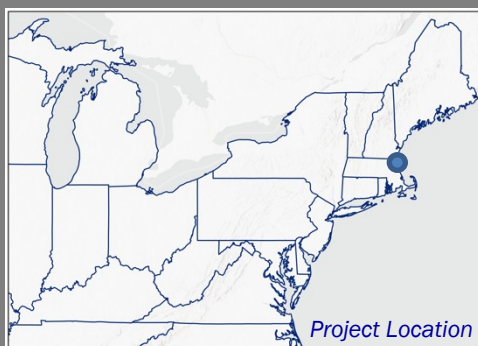


## RESTORATION

# Salt Marsh Habitat Restoration on Parker River National Wildlife Refuge



Parker River National Wildlife Refuge (NWR) protects 4,662 acres of barrier island habitat, including 2,660 acres of salt marsh on the northeastern coast of Massachusetts. The marsh is part of the 20,000-acre Great Marsh and protects neighboring communities from floods, sequesters carbon from the atmosphere, and provides wildlife with nesting habitat, such as Saltmarsh sparrows (*Ammodramus caudacutus*). Historic land management practices have altered the marsh's ability to periodically flood and drain with the tides. To restore the marsh's hydrology, refuge staff and partners conducted pilot studies of nature-based restoration techniques from 2014 to 2020. In 2021, they used a combination of these strategies to restore 100 acres of salt marsh.



Project Location



Salt Panne Within the Marsh on Parker River NWR/USFWS

## KEY ISSUES ADDRESSED

From the 1600s to the 1900s, drainage ditches were dug throughout salt marshes on the East Coast to increase crop production and reduce mosquito populations. Prolonged drainage caused peat soil in the marsh to decompose, sinking the marsh and making it more susceptible to flooding. Lack of maintenance caused the ditches to clog by the early 2000s. As a result, large water pools formed throughout the refuge and drowned out high marsh plants, leaving low marsh grasses to take their place. Saltmarsh sparrows build their nests in the highest parts of the marsh to keep their eggs and chicks from drowning. Lack of suitable nesting habitat has caused their populations to decline.

## PROJECT GOALS

- Restore the periodic flooding of tidal waters throughout the entire marsh surface.
- Restore healthy marsh vegetation so that it can keep up with sea level rise.
- Increase nesting success for the saltmarsh sparrow.
- Increase the marsh's ability to mitigate storm damage and flooding in adjacent communities.

## RESTORATION PARTNERSHIPS

Refuge staff worked with academics and private contractors to design and plan the restoration. Specialized equipment from the local mosquito control district was used in the pilot project.



Wildlife Biologist Holds a Saltmarsh Sparrow/USFWS

## PROJECT HIGHLIGHTS

**Digging Runnels:** Runnels are shallow channels that drain pools of standing water. In 2015, scientists dug two runnels to drain a 3.52 hectare pool. By 2019, about 60% of the pool had drained (Pau, 2022). Between 2020 and 2021, staff created 23 additional runnels.

**Healing Ditches with Hay:** From 2014-2017, scientists added bundles of native salt marsh hay to 17 ditches to encourage peat soil development and vegetation growth. By 2017, the ditches increased in elevation by 15 cm on average. Salt marsh grass grew in treated ditches shallower than <15 cm (Burdick et al., 2017). In 2022, refuge staff remediated 30 additional ditch segments.

**Removing Ditch Plugs:** Between 2015 and 2020, staff removed ditch plugs from 12 sites to increase drainage. After removal, the percent of time the sites were inundated dropped from an average of 94% to 18% (Stuntz, 2021).

**Creating Saltmarsh Sparrow Habitat:** In 2021, staff used sediment excavated from digging runnels to create 60 microtopography islands. The islands increase marsh elevation and provide saltmarsh sparrows with more nesting grounds. By 2022, all islands exhibited 80 to 100% native vegetation cover, with three quarters primarily growing high marsh vegetation (DiNunzio et al 2023).

## Collaborators

- See online for full list of partners

CART Author: Belen Delgado, USFWS Maintenance and Infrastructure Fellows Program, June 2024.

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Visit CART:



## LESSONS LEARNED

Promising results from the pilot studies gave state regulators the confidence to permit restoration projects across the refuge. The results also encouraged conservation partners to take action. In 2020, The Trustees of Reservations remediated ditches to restore 85 acres of the Great Marsh. The following year, they were granted \$1 million to rehabilitate 1,274 acres of the marsh, with several of the land tracts belonging to other conservation partners. Working together to restore the Great Marsh has allowed refuge staff and their partners to plan projects that work best for the ecosystem without focusing on land ownership boundaries.

In addition to their pilot studies, refuge staff monitored the effects of a 2018 Nor'easter that deposited large volumes of sediment on salt marshes across New England. Much like this event, thin layer deposition is a restoration technique in which dredged material is applied to the marsh's surface to increase elevation. Data gathered from this event can be used to develop thin layer deposition projects in the future.

## NEXT STEPS

- Restore 1,450 acres of refuge land from 2024-27
- Determine whether marsh restoration is increasing saltmarsh sparrow productivity
- Monitor marsh hydrology and elevation to understand the benefits of combining techniques
- Implement nature-based solution restoration techniques throughout 8,000 acres of the Great Marsh on refuge and partner lands within the next 10 years

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Volunteers Work With Refuge Staff to Rake Hay Into a Ditch/USFWS