



BE CZAK TIDAL MARSH SHORELINE

OVERVIEW

An eroding shoreline impacted by human use, currents, waves, and ice was reconstructed to include vegetation, varied slopes, and sinuous soft shoreline features. This engineered shoreline protects shoreline habitat and accommodates a boat launch and other recreational activities. It has served as a model for other shoreline improvement projects throughout Yonkers.

LOCATION & ACCESS

Beczak Tidal Marsh Shoreline is in the City of Yonkers, New York, located on Alexander Street at the site of the Beczak Environmental Education Center. This site is open to the public. It is located on the east side of the Hudson at river mile 18.

PARTICIPANTS

Owner: Westchester County

Manager: Beczak Environmental Education Center

Design: Creative Habitat Corp. & Westchester County Planning

Contractor: Burtis Construction Co.

Cost: \$515,234

Grants Received: New York State Environmental Protection Fund (\$250,000) and National Fish & Wildlife Foundation (\$50,000)

Project Timeframe: 2003-2004



The Hudson River Sustainable Shorelines Project is a multi-year effort lead by the New York State Department of Environmental

Conservation Hudson River National Estuarine Research Reserve, in cooperation with the Greenway Conservancy for the Hudson River Valley.

The Project is supported by NOAA through the National Estuarine Research Reserve System Science Collaborative.

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BACKGROUND AND STORY

Habirshaw Park on the Hudson at the Beczak Environmental Center has a history of industrial use as the site of a manufacturing facility for Habirshaw Cable & Wire. In the 1950s, the Naval Militia Reserve and the Habirshaw Social Club used the buildings for recreational facilities. However, the buildings were later neglected and fell into disrepair. Soils contaminated with industrial debris, heavy metals, and petroleum were a legacy of the industrial use.

Westchester County purchased the Habirshaw Club property in 1999 with financial support from Scenic Hudson. In addition to committing to repay Scenic Hudson, Westchester County granted Scenic Hudson a conservation easement limiting property development to use only as a public park for recreational and educational purposes. The shoreline stabilization project was managed and funded by Westchester County with additional help from the NYS Office of Parks, Recreation and Historic Preservation and the National Fish & Wildlife Foundation.

The overall project goal was to clean up the parcel, restore the shoreline, and renovate one of the buildings to create an interactive education center along the Hudson River. As a result, Habirshaw Park at the Beczak Environmental Education Center in Yonkers have become important components of outdoor education for Westchester County students and the public. Additionally, in 2013 the Beczak Center partnered with Sarah Lawrence College to form the Center for the Urban River at Beczak (CURB). CURB staff and volunteers maintain the marsh and continue to use it for education.

ASSESSMENT, PLANNING & DESIGN

The sloped shore zone had significant impervious cover with poorly functioning concrete and asphalt armoring, 4000 square feet of which was inundated by the tides. The area was re-envisioned as a waterfront with public access and a place for outdoor environmental education. Design objectives included:

- Increasing natural features of the shoreline
- Improving access to the water and restored vegetated areas
- Utilizing non-functioning armoring materials to assist success of new tidal marsh
- Showcasing a natural shoreline with native species in the Hudson River and an urban area
- Naturalizing upland parkland to decrease run-off and allow for water infiltration.



Figure 1: site plan of park including tidal wetland on right (west).
Photos and drawings courtesy of Beczak Environmental Center and Creative Habitat Corp.

To achieve these objectives, the design included a brackish tidal marsh and a beach and dune area that would highlight the differences and interactions between habitats. Diverse native plants were included to attract native fish and animal species and to safeguard the shoreline site from the forces of erosion. Marshes and dunes can provide natural flood and storm surge protection, which is important as the frequency of major storms increases with global warming.

The shoreline is exposed to very high energy due to the proximity of the Hudson River's shipping channel and the frequent, high wind-driven waves. The design stipulated that some remnants of the concrete shoreline armoring should be removed while others should be used as a partial sill¹ to protect the tidal marsh from erosion.

PLAN IMPLEMENTATION

The site preparation, including removal of hardened shoreline features, grading of the shoreline, and re-configuration of the upland, took place in 2003. This process included clean-up and organization of future maintenance of the restoration site, as well as the creation of the marsh sill. Invasive vegetation and contaminated soils from the site were removed to a depth of 24 inches and the site was re-filled with a sand/soil mix. The existing rip-rap at the toe of a vertical stonewall which protects part of the waterfront was reinforced with additional rip-rap. In 2004, the tidal area was expanded from 4,000 square feet to approximately 10,500 square feet. The new area included a freshwater marsh receiving site run-off from stormwater drainage swales, a tidal brackish water marsh, a tidal channel, and a tidal pool. Following the basic construction of the site features, including the beach, dune, and marsh beds, the native low and high marsh and dune vegetation was planted. Park infrastructure, including pathways and a bridge over the tidal marsh, was constructed prior to the planting. Several erosion control measures were implemented to minimize construction impacts, including floating silt curtains and silt fences.



Figure 2: Completed shoreline stabilization and footbridge, September 2012.

¹ Sills are typically low profile, continuous structures placed parallel to the shore at mean low water. Sills can be made of broken rock, cobbles or other hard material and typically have a trapezoidal cross-section. Sills reduce shoreline erosion by dissipating wave energy which may cause sediment to build up between it and the shoreline.

OUTCOMES

Structural Elements

The sill proved insufficient after initial construction and needed additional height to protect the marsh from the high energy of the Hudson River. The original sill design did not account for the destructive power of ice or wake from the proximity of the water shipping channel to the shoreline. In summer 2008, additional rock was installed on the sill to prevent erosion and control driftwood and debris from entering the marsh. The site's high exposure to erosion from waves and ice continues to lead to the frequent displacement boulders and cobbles on the far side of the bulkhead and rock sill even after the 2008 sill repairs. However, the sill is sturdy and tall enough to continue to support the tidal pool which provides habitat for many observed species.



Figure 3: replanting in May 2007 due to geese browsing



Figure 4: Additional rock added to the sill in 2008 to prevent erosions and control driftwood



Figure 5. View looking Southeast at the tidal pool and salt marsh grasses in August, 2021. Despite continued grazing of geese that were observed nesting in tidal pool, cordgrass is well established.

Native Vegetation

The native plant species survived the initial planting. However, overgrazing geese at the site caused extensive damage to the marsh plants. In summer 2007 the marsh grass was replanted and since then it has withstood the continued grazing (figure 5). The cord grasses along the intertidal pool and the successional meadow between the tidal pool and the upland park remain well established (figure 5 and 6), providing valuable intertidal habitat. Although the native plants at Beczak are established, there are areas of the site that still require maintenance and monitoring. The invasive species, Common Reed (*Phragmites australis*), was observed at the site and requires removal to prevent invasion and spread into the marsh. Additionally, an area of meadow was burned near the bulkhead in 2021, but regrowth has already begun. The burned areas should be monitored in future years to examine any patterns as native and non-native plants reestablish.

Ongoing Monitoring and Management

Post-implementation, daily and seasonal management at the site has remained important for maintaining the sill and the marsh. Beczak staff and community members often remove driftwood, debris, and trash as well as mend fencing and remove rocks that sometimes dislodge and redeposit into the tide pool and channel. The maintenance of the shoreline since construction includes the periodic removal of stranded woody debris and removal of invasives. The site has required two major maintenance projects since the initial construction-- marsh replanting and restoration of the sill – but since 2007, ongoing maintenance has been sporadic and relatively low-effort.



Figure 6: Pathway to the river and tidal marsh shows native plantings



Figure 7: View of the southern section of the meadow where an accidental fire burned vegetation (August 2020)

The Big Picture

The Beczak sustainable shoreline showcases the potential for shoreline restoration in traditionally urbanized areas. The project has resulted in a structurally sound shoreline that has ecological and education benefits, and that has required minimal maintenance since 2007. The marsh has attracted a variety of wildlife including fiddler crabs, great blue heron, monarch butterflies, killifish, blue crabs, and shrimp. In the summer of 2012, baby horseshoe crabs were discovered in the tidal pool (figure 8). Education programs at the marsh allow children to get first-hand experiences with the natural world of wetlands. The shoreline has been used for a student research projects as well.

Due in part to the example that the Beczak shoreline set, sustainable shorelines have become accepted and widely used on Yonkers' shorelines. Sustainable shorelines have been completed at Domino Park and the Apex Riverfront, and a new shoreline is in progress at the Avalon condos just north of Beczak. All told, significant portion of Yonkers' shoreline has been improved with sustainable practices, and the city's shoreline overall provides many more benefits than it did just fifty years ago.

LESSONS LEARNED

- The impact of wave energy, boat wake energy, ice energy, and other causes of erosion should be accounted for in the planning process.
- An isolated small natural site acts as a magnet for wildlife, including potentially destructive overuse by Canada geese.
- Boulders in a sill can get dislodged by wave energy and ice. The site should be monitored frequently and managed as needed for this issue, especially after storms and harsh winters.
- Strategic volunteer engagement can reduce maintenance costs.
- Consistent debris removal helps vegetation thrive.
- Sites that are completely submerged during major storm events tend to sustain less damage, indicating that impacts of debris and ice may be more damaging than wave energy.
- It is essential to consider the proximity of the shoreline to sources of wave energy, such as shipping channels, in the planning process



Figure 8: Baby horseshoe crab found in tidal pool in summer 2012.



Figure 9: The ecologically enhanced shoreline has attracted a variety of species, including the great blue heron.

ADDITIONAL PHOTOS



Figure A: despite previous browsing by geese the smooth Cordgrass (left) has become well established (2018)



Figure B: View of the seine beach next to the bulkhead, shows boulders and cobbles displaced by waves (2020)



Figure C and D: Left photo looking south at sill, right photo looking east from water at sill and footbridge. Additional rock was installed in 2005 and 2007 to raise the height of the sill. The top layer of rip-rap was enclosed in netting to hold it in place. (Photo taken 9/2018).



Figure E. View looking southwest at the rock sill in September, 2020. Rock sill continues to provide a protected tidal pool environment. While the netting that encloses the top layer of rip-rap remains intact, some boulders and cobbles without netting have been displaced on the sill.