

US ARMY CORPS OF ENGINEERS

New England District

NEW HAVEN HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT PROJECT

Project Studies

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Environmental Resources Section

January 2018



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STUDIES

- Sediment Sampling
- Biological Sampling (benthic community analysis)
- Hydroacoustic Surveys (side scan sonar, bathymetry)
 - Remotely Operated Vehicle (ROV) Survey



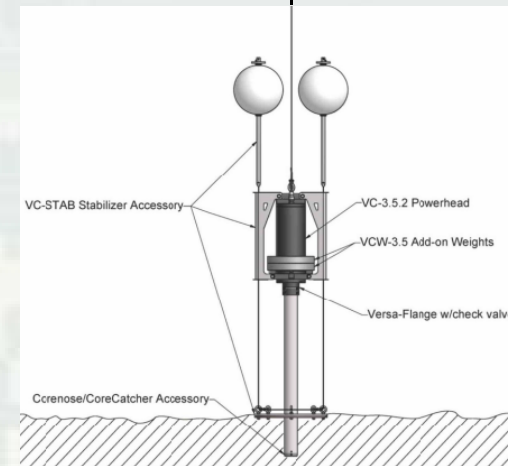
SEDIMENT SAMPLING

Contractors : AECOM & Ocean Surveys, Inc.

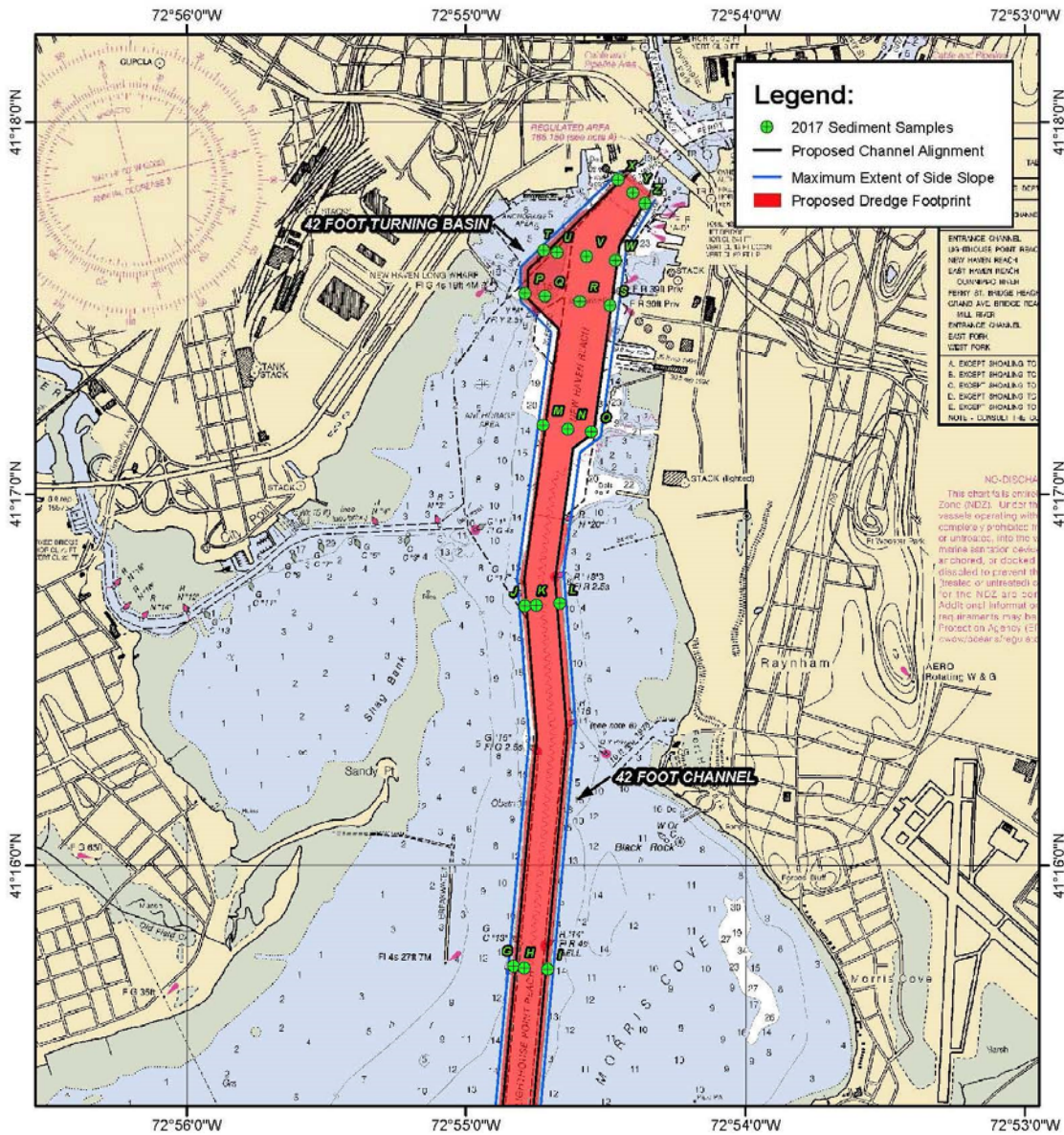
Vibracore sampling to deepest project depth
alternative (-42 feet MLLW + -2 feet)



R/V Candu - OSI



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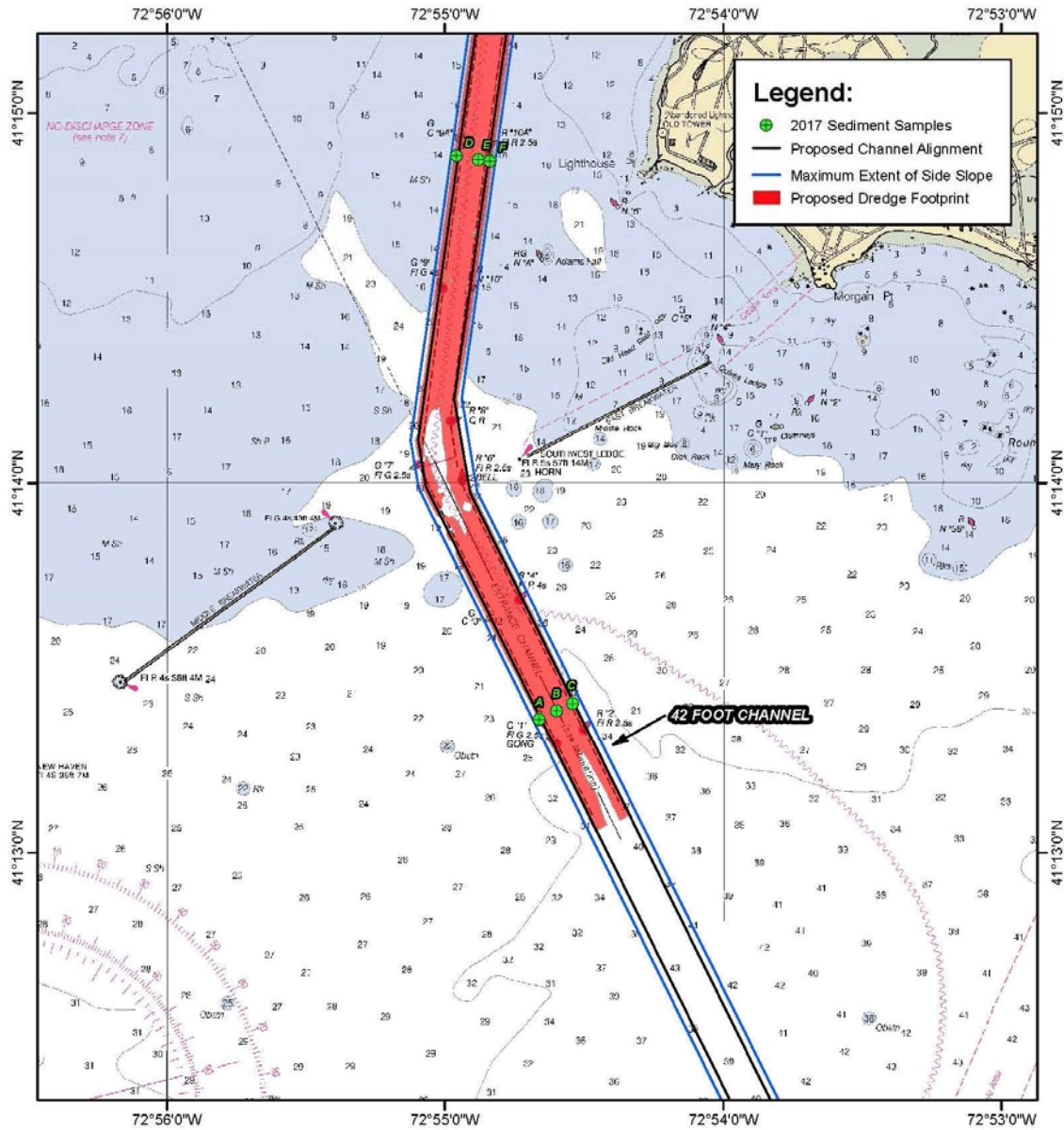


Inner Harbor

- 6 transects
- 17 Stations



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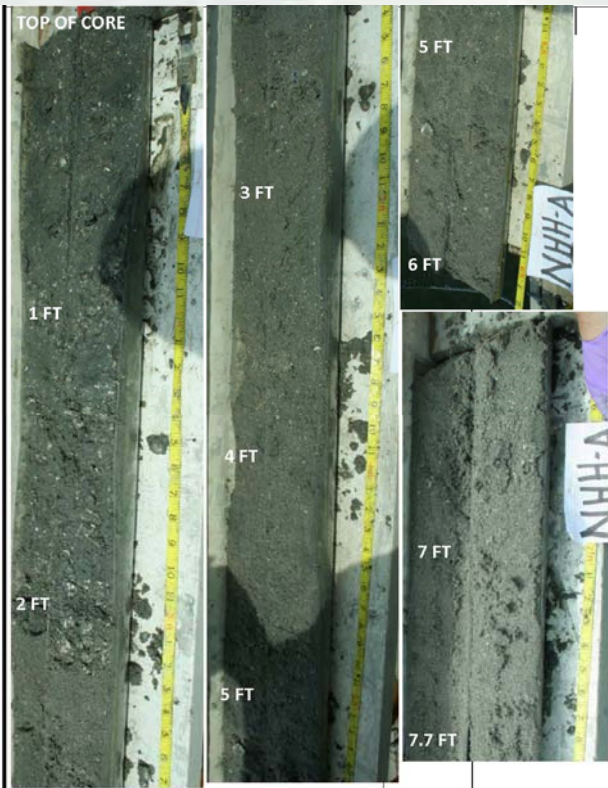


Outer Harbor

- 2 transects
- 6 stations



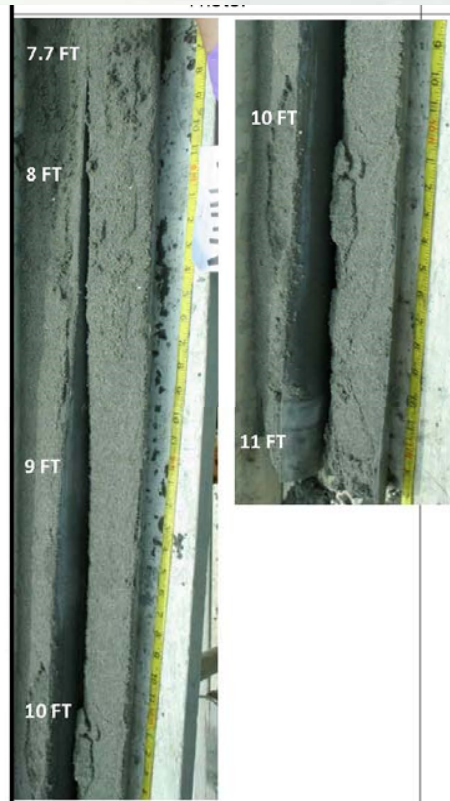
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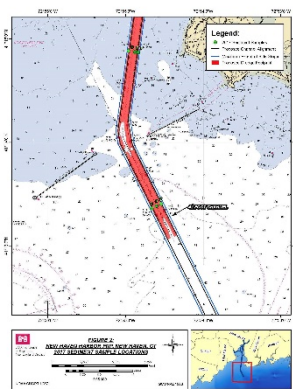
0 - 2.2' - Dark grey fine/ medium sand with trace silt and shells. SW-SM

2.2' - 6.2' - Tan fine/ medium sand with shells. SP

6.2' - 7.7' - Tan fine/ medium sand. SP



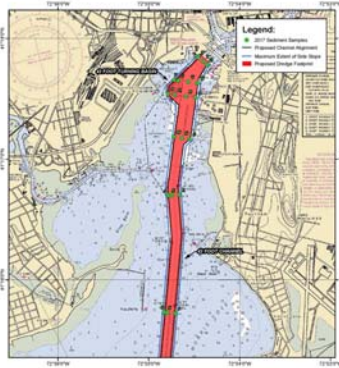
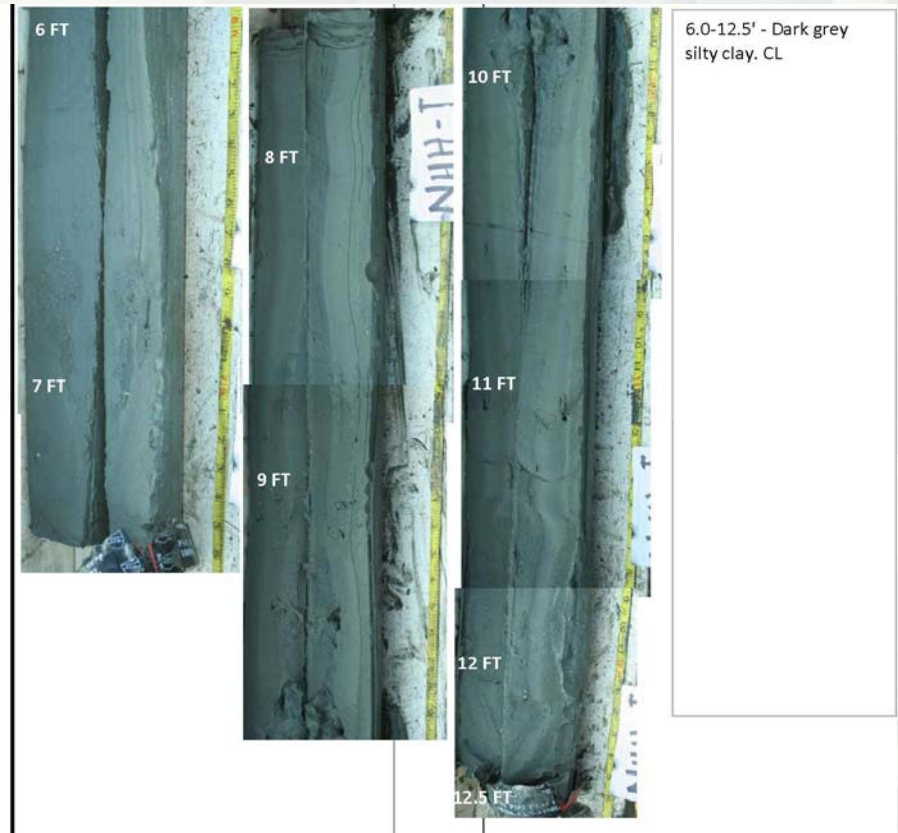
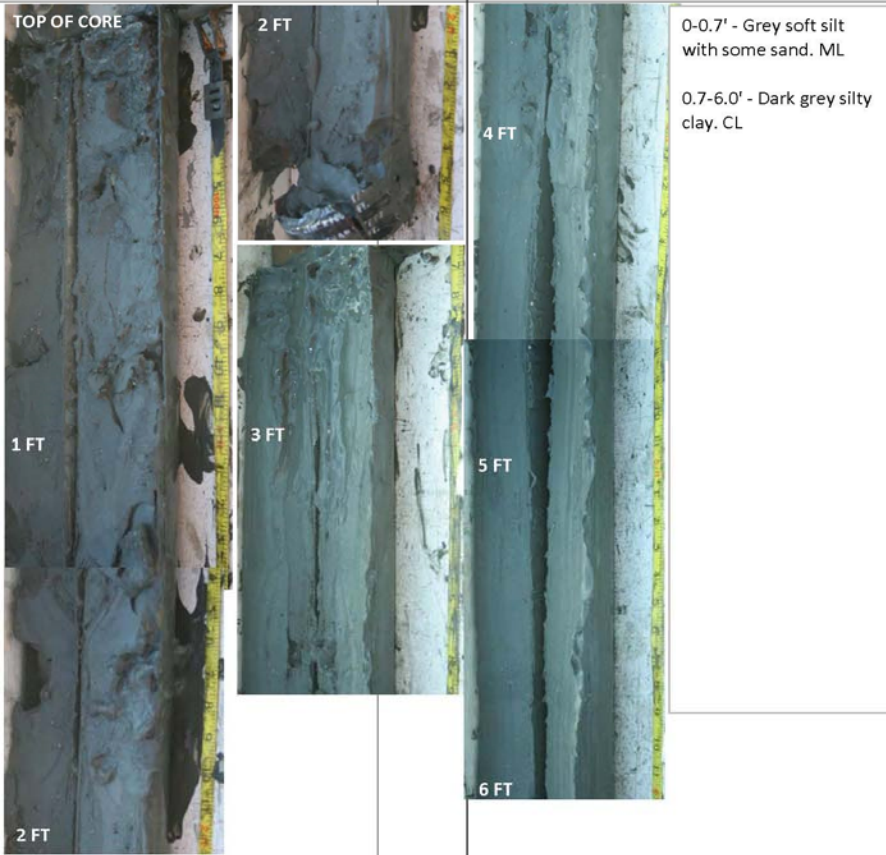
7.7' - 11.0' - Tan fine/ medium sand. SP



Core Log from Station A - material type = all fine sand



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Core Log from Station I - material type = silt and clay





Core Log from Station X – material type = silt and clay from sediment-water interface to 5.2 ' / silty sand below



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Quantities of Dredged Material by Sediment Type

Channel Design Depth	-37'	-38'	-39'	-40'	-42'
Rock	7,000	16,000	24,000	33,000	49,000
Sand (fine sand with silt)	121,000	170,000	245,000	351,000	475,000
Fines (Silt/Clay)	1,984,000	2,591,000	3,355,000	3,885,000	5,245,000
TOTALS	2,112,000	2,777,000	3,624,000	4,269,000	5,769,000



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Sediment Chemistry

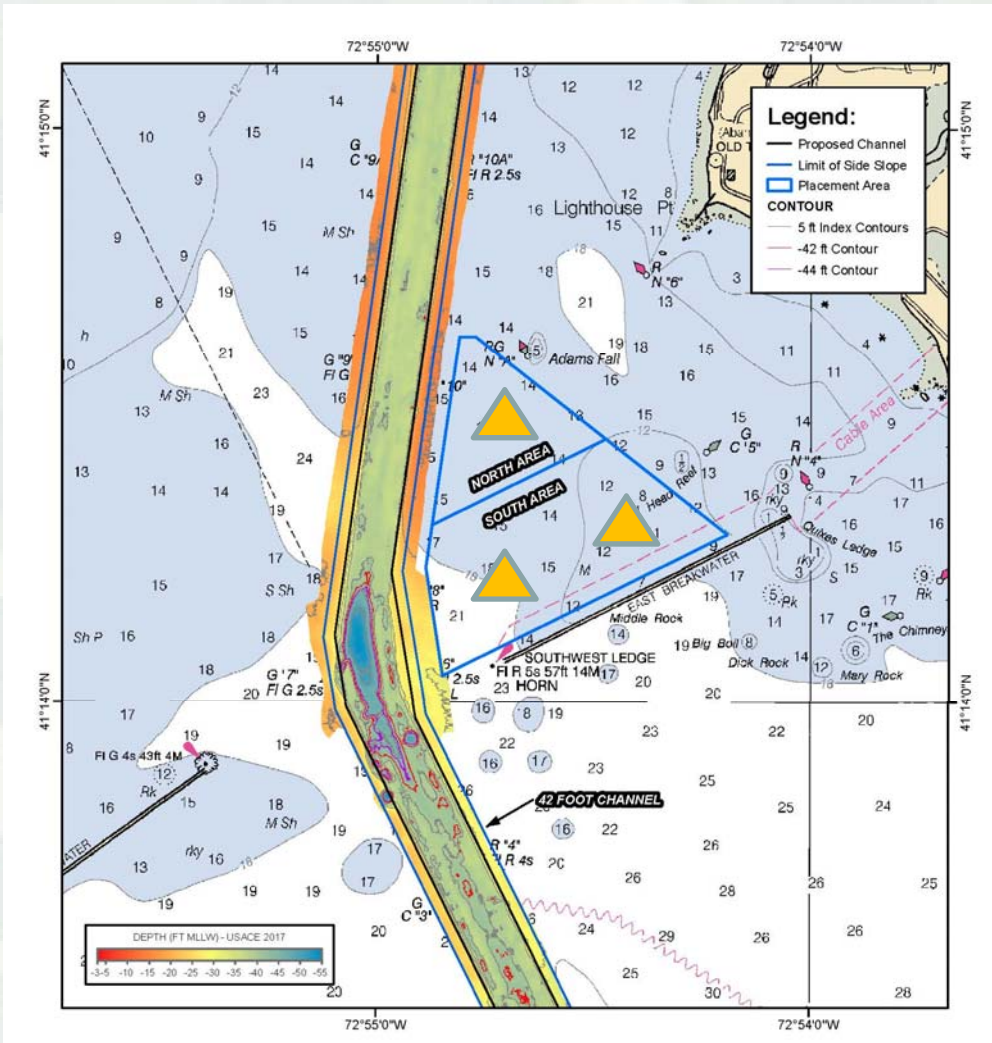
- Chemical Concentrations of Contaminants of Concern for each core
- Biological Testing of Each Transect
 - Whole Sediment Testing
 - Suspended Sediment Testing
 - Bioaccumulation Testing


Preliminary testing results received in December 2017 and are currently under review.

Suitability modelling is ongoing.



Sediments at the Potential Shellfish Area



3 locations within area 

Surficial material = Fines (silt/clay)



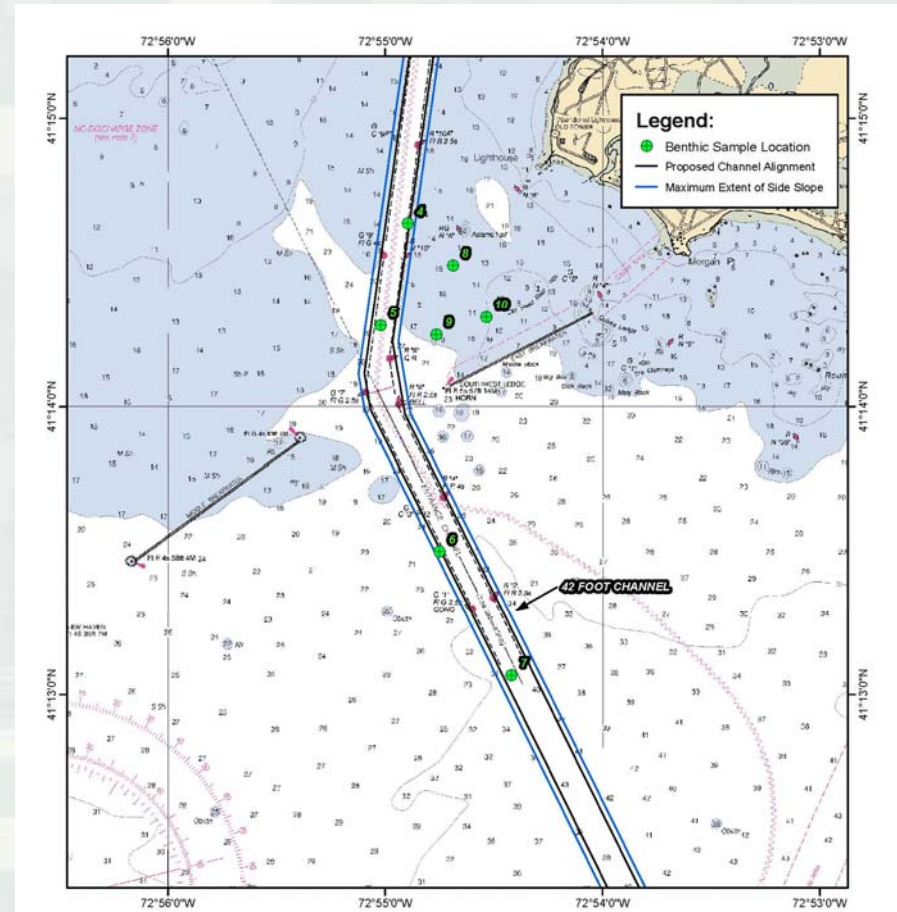
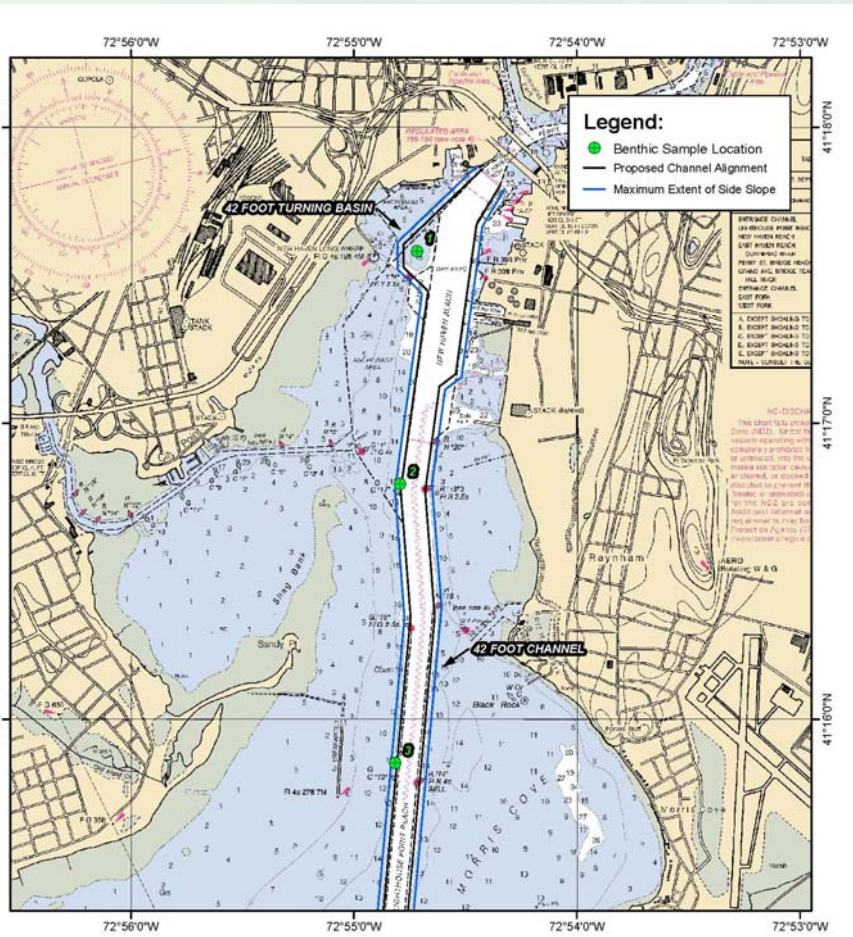
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Benthic Community Analysis



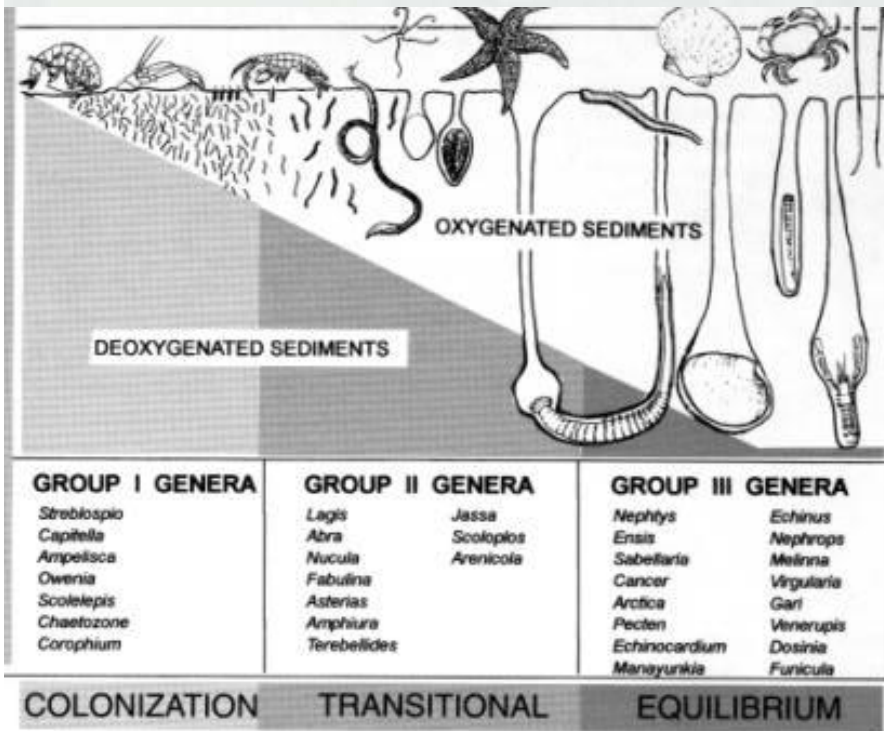
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Results of Benthic Community Analysis



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Results of Benthic Community Analysis



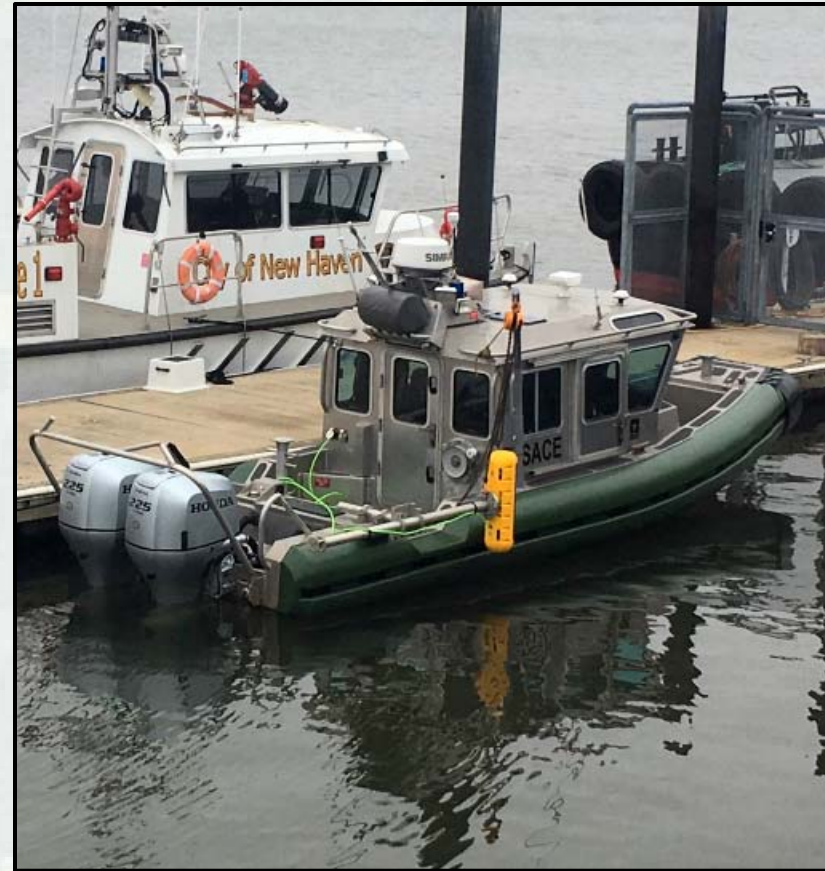
Reach	Group	Dominants
Inner	Group I	Spionid polychaetes Oligochaetes Ampeliscid Amphipods
Mid	Group II	Spionid polychaetes Ampeliscid Amphipods <i>Mulinia</i> sp. <i>Tellina</i> sp.
Outer	Group II	Spionid polychaetes <i>Nephtys</i> sp.
Shellfish Area	Group II	Ampeliscid Amphipods Spionid polychaetes <i>Mulinia</i> sp.



Hydroacoustic Surveys:

EQUIPMENT:

- **R/V Nomad**
- **Hemisphere VS330** position and heading system receiving RTK corrections via CTDOT/UCONN CORS network.
- **Teledyne DMS-10** dynamic motion sensor providing heave, pitch, and roll corrections
- **Edgetech 6205 Multi Phase Echo Sounder** providing co-registered dual frequency side scan (200/400kHz) and bathymetry (200kHz) with full nadir coverage.
- **Hypack** hydrographic software used for navigation, real time data visualization, and recording.



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ROV Survey:

EQUIPMENT:

- **Remotely Operated Underwater Vehicle (ROV)** deployed from the same survey platform used during hydroacoustic surveys.
- **VideoRay Pro3 GTO** used to investigate a subset of targets identified through interpretation of side scan sonar data from the project area.
- Video feed viewed in real time and recorded to DVR for review and analysis.



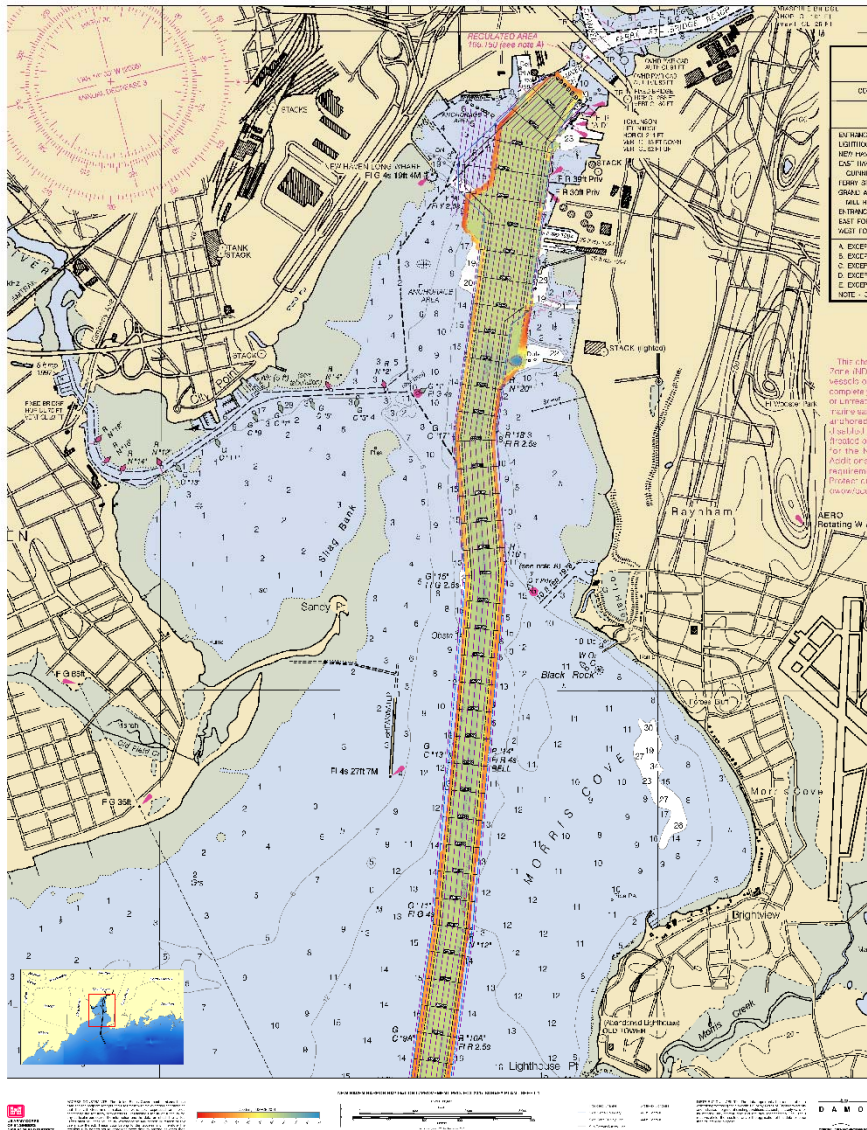
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Survey Plan

- Side scan sonar survey lines laid out parallel to the channel boundary using a line spacing of 100 feet.

→ 22 lines totaling 68.8 survey miles

- All lines run at a speed of 4kts in alternating directions to minimize non-recording time



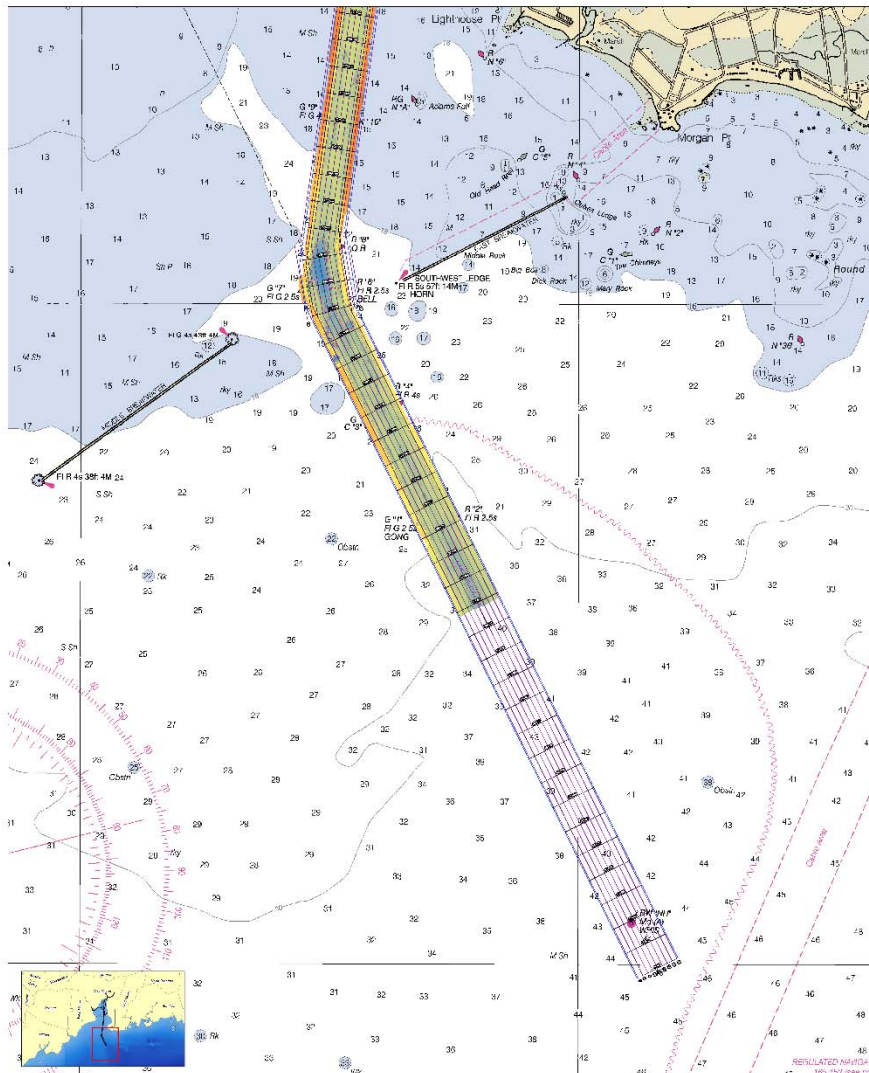
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Survey Plan

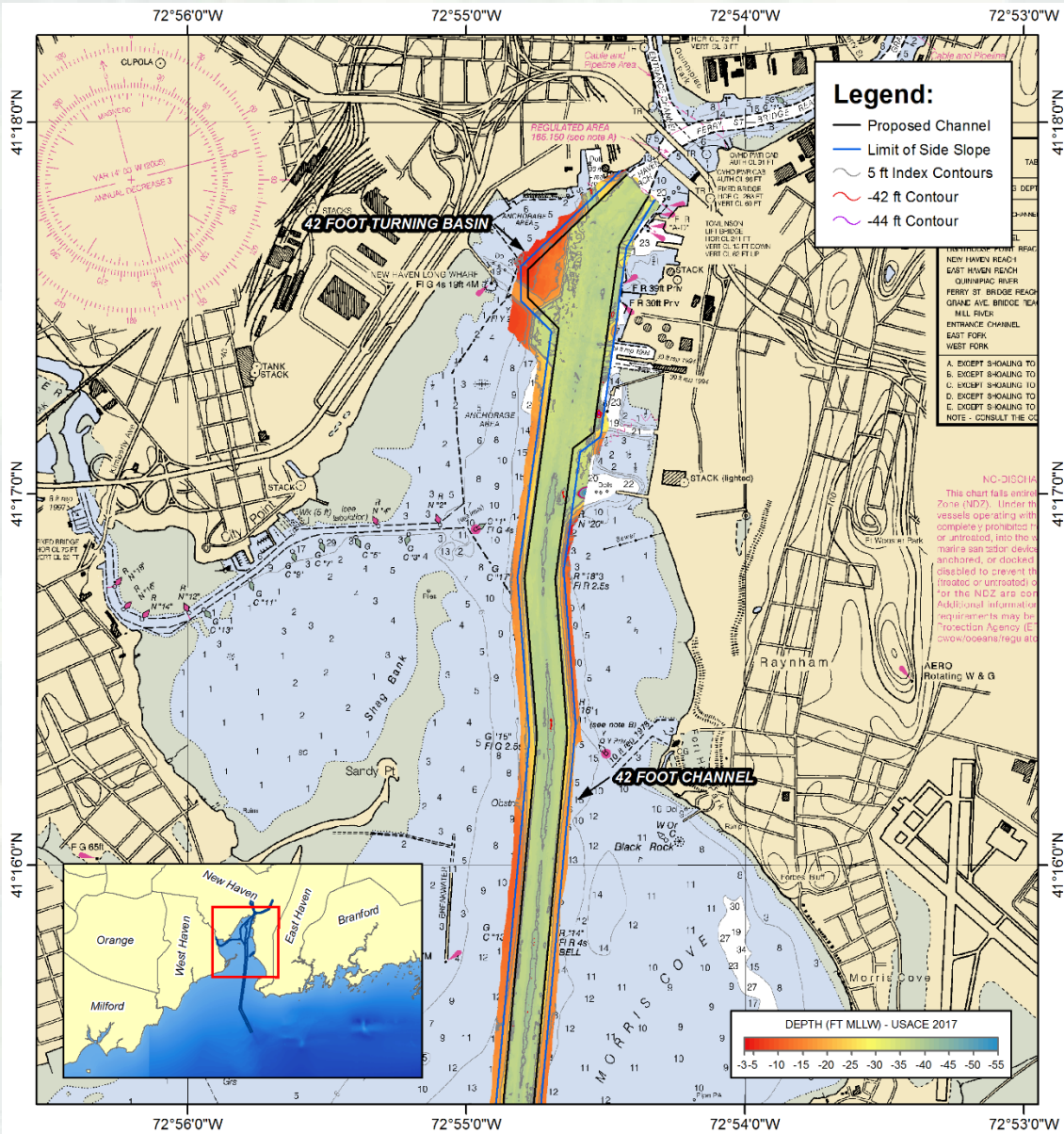
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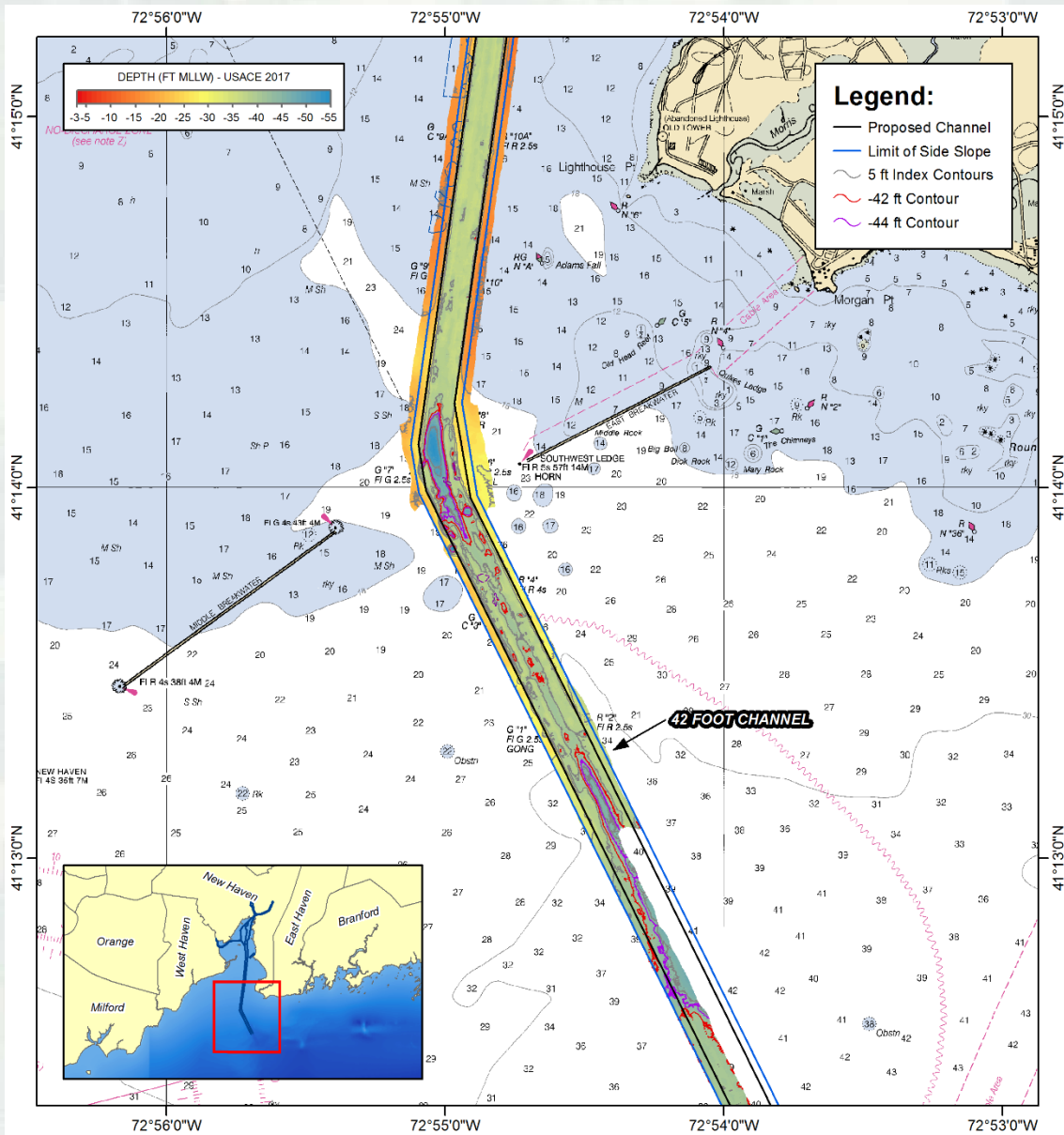
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Inner Harbor Bathymetry

- 200kHz bathy data processed using Hypack- Hysweep Editor
- 3x3 averaged matrix consisting of 1,048,576 processed points exported to ArcGIS for further analysis and for map creation.
- Achieved full coverage of the proposed project area with exception of the eastern half of entrance channel between G1/R2 and NH sea buoy.



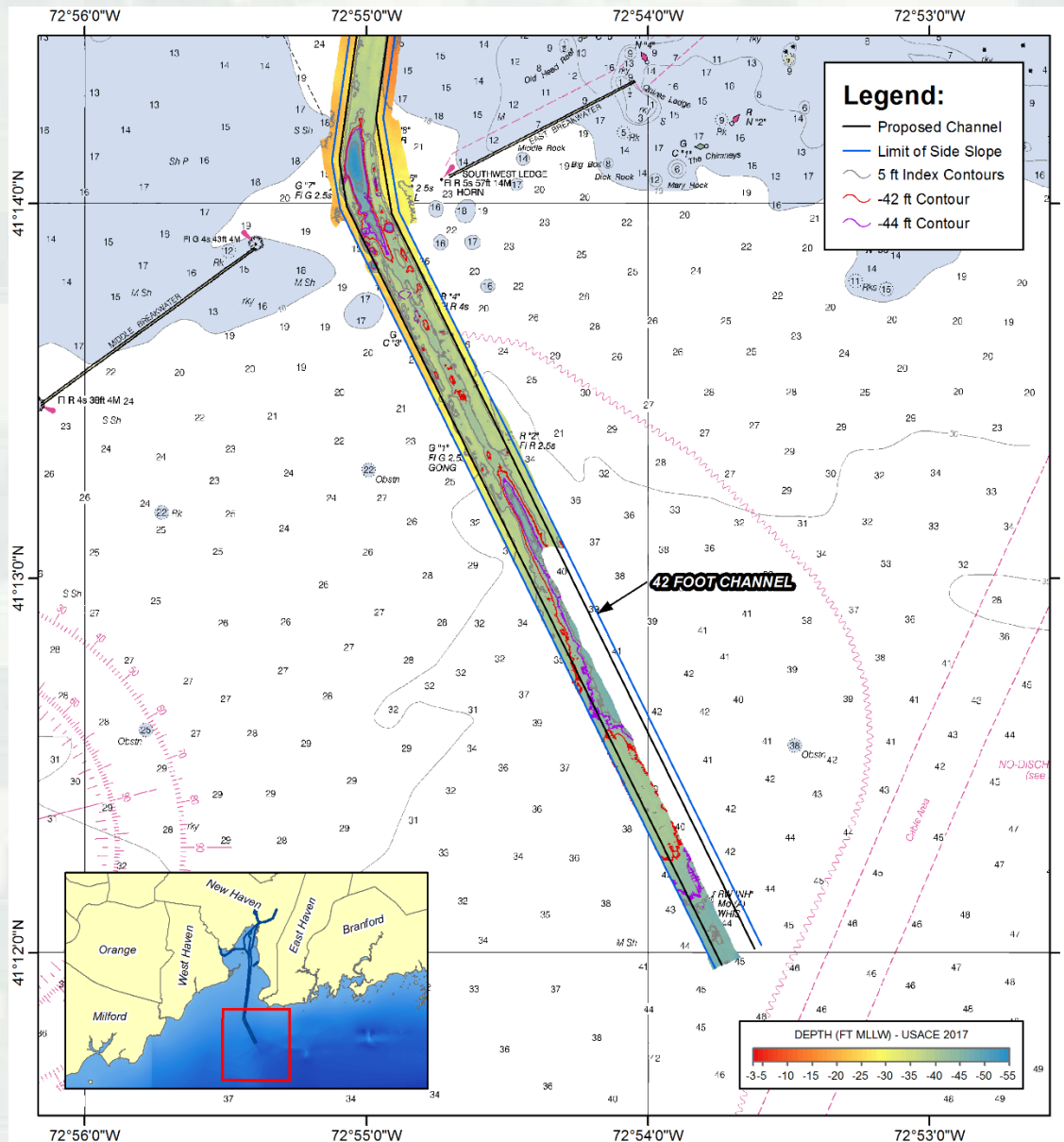


Outer Harbor Bathymetry

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Outer Harbor Bathymetry



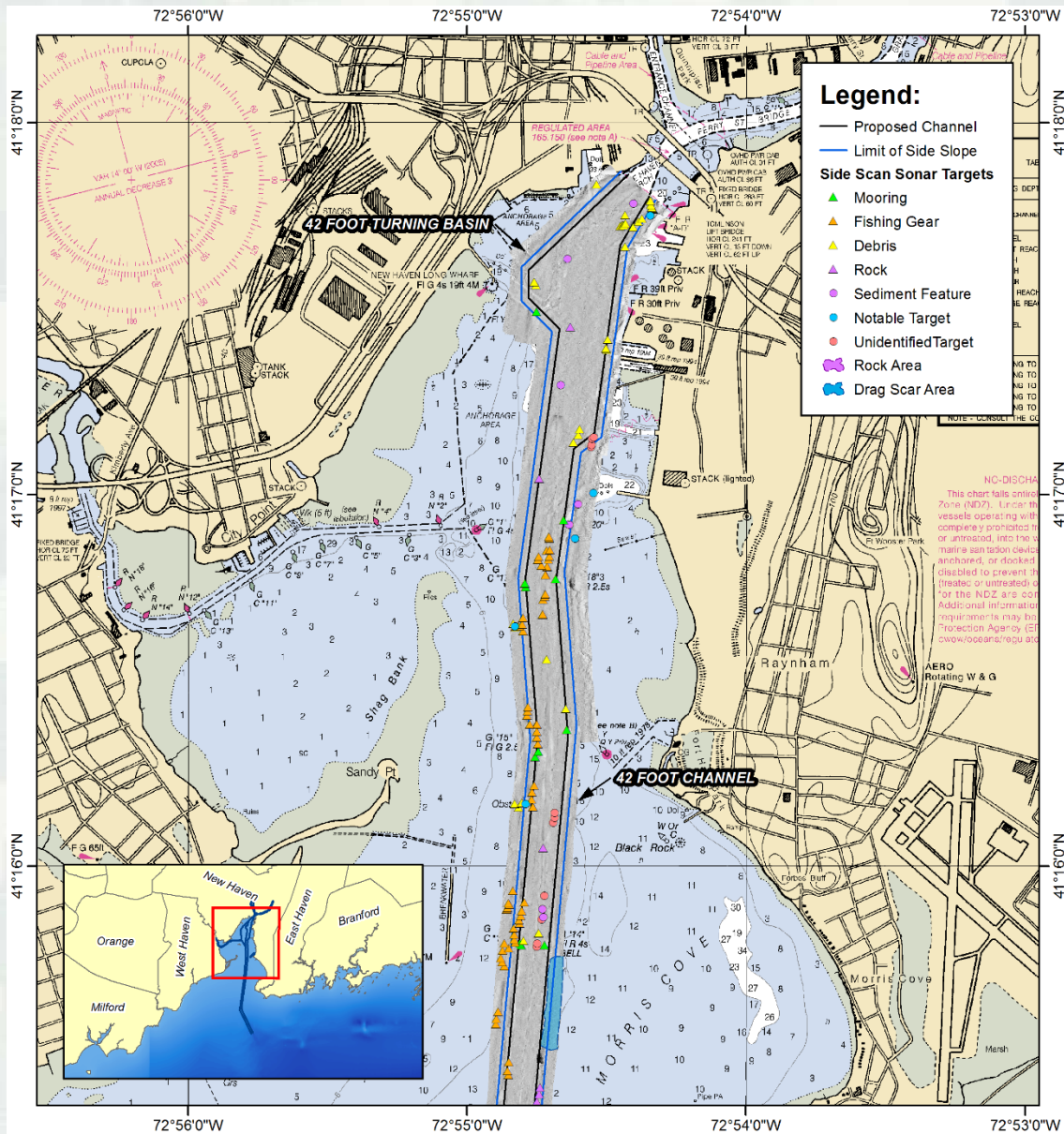
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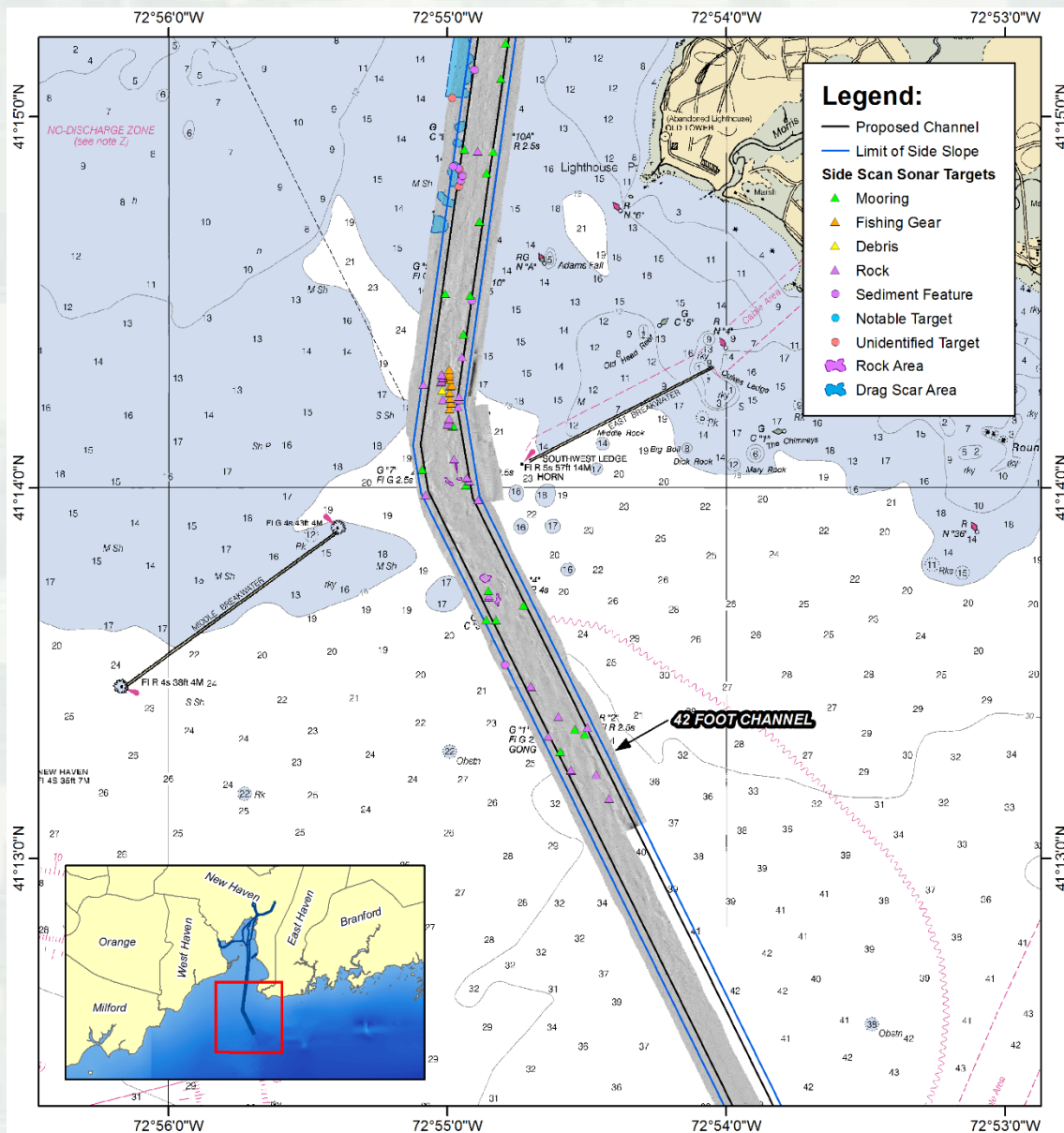


Side Scan Interpretation

- 400kHz side scan sonar data processed using Chesapeake SonarWiz software.
- Side scan mosaic created and exported to ArcGIS for map creation
- Side scan waterfall from each survey line reviewed and used to identify targets of interest.
- **242 Targets Total**
 - 80 Fishing gear
 - 46 Rock or rock areas
 - 38 Mooring related features
 - 31 Debris
 - 15 Isolated sediment features
 - 15 Unidentifiable targets***
 - 8 Areas with drag scars
 - 1 Containment Boom
 - 1 Pipeline
 - 1 Sewer outfall



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Known Targets



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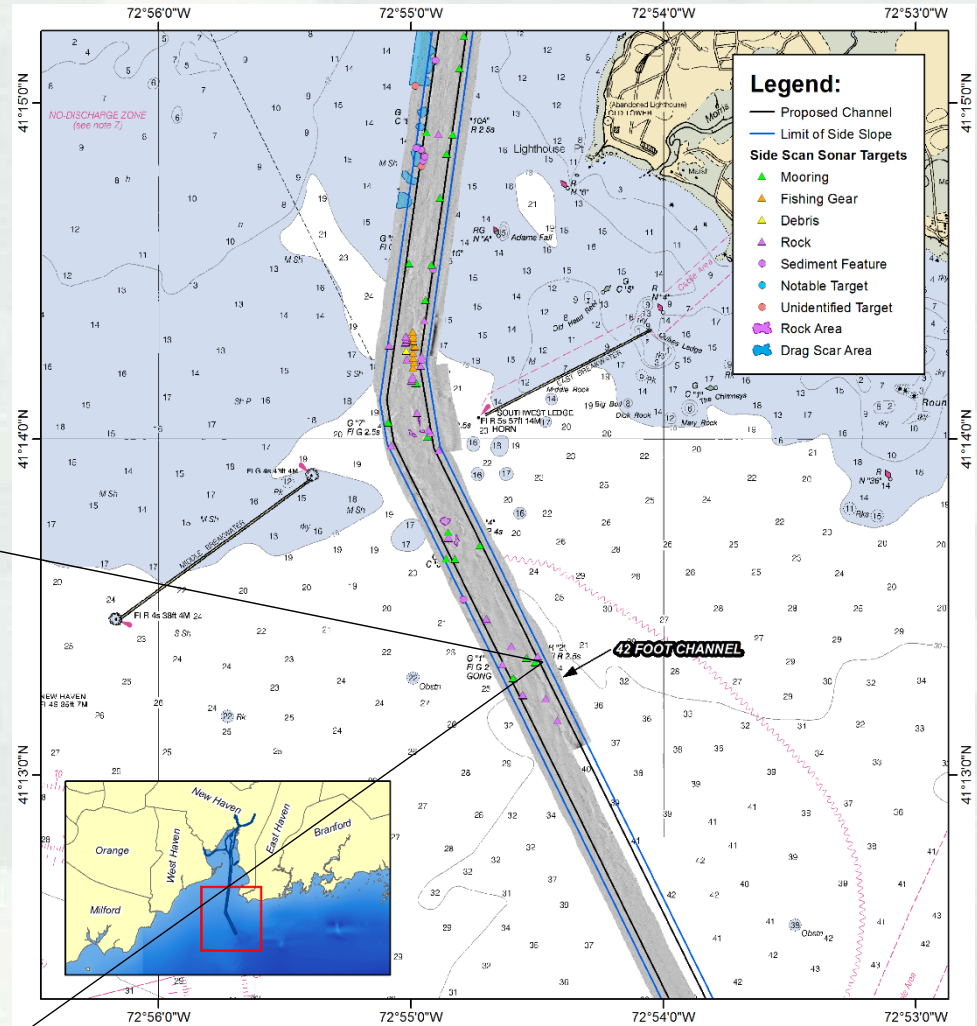
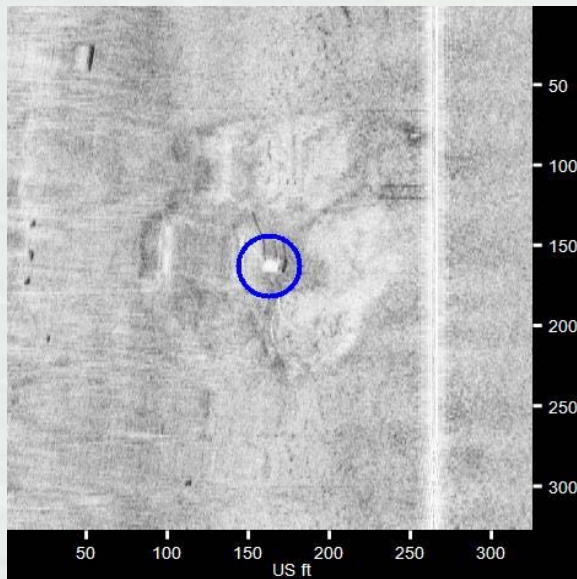
Outer Harbor:

Target NHH013

Classification: Mooring

- Lat 41.222242 Lon -72.9084532
- Length: 5.7 ft Width: 6.2 ft
- Description:

Mooring for R2. Line visible. Match with location on NAV chart. Possible derelict mooring to NW.



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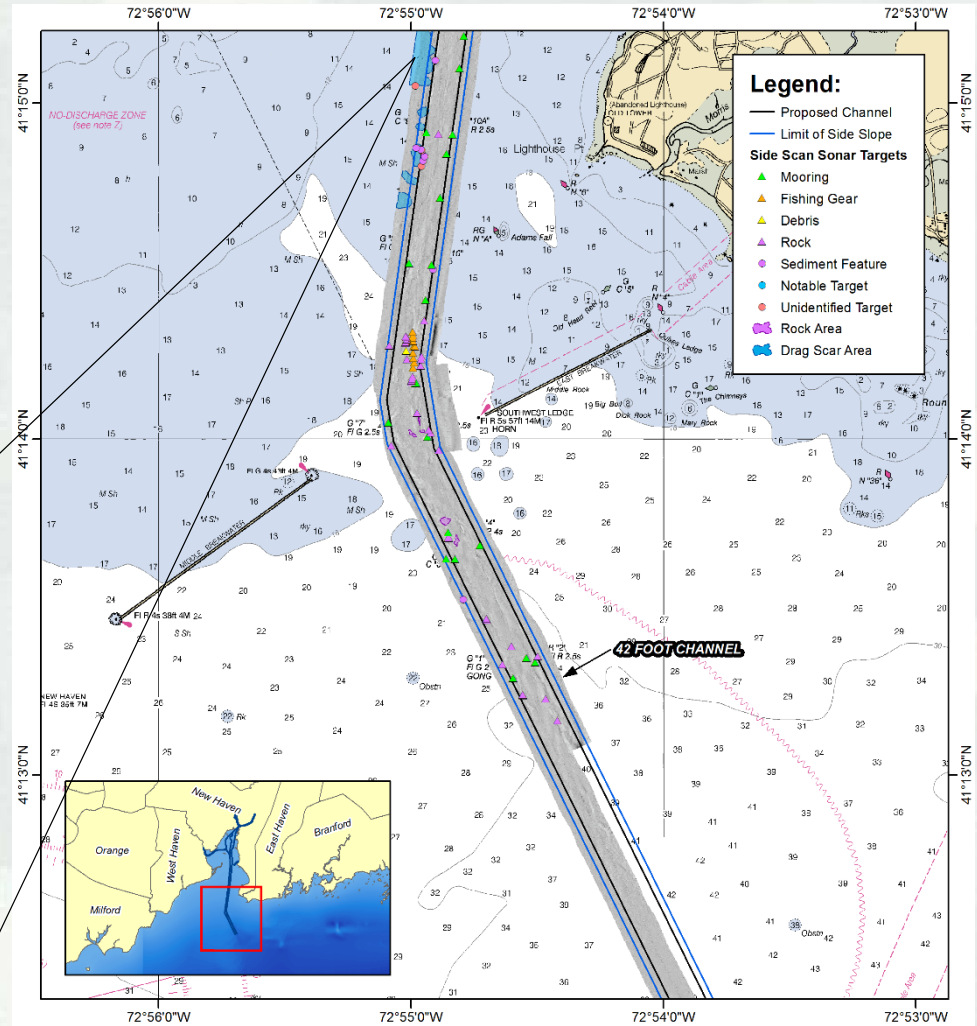
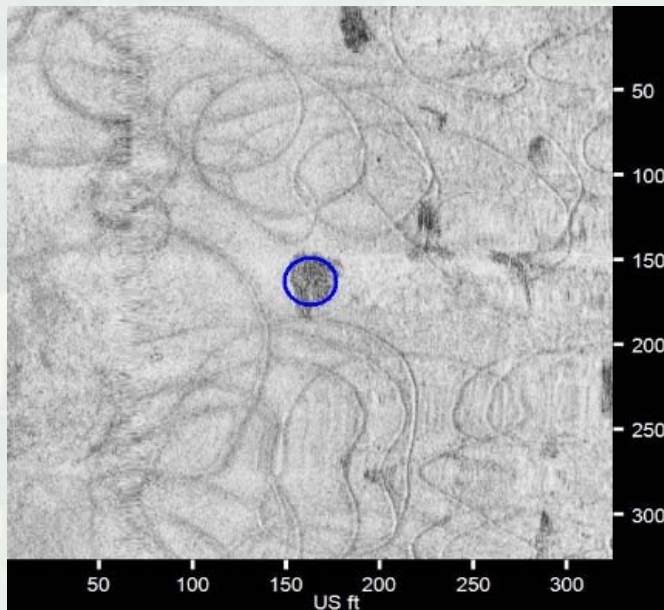
Outer Harbor:

Target NHH0090

Classification: Drag scars

- Lat 41.252210 Lon -72.915926
- Length: 1040.7 ft Width: 329.8 ft
- Description:

Area of drag scars and disturbed sediment along western side of channel.



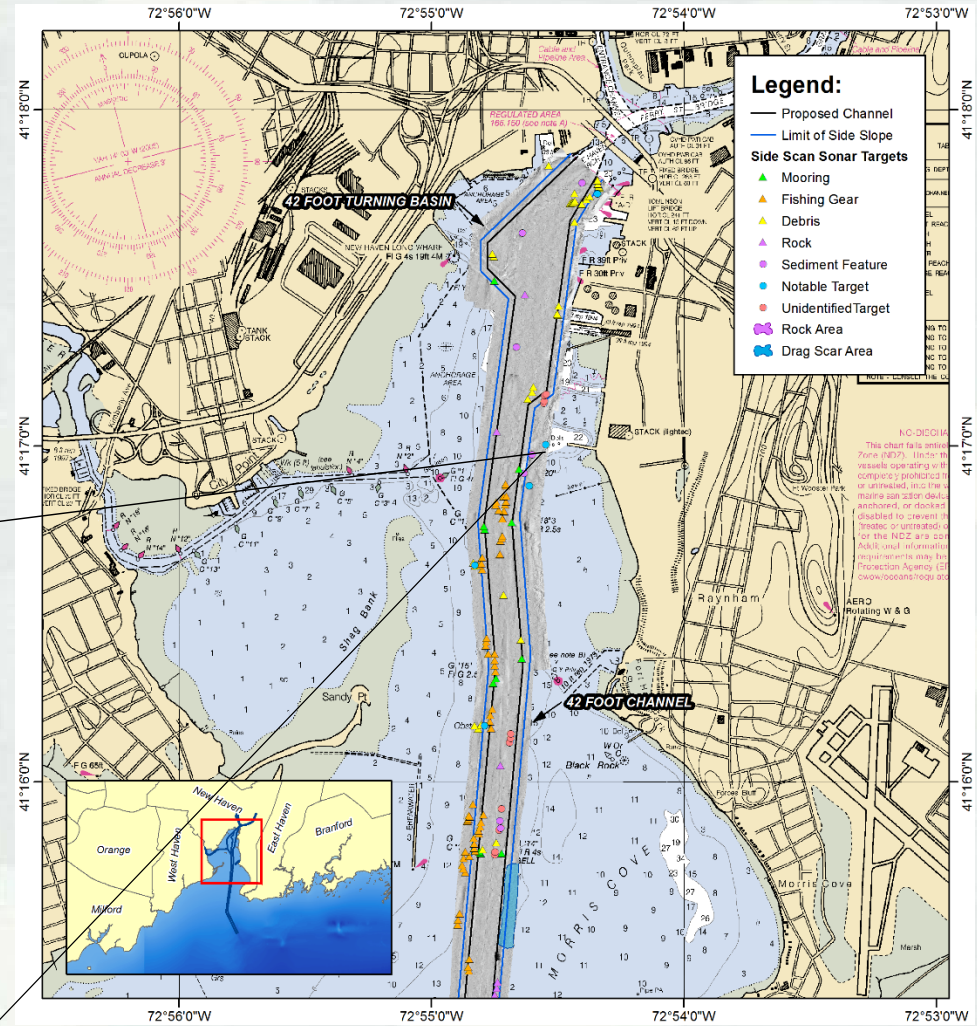
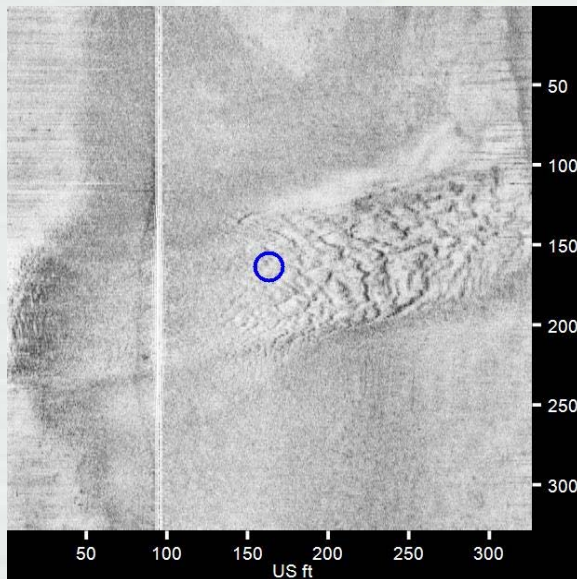
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Inner Harbor:

Target NHH0201

- Classification: Sewer Outfall
- Lat 41.281354 Lon -72.910219
- Length: 737.6 ft Width: 76.5 ft
- Description:

Sediment feature corresponding to sewer outfall on nav chart.



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Investigated Targets



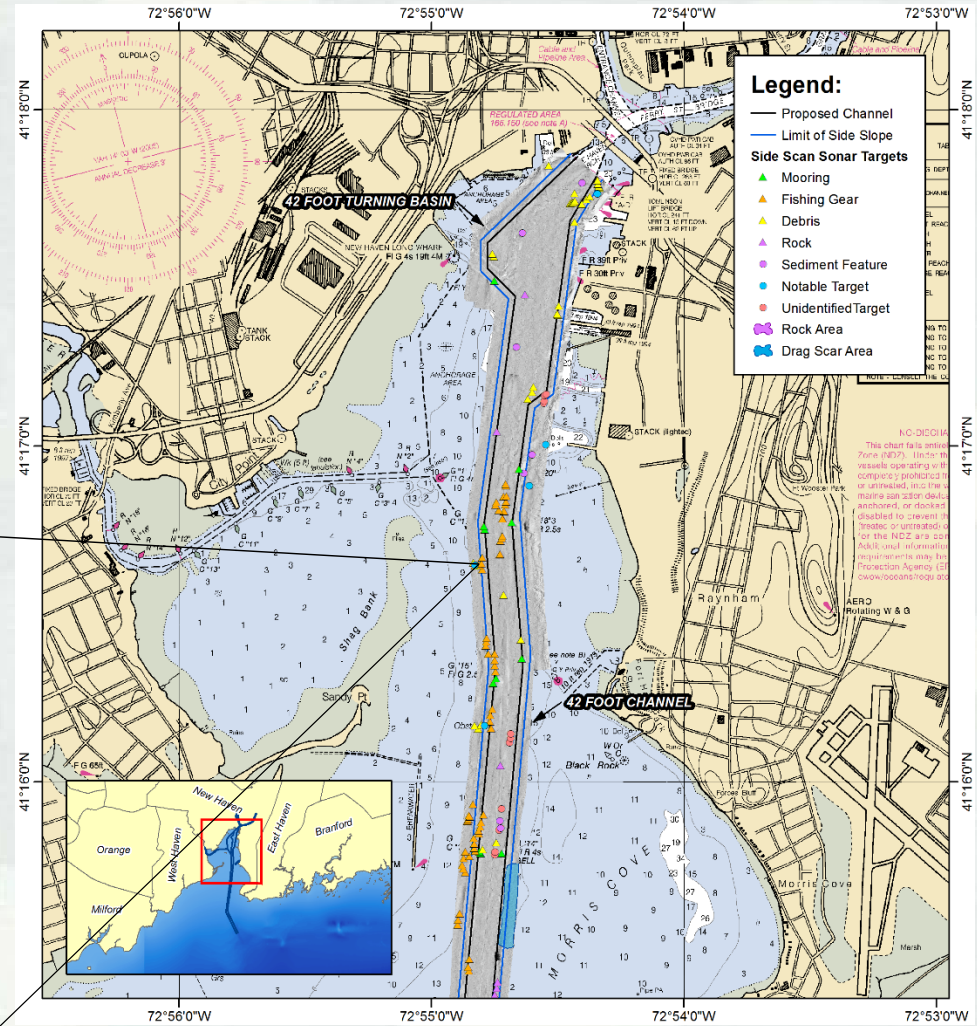
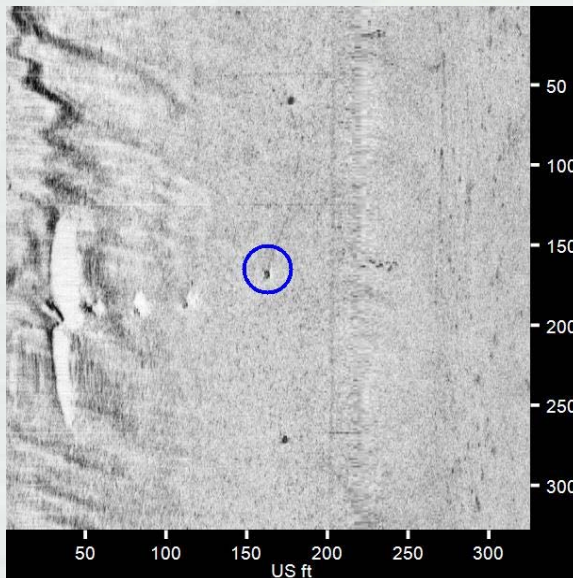
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Inner Harbor:

Target NHH0178

- Classification: Fishing gear
- Lat 41.277485 Lon -72.913345
- Length: 3.5 ft Width: 2.9 ft
- Description:

String of rectangular targets adjacent to channel. Line visible. Likely derelict fishing gear.



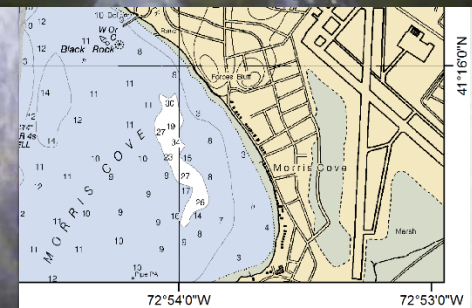
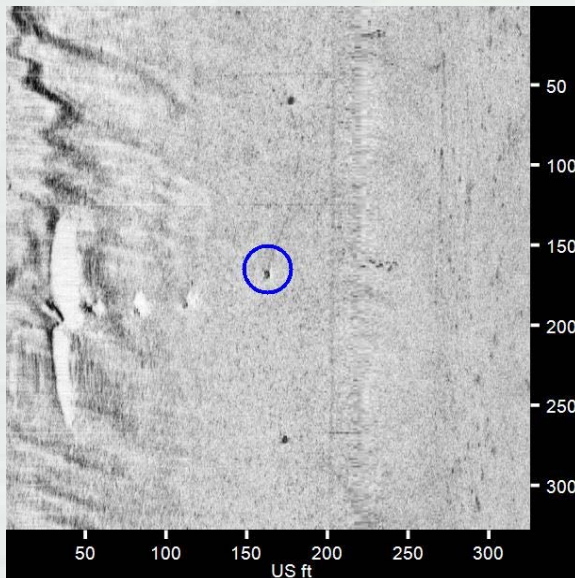
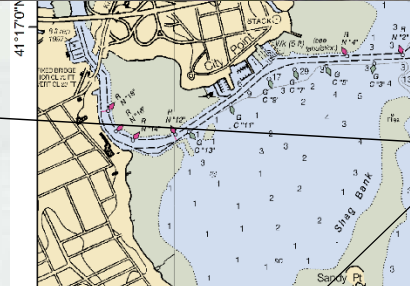
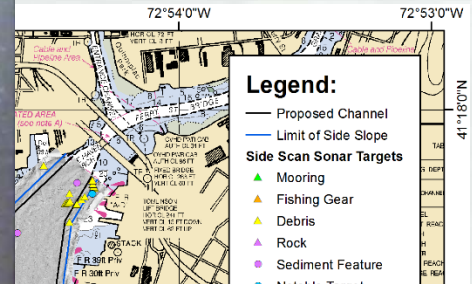
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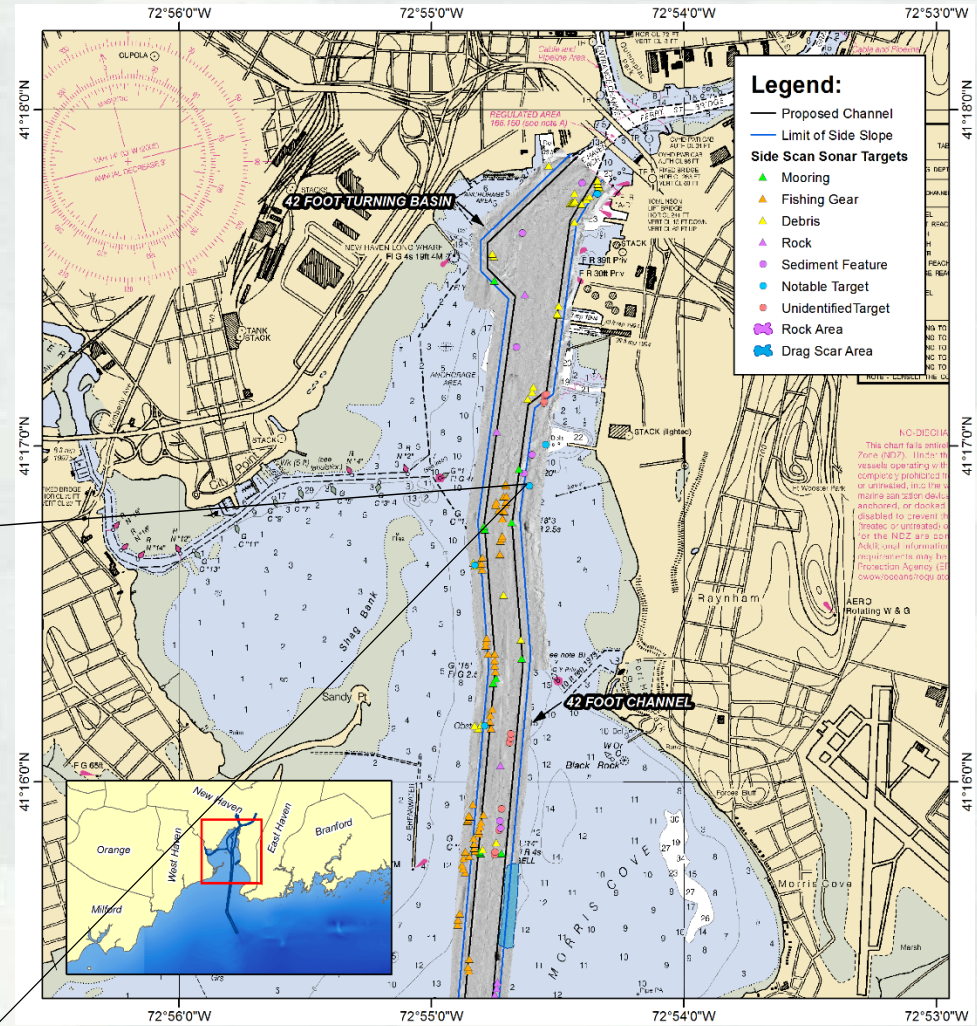
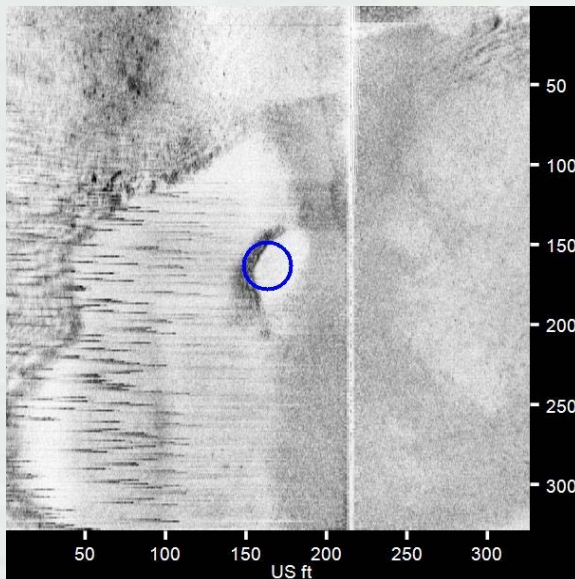
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Inner Harbor:

Target NHH0203

- Classification: Area of coarse material
- Lat 41.281970 Lon -72.910550
- Length: 53.1 ft Width: 15.3 ft
- Description:

Large gravel/shell reef adjacent to edge of channel.



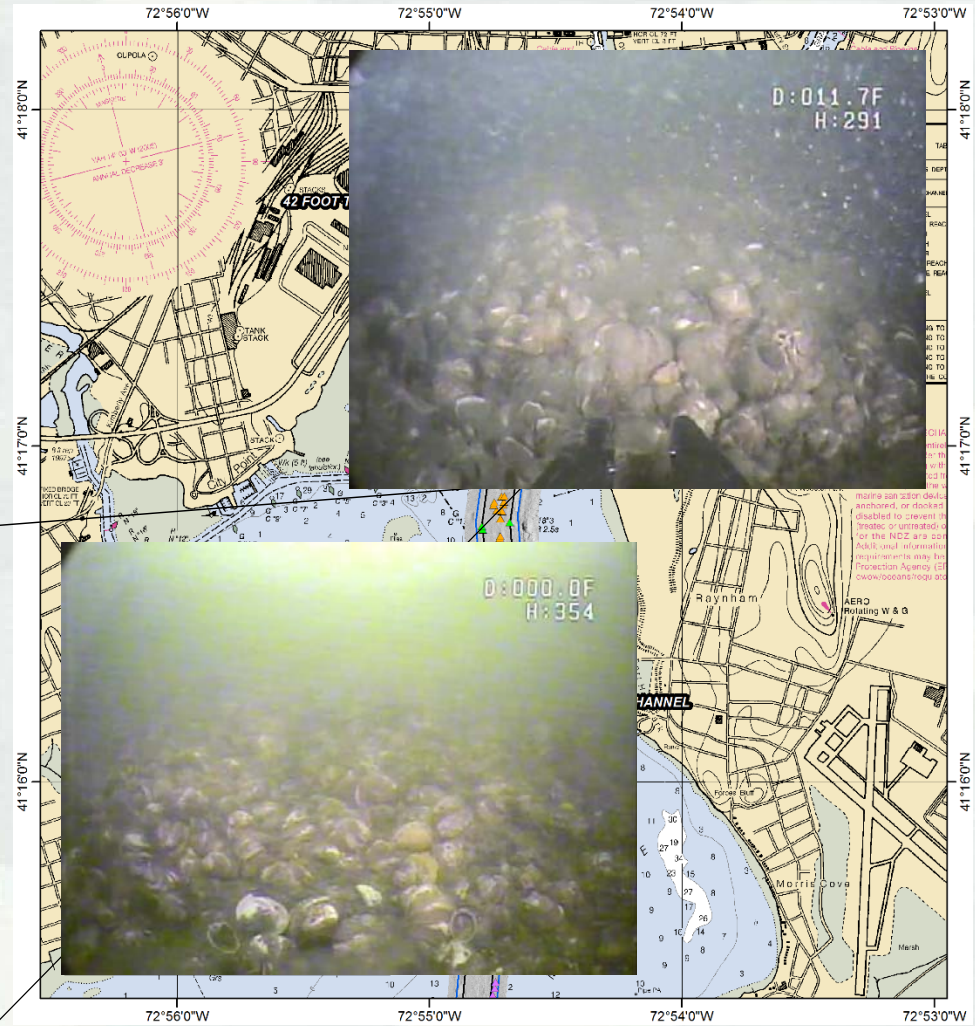
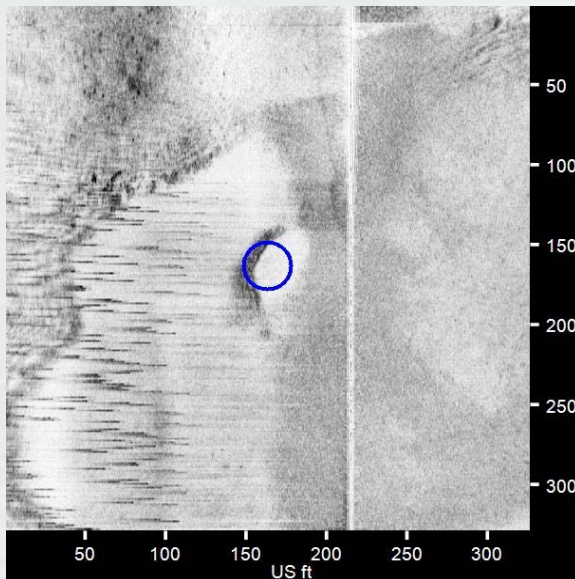
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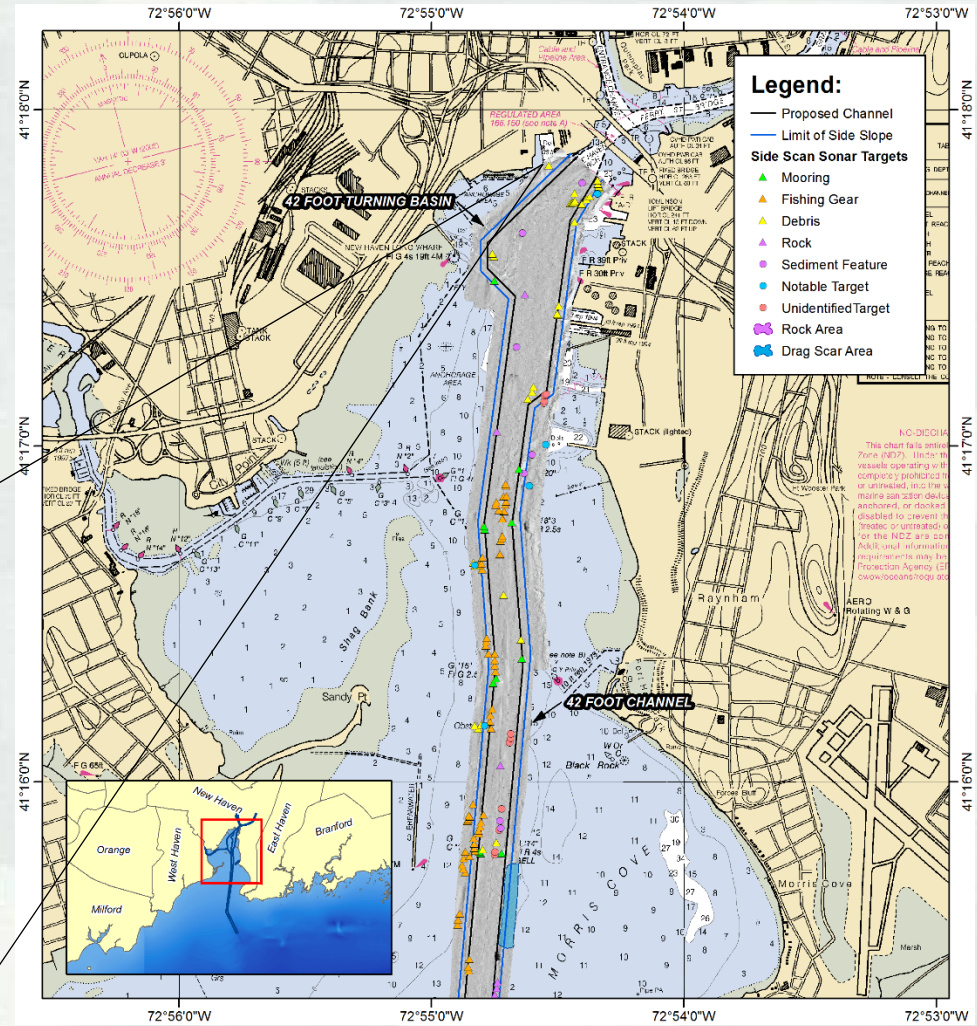
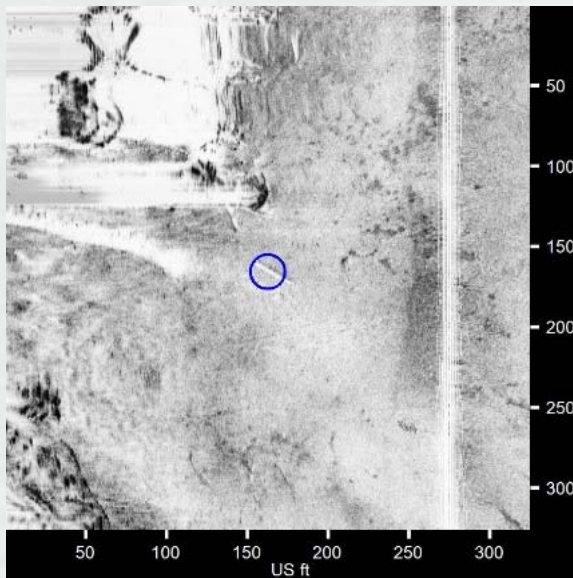
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Inner Harbor:

Target NHH0242

- Classification: Debris, piling
- Lat 41.297225 Lon -72.908892
- Length: 26.8 ft Width: 1.3 ft
- Description:

Linear target on seafloor in vicinity of pier.
Likely piling.



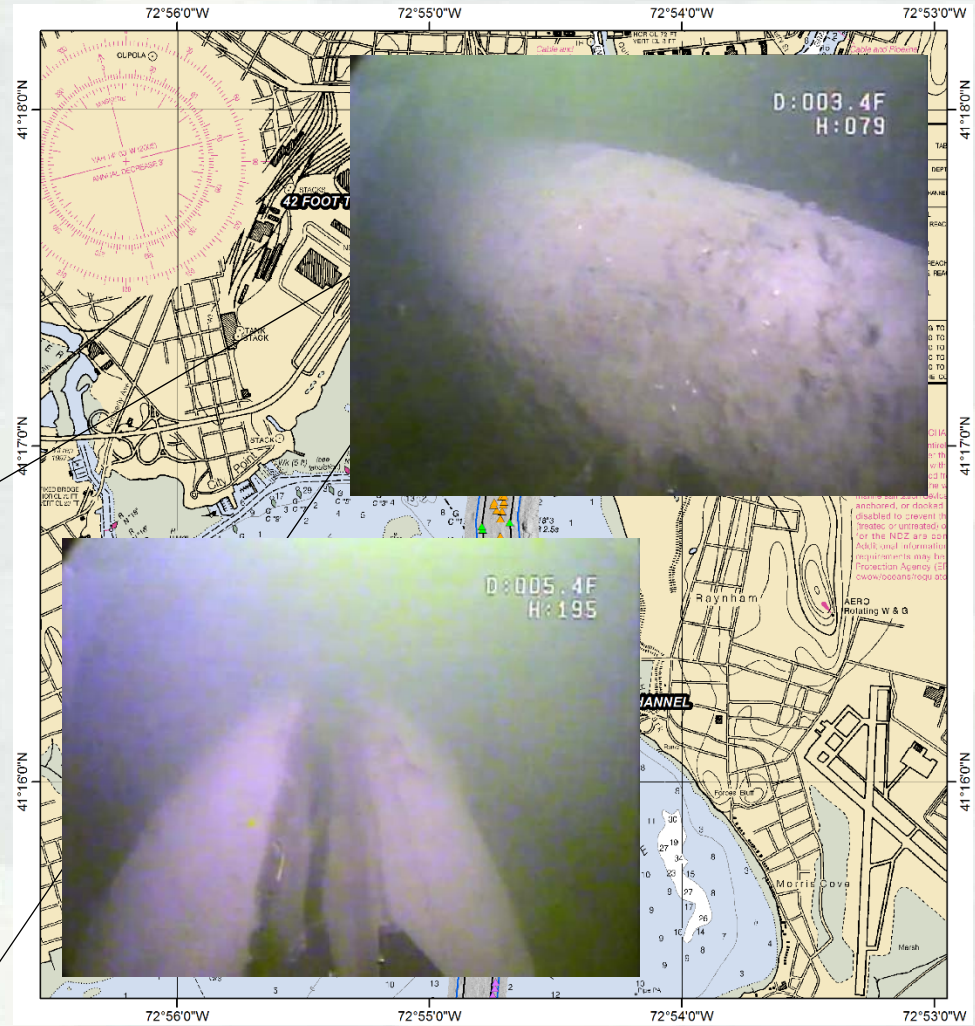
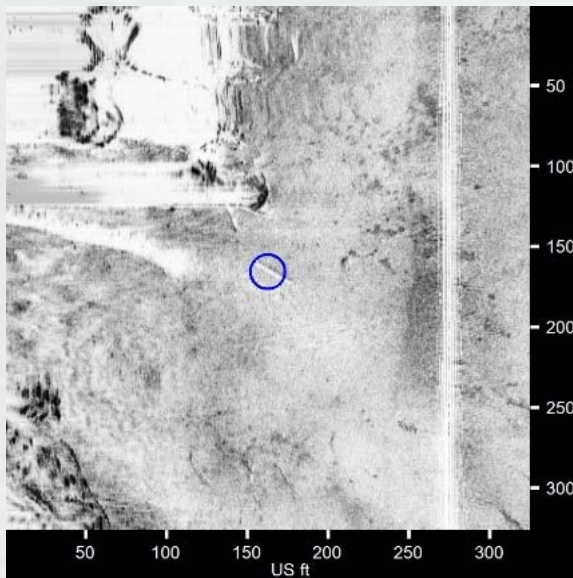
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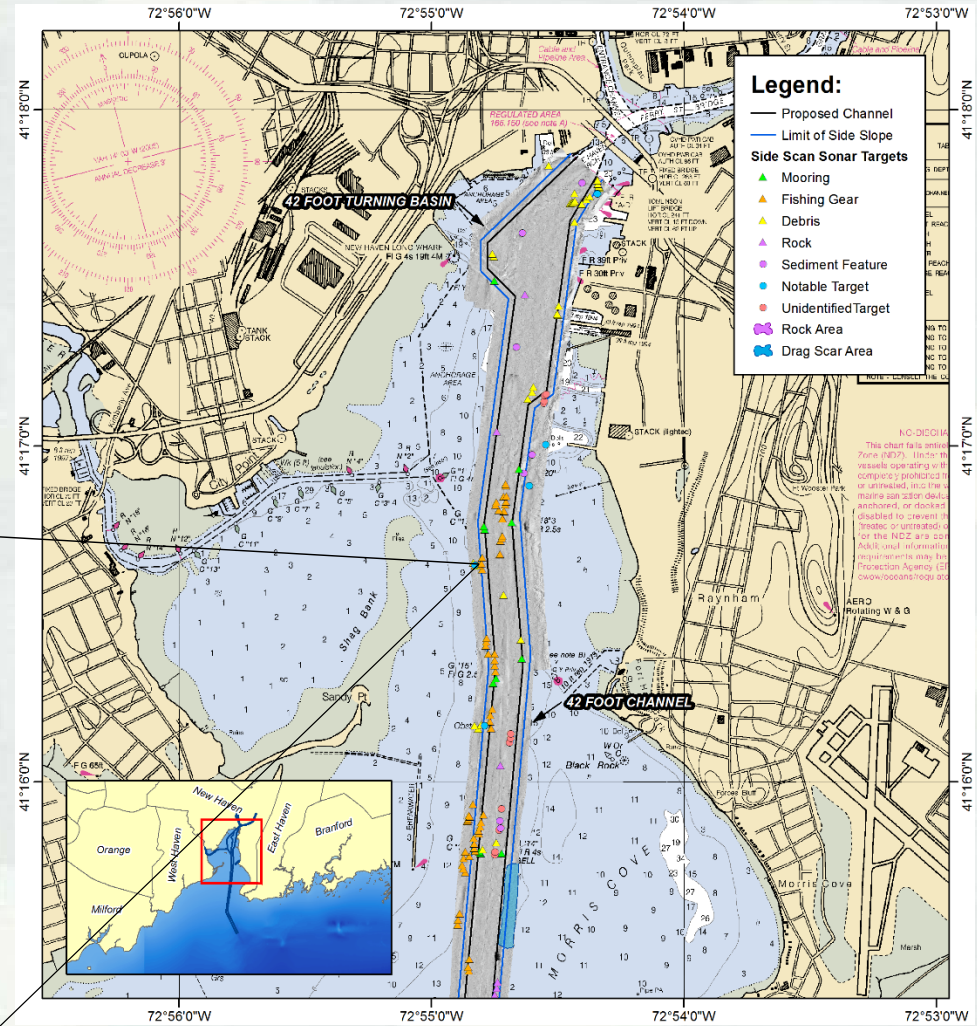
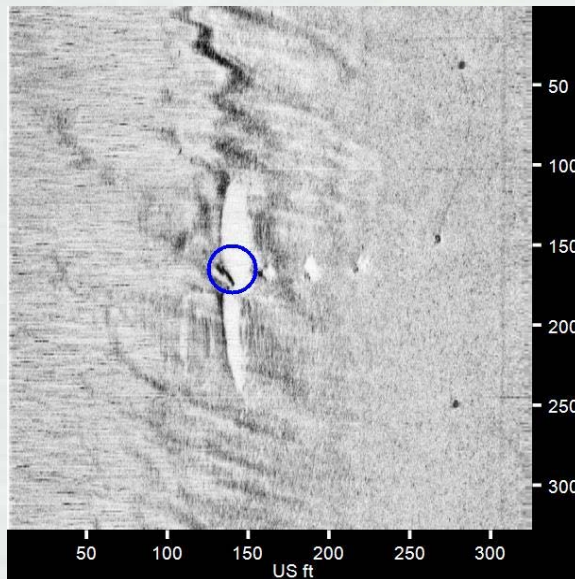
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Inner Harbor:

Target NHH0176

- Classification: Debris, possible shipwreck
- Lat 41.277411 Lon -72.913807
- Length: 129.0 ft Width: 19.8 ft
- Description:

Large irregular target adjacent to channel.
Partially buried. Likely wreckage or debris.
Visible on multiple survey lines.



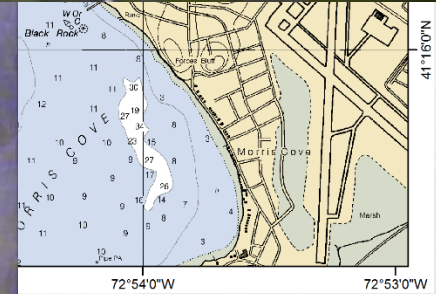
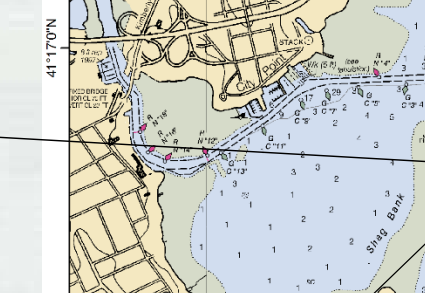
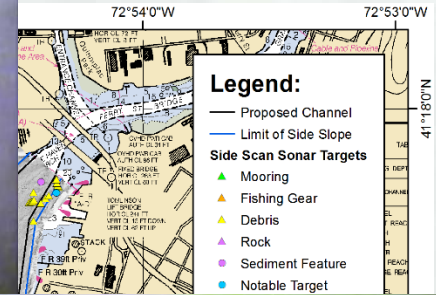
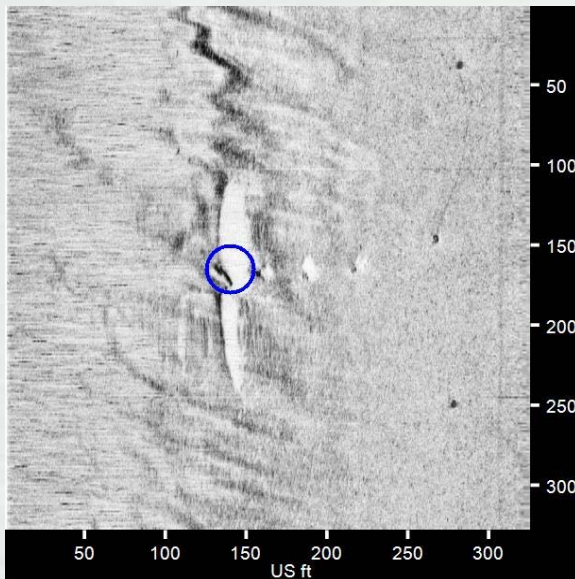
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- Lat 41.277411 Lon -72.913807
- Length: 129.0 ft Width: 19.8 ft
- Description:

Large irregular target adjacent to channel.
Partially buried. Likely wreckage or debris.
Visible on multiple survey lines.



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Thanks!



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