COASTAL RESTORATION CASE STUDY

Shorters Wharf Tidal Marsh Resilience Project

Partners

- US Fish and Wildlife Service (USFWS)
- The Conservation Fund
- Audubon Maryland-DC
- Sustainable Science, LLC
- US Army Corps of Engineers (USACE), Baltimore

Contractors

- Dredge America©
- Ecological Restoration and Management©
- Geo-Technology Associates©

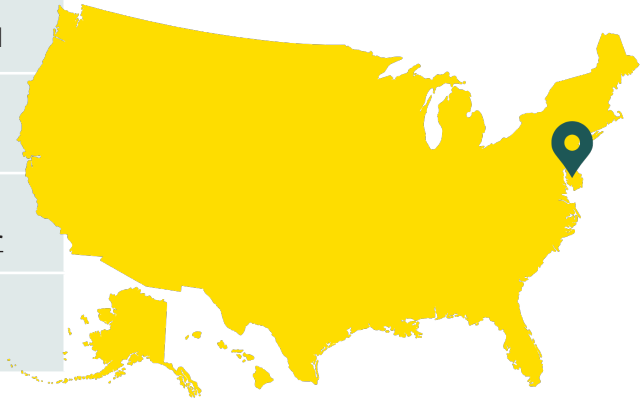
Key Information

PROJECT LOCATION
Blackwater National Wildlife Refuge (NWR), Cambridge, Maryland

HABITAT	LANDSCAPE	PROJECT SIZE
Saltmarsh	Back bay	40 ac

USACE DISTRICT	PROJECT WEBSITE
Baltimore District	fws.gov/refuge/blackwater

PROJECT COMPLETED	PROJECT UPDATED
2017	2/22/24



ABSTRACT

The purpose of this project was to increase the resiliency of approximately 40 acres of tidal marsh within Blackwater NWR to relative sea level rise and storm impacts. The project was needed to restore tidal marsh elevation capital thereby increasing marsh grass productivity. Increased plant productivity will help this tidal marsh area keep pace with rising relative sea levels through increased below ground biomass production and thus provide a high quality habitat for salt marsh birds. Without this action, the marsh at the project site would have likely converted to open water in the near future.[1]

PROJECT GOALS

- Increase resilience of the marsh by increasing elevation capital by 30 cm above NAVD 88, based on studies (paper in *Ecology* 2012 - Kirwan and Guntenspergen note that 30 cm above NAVD 88 increased below ground biomass and ability to build marsh for future Sea Level Rise (SLR).
- Increase the amount of high-quality high marsh habitat available for Saltmarsh Sparrow (SALS) and Black Rail (BLRA) (Note - some Spartina patens on site).

[1] Whitbeck, M., A. McCullough, E. Meyers, and D. Curson, Shorters Wharf Tidal Marsh Resilience Project: Implementation Report, 2019, The Conservation Fund (Arlington, Virginia)

FUNDING

National Fish and Wildlife Foundation's (NFWF) Hurricane Sandy Coastal Resiliency Competitive Grants Program (Grant #42942) to The Conservation Fund. Total Grant: $3.3 million; $1.88 million for restoration work associated with this project site.

PARTNERSHIP DEVELOPMENT AND MAINTENANCE

The 2013 Blackwater Climate Adaptation Project (BCAP), a collaboration of The Conservation Fund, Audubon Maryland- DC and USFWS, actively assisted by Maryland Department of Natural Resources (MD DNR), USGS, and other groups and agencies, identified restoration opportunities in the Refuge. The Shorters Wharf project site was within the larger Marsh Conservation Zone, which was identified as having the highest regional priority for action.

Partner Contact: Matt Whitbeck

Restoration Outcomes and Lessons Learned

RESTORATION OUTCOMES

- Some native saltmarsh plant species came back quickly.
- Keeping soil placement within the normal high high tide range helps with the soil acidic issue.
- The project objective was to restore and extend the lifespan of the high salt marsh habitat that Saltmarsh Sparrow (SALS) and Black Rail (BLRA) require.
- Raised marsh level, vegetated. USGS Eastern Ecological Science Center monitoring below ground biomass.

LESSONS LEARNED

- Elevations are difficult to achieve exactly. Project site has variations due to flow settling out based on sediment characteristics and topography.
- Rainbow spray method of hydraulic sediment application improved project outcomes — pipe used a plate that directed sediment up and sprayed as a fan.
- Use of witness boards for elevation monitoring during sediment application helped achieve placement goals.

Advice for similar restoration projects

- Engage with regulatory staff as soon as possible before submitting plans and permit application.
- Develop project together.
- Having solid research to back the plan is very important and helpful. Scientists have been working there for decades and have ample research data to demonstrate need and address regulatory questions.
- The proposed restoration approach needs to address future as well as current needs to be a healthy marsh.

Data sources and decision support tools used

- The Blackwater 2100 Plan (Conservation Fund and MD published in 2013).
- SLR adaptation plan identified Marsh conservation zone — area of highest remaining marsh and at risk species.
- Bird survey data as showing where Saltmarsh Sparrow (SALS) and Black Rail (BLRA) presence had been previously reported.
- Distance to material borrow areas selected within financial feasibility.

- Bathymetry conducted for source up and down stream of project site for depth and contours. Geotech cores to test for soil composition.
- Project proximity to Shorters Wharf was an excellent location for high profile post project sharing.

Figure 1. Source: Whitbeck, M., A. McCullough, E. Meyers, and D. Curson, Shorters Wharf Tidal Marsh Resilience Project: Implementation Report, 2019, The Conservation Fund (Arlington, Virginia)

October 2016 – Pre-Project

May 2017 – Immediate post-thin-layering

October 2018 – Two growing seasons following thin-layer addition

PLANNING	
Overall cost	Total NFWF grant $3.3 million, Shorters Warf restoration project cost $1.88 million • Pre/post technical studies, construction oversight, and permits - $240,000 • Dredging and material application - $1.1 million • Native marsh plug planting - $400,000 • Project and grant management - $140,000 • In-kind USFWS labor, equipment, misc. materials – not tallied
Cost summary	Within budget
Link to USACE dredge project	Not an O&M - just for the project
Beneficial use	No. Dredging conducted solely as source of restoration material.
Low cost / no cost alternative to ACOE	No
Placement coordination mechanism	Identified generally within Blackwater Climate Adaptation Plan. Subsequent extensive Real-Time Kinematic (RTK) studies of elevations, on-site surveys with marsh master and boat, aerial photos and plans carefully developed to fill some "holes" but preserve long-standing open water sites with the SW marsh location.
Alternate sediment reclocation if BUDM project hadn't happened	The sediment was borrowed from the adjacent Blackwater River meander bend accretion zones. Without the project, the sediment would have stayed in the riverine system and may eventually have emptied into Fishing Bay.
Public outreach/education efforts	NFWF grant success required public education efforts which included multiple presentations and public meetings about the project, site visits and presentations before, during and after project with members of the public, public officials (national, state and local), NGOs and regulatory staff. Multiple publications including the Implementation Report and a series of NFWF-funded evaluations were also part of the project. The project received second place national honors in the 2017 American Society for Adaptation Professionals recognition program.
Public perception challenges	None noted

PERMITS	
Required permits	State of Maryland and US Army Corps of Engineers Clean Water Act section 404 Nationwide Permit Number 27, FWS special access license, and Dorchester County Soil and Water permit
Responsible party	USFWS was permit applicant, as site owner. Regulatory application work was a team effort.
Adaptive management	No alterniflora was planted but existing plants served in buffer berm to contain the added sediment layer. For the unvegetated areas, two rounds of planting of plugs of spartina patens and distichlis spicata were installed for total of nearly 250,000 plant plugs. Seeds did not form a significant part of the vegetation recovery plan.
Policy incentives and regulatory barriers	Everything took time. Beneficial use has happened, but marsh platform elevation of an existing marsh was a new idea. Viewed project site with all regulatory / permit staff ahead of time to explain process and need since this was a novel project for MD. Communication ensured clear understanding for project need.
Impact on design or implementation	Fisheries staff had concerns regarding the restoration of marsh and loss of some open water. Some concerns regarding marsh composition and lack of clay substrate, used high floating tracked equipment pontoon excavators to reduce compaction and impact.

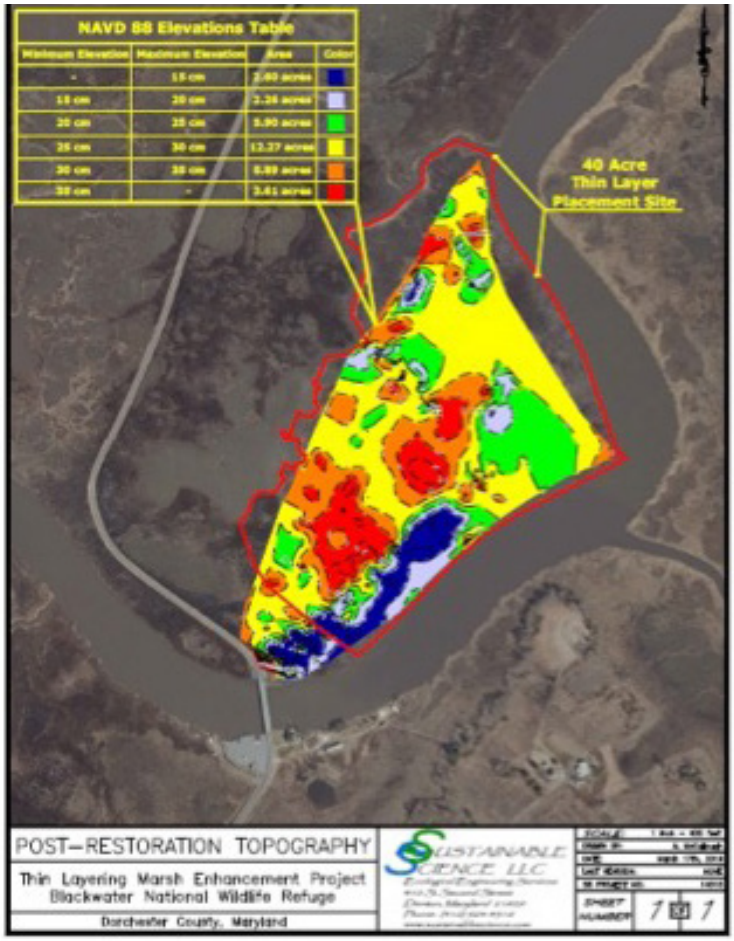
MAINTENANCE AND MONITORING

Ongoing maintenance	None required. Regular site maintenance addresses limited invasives species. Some Phragmites pop up areas are addressed via air boat applications.
Dredging to provide future material	No
Monitoring includes	Monitoring of vegetation cover and composition, breeding bird communities, below ground biomass production, and marsh elevation change began prior to the project and will continue as long as resources allow. USGS is monitoring marsh elevation change and below ground biomass. Breeding bird communities were monitored by Audubon Mid-Atlantic and the University of Delaware through the Saltmarsh Habitat and Avian Research Program (SHARP).
Short- and long-term requirements	Followed standard requirements for wetland permits

DESIGN/CONSTRUCTION ELEMENTS

Lifespan of project	Blackwater 2100 plan sets forth guidance of 25 year project life based upon marsh loss projections.
Materials used	Soil textures consisted of 32.0 percent sand, 37.8 percent silt and 30.2 percent clay on average.
Volume of material used	2017: 26,000 yd3
Sediment volume and composition sufficient or augmented	Sufficient for project scope
Techniques to achieve design elements	**Sediment Placement:** Material placed using kick boards to spray sediment in diffuse manner. Witness boards were used to help identify when sediment placement reached the desired elevation. The upper horizontal board was set to indicate the maximum elevation of dredge material placement, and the lower board indicated predicted settlement height that would be achieved two weeks after material placement. Dredge material gravity flowed ~ 150 feet outward from nozzle location. Nozzle relocated 300 feet for next placement resulting in circular placement piles with sandier material in center and gradient of fines towards edge. Deeper holes filled and above grade depth of sediment ranged 15 to 35 cm across project site (See Figure 2). **Plantings:** 217,050 two-inch Spartina patens plugs were installed in varying densities across the project site during June and July 2017. June 2018 supplemental planting of 20,700 two-inch saltgrass (*Distichlis spicata*) **Containment Efforts:** Did not need to do any hard containment for material, existing vegetated berm contained the sediment. Plugged some channels onsite with burlap plugs and removed post placement. Sand wrapped in a biodegradable coir mat was used to plug each of the two tidal ditches on the west side of the project area.
Protective measures	Dredging contractor had to monitor flow and run off constantly through the process to eliminate off-site sediment flow and keep turbidity to background levels
Equipment required	Cutterhead swinging ladder dredge and two marsh buggies with hydraulic excavators.
Distance material was transported	500-800 meters. Worked adjacent to project site and able to move it around project site.
Method of sediment suitability assessment	Vibracore samples and bathymetric surveys

Figure 2. Post Restoration Topography. Source: Whitbeck, M., A. McCullough, E. Meyers, and D. Curson, Shorters Wharf Tidal Marsh Resilience Project: Implementation Report, 2019, The Conservation Fund (Arlington, Virginia).



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