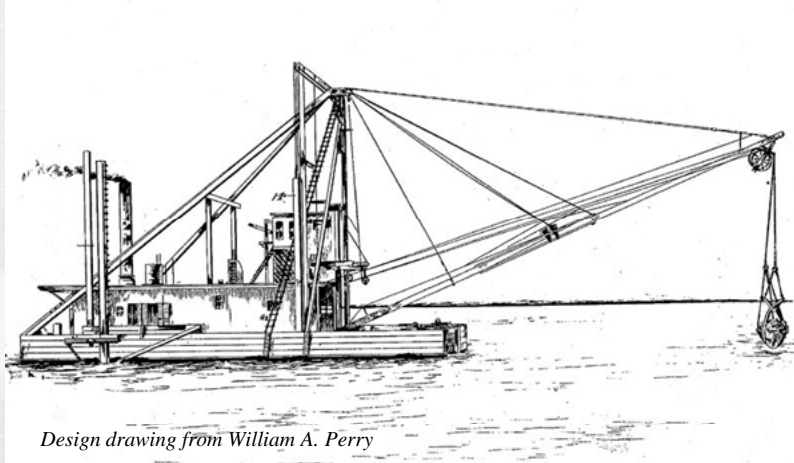


Part 2: Overview of Dredged Material Disposal at the Proposed Penobscot Bay Site

- 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



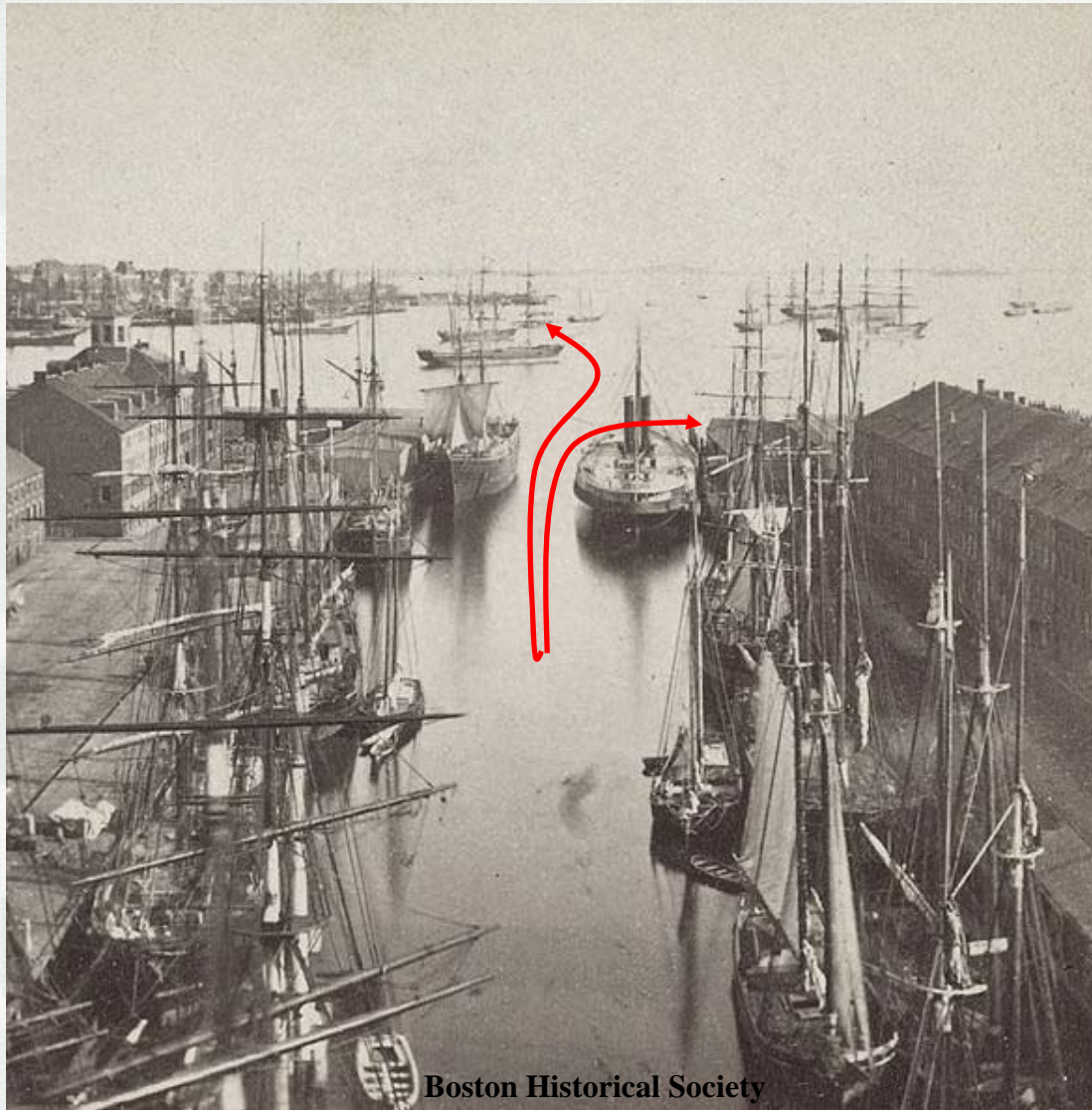
History of Aquatic Placement of Dredged Material



- 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



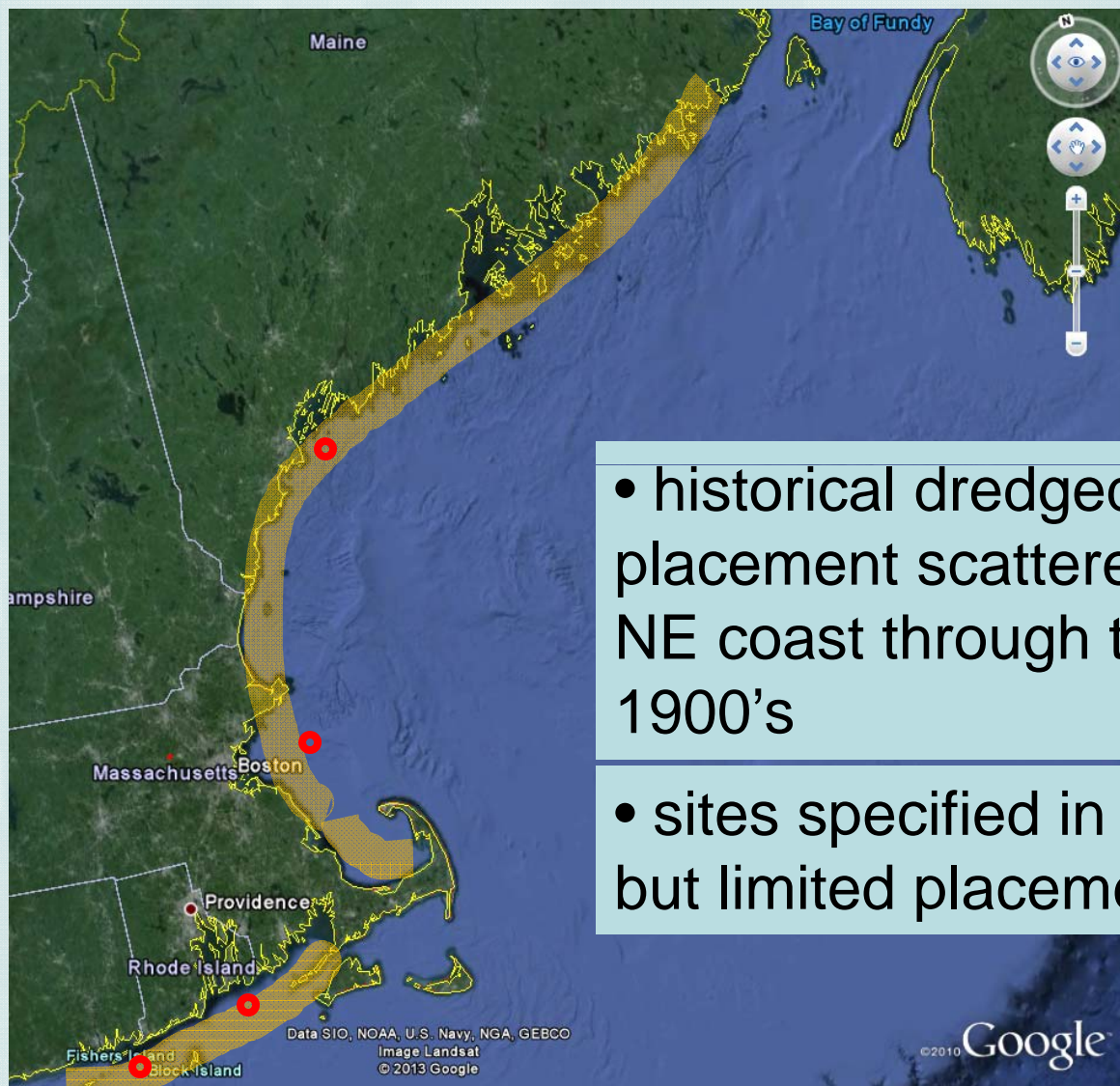
History of Aquatic Placement of Dredged Material



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



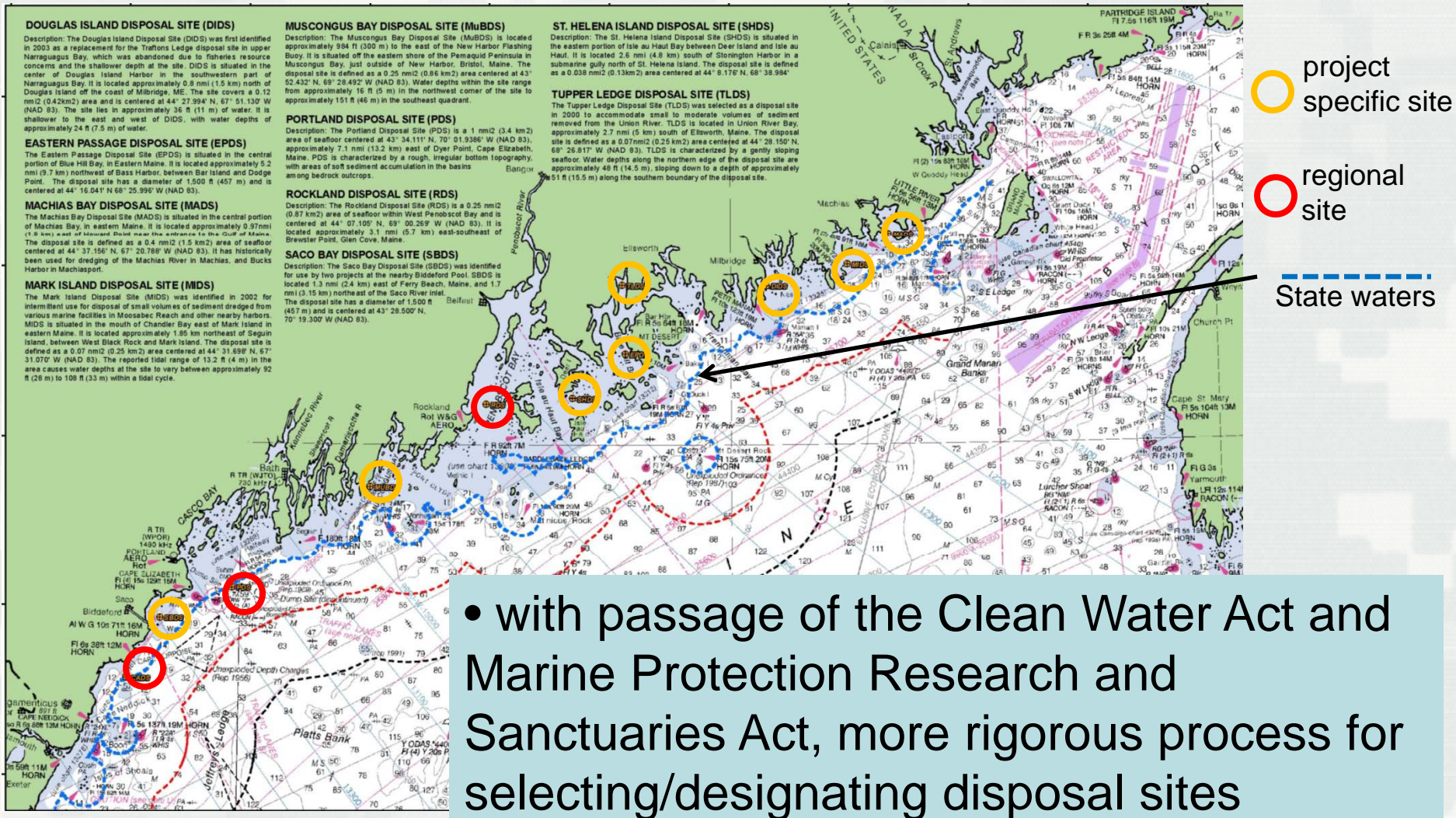
History of Aquatic Placement of Dredged Material



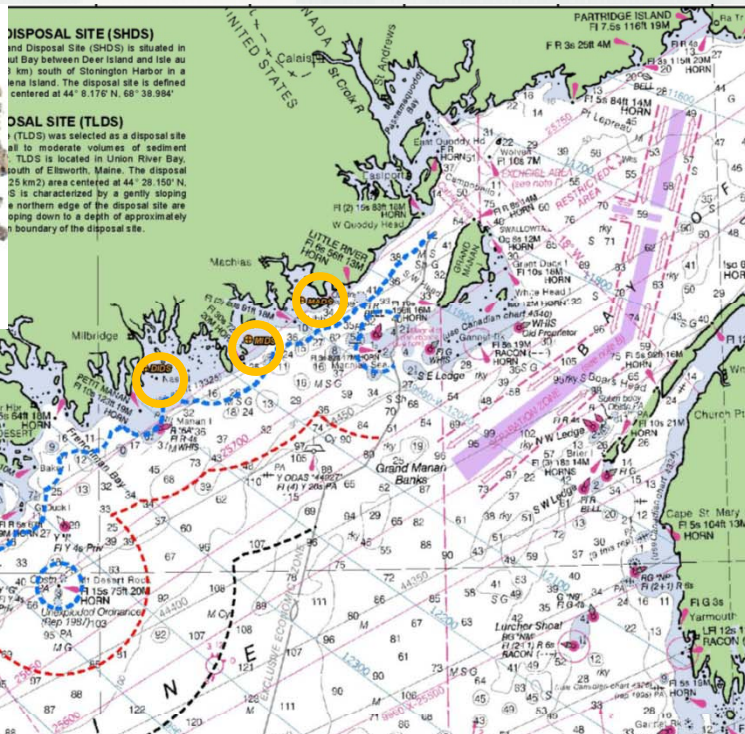
- historical dredged material placement scattered along the NE coast through the early 1900's
- sites specified in mid 1900's but limited placement guidelines



History of Aquatic Placement of Dredged Material



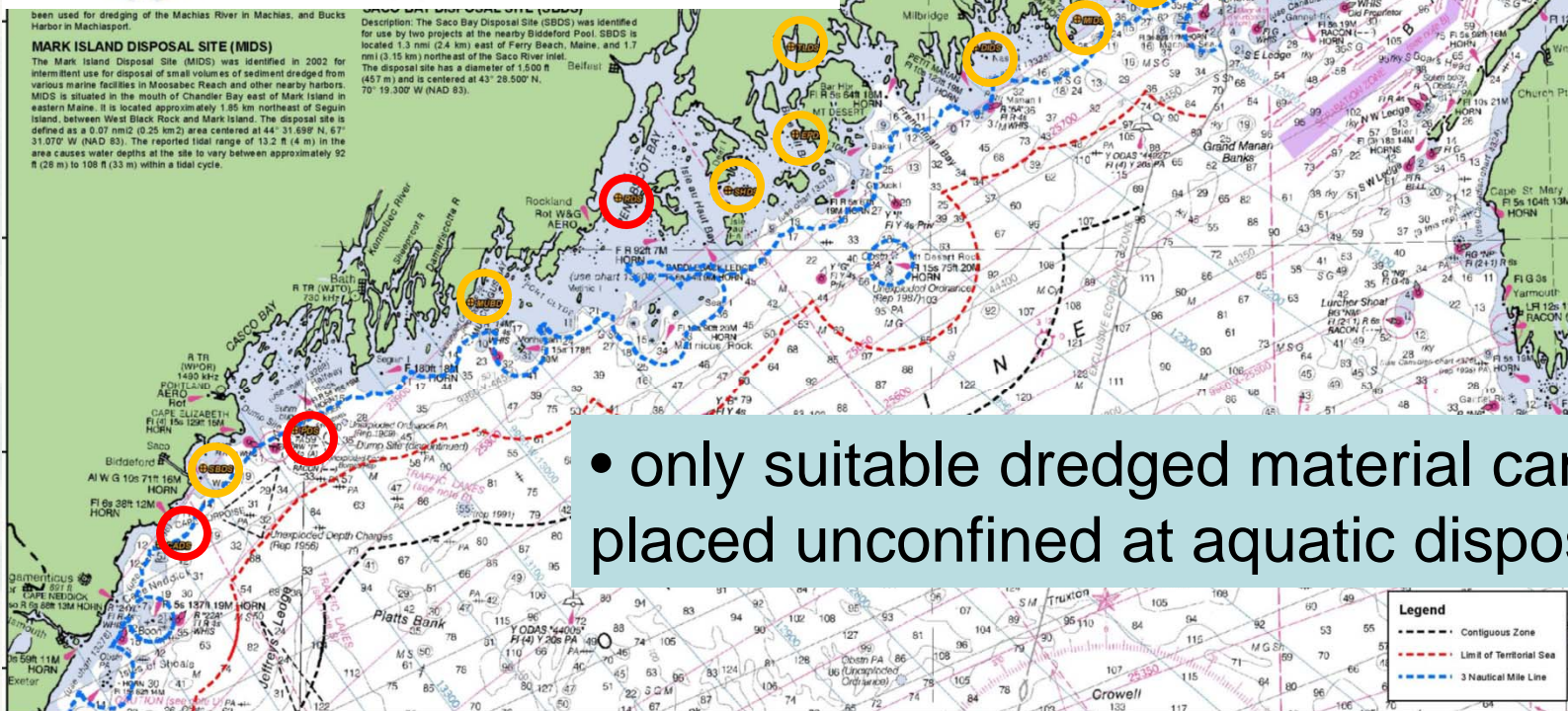
History of Aquatic Placement of Dredged Material



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

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 nm² (0.25 km²) area centered at 44° 31' 59" 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.

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

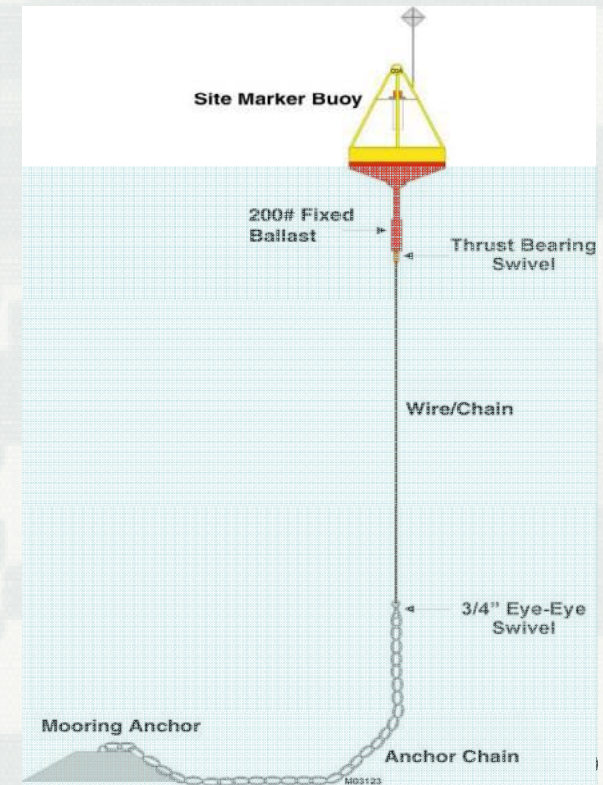


Placement & Monitoring of Dredged Material

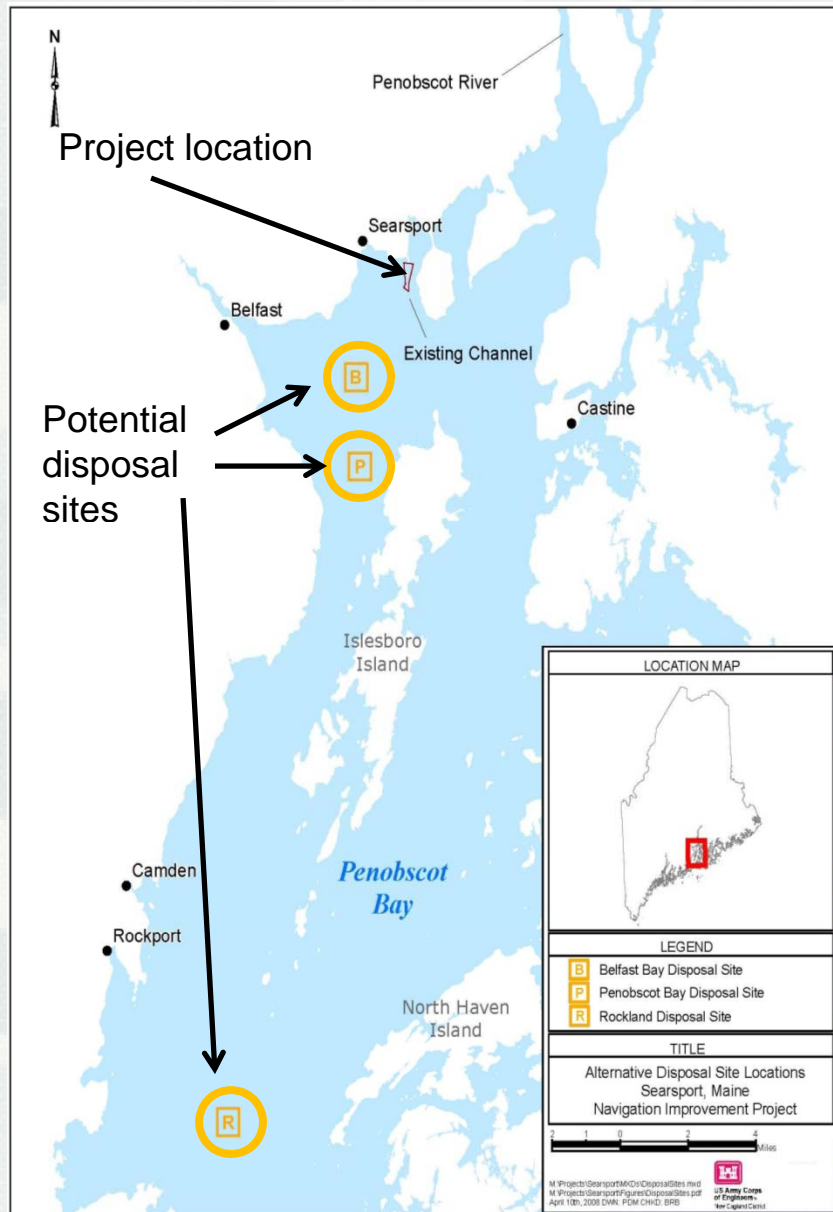


- Disposal Area Monitoring System (DAMOS) was initiated in 1977 focused on monitoring material dredged from the Trident sub base

- Targeted placement of material to minimize impacts (at buoys)
- Monitoring to track site recovery – expanded to cover sites throughout New England
- Results summarized in reports available to the public



Selection of Potential Disposal Sites



- Assessment of potential sites in Penobscot Bay 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

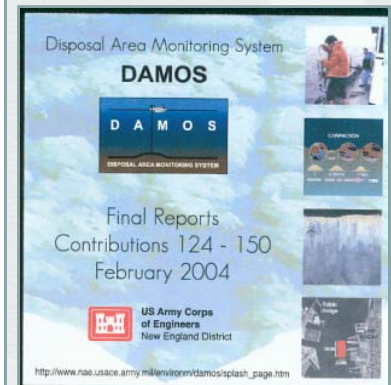
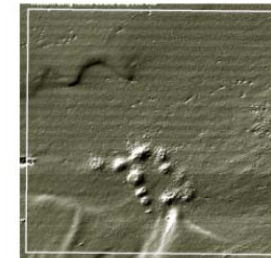
Disposal Area Monitoring System DAMOS



Contribution 177
November 2007



US Army Corps of Engineers
New England District



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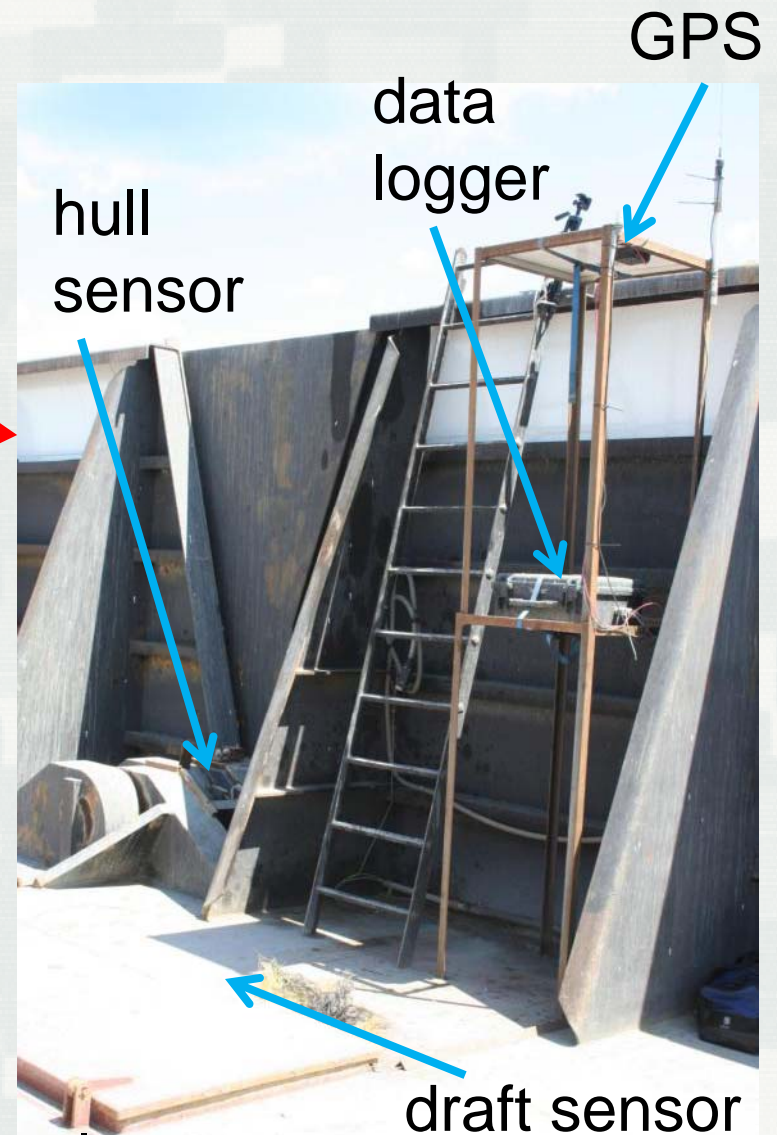
Concerns Addressed When Selecting a Disposal Site



- 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? (e.g. lobster, mercury)



Accurate Placement of Dredged Material



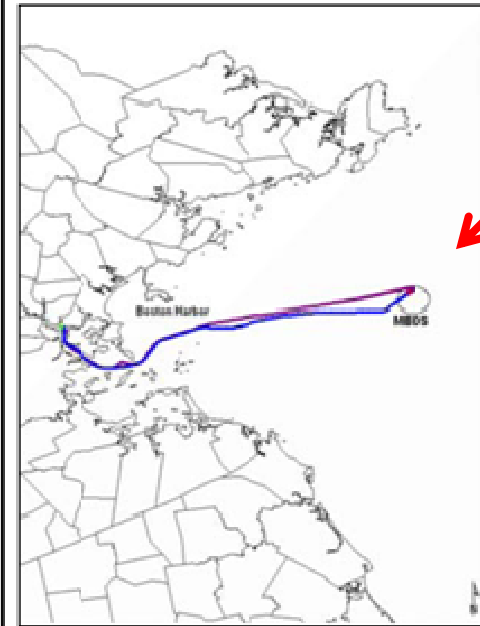
Tracking system required for all disposal

Accurate Placement of Dredged Material



- GPS allows for tracking tug/scow over full disposal trip

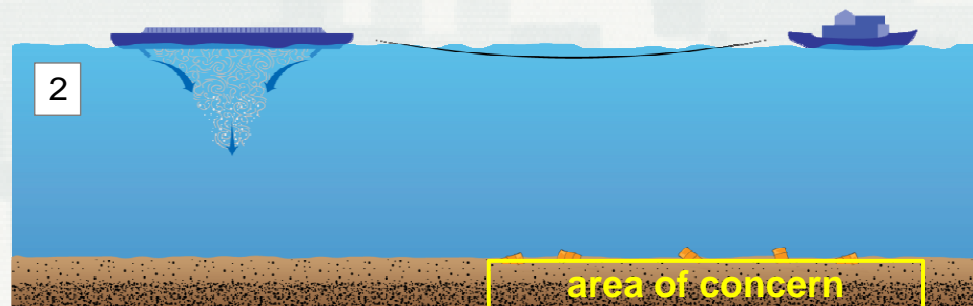
<u>Trip Information:</u>		<u>Placement Information:</u>	
Trip #:	68	<u>Placement Start:</u>	<u>Placement End:</u>
Tug:	Lemmerhirt	Time: 6/17/2008 11:30:16	Time: 6/17/2008 11:31:09
Captain(s):	Unknown	Lat: 42.424935	Lat: 42.426364
Scow:	GL65	Long: -70.592248	Long: -70.590189
Type:	Split Hull Scow		
Technique:	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.			



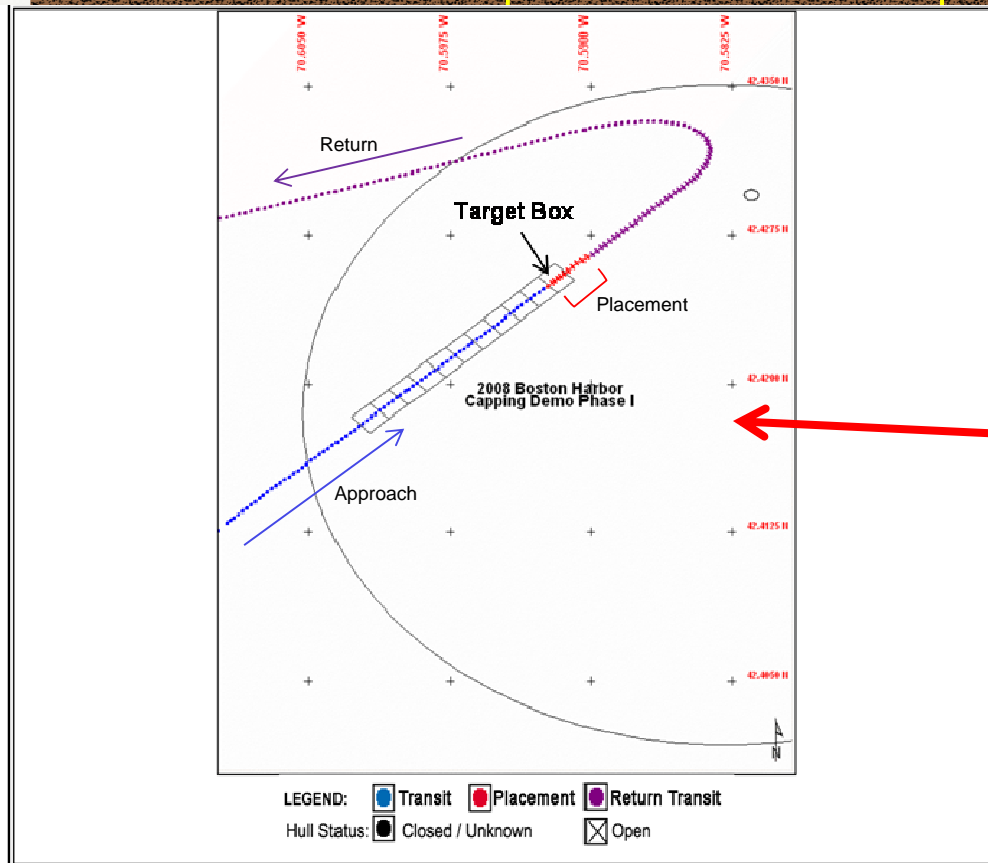
Example recorded track of scow loaded in Boston Harbor and disposed in Massachusetts Bay



Accurate Placement of Dredged Material



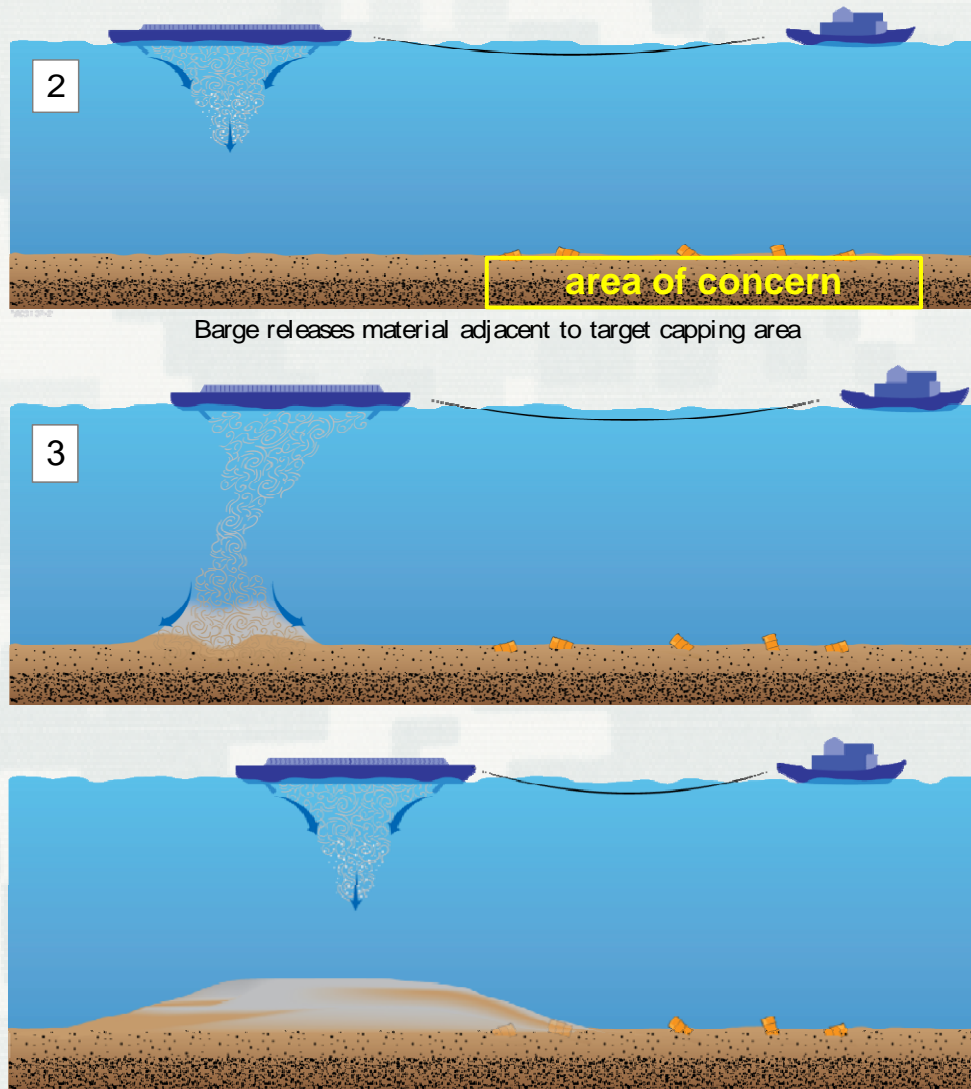
- Hull and draft sensors allow for tracking release of material from the scow



Example recorded track of scow as it approaches the disposal site and releases material at the target coordinates



Accurate Placement of Dredged Material



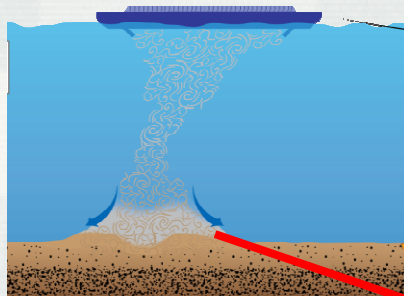
- Very sensitive fathometers allow identification of individual scow disposal events and tracking buildup of material on the bottom with multiple loads

Example from evaluation of potential capping of the historic Industrial Waste Site in Massachusetts Bay

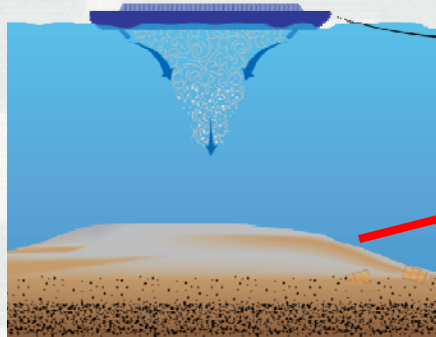


Accurate Placement of Dredged Material

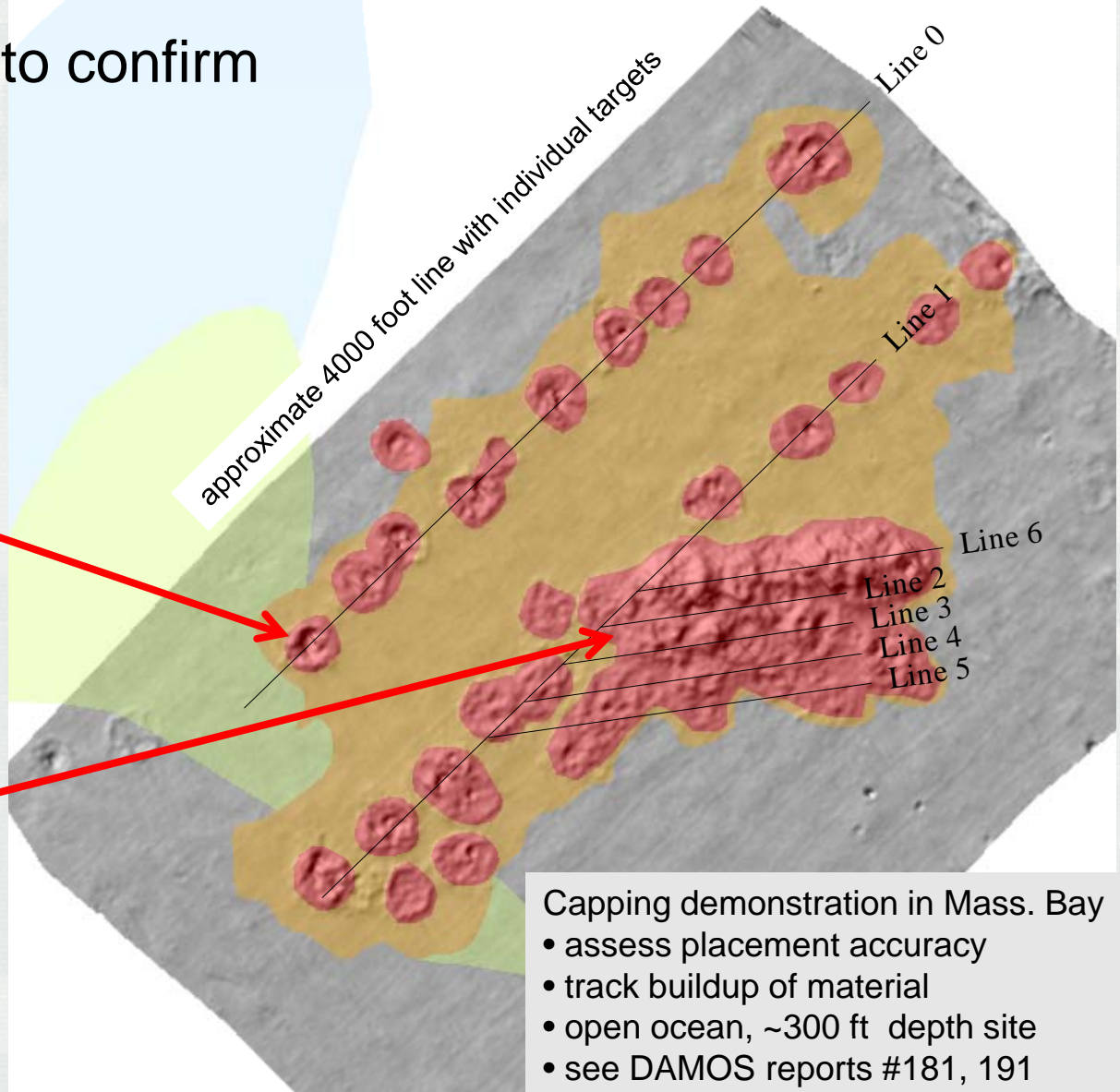
- bathymetry surveys to confirm placement locations



single placement

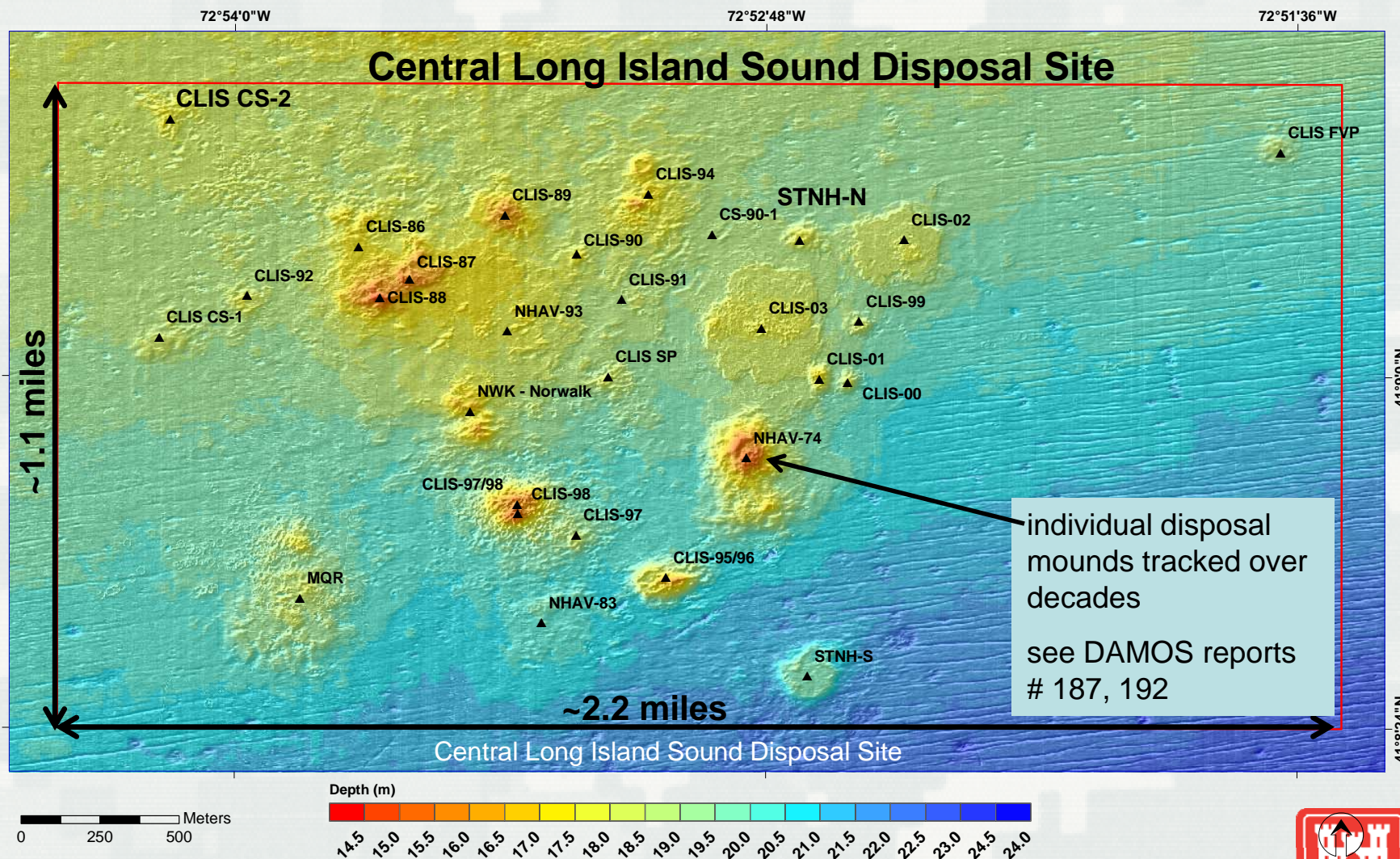


multiple placements



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

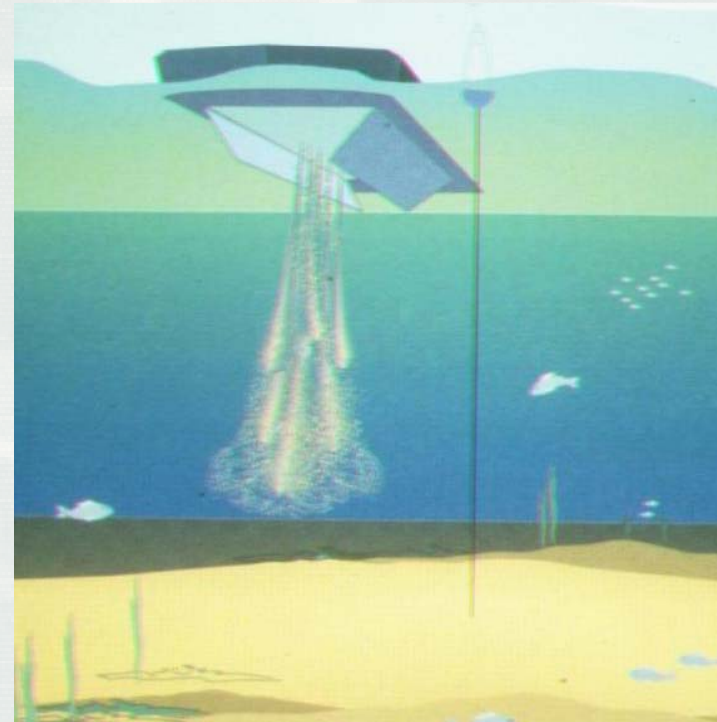
Depth in meters, MLW

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Assessing Release of Material to the Water Column

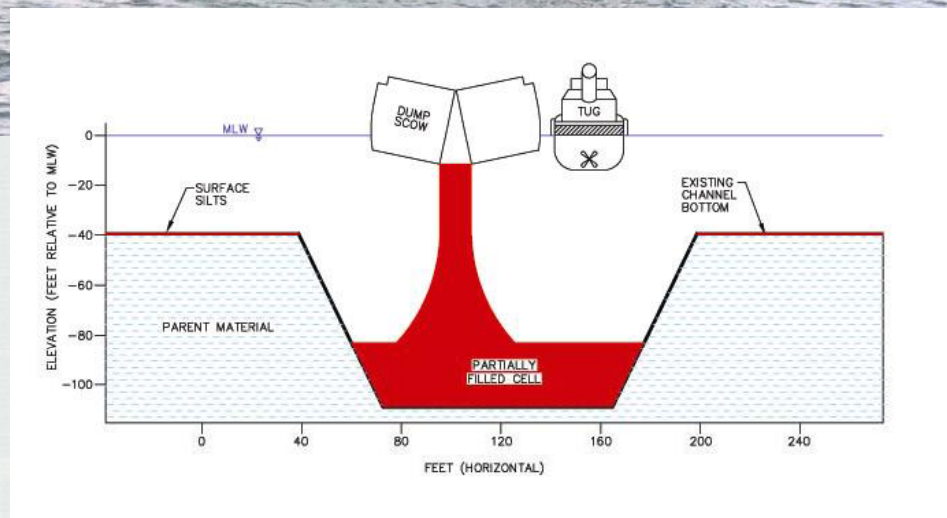
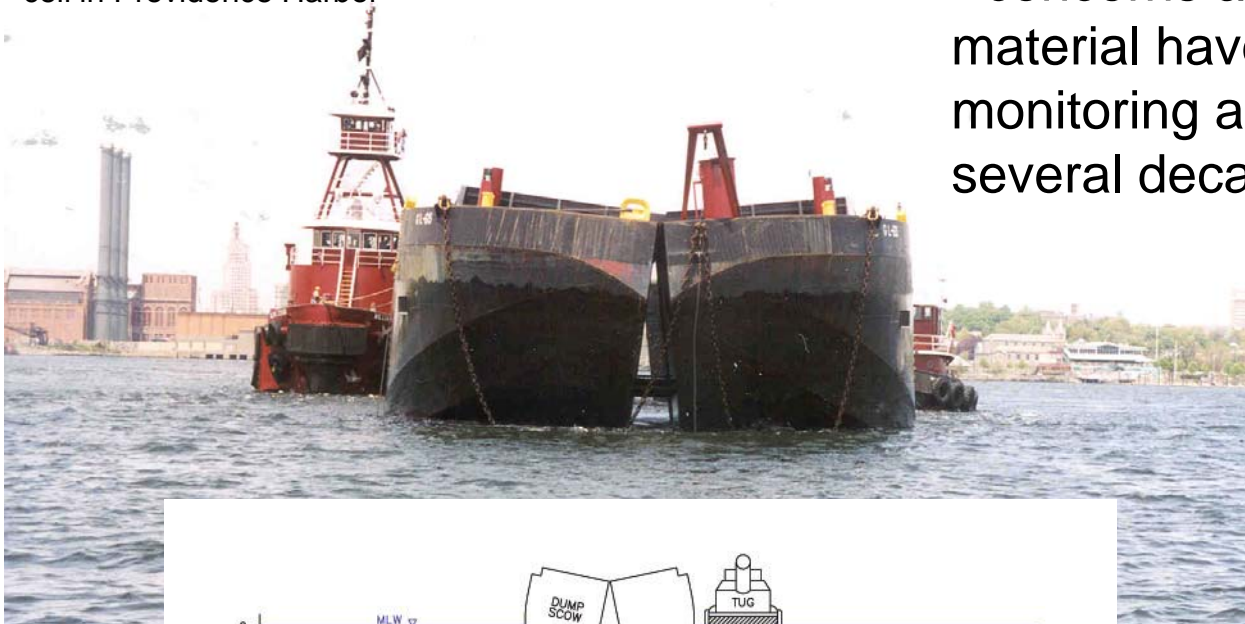
- release of 3000+ cubic yards of improvement dredged material from Boston Harbor at the Massachusetts Bay Disposal Site



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 to identify and track plume of suspended material following scow opening



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

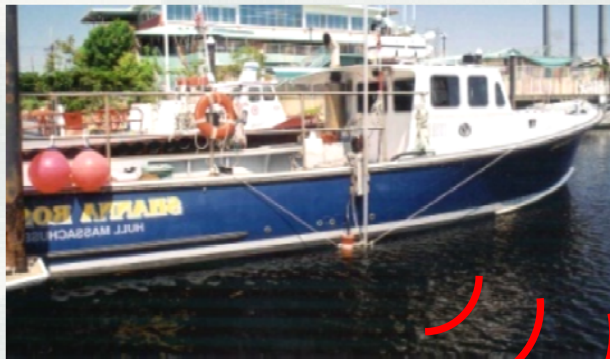


See DAMOS reports #166,167,168,178



Assessing Release of Material to the Water Column

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



See DAMOS reports #166,167,168,178



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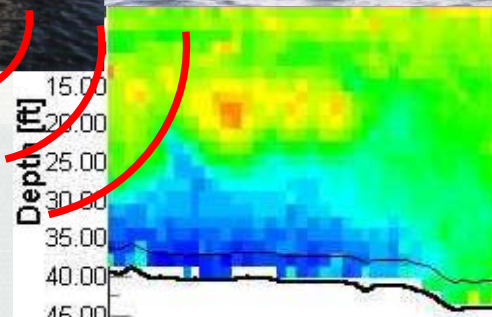
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Assessing Release of Material to the Water Column

- Field measurements to identify and track plume of suspended material following scow opening



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



See DAMOS reports #166,167,168,178



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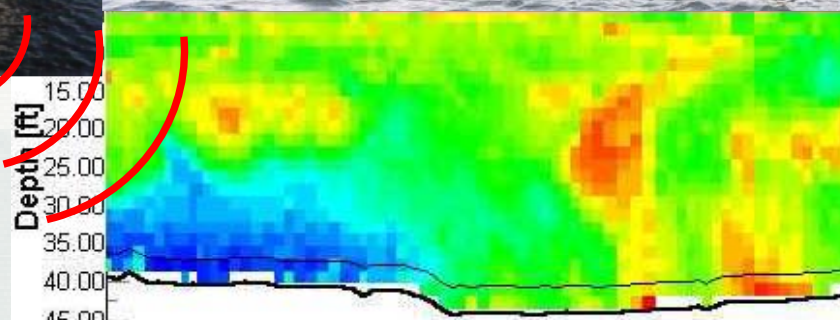
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Assessing Release of Material to the Water Column

- Field measurements to identify and track plume of suspended material following scow opening



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



See DAMOS reports #166,167,168,178

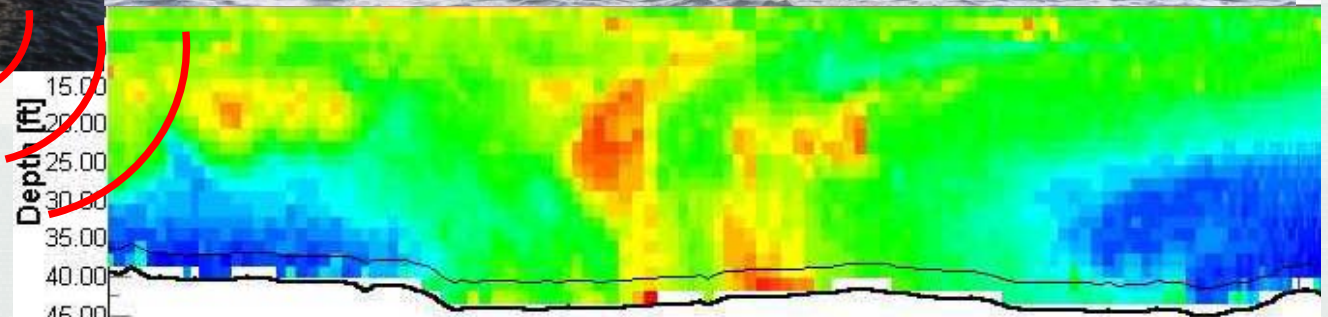


Assessing Release of Material to the Water Column

- Field measurements to identify and track plume of suspended material following scow opening



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



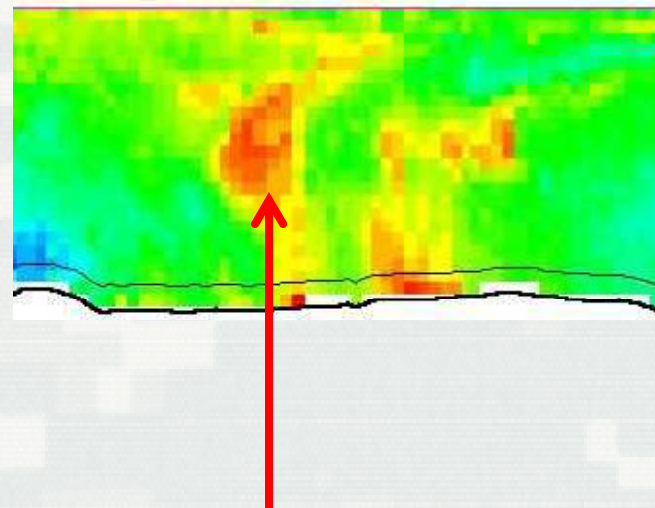
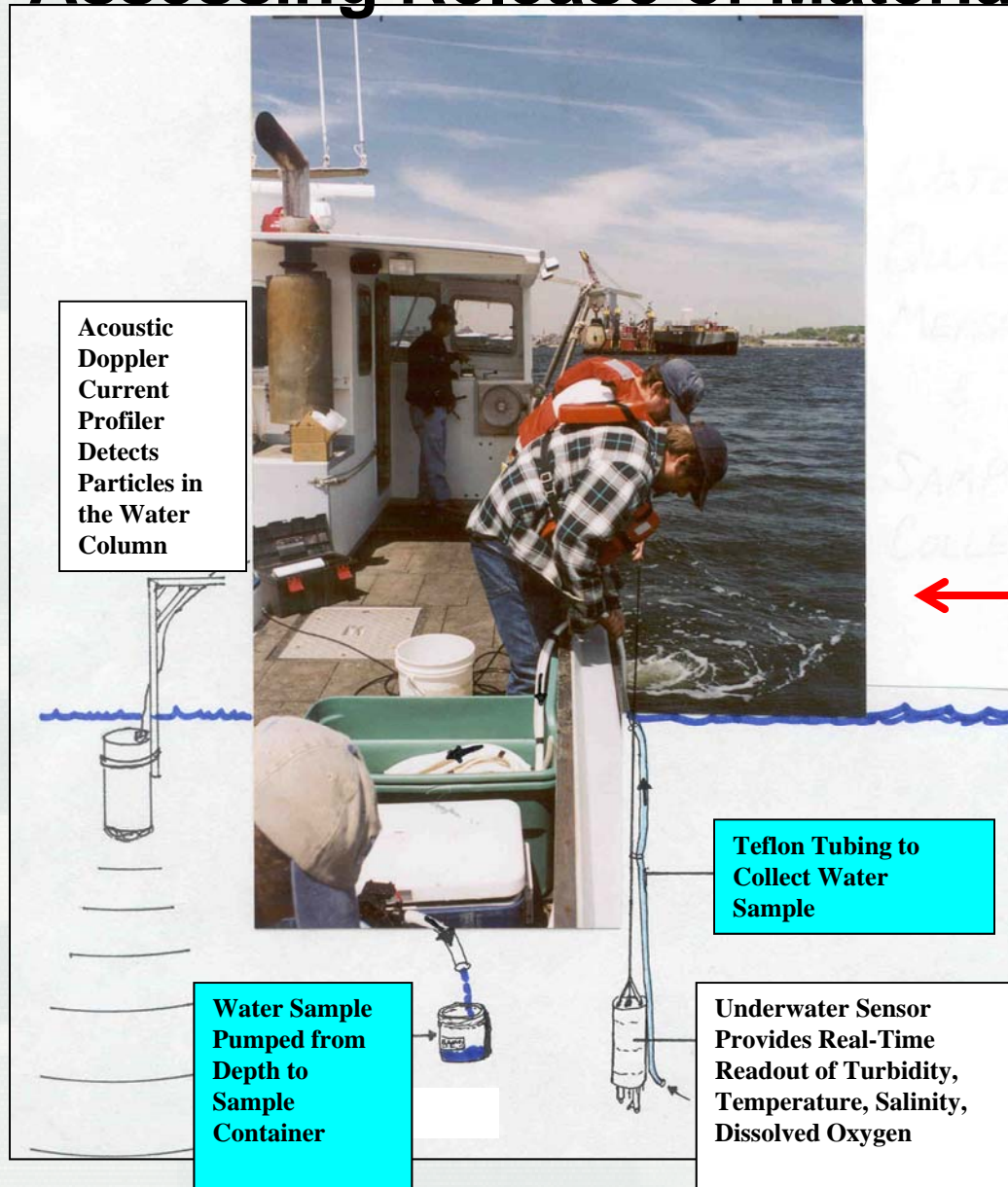
See DAMOS reports #166,167,168,178



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Assessing Release of Material to the Water Column



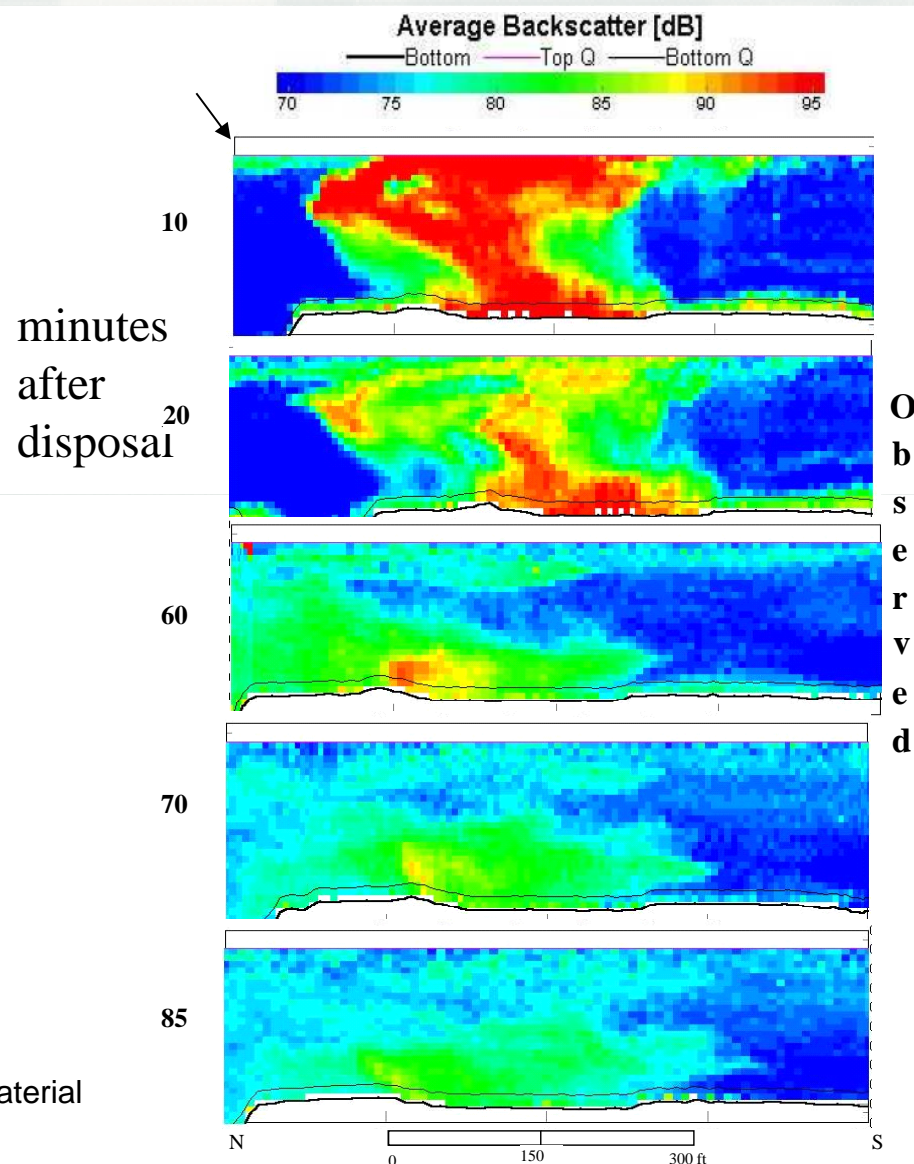
- Boat returns to area with highest signal to collect water samples for lab analysis



Assessing Release of Material to the Water Column

- Sequential boat-based transects show very limited duration of suspended material in the water column
- Laboratory analyses of water samples collected from the disturbed area did not identify impacts

monitoring following scow release of material
over CAD cell in Providence Harbor



Assessing Release of Material to the Water Column

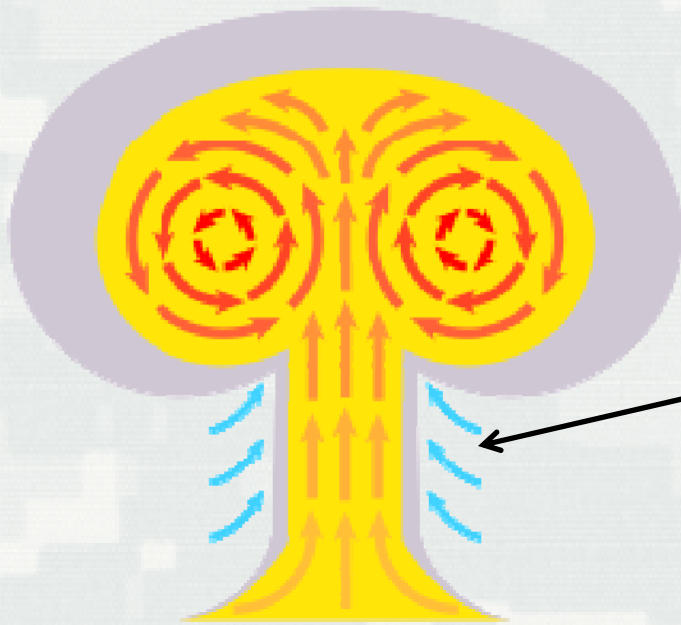


image from Wikipedia free media

- 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

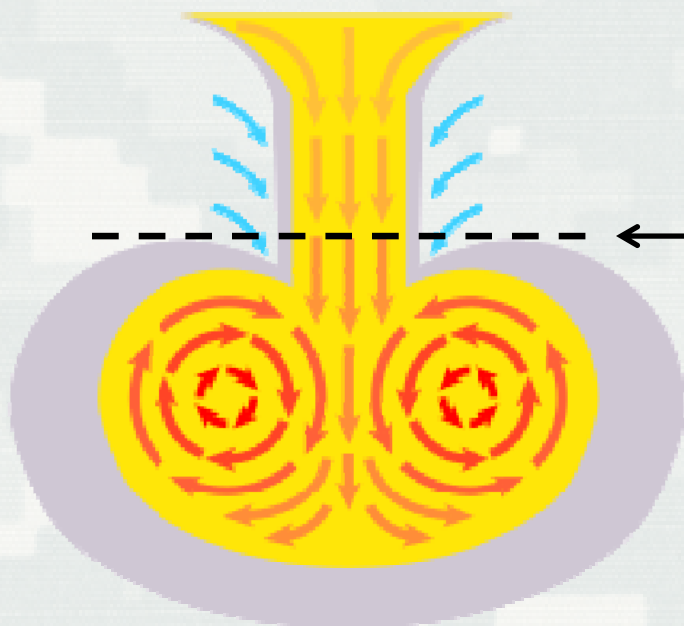


image from Wikipedia free media

- 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

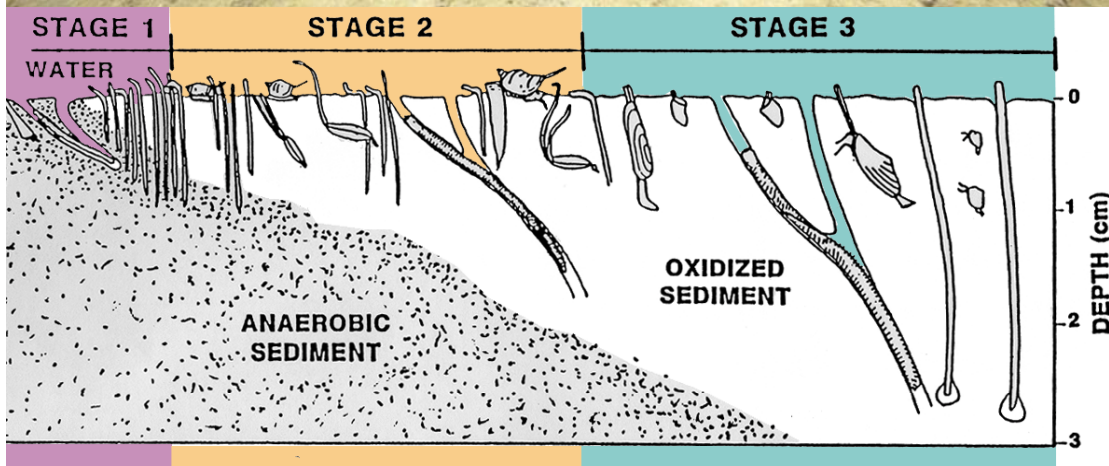


MIT laboratory simulation of release of material from a scow using scaled fluorescent beads in a ~10 ft tank (Ruggaber 2000)

See DAMOS reports #166,167,168,178



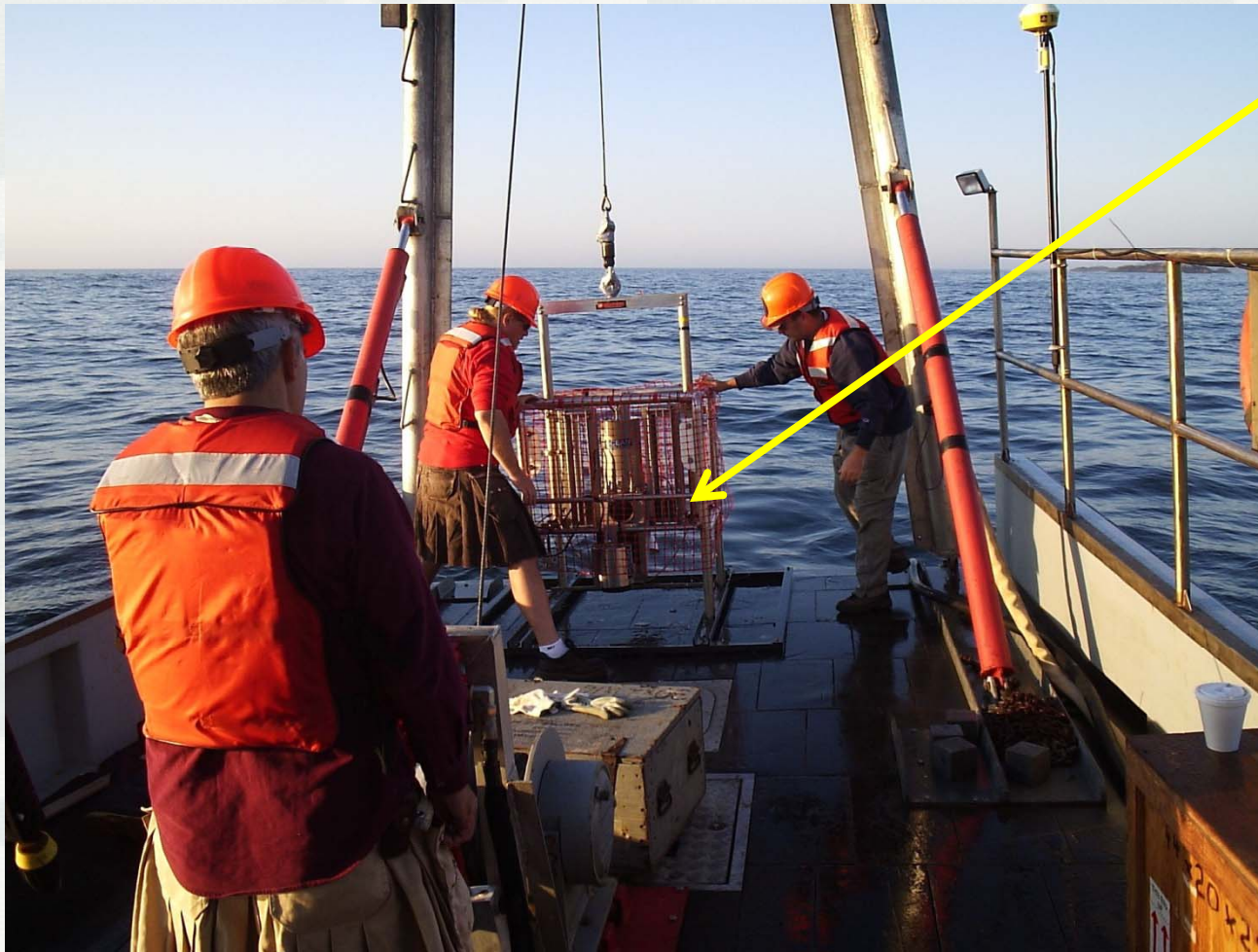
Assessing Impacts to the Benthic System



- 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

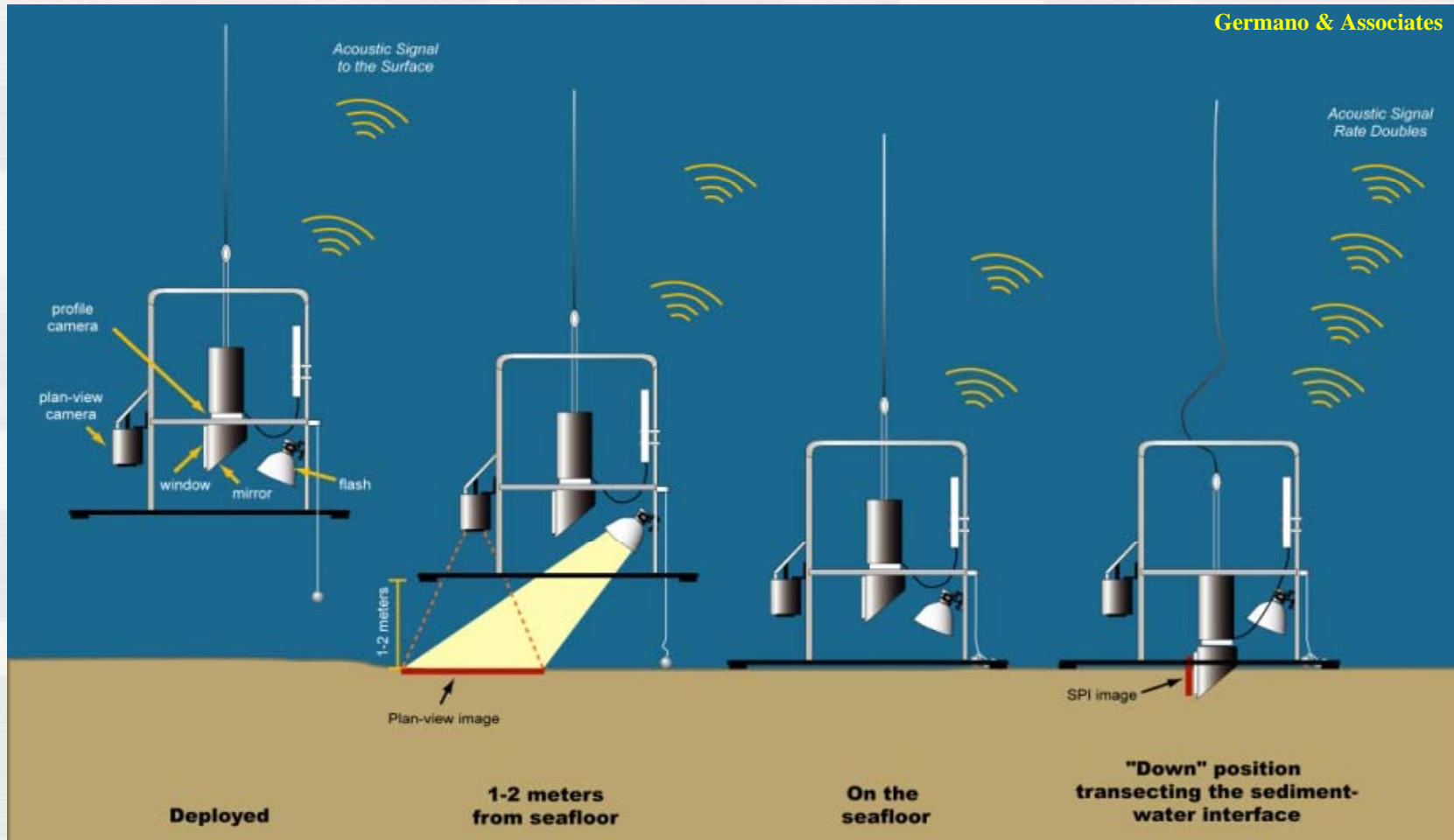


- sediment profile and plan view cameras provide images above and below the seafloor
- imaging multiple locations provides a comprehensive evaluation of a site



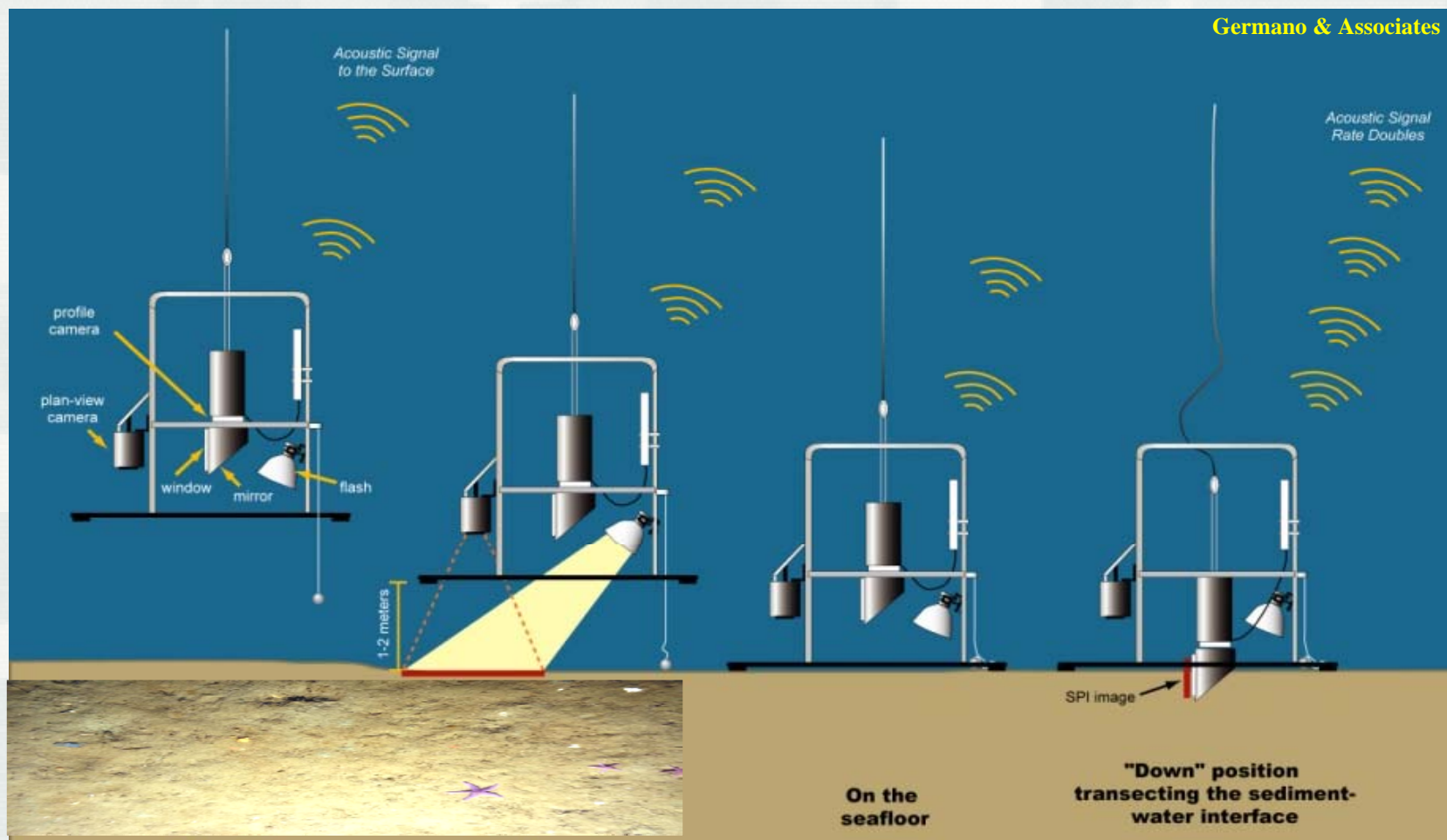
Assessing Impacts to the Benthic System

- Deployment of the seafloor imaging camera



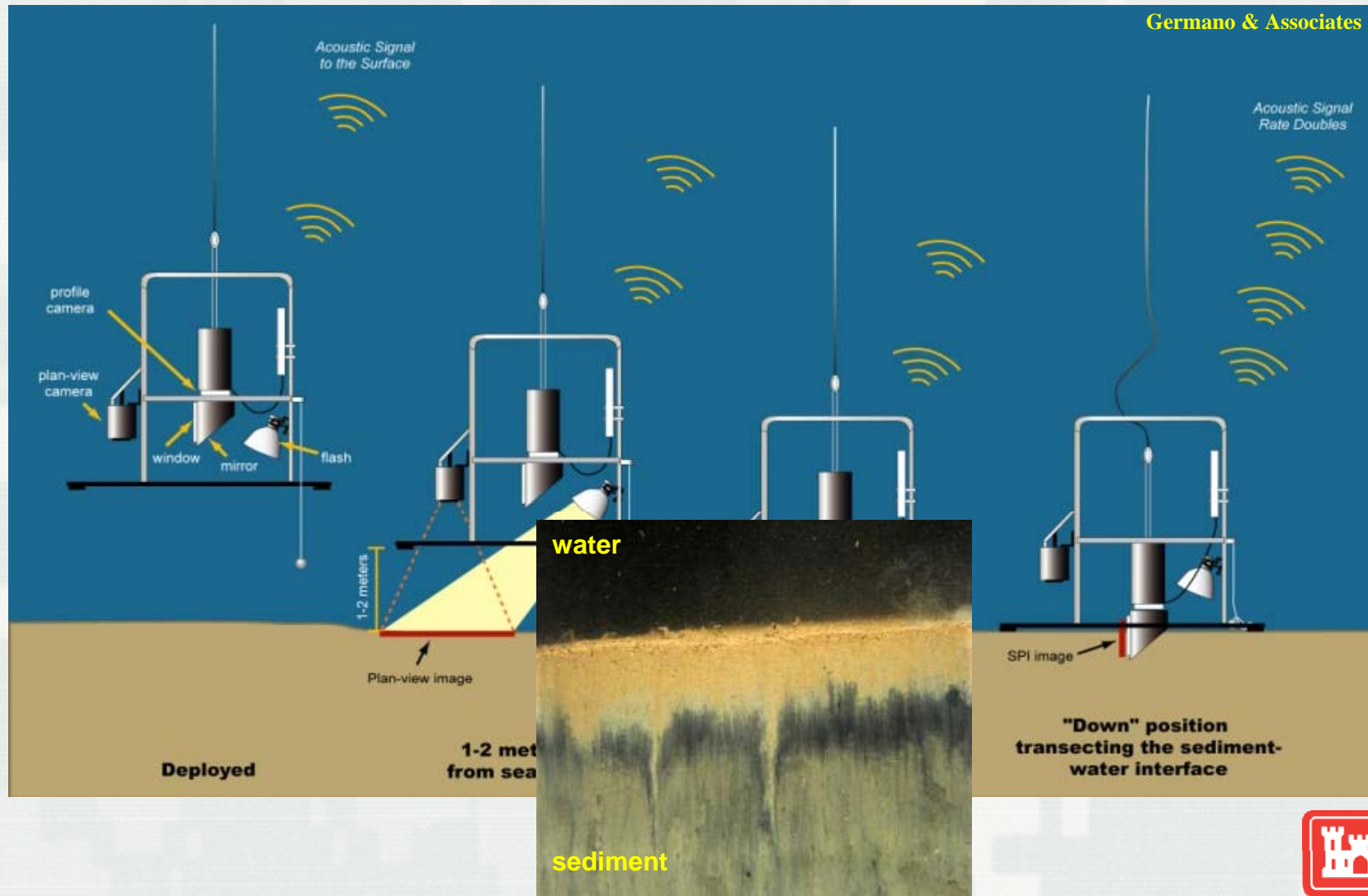
Assessing Impacts to the Benthic System

- Deployment of the seafloor imaging camera

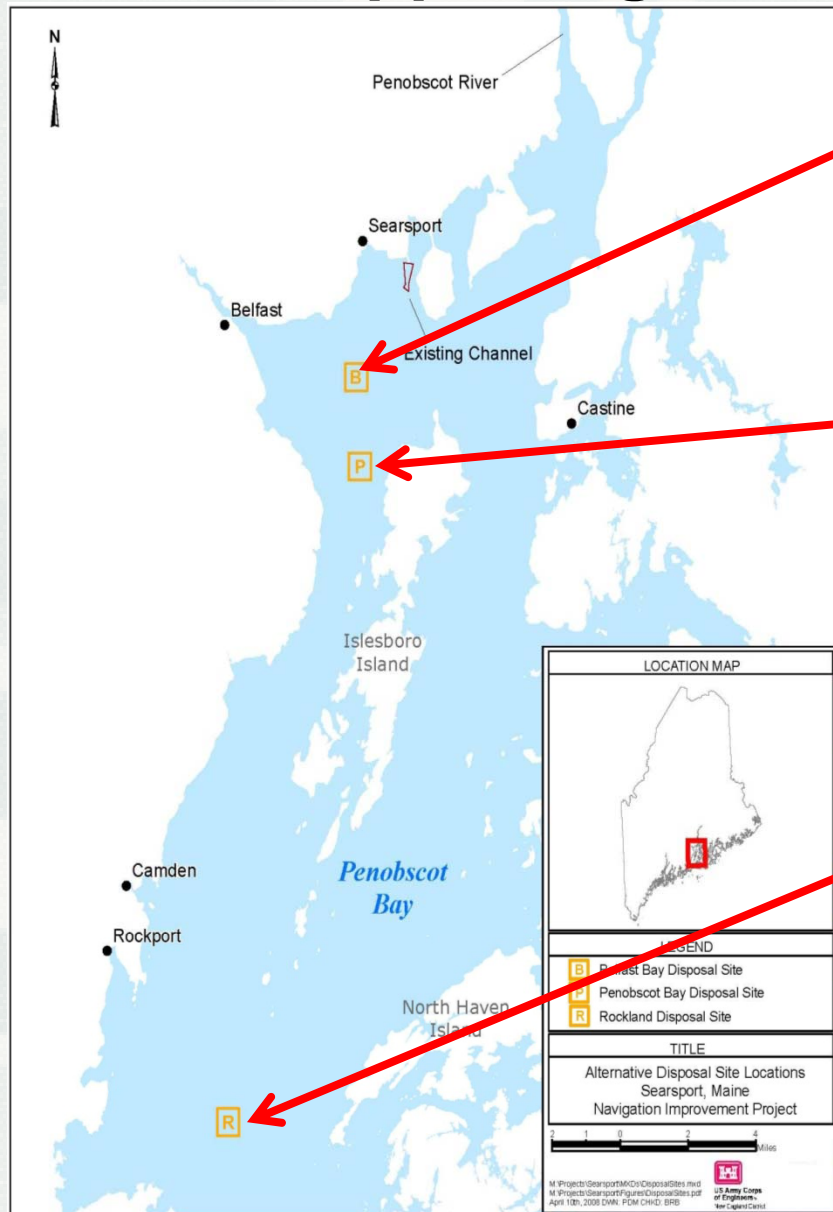


Assessing Impacts to the Benthic System

- 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

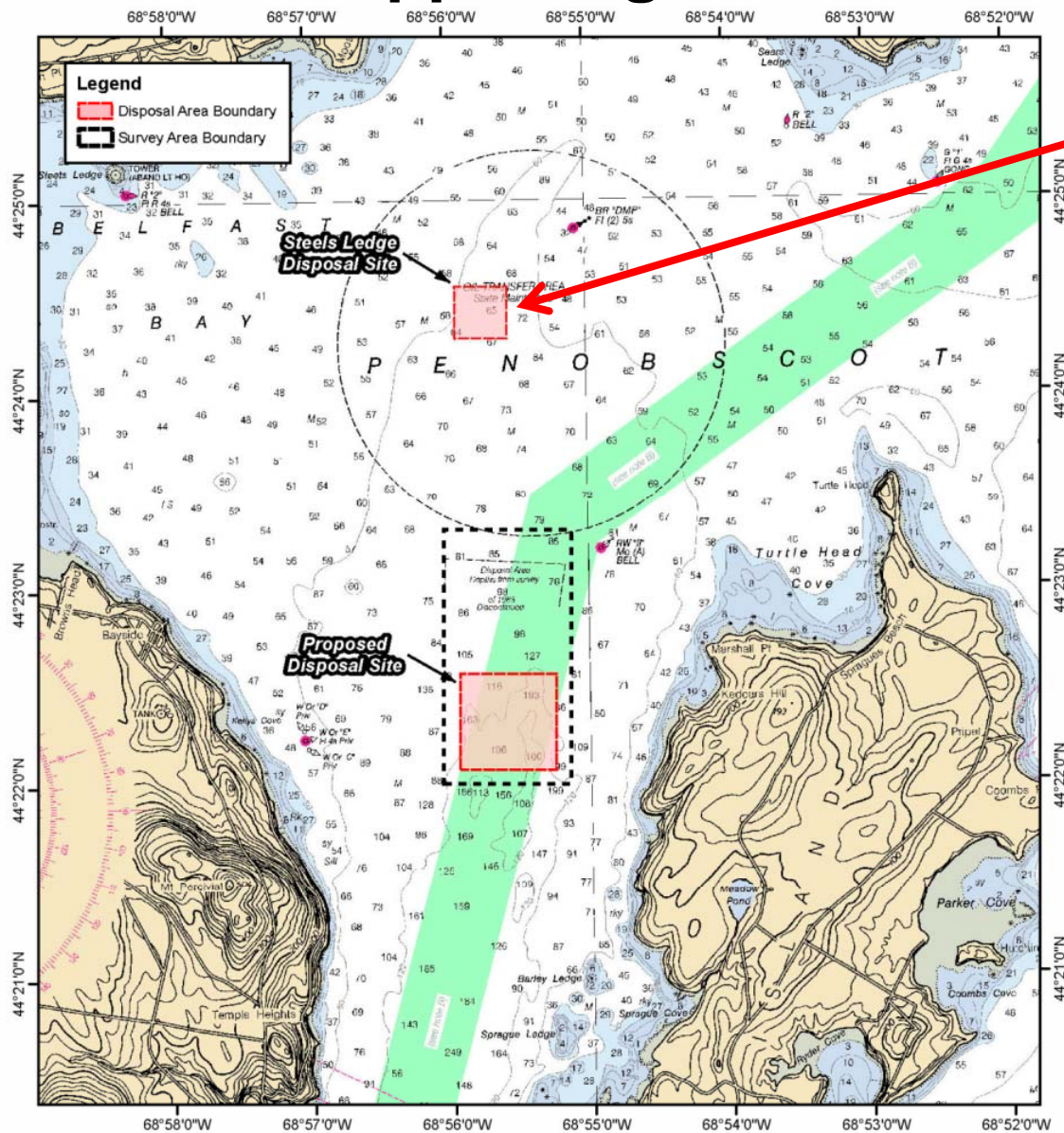
- approximately 38 miles additional haul for each scow round trip



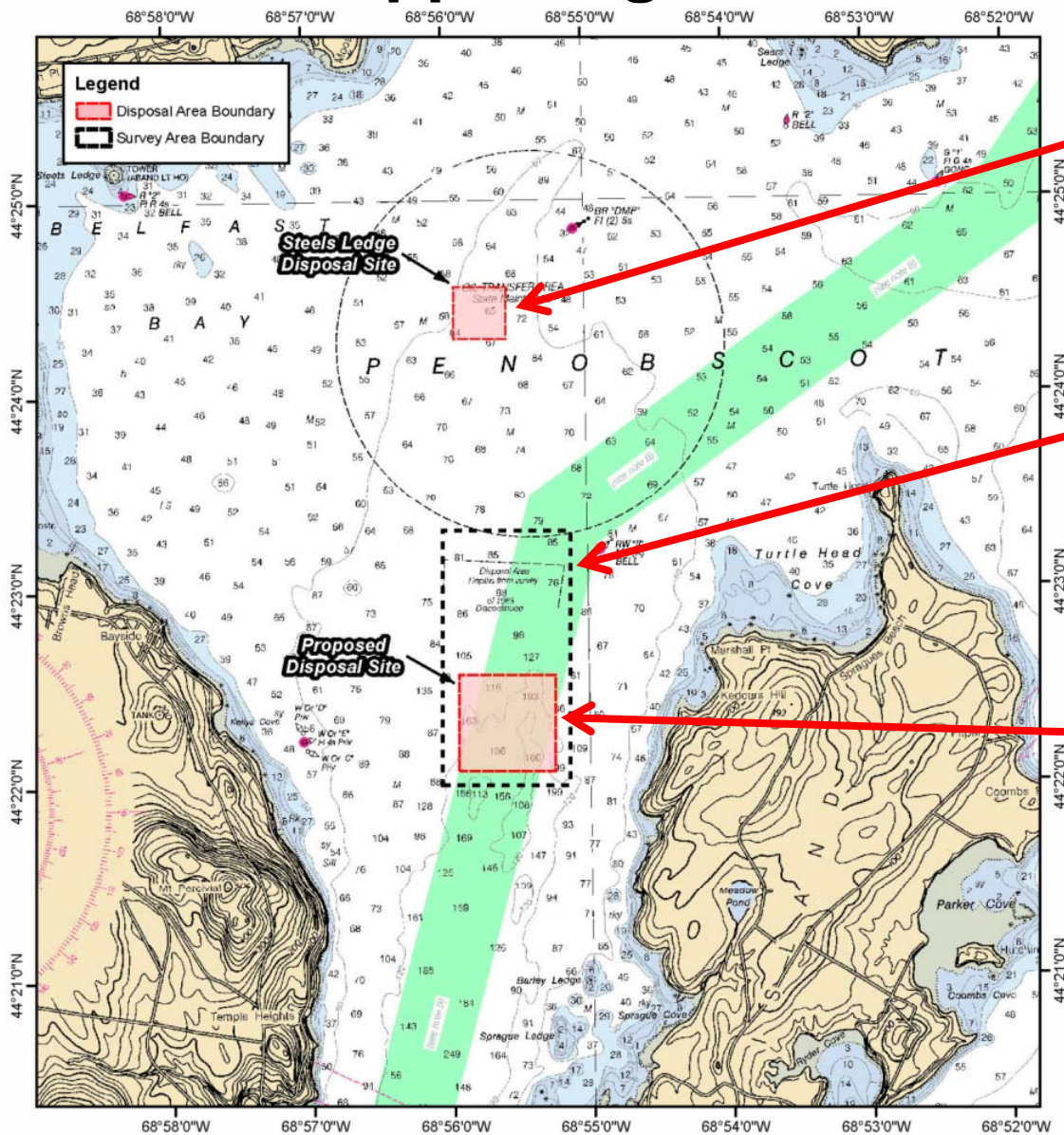
- additional 63 days of tug-scow traffic on the bay
- additional 260,000 gallons of diesel fuel usage



Studies Supporting the Selection of the Disposal Site



Studies Supporting the Selection of the Disposal Site

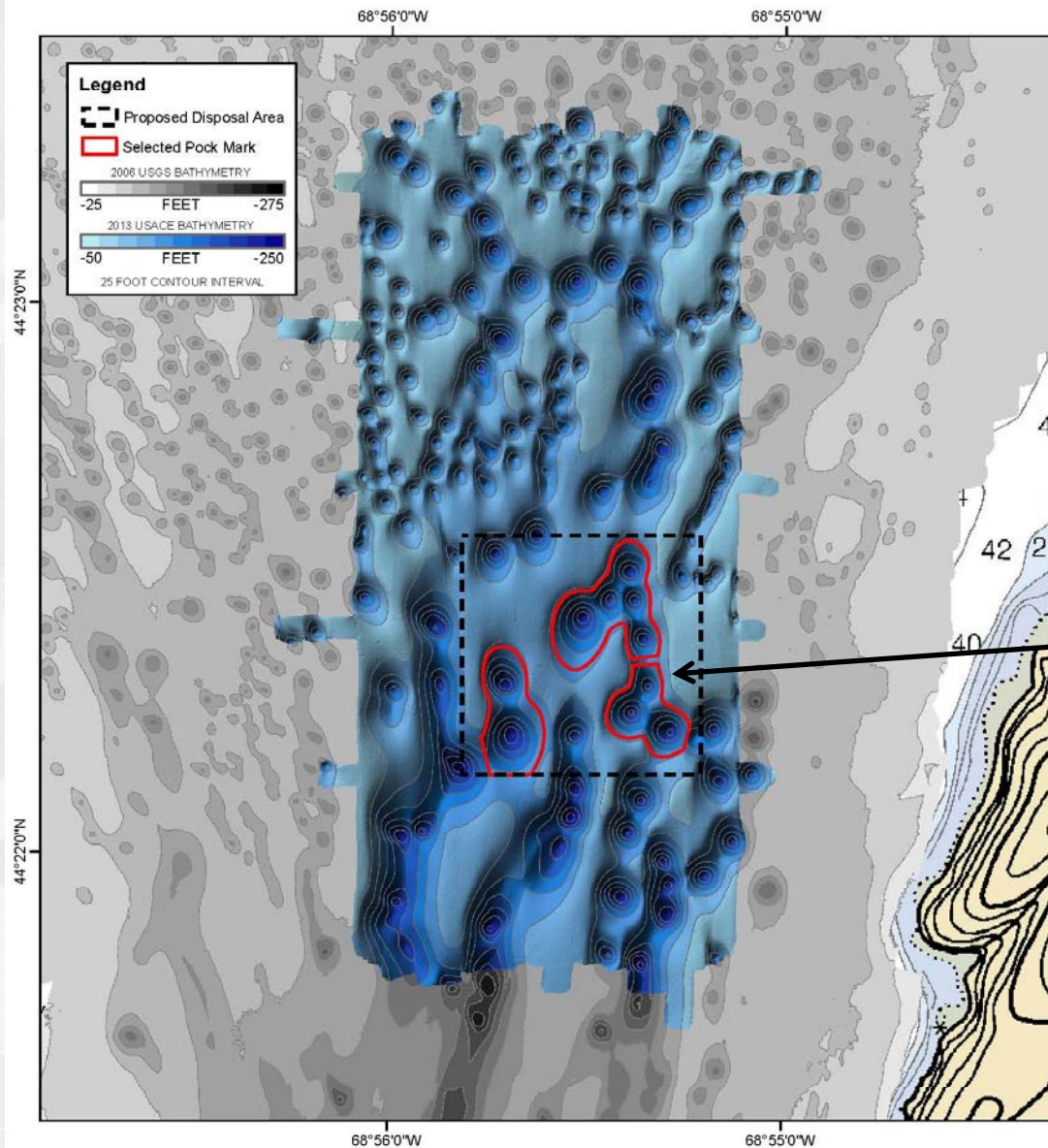


- Belfast Bay (Steels Ledge) site – averages ~60 ft deep
- 2013 survey area expanded to include charted historic disposal area
- Penobscot Bay site - depths of 100-200 ft



- 

Studies Supporting the Selection of the Disposal Site



- 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



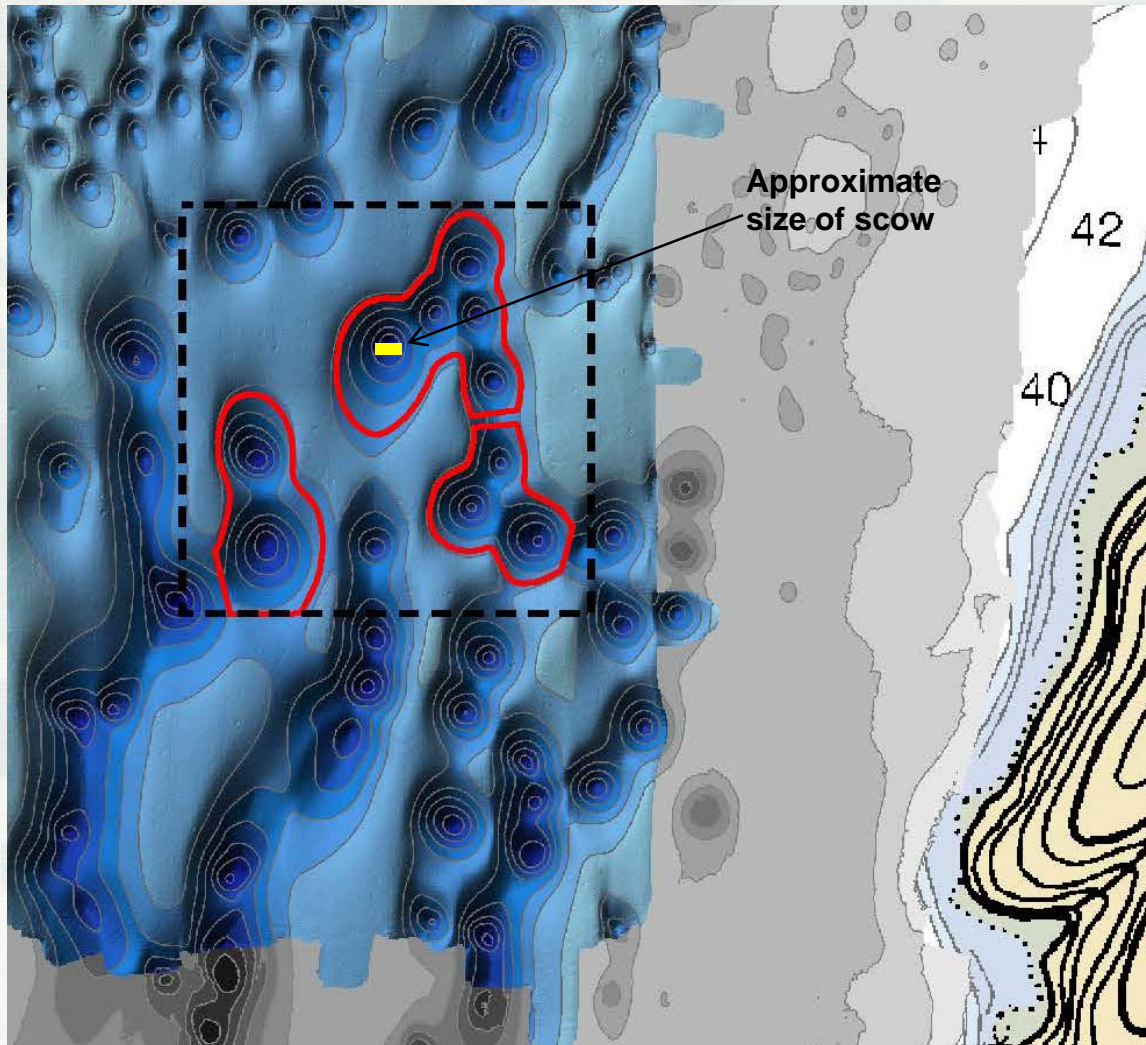
← example plan view image of seafloor in a pit within the proposed disposal area (~2 ft across)

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 early May

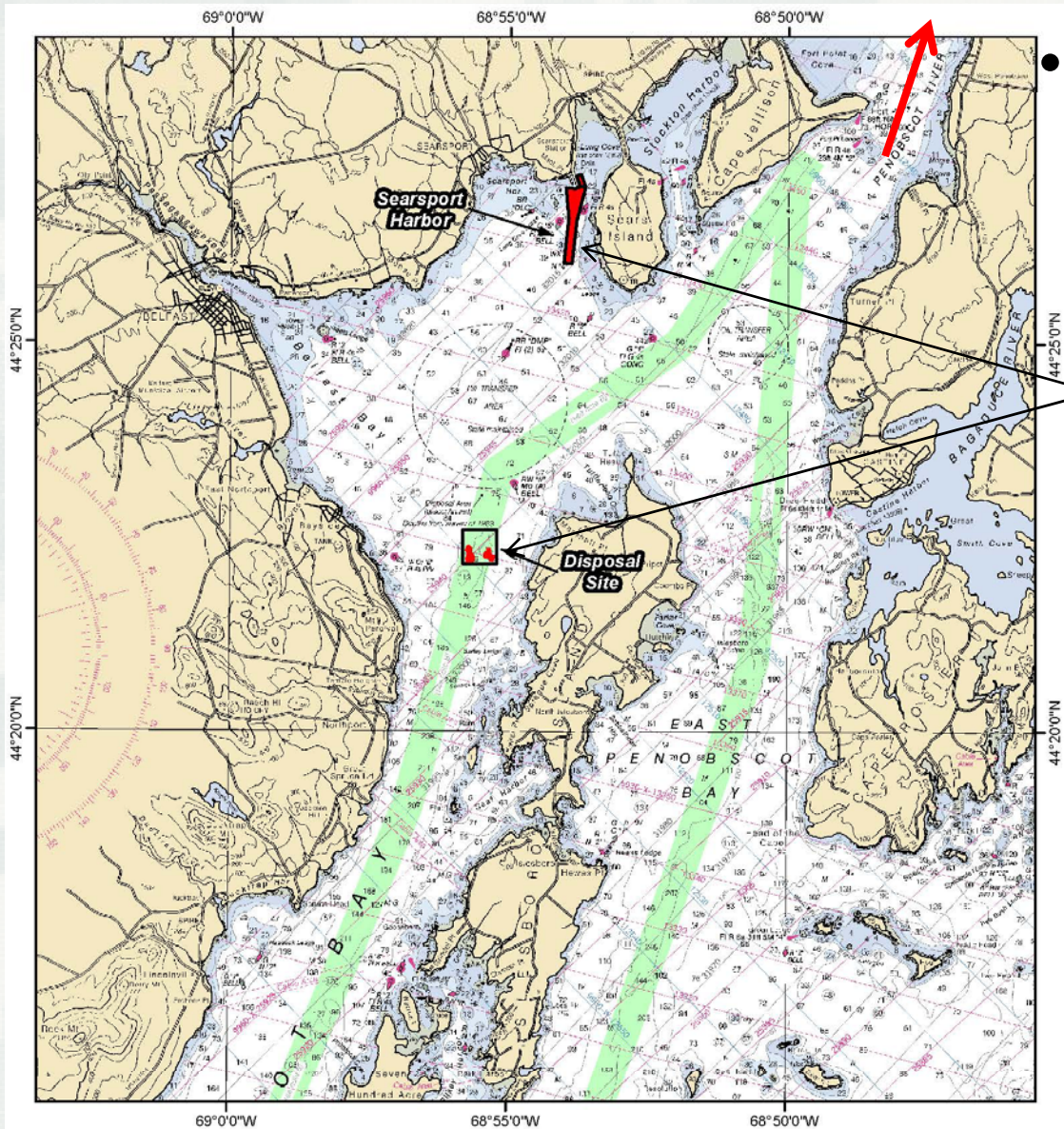
Studies Supporting the Selection of the Disposal Site



- 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



Addressing Concerns Related to Mercury



- source of mercury and high sediment concentrations are further up the Penobscot River
- testing of surficial sediment at the project site showed that it was suitable for placement at an open water site and similar to the disposal site
- results are similar to findings of the Bay-wide mercury study (no remediation needed at this location)

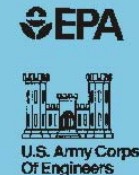


Note on Suitability Testing

- detailed guidance on testing and evaluation requirements to determine the suitability of dredged material for aquatic placement



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United States
Environmental Protection
Agency
Office of Water (WH-556F)

Department Of The Army
U.S. Army Corps Of Engineers

EPA-503/8-91/001
February 1991

Evaluation Of Dredged Material Proposed For Ocean Disposal



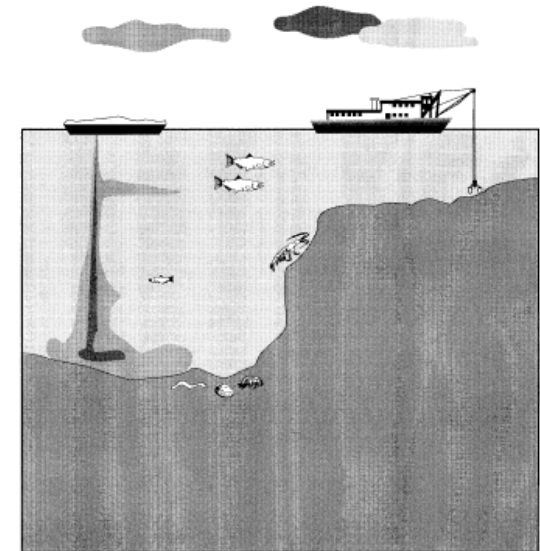
United States
Environmental Protection
Agency
Office of Water (4305)

Department Of The Army
US Army Corps of Engineers

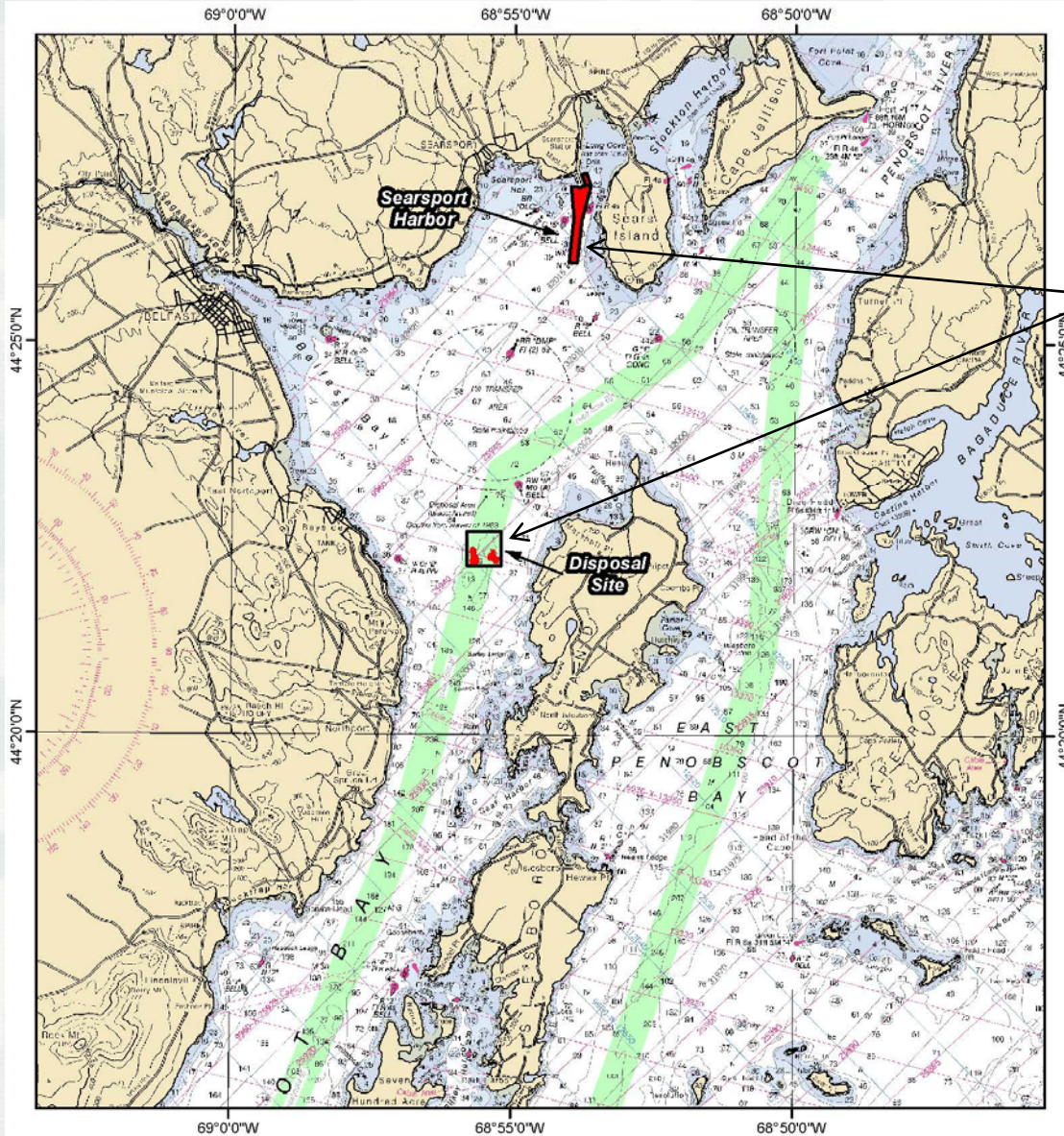
EPA-823-B-98-004
February 1998

Evaluation of Dredged Material Proposed For Discharge in Waters of the U.S. - Testing Manual

Inland Testing Manual



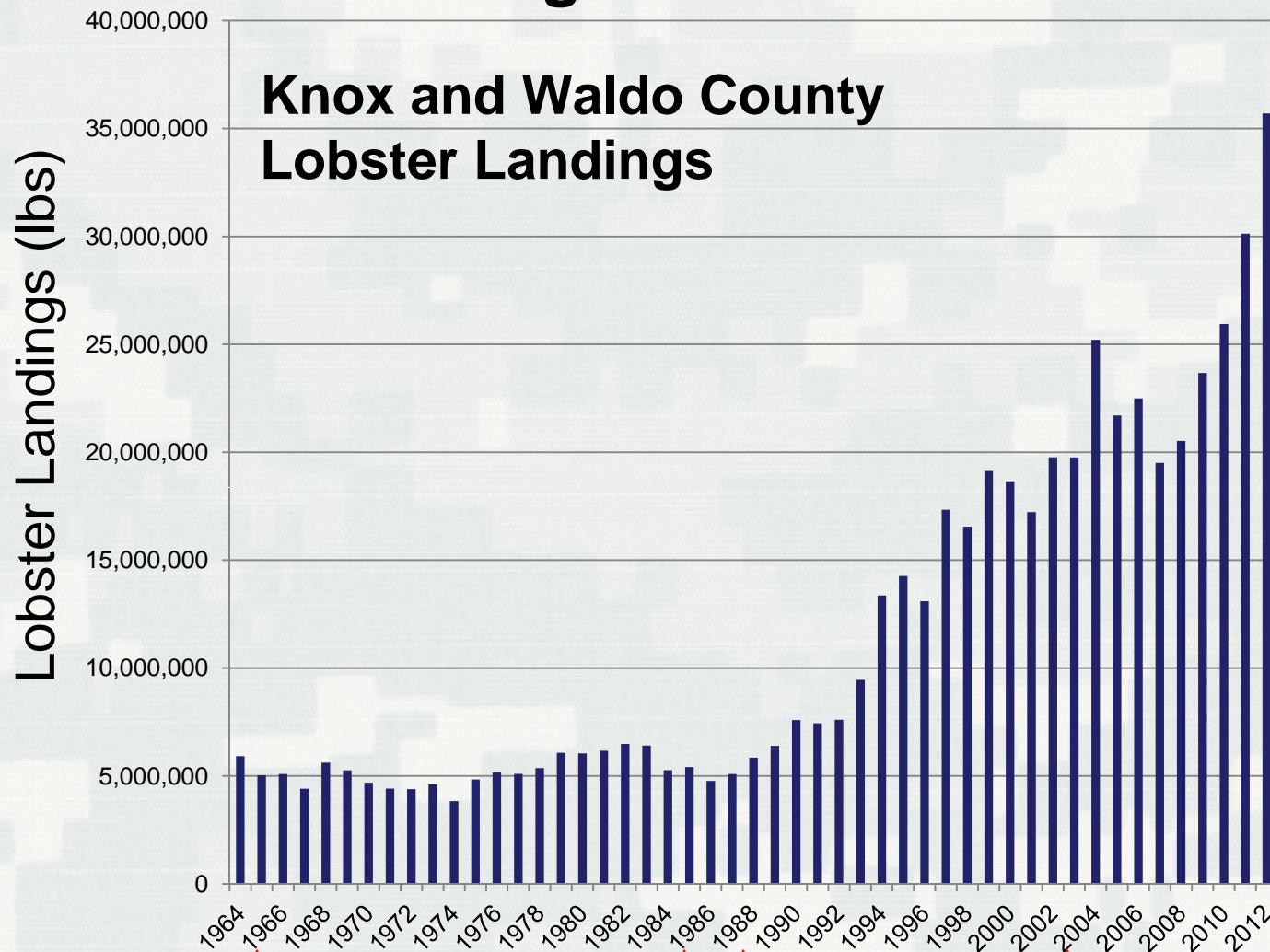
Addressing Concerns Related to Lobster



- dredging and disposal areas affect only a limited area within the bay
- similar dredging operation to previous projects



Addressing Concerns Related to Lobster



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

Maine DEP email

channeldredge.dep@maine.gov

