

## **FWS Project: Wave Attenuation for Jamaica Bay, NYC**

A range of ecosystem restoration pilot projects within the Jamaica Bay watershed in New York City were identified that focused on cleaning the water of the Bay and restoring ecological habitats. One of the pilot projects was a Floating Wetlands Wave Attenuator to study the efficacy of deflecting and reducing the energy of waves in order to better protect critical wetland shorelines and habitat.

Jamaica Bay is a 31-square-mile water body with a broader watershed of approximately 142 square miles, which includes portions of Brooklyn, Queens, and Nassau County. The Bay is a diverse ecological resource that supports multiple habitats, including open water, salt marshes, grasslands, coastal woodlands, maritime shrublands, and brackish and freshwater wetlands. These habitats support 91 fish species, 325 species of birds, and many reptile, amphibian, and small mammal species. Jamaica Bay's wetlands serve many critical functions within the larger ecosystem. Over the last 150 years, Jamaica Bay has lost a significant amount of marsh and wetland area due to a variety of factors, including sea level rise, dredging and filling throughout the Bay, a loss of sediment, and increased tidal heights. Many of these changes have permanently altered sections of the Bay. This pilot program will help inform how to better protect the surviving marsh and wetland areas for the future.

It is well documented that wetlands can help reduce wave energy and velocity, and over the last 150 years, Jamaica Bay has lost a significant amount of marsh and wetland area due to a variety of factors, including sea level rise, dredging and filling throughout the Bay, a loss of sediment, and increased tidal heights. Many of these changes have permanently altered sections of the Bay. In addition to restoring those areas that have been lost, the wave attenuator pilot program will help inform how to better protect the surviving marsh and wetland areas.

Brant Point was chosen as the location for the wave attenuator project, as its shorelines and marshes are actively eroding due to wave energies. The team used remote acoustic monitoring devices to measure how the attenuators perform in deflecting and reducing the energy of waves, as well as the anticipated decline in erosion along the wetland edge. If the attenuators succeed in diminishing the strength of the waves and slowing the rate of erosion, that information will be used to determine whether oyster beds and other breakwater offshore structures could be planted in similar areas to protect other critical wetland and shoreline areas.

The project was designed and managed by a joint venture team which included Biohabitats, HDR and Hazen & Sawyer. Bluewing Environmental won the contract for the floating islands (attenuators) and they hired Floating Wetland Solutions to produce the units per the design specifications.



**Planting and Launching**

Five attenuators, each approximately 40 feet in length were anchored to the seabed approximately 100 feet off-shore. The attenuators were angled to deflect waves produced from prevailing northeast winds that would otherwise land on a roughly quarter mile of salt marsh wetlands along Brant Point, on the southern shore of Jamaica Bay. The project was to remain in place for 2 years.



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After approximately 18 months into the 2 year pilot, two of the five attenuators showed signs of wear and came loose from a portion of their anchoring. FWS was hired to make field repairs and assess the conditions. We made temporary field repairs and recommendations for an improved design using our engineered floating islands that would better deal with the wave energy generated in the bay. Since the pilot project was only intended to last 2 years, the decision was made to live with the repairs as is and not pursue the improved design.

The units remained in the bay for approximately 18 more months before there were additional signs of wear and they were removed. While we have not seen the before and after data, anecdotal evidence supports that the attenuators indeed dampened waves leading into the wetlands.

Floating Islands have been used in other wave breaking applications with success, but the design requirements for sustained wave energy are stringent. Anchoring alone can be a significant challenge depending on the site conditions. Jamaica Bay's conditions were the most challenging to date. Had we been able to design the attenuators using our engineered materials and steel frames and interconnectors, we believe we could have significantly improved the durability results. Our work on this project with this team has resulted in several new projects including the National Aquarium where our unique capabilities will be leveraged.

