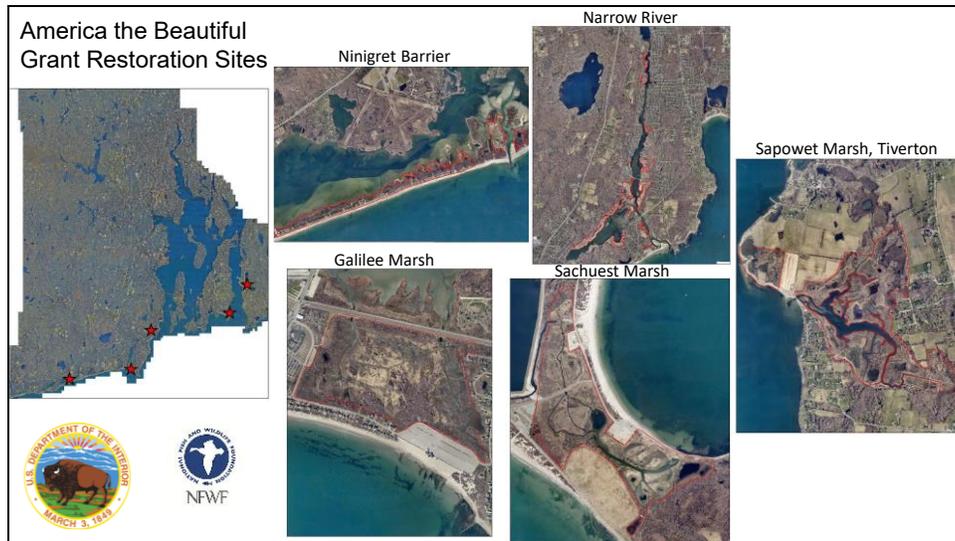


Slide 1



This presentation will focus on the salt marsh restoration component of the habitat restoration project being conducted at the Ninigret barrier and salt marsh complex in Charlestown, RI.

Slide 2



In 2024, the Rhode Island Department of Environmental Management (RIDEM) in cooperation with Save The Bay received an America the Beautiful grant from the Department of the Interior to conduct salt marsh and coastal habitat restoration projects on three RIDEM owned and two U.S. Fish and Wildlife Service (USFWS) owned coastal properties: the Ninigret barrier in Charlestown, Galilee Marsh in Narragansett, the Narrow River in Narragansett and South Kingstown, Sachuest Marsh in Middletown and Sapowet Marsh in Tiverton.



The Ninigret barrier beach restoration area includes the RIDEM and USFWS owned barrier beach and salt marsh on the west side of the Charlestown breachway and the RIDEM owned salt marsh on the east side of the breachway.

Salt Marsh Values

- Create valuable habitat and food source for a diversity of organisms including mussels, crabs, shrimp, wading birds, osprey, and a myriad of other species
- Provide unique nesting habitat for salt marsh nesting birds including the saltmarsh sparrow and willet
- Able to store carbon
- Act like 'filters' converting dissolved nutrients into vegetation
- Buffer wave energy during coastal storms
- Store flood waters



Great egret and eel; photo courtesy of Jack Kelly



Monarch butterfly during fall migration on seaside goldenrod on upper edge of Quonnie salt marsh

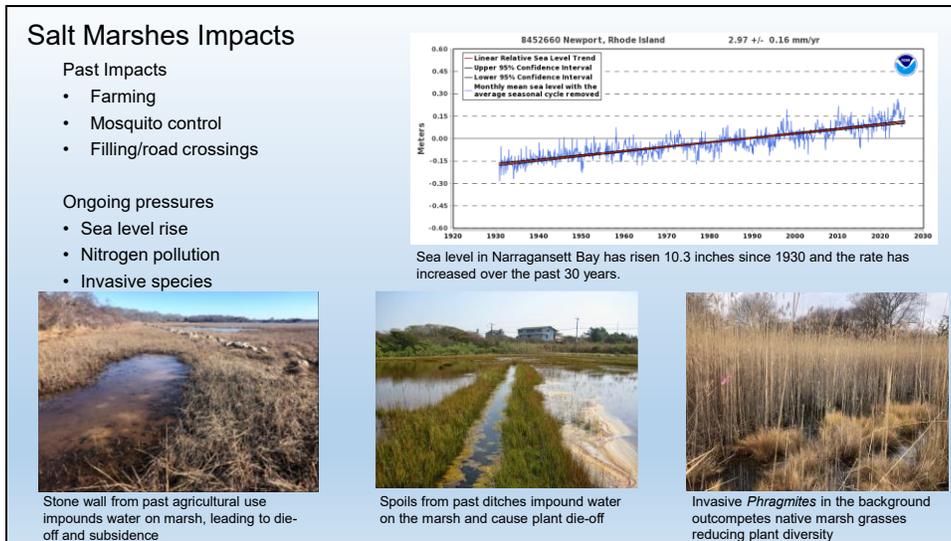


Saltmarsh sparrow: photo courtesy of Suzanne Paton, USFWS Coastal Program



Healthy marsh habitat that provides suitable habitat for marsh nesting birds.

Our region's coastal salt marshes provide many functions and values including providing habitat and a food source for a diversity of species of marine life and coastal birds including the threatened saltmarsh sparrow and other marsh nesting birds, storing or sequestering carbon, filtering out nutrients from coastal waters, and buffering wave energy to lessen erosion during coastal storms.

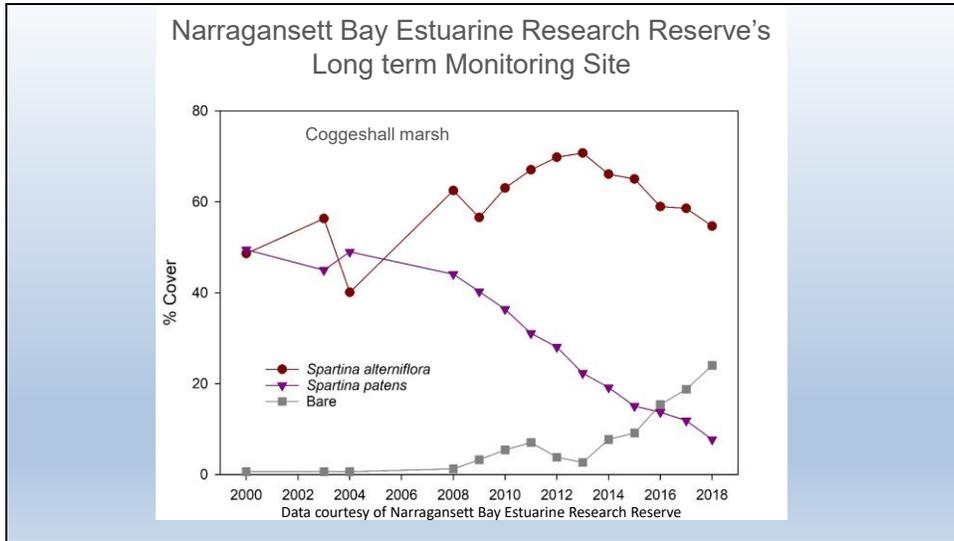


Over 50% of Rhode Island’s marshes have been lost to filling or were cut off from the tidal flow by roads and dams. The remaining marshes have been impacted by past farming and mosquito control activities. Historically most of our region’s salt marshes were farmed for hay as early as the 1600s when colonists brought livestock with them from Europe. The farmers built small earthen embankments made from marsh soil known as peat to keep the tides from flooding the upper parts of marshes so that they could grow more valuable hay crops. These embankments had ditches through them with some form of wooden stop logs to drain freshwater and prevent salt water from flooding the marsh. The lower the salinity of the marsh, the more valuable hay crops could be grown. These embankment and ditch features still exist today and impact marsh hydrology.

Ongoing pressures to salt marshes include accelerated sea level rise, invasive species encroachment of *Phragmites* and nutrient pollution. A recent study by Dr. Kenny Raposa from the Narragansett Bay Estuarine Research Reserve documented that marshes in our region are not keeping pace with sea level rise and are accreting or building elevation at only 1.8 mm per year while the sea level rise rate has increased to 5.26 mm per year.



Save The Bay conducted a region wide study to assess the extent of marsh degradation by monitoring vegetation and the stability or bearing capacity of the marsh peat. The majority of the 40 marshes assessed had impounded water and either stunted and stressed *Spartina alterniflora* and bare peat that had once been vegetated based upon evidence of root fragments and on the marsh platform. Also we found mosquito larvae in many of the impounded water areas that are too shallow and warm to support marsh fish species such as mummichogs that eat mosquito larvae.



Long term salt marsh data collected by the Narragansett Bay National Research Reserve at Coggeshall marsh on Prudence Island documented a similar change in marsh composition over a 20 year period as Save The Bay's region-wide assessment. The high marsh species, *Spartina patens* in purple, less tolerant to flooding, declined from 50% to ~10% of total marsh cover and bare areas with no vegetation increased from 0 to over 20% of total marsh cover.

Slide 8

Saltmarsh Sparrow

- Total population < 30,000; range Virginia to Maine
- Declining trend: 5% per year
- Nesting habitat at risk due to accelerated sea level rise
- Population Viability Assessment study: projects zero reproduction by 2045-65 (Field, UConn)

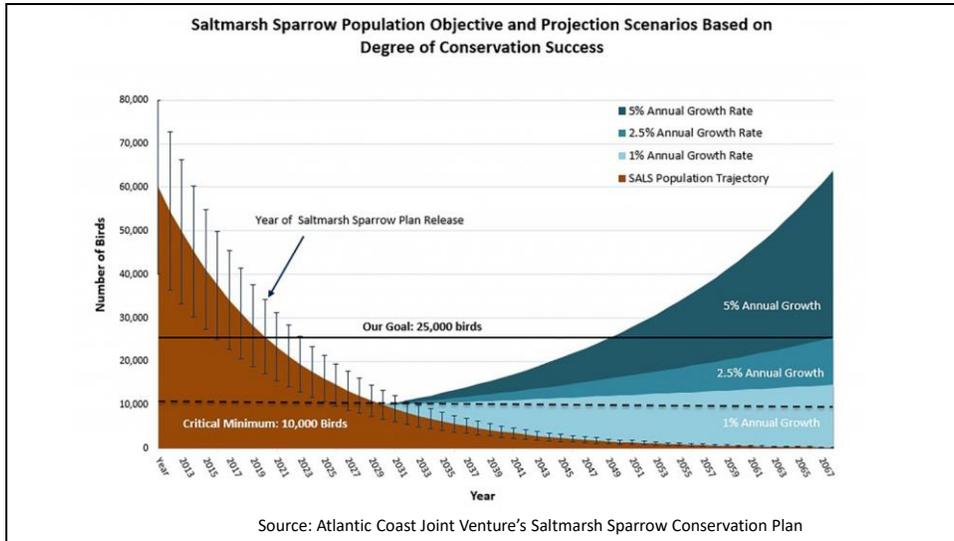


Photo credit: Jeanna Mielcarek (UConn SHARP Lab)



Photos: Suzanne Paton, USFWS Coastal Program

Saltmarsh sparrows are highly vulnerable to these changes in marsh vegetation since they weave their nest out of grasses just inches above the marsh surface. This species has adapted to the regular flooding of the marsh during moon tides by having a short nesting period that can occur within a lunar cycle. The chicks prior to fledging the nest can climb up the grasses above the flooding moon tides to avoid drowning. However accelerated sea level rise has caused increased nest flooding and nest failures. Recent studies document the saltmarsh sparrow population declining at a rate of 5% per year and predictions of the species going extinct by mid-century.



This graph from USFWS' Atlantic Coast joint Venture documents past saltmarsh sparrow population decline in orange and predicts the future population decline based on that rate. The graph also includes potential growth rates in blue based on successful restoration efforts that protect and restore saltmarsh sparrow nesting habitat.

Restoration Goals

- Restore hydrology impacted by past human activities such as agricultural embankments and ditch spoils
- Prevent further marsh subsidence by allowing vegetation to recolonize impounded water areas
- Promote revegetation to increase below ground biomass and the elevation building capacity of the marsh
- Improve saltmarsh sparrow habitat
- Reduce mosquito breeding habitat
- Reduce density of *Phragmites*
- Facilitate marsh migration



Agricultural embankment impounding water on marsh surface



Mosquito breeding habitat in shallow depression

Save The Bay has been conducting salt marsh restoration projects for over 25 years with municipal, state and non-profit partners. The goals of these salt marsh restoration projects include restoring the hydrology of marshes that have been impacted by centuries of human activities including past agricultural activities and mosquito control activities. Through restoring how water flows in and out of marshes, impounded water on the marsh can drain preventing additional subsidence of the peat and allowing plants to recolonize the marsh. The highly productive marsh plants' roots stabilize the bare peat and increase the amount of roots also known as belowground biomass. The productive root system of marsh plants help marshes accrete or build elevation to keep pace with sea level rise.

The marsh restoration goals also include:

- improving the habitat for marsh nesting birds such as the saltmarsh sparrow and willet,
- reducing mosquito breeding habitat and risk to public health by draining impounded water that creates ideal habitat for mosquitoes to
- reducing the extent and the vigor of the invasive plant, *Phragmites* by draining brackish water that creates conditions that allow *Phragmites* to thrive and outcompete native vegetation, and
- improving the ability of the salt marsh to migrate inland by reducing the impounded water along the upper edges of the marsh and reducing the density of *Phragmites*.

Marsh Restoration Strategies

In Marsh

- Drain impounded water through excavation of shallow drainage features (runnels) and maintenance of existing drainage features (ditches)
- Sediment placement to elevate severely degraded marshes so that they can keep pace with sea level rise

Marsh Migration area

- Invasive plant management
- Remove of physical barriers to marsh migration i.e. walls/dams/roads
- Land conservation



Use of low ground pressure excavator to dig runnel into impounded water area



Sediment placement on degraded marsh at Ninigret Pond



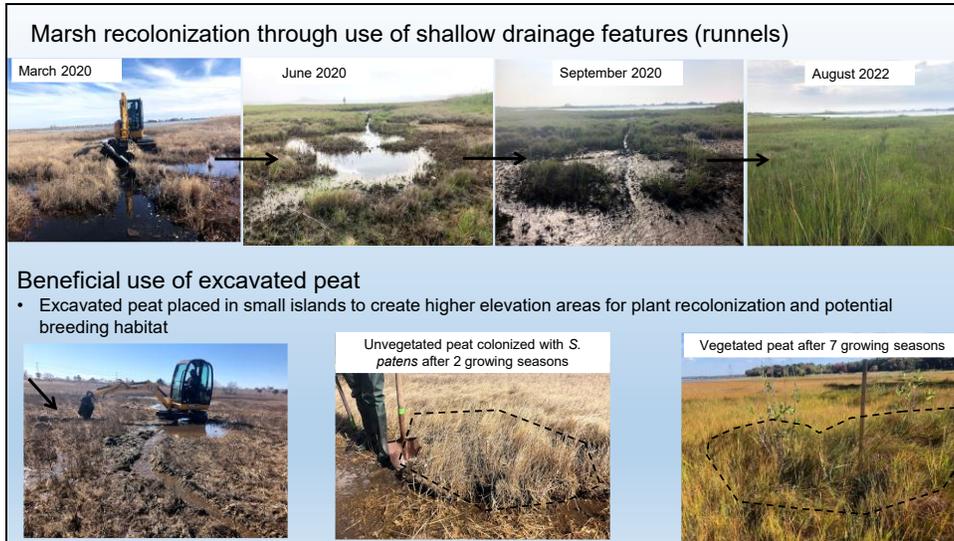
Hand digging shallow runnel to drain impounded water



Marsh grasses growing into former agricultural field that was converted into field of native grasses

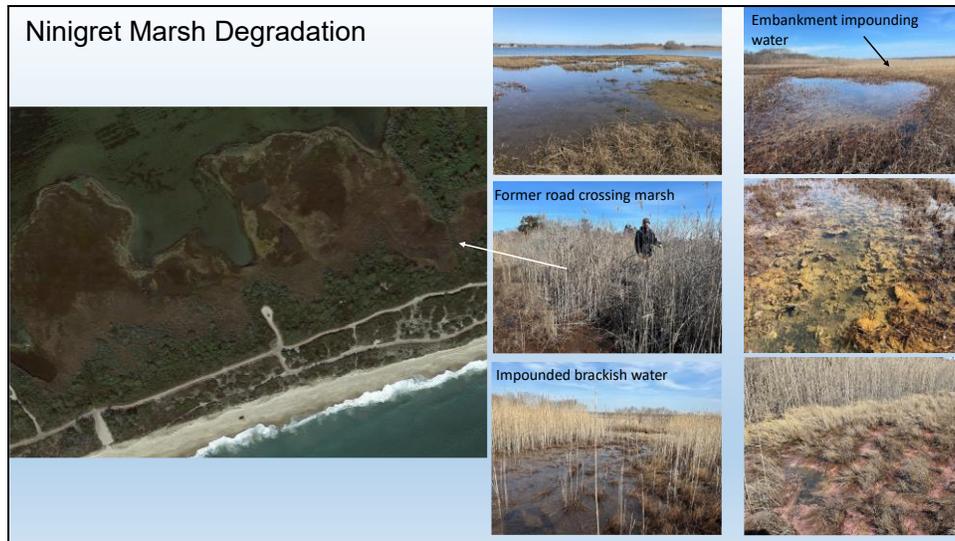
Our strategies to restore these degraded marsh conditions include:

- restoring the hydrology of the marsh drainage through maintaining some of the existing drainage features or ditches and extending shallow drainage features also known as runnels into impounded water areas,
- placing sediment on degraded marshes to elevate the marsh surface so it can revegetate and keep pace with sea level rise, and
- facilitating marsh migration by removing barriers to migration such as agricultural berms or stone walls, removing current infrastructure such as low lying roads, changing land management practices such as converting tilled fields into native grasses, and conserving undeveloped land in the area where salt marshes are projected to migrate.



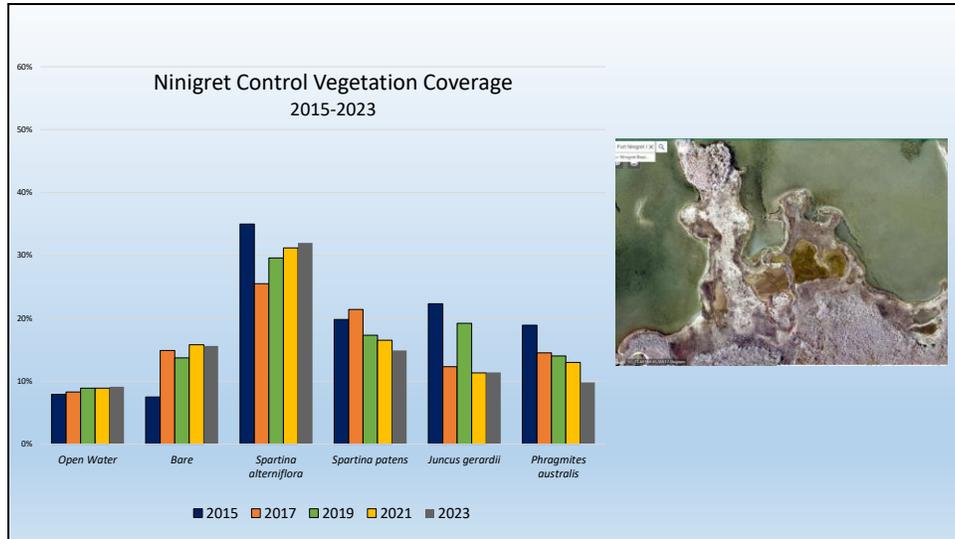
Save The Bay digs the runnels and maintains the ditches either by hand or with the RI Department of Environmental Management's low ground pressure excavator which is designed with large tracks to minimize impact on the marsh. The photos above show a runnel being dug by the excavator into impounded water at Winnapaug Marsh. As the water drained, Save The Bay extended the runnel by hand. After hydrology was restored, the bare areas or soft, unconsolidated sediment began to revegetate. The plants stabilized the peat and the vegetation colonized the bare sediment after 2 growing seasons.

The peat, excavated by hand or excavator, is beneficially used to create small higher elevation areas from 3 to 8 feet wide and up to 12 inches on the marsh platform. The photos highlight the peat being placed by the excavator and revegetation of bare peat in 2 growing seasons at Winnapaug Pond marsh and revegetation with high marsh grasses of a peat island after 7 years on the Narrow River.



At the salt marsh on the north side of the Ninigret barrier beach, the marsh shows similar signs of degradation as marshes throughout the state. There are large areas of shallow impounded water that have caused the vegetation to die-off, algal mats to grow and *Phragmites* to expand. Agricultural embankments and a former road on the marsh impound both salt and brackish water on the marsh surface. The brackish water has caused *Phragmites* to expand and outcompete native marsh grasses. These degraded conditions have resulted in loss of salt marsh and resulted in poor quality habitat for salt marsh nesting birds.

Slide 14



On the USFWS marsh on the north side of the Ninigret barrier, Save The Bay collaborated with USFWS to monitor the marsh vegetation since 2015 prior to restoration. This chart documents the decline in high marsh grasses (*Spartina patens* and *Juncus gerardii*) less tolerant to flooding and the increase in bare areas during that 8 year period.



After state and federal permits were received, the marsh restoration project began in November of 2025. Save The Bay's Restoration Ecologist operated RIDEM's Division of Mosquito Abatement's low-ground pressure excavator to dig shallow runnels to drain impounded water. In areas not accessible for the excavator, staff and interns dug the runnels by hand. Save The Bay will continue to conduct this work in phases in 2026 to allow the unconsolidated sediment in the impounded water areas to drain and stabilize through revegetation.



As part of this collaborative restoration project, Save The Bay will maintain the salt marsh restoration project on the far eastern end of the Ninigret barrier beach to the west side of the Charlestown breachway. The Coastal Resources Management Council working in conjunction with RIDEM and Save The Bay elevated the severely degraded marsh in 2017 using sand dredged from the breachway that was pumped onto the marsh and graded.

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Once the sediment was placed on the marsh, Save The Bay continued the next phase by refining the grading and creating creeks to allow tidal flow onto to the newly placed sediment and to drain freshwater from the upper edges of the marsh.

Slide 18



These photos taken from the same location document the degraded marsh with impounded water before the restoration occurred, the bare sand after the first growing season, and recolonization during the 2nd and 7th growing seasons. Salt marsh seeds from adjacent marshes were brought in with the tides and allowed natural recolonization of marsh plants. In higher elevation areas that were designed to provide area for salt marsh habitat to migrate as sea level rises, upper marsh plants including groundsel tree, bayberry, and *Phragmites* have become established.



Ongoing monitoring of the salt marsh recovery by USFWS, RIDEM and Save The Bay has documented saltmarsh sparrows successfully nesting in the sediment placement restoration area, a target species for this collaborative restoration effort.

Slide 20



These aerial images show the change in the marsh from pre restoration in 2016 to 2 years and 6 years post restoration. In 2016 and 2027, Save The Bay and RIDEM will maintain the creeks installed after the sediment was placed as part of this grant project.