Hydrology and vegetation responses to runneling of degraded, waterlogged salt marsh in New England

David Burdick, **Grant McKown**, **Gregg Moore** and **Jenny Gibson** (University of New Hampshire, Durham, NH 03824),
Wenley Ferguson (Save The Bay, Providence RI 02905), **Geoff Wilson** (Northeast Wetland Restoration, Berwick, ME 03901),
Susan C. Adamowicz (Rachel Carson NWR, Kennebunkport, ME 04043), **John Herbert**, Mass Audubon, Lincoln, MA 01773)

Colonial agriculture in New England began in salt marshes via embankments and drainage systems (Figure 1).

Figure 1. Every salt marsh was a farm. . . and what is left

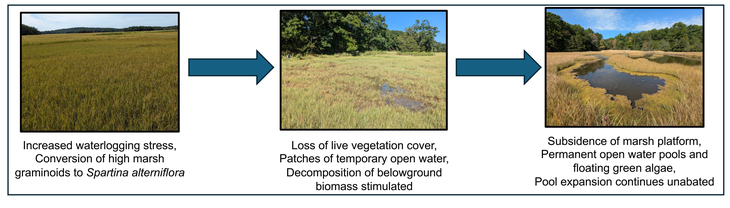
"*Repairing a* dyke" by Azor Vienneau; Nova Scotia Museum
Accession number 87.120.2

American Farmer, 1824

After abandonment, these legacy features have continued to impair hydrology, leading to the formation of waterlogged basins of short *Spartina alterniflora* (pannes) or deep pools (mega-pools; Figures 2-3).

Figure 2. Pool formation in Hampton Falls, NH

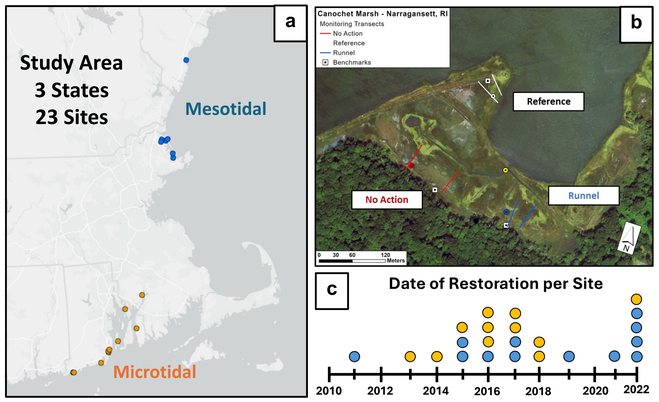
Figure 3. Waterlogging Subsidence Trajectory



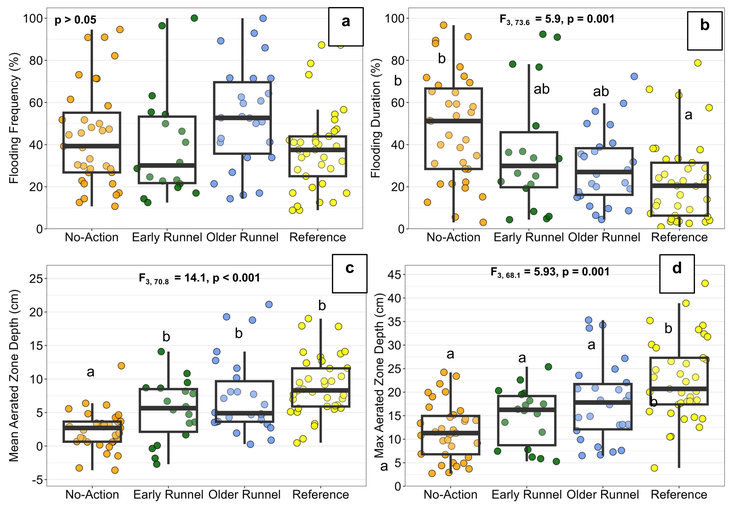
Runnels (shallow drainage features) were installed so regular tidal flooding and draining would restore high marsh vegetation (Figure 4).

By design, runnels (teal lines) minimize physical impacts using hydrology to restore at the speed of nature (Figure 5).

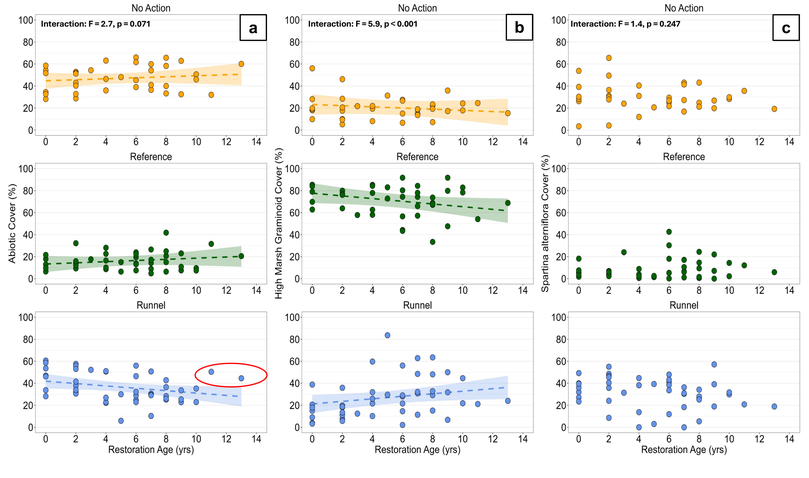
We monitored 23 marshes from ME to RI where runnels were installed 2 - 12 years ago to determine if this technique can restore sparrow habitat (Figure 6).



Water level recorders installed in peat near runnels showed deeper drainage during neap tides (Figure 7).



We sampled the vegetation community and used space for time substitution of the 23 marshes (runnel, reference, and no-action control plots). Runnels halted pool expansion and revegetated with graminoids (Figure 8), but deeper areas remained bare for years.



Funding provided by Atlantic Coast Joint Venture (F21AP00933-00) through the US Fish and Wildlife

Special Thanks!
Barbara Spiecker
Tiffany Chin
Nathan Hermann
Katie Low
Liz Gorrill
Nick Ernst
Ben Gaspar
Andrew Payne
Chris Peter
Natalie White
Lauren White
Kim Arlen

Reference Materials

Estuaries and Coasts (2020) 43:1672–1679
https://doi.org/10.1007/s12237-019-00634-5
SPECIAL ISSUE: HURRICANE SANDY IMPACTS AND RESPONSES
Mitigating the Legacy Effects of Ditching in a New England Salt Marsh
David M. Burdick · Gregg E. Moore · Susan C. Adamowicz · Geoffrey M. Wilson · Chris R. Peter
Received: 16 April 2019 / Revised: 16 September 2019 / Accepted: 9 October 2019 / Published online: 9 December 2019
© Coastal and Estuarine Research Federation 2019

SALT MARSH RESTORATION INSIGHTS
Wetland Science & Practice July 2020
Farmers in the Marsh: Lessons from History and Case Studies for the Future
Susan C. Adamowicz, Geoffrey Wilson, David M. Burdick, Wenley Ferguson, and Russell Hopping

Journal of Coastal Research | 40 | 6 | 1141–1150 | Charleston, South Carolina | November 2024
Evaluation of Drainage Enhancement for Vegetation Recovery in New England Salt Marshes Using Public Domain, High-Resolution Aerial Imagery
J. Grant McKown†, David M. Burdick‡, Gregg E. Moore†, Jennifer L. Gibson†, and Wenley Ferguson§
†Jackson Estuarine Laboratory, School of Marine Sciences and Ocean Engineering, University of New Hampshire, Durham, NH 03824, U.S.A.
‡Department of Biological Sciences, University of New Hampshire, Durham, NH 03824, U.S.A.
§Save the Bay, Providence, RI 02905, U.S.A.

Wetlands (2023) 43:35
https://doi.org/10.1007/s13157-023-01683-6
WETLAND RESTORATION
Runnels Reverse Mega-pool Expansion and Improve Marsh Resiliency in the Great Marsh, Massachusetts (USA)
J. Grant McKown† · David M. Burdick‡ · Gregg E. Moore† · Christopher R. Peter† · Andrew R. Payne† · Jennifer L. Gibson†

Wetlands Ecol Manage
https://doi.org/10.1007/s11273-021-09635-3
ORIGINAL PAPER
"Waffle" pools in ditched salt marshes: assessment, potential causes, and management
Joseph A. M. Smith · Susan C. Adamowicz · Geoffrey M. Wilson · Ilia Rochlin

JGR Earth Surface
RESEARCH ARTICLE
Widespread Expansion of Salt Marsh Pools Observed on Maine Marshes Since 2009
K. DeWitt[1], W. Kerchitsky[1], R. Ellis[1], P. Morrill[1], M. Pittsley[1], P. Morgan[1], C. Burns[1], A. Campbell[2,3], and S. Adamowicz[1]
[1]School of Marine and Environmental Programs, University of New England, Biddeford, ME, USA, [2]Wassaskeag Bay National Estuarine Research Reserve, Mill Annapolis, MD, USA, [3]Scotland Neck High Crime, NASA, Rockville, MD, USA, [4]Scotland Earth Sciences Technology and Research II, University of Maryland, Baltimore County, MD, USA, [5]Rachel Carson National Wildlife Refuge, Wells, ME, USA

We monitored 23 marshes from ME to RI where runnels were installed 2 - 12 years ago to determine if this technique can restore sparrow habitat (Figure 6).

***S. alterniflora* colonized bare pannes; areas dominated by short *S. alt.* showed increases in *S. patens, Distichlis spicata* and *Juncus gerardii* (Figure 9), preferred nesting habitat for saltmarsh sparrows (Figure 10).**

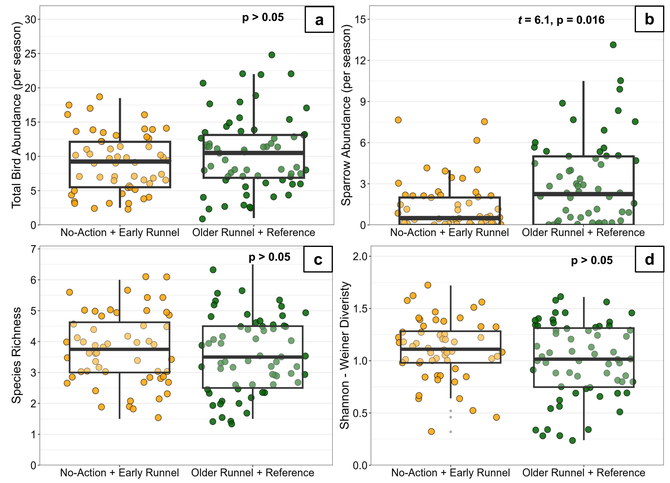
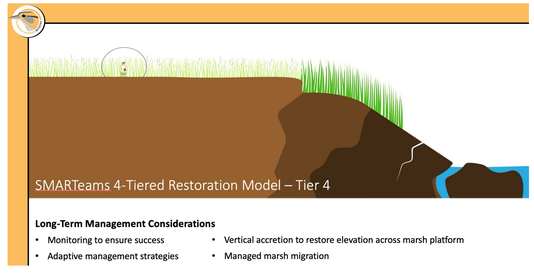



Figure 10 *Banded female Saltmarsh Sparrow. Talia Kuras*