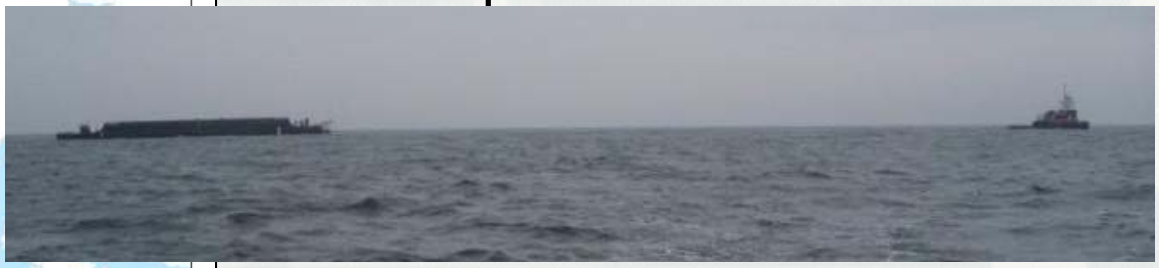
- Belfast Bay (Steels Ledge) site - marked on charts (historical); evaluated in 2000, 2007-08 but no detailed record of use
- Penobscot site – nearby area marked on charts (historical)
  - initial sampling in 2007-08
  - bathymetry, imaging, benthic sampling in 2013
- Rockland – established regional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

Concerns with Use of the Rockland Disposal Site



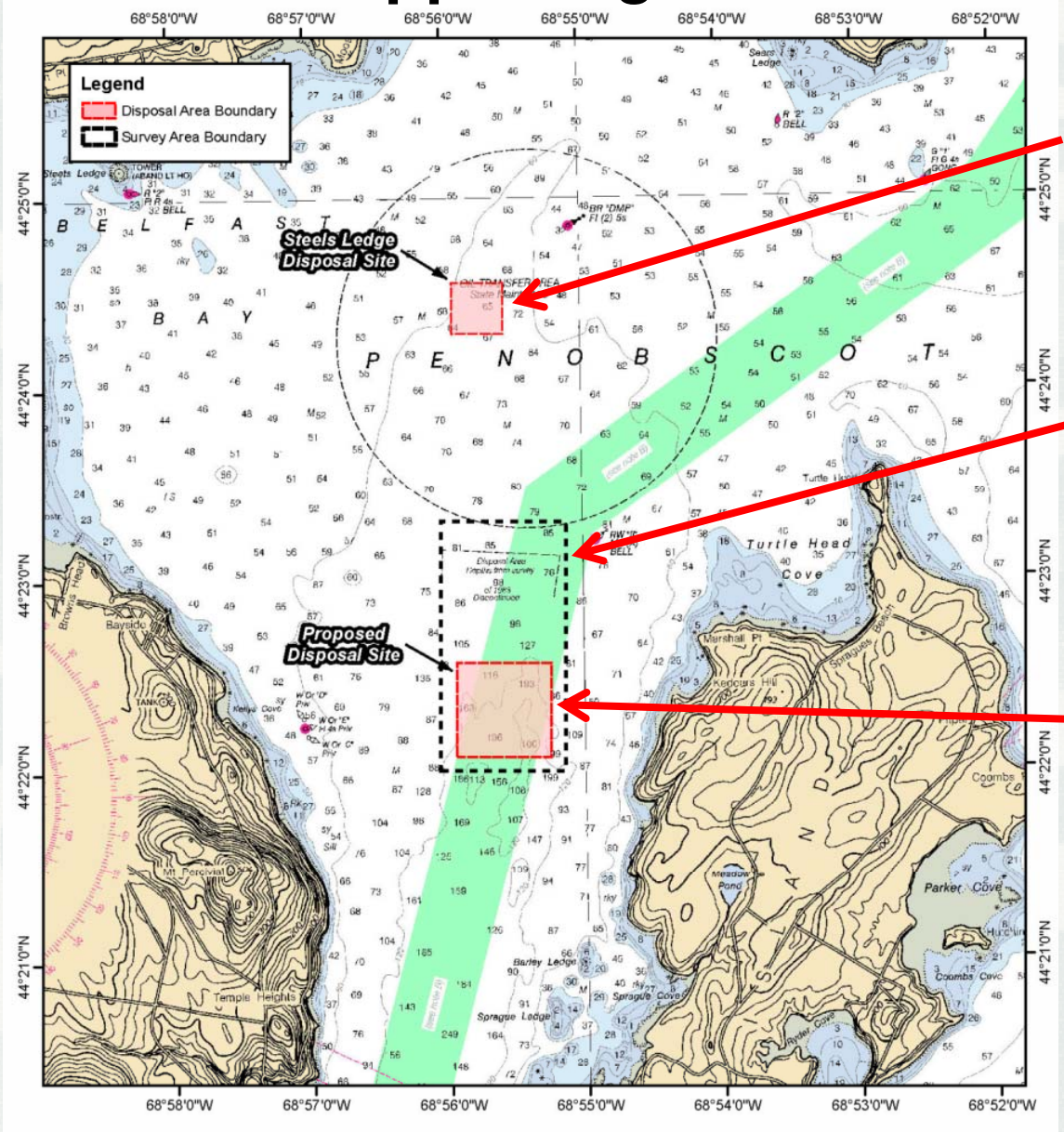
Extended haul distance to disposal site

- approximately 38 miles additional haul for each scow round trip



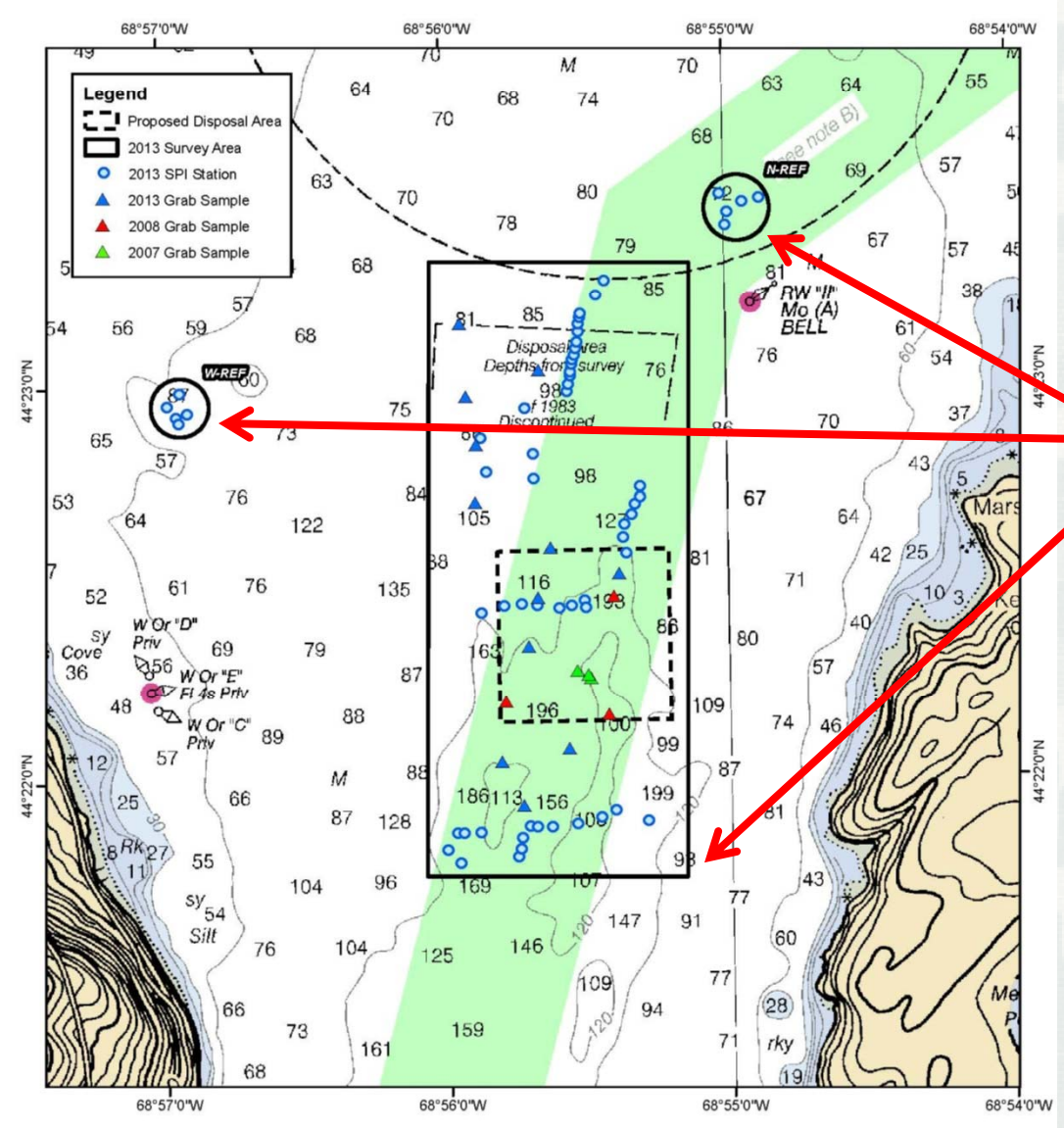
- additional 63 days of tug-scow traffic on the bay
- additional 260,000 gallons of diesel fuel usage

Studies Supporting the Selection of the Disposal Site



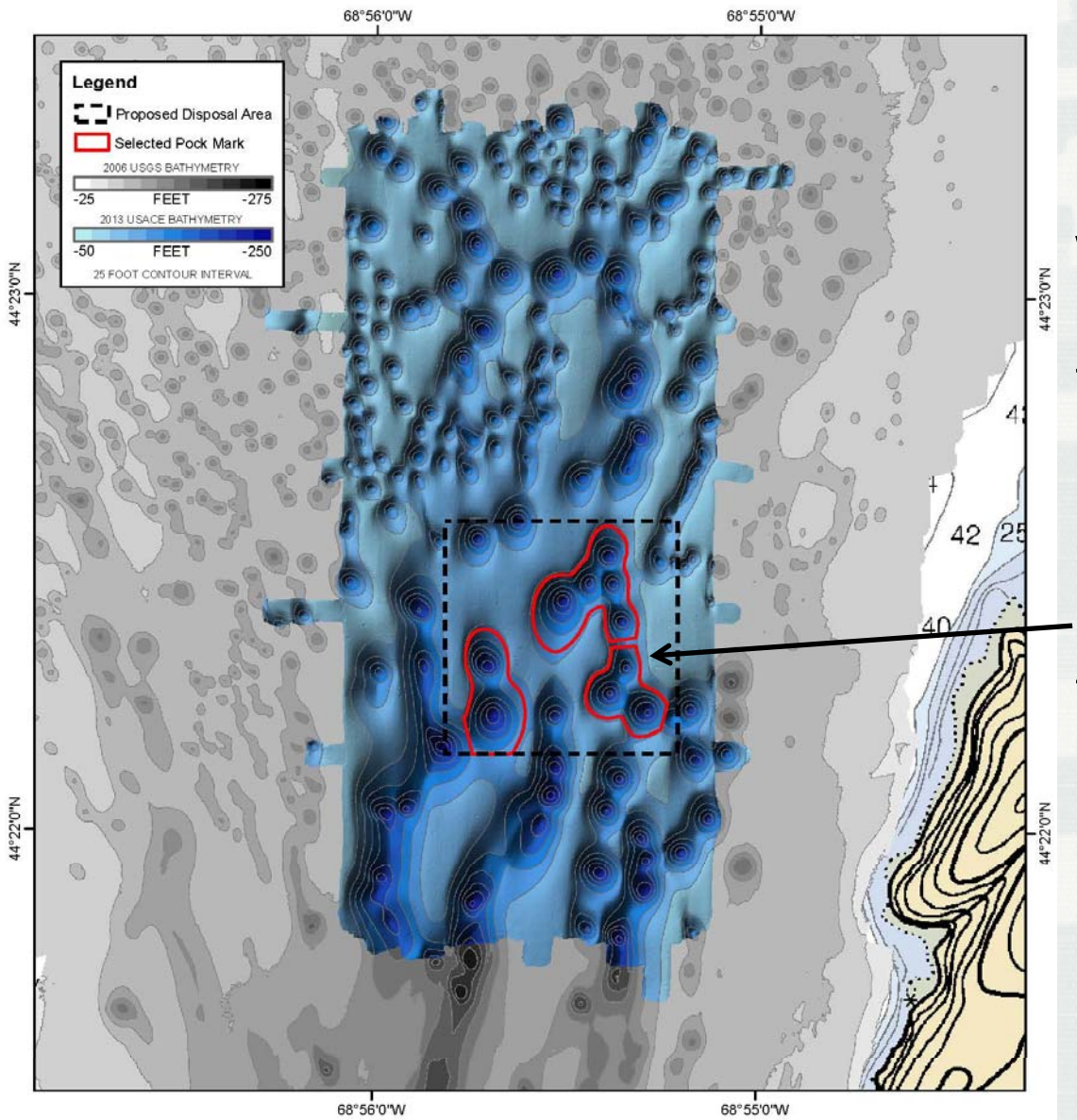
- Belfast Bay (Steels Ledge) site – averages ~60 ft deep
- 2013 survey area expanded to include charted historic disposal area
- Penobscot Bay site - depths of 100-200 ft

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

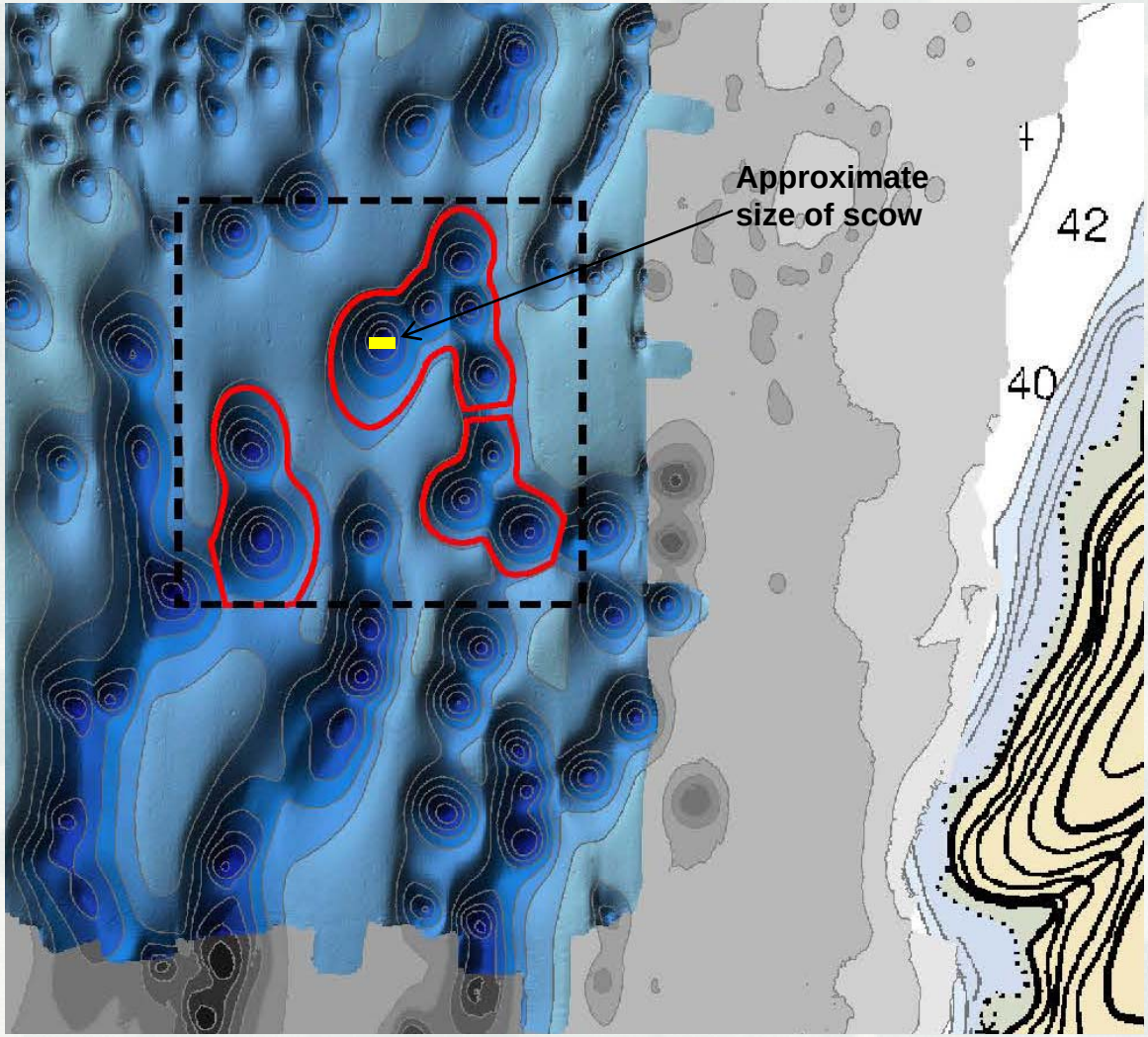
Studies Supporting the Selection of the Disposal Site

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)

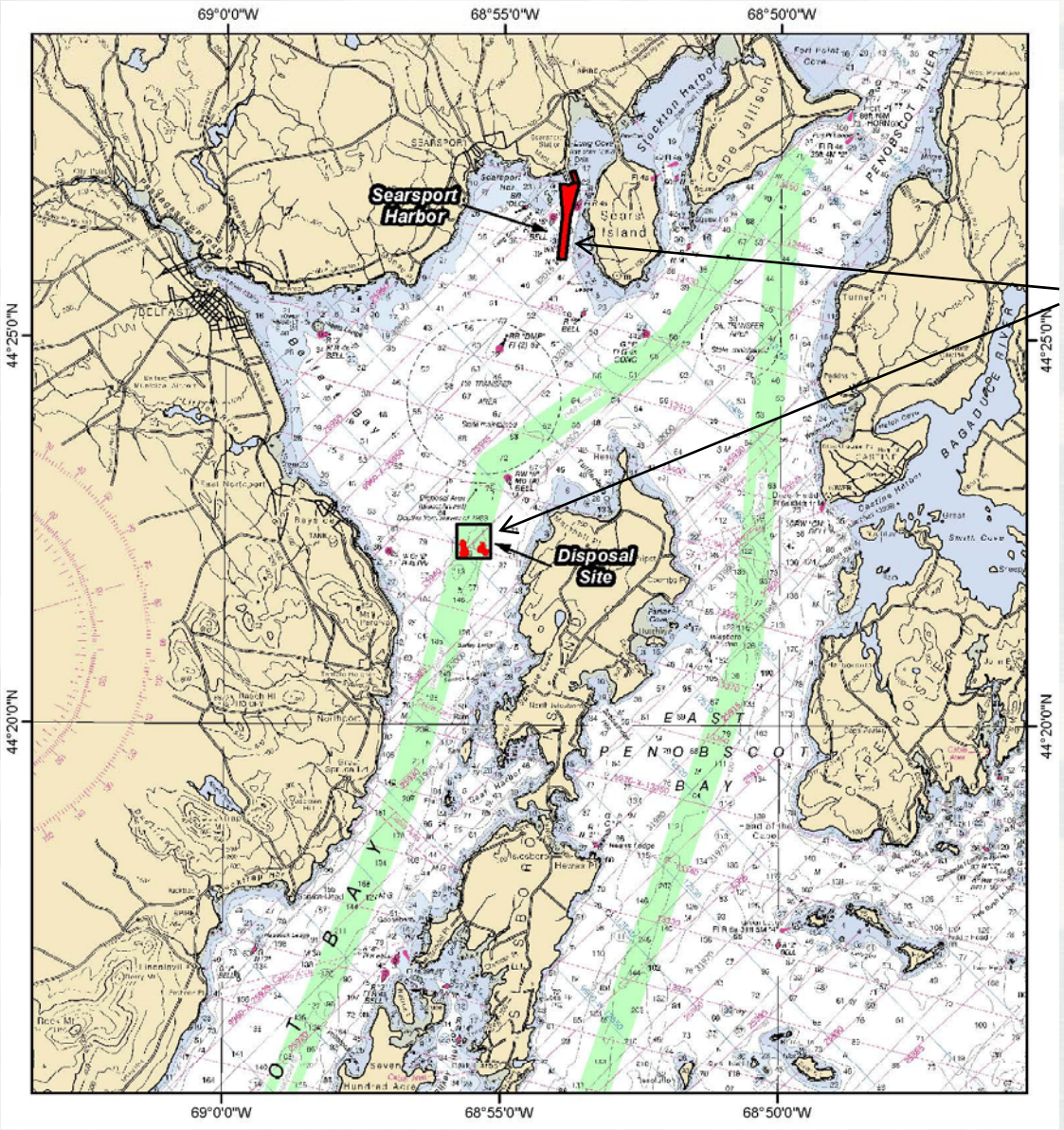
Full report of the 2013 investigation available in late March

Studies Supporting the Selection of the Disposal Site



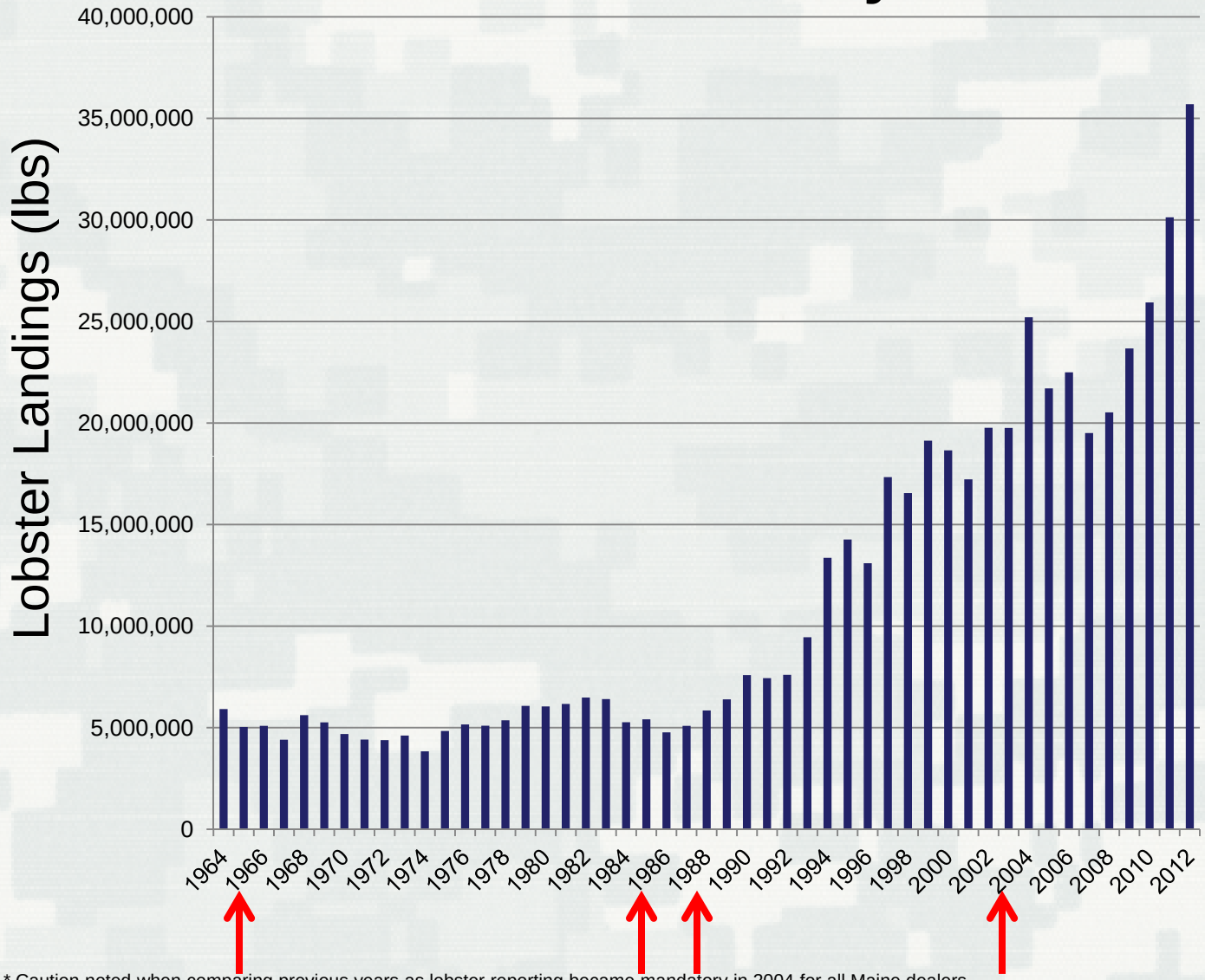
- one or two of the pit clusters will provide sufficient capacity for all the material from the project
- disposal will be targeted to cover less that ¼ of the site

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

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

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