

Mattapoisett Land Trust, Inc.

Habitat Restoration Plan for the Mattapoisett Salt Marshes Initial Technical Review Meeting, November 17, 2023 Mattapoisett Fire Station Training Room, 62 County Road (Rt. 6), Mattapoisett

Agenda

10:00 am:	Introductions, briefly review roles of all participants (Mike Huguenin)	
10:10 am:	Review work plan and intended project outputs (Mike Huguenin)	
10:20 am:	Review status of companion hydrology study funded by DER/BBC (Mitch Buck, Jason Clermont)	
10:30 am:	Review/discuss results of initial site evaluation and resource delineation (Adam Finkle, then all)	
10:50 am:	Identify and discuss data sets and relevant studies that should be reviewed by the project team, for example:	
	BBC marsh monitoring at Molly's Cove and elsewhere, BBC runnel experiments (Rachel Jakuba)	
	past and ongoing work in Mattapoisett marshes by BBNEP (Joe Costa)	
	imagery and other data available from PCMCP (Ross Rossetti)	
	storm water and other data available to the Town of Mattapoisett (Garrett Bauer)	
	others?	
11:20 am:	Revisit tasks and schedule going forward (Mike Huguenin, and all)	

11:30 am: Adjourn (room available until 12 noon if necessary)



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Project People

Grantee:	Mattapoisett Land Trust, Inc. (MLT) Mike Huguenin and Colleen Andrews
Partners:	Mattapoisett Select Board (Mike Lorenco)
	Mattapoisett Highway Surveyor (Garrett Bauer)
	Mattapoisett Conservation Commission (Brandon Faneuf)
	Buzzards Bay Coalition (BBC) (Rachel Jakuba, Sara Quintal, Jason Clermont)
	Buzzards Bay National Estuary Project (BBNEP) (Joe Costa)
	Plymouth County Mosquito Control Project (PCMCP) (Ross Rossetti)
Subcontractors:	Woods Hole Group, Inc. (Adam Finkle, Mitch Buck)
	Greenman Pedersen, Inc. (Kim Armstrong)
Sponsor:	Mass CZM Coastal Habitat and Water Quality Program Adrienne Pappal Lexie Neffinger Marc Carullo Sam Haines

Mattapoisett Neck Salt Marshes - Study Area - Drone Footage





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Project Work Plan Summary

- I. Assessment of Existing Marsh Conditions (December 31)
 - a) Review existing and recent aerial imagery, on-the-ground site evaluation and delineation of resource areas, review existing data sets
 - b) Initial technical review meeting, November 17th
- II. Projection of Future Marsh Conditions (January 31)
 - a) Project future conditions using SLAMM and MC-FRM data sets
 - b) 50 year time horizon, e.g. out to ~ 2070

III. <u>Potential Restoration Actions: develop, evaluate, prioritize (March 31)</u>

- a) List potential restoration actions with promise
- b) Second technical review meeting, early February
- c) Finalize restoration actions list, and prioritize (concrete actions, ecological focus, implementable within 5 years)

IV. Habitat Restoration Plan, and Restoration Action Planning (June 30)

- a) Draft, then Final Restoration Plan reporting all project results
- b) Restoration Action Plans for 3-4 specific actions, including detailed descriptions, designs, cost estimates, schedules and permitting needs
- c) Third technical review meeting, early to mid May
- d) One Restoration Action Plan will be a 25% design for a replacement culvert under Mattapoisett Neck Road at Molly's Cove. This will be completed by Kim Armstrong of GPI, using H&H modeling by WHG provided under separate contract with BBC.

Images from Joe Costa 1 of 2



Images from Joe Costa 2 of 2





Mattapoisett Neck Habitat Restoration Plan

Technical Review Meeting

Adam Finkle Woods Hole Group Coastal Scientist, PWS, CERP afinkle@woodsholegroup.com Mike Huguenin President Mattapoisett Land Trust <u>m.huguenin@comcast.net</u>









Companion Study 2023 Field Data Collection Program for BBC

- 1) Aerial Drone Survey Imagery & Topography
- 2) Confirmatory Topography & Wading Survey
- 3) Tides & Salinity Measurements

Inform Model Development

Aerial Drone Survey

- September 28, 2023
- Facilitated by Center for Coastal Studies
- Photogrametric Approach





Topographic Survey

- Confirmatory measurements to ground truth drone data
- Survey Grade Real Time Kinematic (RTK) GPS Unit
- Collected survey data from marsh surface, channels, and shallow bathymetry (wading)
- Datums: Massachusetts State Plane Mainland (feet) and NAVD88 (feet)



Tide Study

- Deployed six (6) water level (tide) gauges for 30 days
- Gauges deployed either side of each culvert
- One each in Harbor & Hammonds Cove
- Salinity at one station



Mollys Cove, Mattapoisett 2023 - All Tides



Resource Area Delineation

1) Document Existing Conditions

• Salt Marsh, Mudflat, Coastal Bank, Land Subject to Coastal Storm Flowage

High and Low Marsh Plains Observed *S. alterniflora* and *D. spicata* – dominant
All banks low-lying and gradual
BVW supported by groundwater flows
Large Area!

2) Identify Key Stressors

 Sedimentation, Channel In-Filling, Poor Drainage, Nutrification, Stunting & Die-Back, Mudflat Expansion, etc.



Virtual Site Walk

1) Document Existing Conditions

- Low-grow S. alterniflora
- Low-lying coastal bank
- Regular BVWs

2) Identify Key Stressors

- $\circ~$ Saturated marsh plain
- Groundwater inputs
- $\circ~$ Infilled channels







Numerous Hummocks

Infilled Channel

Groundwater Inputs

> Groundwater Inputs

Dieback

Virtual Site Walk

1) Document Existing Conditions

- Numerous Hummocks
- Direct Streamflow
- North = Low Marsh
- South = High Marsh

2) Identify Key Stressors

- \circ Nutrients
- Stormwater Impacts
- Invasive Species







Outfall / Streamflow

Little impediment to tidal flow

Extensive Phragmites High Marsh

Virtual Site Walk

1) Document Existing Conditions

- Variable Marsh Condition
- Numerous BVWs
- Expansive Mudflat

2) Identify Key Stressors

- $\circ~\mbox{Supersaturation}$
- $\circ~$ Stunted Vegetation
- $\circ\,$ Channel Infilling





Supersaturated Marsh Surface

Channel Infilling

Streamflow

Persistent Upland Vegetation





Opportunities Abound

- Tidal Flow Restoration
- Creation of runnels to drain ponded areas on the marsh
- Facilitate future marsh migration
- Invasive species management
- Channel restoration
- Thin layer deposition
- Marsh crab mitigation
- Restoration plantings

Recent DEP Guidance:

- DEP has developed permitting guidance for ditch remediation, runneling, and marsh island creation
- DEP is investigating targeted thin layer deposition
- DEP is updating regulations to support climate resilience measures
- DEP is updating regulations to salt marsh restoration
- DEP is creating wetland regulations guidance for consistency across agencies
- Ditch remediation, runneling and marsh islands can only be permitted as a Ecological Restoration Limited project. BUT MassDEP is working on a regulatory package that will streamline these activities.



Questions?

Adam Finkle Woods Hole Group Coastal Scientist, PWS, CERP afinkle@woodsholegroup.com Mike Huguenin President Mattapoisett Land Trust m.huguenin@comcast.net

Salt marsh long-term monitoring

- Motivated by observations of marsh loss/degradation
- Launched in 2019 to track condition and changes over time in elevation, vegetation, key animals
- Partnership with BBNEP
- 12 sites with transects that go from upland edge to water
- ~20 quadrats/site along transects



Salt marsh long-term monitoring

- Elevation every 2m along transect, related to permanent benchmarks
- Vegetation at each quadrat
 - Photograph
 - Species present
 - Stem/canopy height of *S alterniflora*, *S patens*, *P australis*
 - Stem count of S alterniflora
 - Percent cover/bare by point-intercept
- Fauna
 - Counts of snails, ribbed mussels, crab burrows at each quadrat
 - Thatch height at each quadrat
 - Counts and carapace width of crabs using crab pit traps at 5 locations per site once per summer



Pilot runnelling technique as SLR mitigation tool

- Runnels are small channels to create tidal connection between shallow water on marsh surface and a creek, draining root zone
- Pre-monitoring in 2020, runnels created Oct 2020 Feb 2021, post-monitoring thru 2023
- Partnership with Woodwell, Save the Bay RI, BBNEP, USGS, Bristol County Mosquito Ctl







Pilot runnelling technique as SLR mitigation tool

- Monitoring:
 - Vegetation metrics
 - Photo stations
 - Elevation
 - Soil characteristics
 - Water level
 - Shear strength
 - Decomposition

Estuaries and Coasts https://doi.org/10.1007/s12237-021-01028-8

PERSPECTIVES

Buying Time with Runnels: a Climate Adaptation Tool for Salt Marshes

Alice F. Besterman^{1,2} • Rachel W. Jakuba¹ • Wenley Ferguson³ • Diana Brennan⁴ • Joseph E. Costa⁵ • Linda A. Deegan²

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Abstract

A prominent form of salt marsh loss is interior conversion to open water, driven by sea level rise in interaction with human activity and other stressors. Persistent inundation drowns vegetation and contributes to open water conversion in salt marsh interiors. Runnels are shallow channels originally developed in Australia to control mosquitees by draining standing water.





