West Pond Living Shoreline
Queens, New York

Chester Zarnoch
Baruch College and Graduate Center
City University of New York
Science and Resilience Institute
Project Team

**Project Lead (design and construction):** Jamaica Bay-Rockaway Parks Conservancy, a project of the Fund for the City of New York

**Design Team (design, permit and construction management):** Dirtworks Landscape Architecture, Rippled Waters Engineers, Great Ecology

**Contractor:** Galvin Bros. Inc./Madhue Contracting Inc., a Joint Venture

**Non-profit Partner:** Billion Oyster Project (provided oyster shell)

**Key Community Partners:** Jamaica Bay Ecowatchers and American Littoral Society

**Funding Partners:** NYS Dept. of Environmental Conservation, NYC Department of Environmental Protection and NYS Attorney General’s Office (on behalf of the Nitrogen Settlement Fund), National Fish and Wildlife Foundation

**Monitoring Partner:** Science and Resilience Institute at Jamaica Bay
West Pond Living Shoreline

**May-October 2021**
- 2,400 linear feet of shoreline
- 51,000 cubic yards of sand/soil
- 14 acres total area
- 200,000 native plants
- Breakwater features
  - 4,900 bags of shell
- Erosion Control
  - 20”w and 12”w coir logs
  - Tree fascines
- Natural materials
- $3.7 million project
• Breakwater features 4,900 bags of shell
Coir logs

• Erosion Control
- 20” w and 12” w coir logs
Monitoring began September 2022
Monitoring began September 2022
Elevation across monitoring points in 2022
Cordgrass % coverage across monitoring points 2022

2022 Mean = 8%
2023 Replanting - 60,000 plugs
Cordgrass coverage increased 3x in 2023

2023 Mean = 27%
Cordgrass stem heights and densities increased significantly from 2022 to 2023

a) S. alterniflora stem density (# m$^{-2}$)

b) S. alterniflora max stem height (cm)
Planting technique did not improve vegetation
5 plug cluster vs 12” on center

[Graph showing % Coverage, Max Stem Heights, and Stem Density for 5 plug cluster vs 12” on center]
Planting technique did not improve vegetation
6” on center vs 12” on center

(a) % Coverage
(b) Max Stem Heights (cm)
(c) Stem Density (# m⁻²)
Project Challenges – Shell bags degraded & All coir logs were lost < 1yr
Project Challenges – Herbivore Exclusion
Project Challenges – Herbivore Exclusion
Project Challenges – Herbivore exclusion enhances litter accumulation

**Hypothesis:** Herbivore exclusion fencing will trap litter and create a “hot-spot” of litter accumulation.
Project Challenges – Herbivore exclusion enhances litter accumulation

- Significantly more litter in West Pond than natural marsh.
- Litter was heavier in the natural marsh.
Project Challenges – Herbivore exclusion enhances litter accumulation
Project Challenges – Herbivore exclusion enhances litter accumulation.

~50% of the plastic litter in the living shoreline was PVC flagging tape.
Project Challenges-
Macroalgal accumulation
Project Challenges – Wind Fetch
Do the shell mounds provide ecological benefits?
Invertebrate biodiversity study
West Pond Shell Mounds
Vertical complexity increased invertebrate density and biodiversity
Lessons Learned

• Ongoing maintenance is key
  • Herbivore exclusion fencing
  • Replanting

• Spring planting performed better than fall planting

• Elevation is critical but one of many factors driving plant success

• Wind & Waves may leave some habitat without vegetation
  • Breakwaters may be needed
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<tr>
<th>Jamaica Bay Rockaway Parks Conservancy</th>
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<tbody>
<tr>
<td>Terri Carta</td>
<td>Brett Branco</td>
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<td>Elizabeth Stoehr</td>
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<td>Scott Middleton</td>
<td>Sarah Maria Dos Santos</td>
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<td>Anil Pasram</td>
<td>Judah Duke</td>
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<td>Camilo Gaston-Greenberg</td>
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<td><strong>NPS/Gateway National Recreation Area</strong></td>
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<td>Patti Rafferty</td>
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<td>Baruch students in ENV 3020 &amp; 3001</td>
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