Gowanus Canal – Debris Removal Pilot Study

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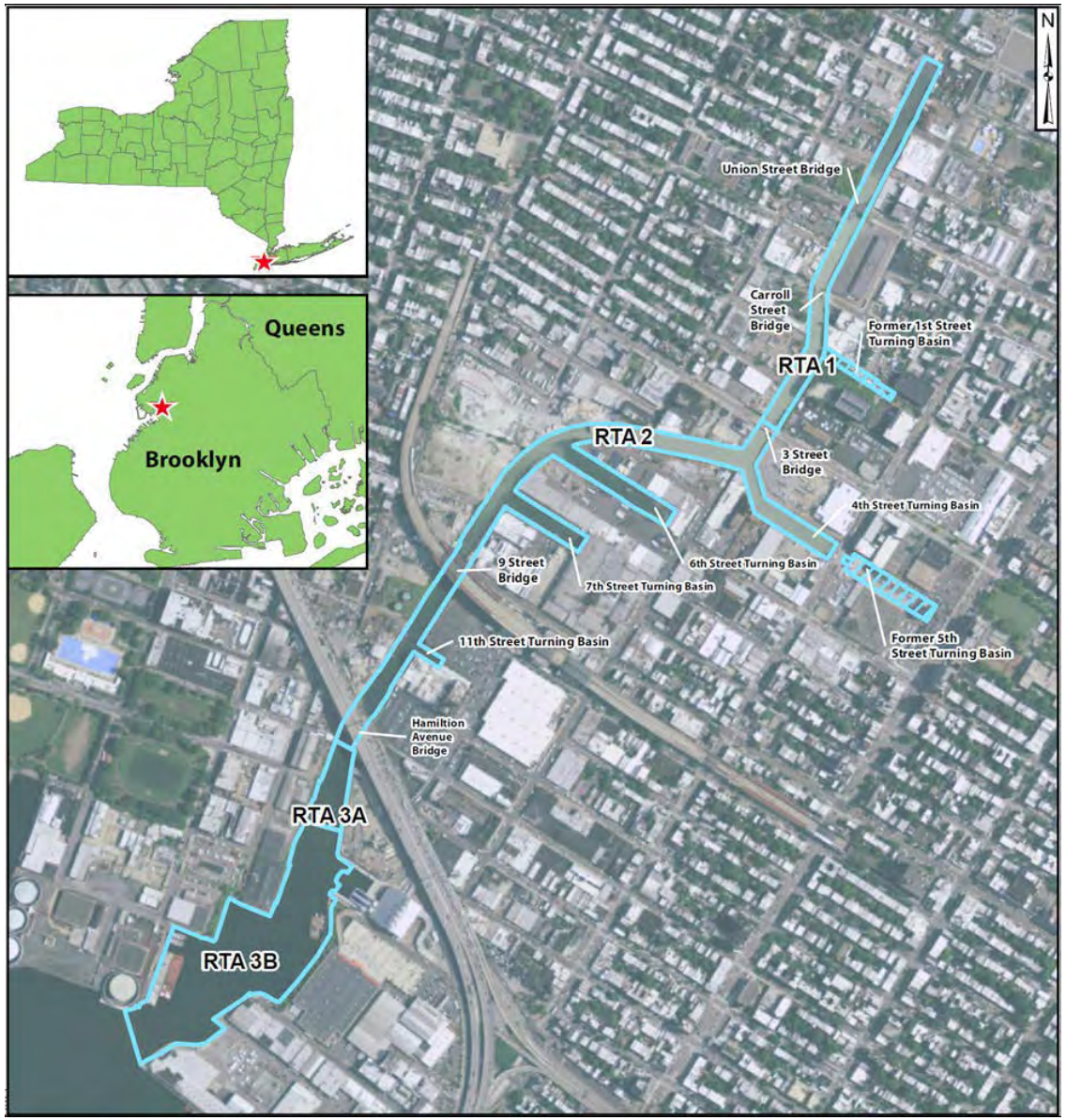
WEDA Dredging Summit & Expo ’17

Geosyntec consultants

Gowanus Canal



- Brooklyn, NY
- 2.9 km man-made canal
- Width: 30 meters
- Depths: 10.5 to <1 meter

Gowanus Canal History

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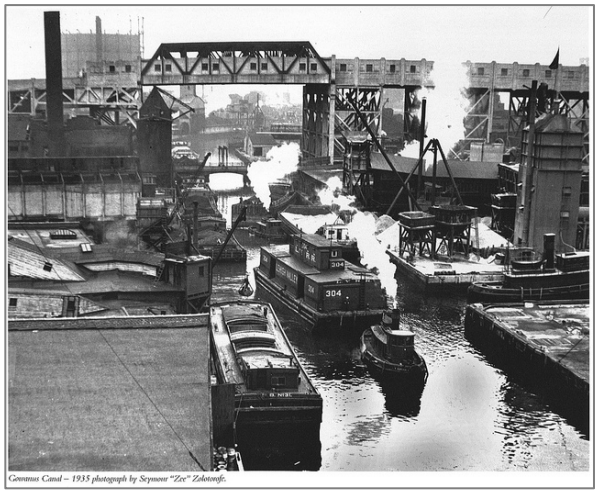
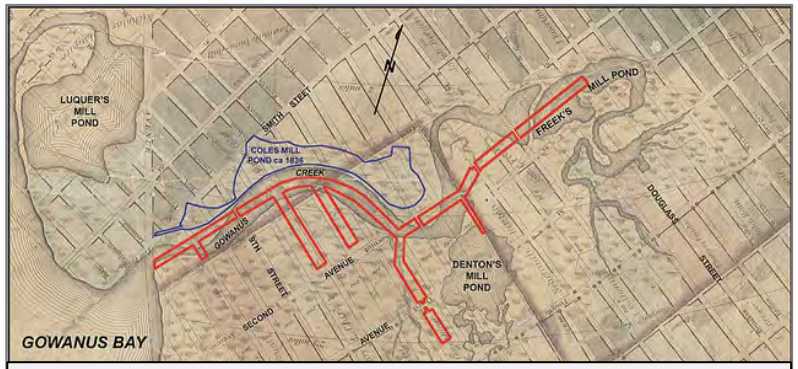
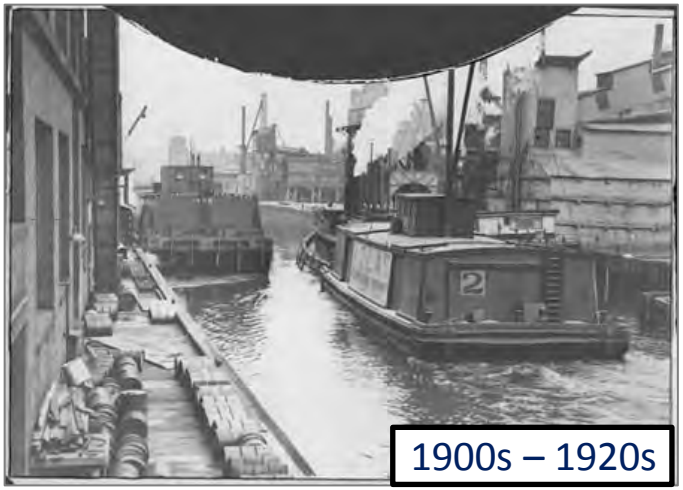
- Authorized: 1848
- Constructed: 1853 - 1869
- Draining of wetlands and open the area to development
- 1920s: Peak operation - 25,000 vessel trips/year and 60 dock facilities
- 2000: 500 vessel trips/year and 5 dock facilities





Overlay of Canal plan with Gowanus Creek



1900s – 1920s

Contaminants of Concern & EPA Action

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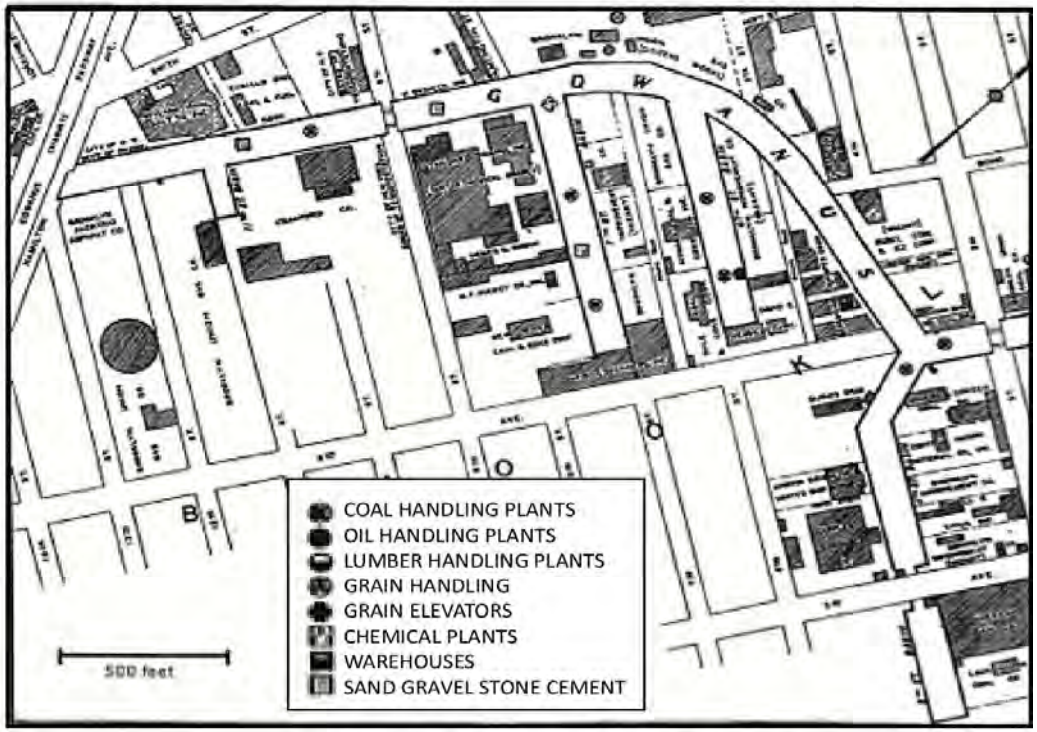
- Industry and CSOs lead to elevated levels of PAHs, PCBs, heavy metals, and sewage



INDUSTRIES OF GOWANUS CANAL (CA. 1942)

- **Mar 2010**
  National Priorities List
- **Jan 2011**
  Remedial Investigation
- **Dec 2012**
  Feasibility Study
- **Sept 2013**
  Record of Decision

Gowanus Canal Design Overview

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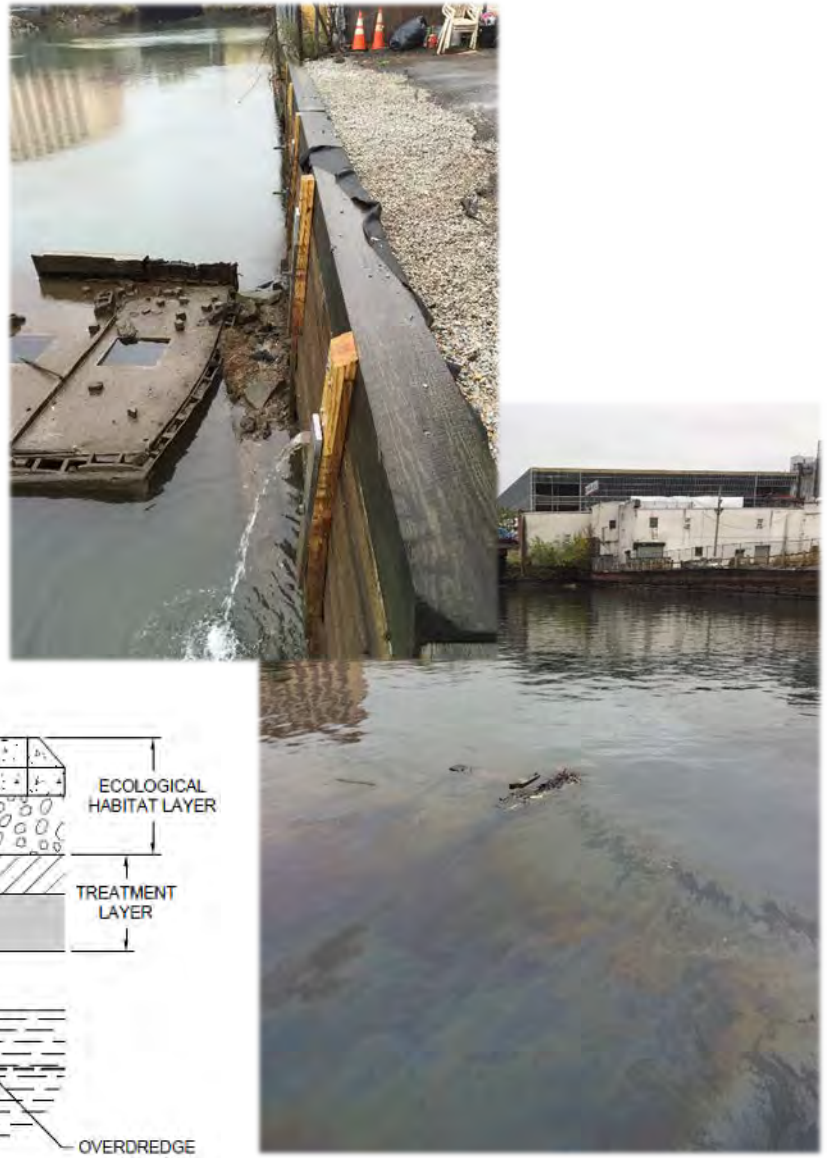
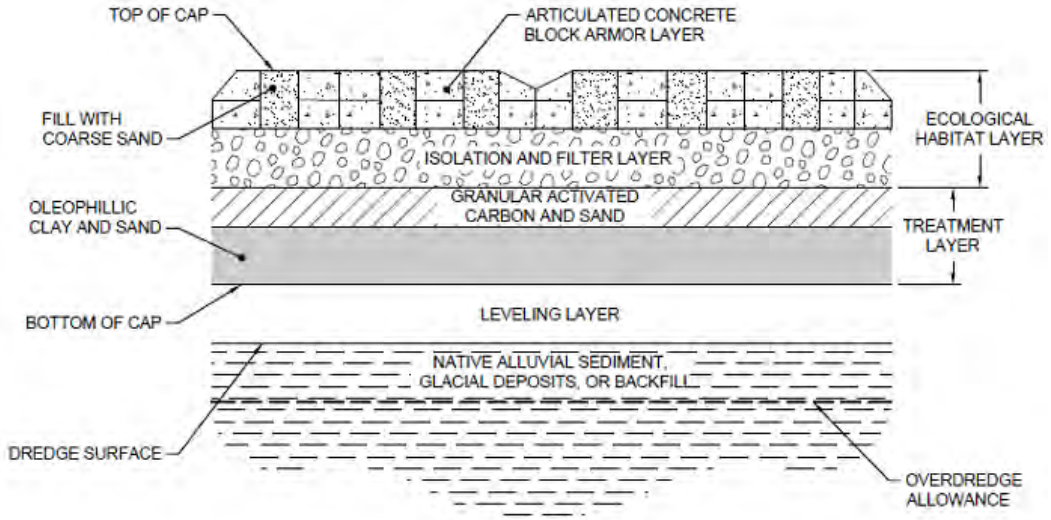
- Bulkhead repairs
- Dredging
- Ex-situ treatment
- Dredge water treatment
- In-situ stabilization
- Capping





4th Street Turning Basin (TB4) Pilot Study

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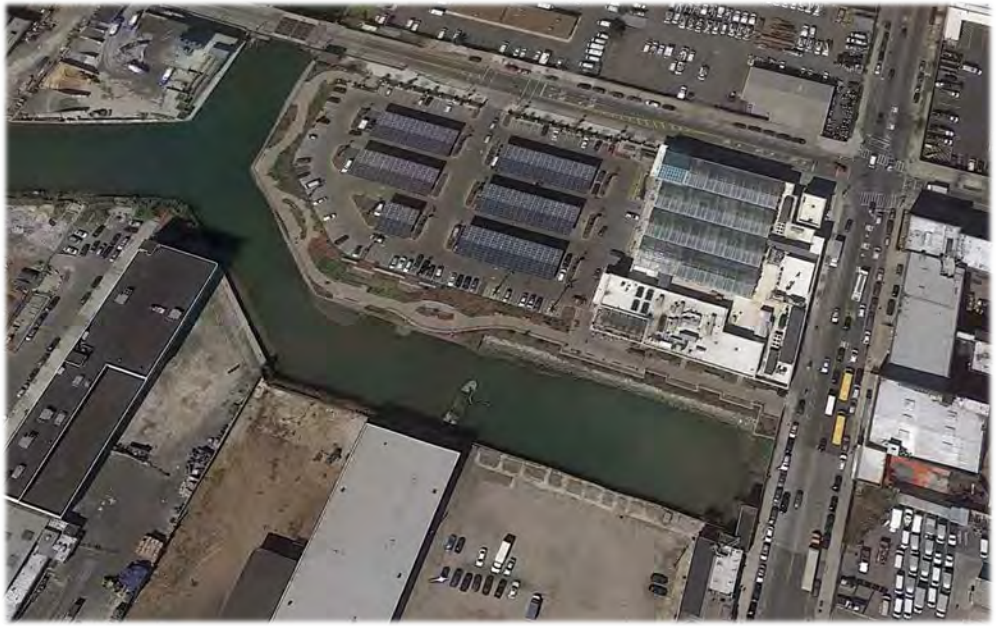
- Comprehensive Pilot Study in the 4th Street Turning Basin to aid design efforts
- Three phases
  - Site staging area preparation (Fall 2016)
  - Debris removal (Fall 2016)
  - Dredging, bulkhead stabilization, and capping (Fall 2017)



Debris Removal Pilot Study

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- Clear obstructions for navigational access
- Evaluate different equipment types for debris and sediment removal efficiency
- Evaluate debris management
  - Debris cleaning and disposal
  - Archaeological profiling
  - Water treatment and reuse
- Evaluate environmental impacts

Large Debris Removal

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- Removal of 36 large debris targets and 10 tires
- Evaluation of 5-tined grapple and rake

Attachment	Targets Attempted	Targets Removed	Removal Rate	Total Duration (min)	Duration per Target (min)
Grapple	14	10	71%	165	12
Rake	32	21	66%	450	14

Debris Field Removal

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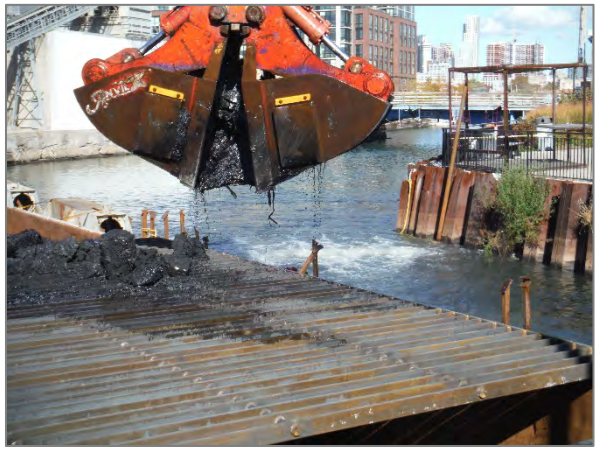
- 250 cubic meters (CM) of sediment/debris removed
- Evaluated two bucket types
  - 1.1 CM environmental
  - 1.9 CM conventional
- Evaluated three scow loading techniques

10-cm screen

Directly into scow

10-cm grizzly bars



Debris Field Removal

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Production Evaluation	Scow 1	Scow 2	Scow 3	Scow 4
Bucket Type	E	E/C	C	C
Load Type	10-cm S	Direct	Direct	10-cm GB
Scow Volume (CM)	55	60	68	70
Total AVG Cycle Time (sec)	193	92	127	137
Total Scow Load Time (hr)	4.5	2.8	2.7	3.6
Total Scow Time w/ Material Rehandle (hrs)	4.5	3.3	3.2	3.6
Average Bucket Percentage	58%	40%	47%	38%

- Extended cycle times associated with loading scows through a screen
- Negligible difference between direct loading plus rehandling and loading directly through grizzly bars

Sediment and Debris Disposal

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- All debris offloaded to an asphalt pad at the staging site
- Sediment stabilized with Portland cement
- All disposed at permitted landfills (limited quantity of recyclable material)

Environmental Monitoring

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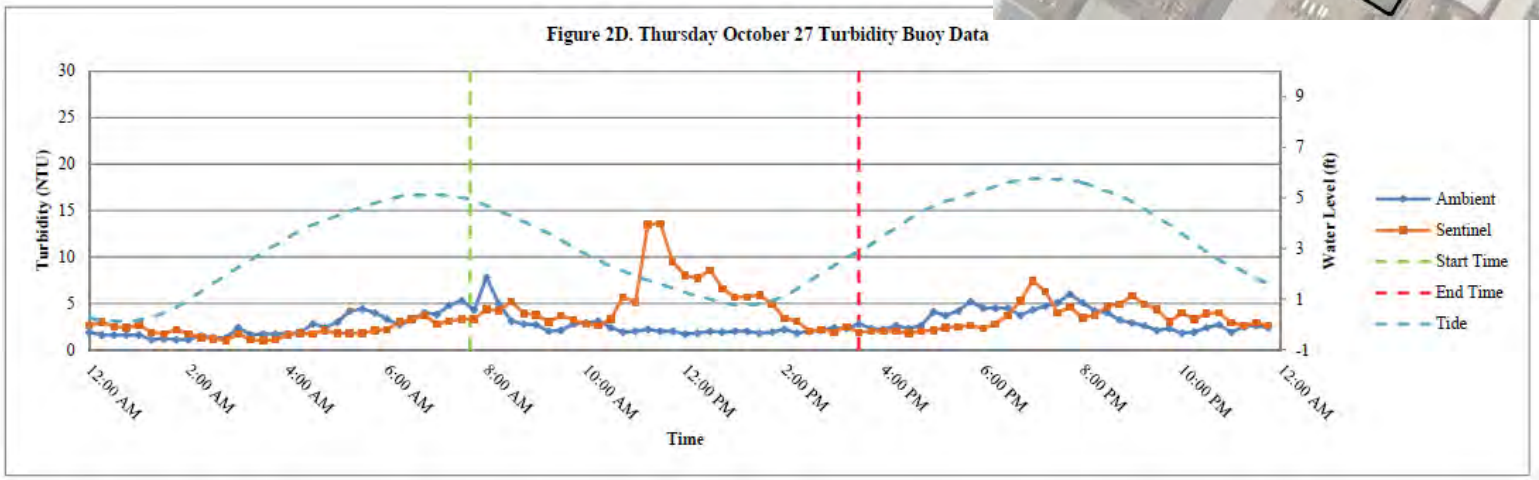
- Silt curtain during large debris removal
- Air curtain during debris field removal
- Noise monitoring
- Air monitoring
- Water quality monitoring
  - Turbidity buoys
  - Turbidity/TSS measurements

Turbidity Measurements

- Two turbidity monitoring buoys
- Large Debris
  - AVG Difference: <5 NTU
  - Max Difference: 10 NTU
- Debris Field
  - AVG Difference: <5 NTU
  - Max Difference: 20 NTU



Plume Generation and Turbidity

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Description of In-Canal Activity	AVG Turbidity in Plume (NTU)	MAX Turbidity in Plume (NTU)	AVG Distance from Source of Sediment Resuspension (m)	Number of Measurements
Large Debris Removal with Grapple	21.8	25.0	18	2
Large Debris Removal with Rake	23.6	32.0	18	4
Debris Field Removal with Environmental Clamshell Bucket	9.9	26.9	9	87
Debris Field Removal with Conventional Clamshell Bucket	16.8	27.1	13	35
Movement of Barges with Push Boat	46.3	155	30	28

- Negligible difference between the grapple and rake
- On average, environmental bucket had lower turbidity readings than the conventional bucket
- Barge movements caused the largest plumes

Conclusions and Lessons Learned

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- Environmental Impacts
  - Optimal sediment and floatable containment
  - Long-lasting foam an acceptable alternative to plastic sheeting
  - Misting for odor control no longer approved
  - Limit tug and barge size
  - No noise issues or complaints
  - Dust control for in-barge mixing
- Production
  - Both a rake and grapple are effective for large debris removal
  - If environmental bucket is not closing properly due to debris, a conventional bucket does not significantly increase turbidity
  - Sort material through a 15-cm grizzly bar
  - Optimal scow loading technique

Path Forward

- Full 2017
  - 4th Street Turning Basin
    - Dredging
    - Capping
    - Bulkhead Support

- Results of the 4th Street Turning Basin Pilot Study will be incorporated into the ongoing Remedial Design

Acknowledgments

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  - Howard Cumberland, Dave Himmelheber, Jay Beech, & Russell Hyatt