

ECAC & DNR Saltmarsh Proposal to CPC

**Gerry Stahl & Greg Berman
November 2024**



Summary

- **ECAC Mission:**

To reduce Chatham’s contribution to climate change, and to execute mitigation actions and adaptation strategies that anticipate and respond to the effects of climate change. A major focus is on the preservation of salt marsh – to sequester CO₂, to mitigate storm surge and to adapt to sea level rise and flooding.

- **Project Strategy:**

Our project strategy for salt-marsh preservation focuses on studying the floodplain (elevation, sedimentation, vegetation, tidal dynamics), predicting changes to marsh conditions, and clearing barriers to marsh migration within the floodplain. The preservation of salt marsh can involve removing tidal restrictions, facilitating natural marsh migration processes and technical interventions, including supplementing sedimentation.

- **CPC Grant Proposal:**

Title: “Field Studies to Preserve Open Space for Salt Marshes”

Description: The Energy and Climate Action Committee (ECAC) of the Town of Chatham along with the Town’s Director of Natural Resources request \$140,000 for the second year of its effort to study Chatham salt marshes, predict their response to climate change, and facilitate salt-marsh migration in response to predicted sea-level rise.

The marsh preservation problem

“Most of the world’s salt marshes could succumb to sea level rise by the turn of the century.”

- “Cape Cod’s salt marshes are as iconic as they are important. These beautiful, low-lying wetlands are some of the most biologically productive ecosystems on Earth. They play an outsized role in nitrogen cycling, act as carbon sinks, protect coastal development from storm surge, and provide critical habitats and nurseries for many fish, shellfish, and coastal birds.”
- “And, according to new research from the Marine Biological Laboratory (MBL), more than 90 percent of the world’s salt marshes are likely to be underwater by the end of the century.”

These findings come from a 50-year study in Great Sippewissett Marsh in Falmouth, Massachusetts: Valiela, I., Chenoweth, K., Lloret, J., Teal, J., Howes, B., & Toner, D. G. (2023). Salt marsh vegetation change during a half-century of experimental nutrient addition and climate-driven controls in Great Sippewissett Marsh. *The Science of the Total Environment*. DOI: [10.1016/j.scitotenv.2023.161546](https://doi.org/10.1016/j.scitotenv.2023.161546).

Long-range plan for preservation

Chatham faces an inflection point in its planning for the future. If no new actions are taken, Chatham's carbon footprint will continue to increase, salt marshes will shrink, and homes will be flooded. However, if steps are begun to actively preserve salt marshes, the marshes can serve as carbon sinks, as buffers for storm surge, and as drains for flooding of nearby properties.

Year I – current CPC grant for 2024

Study four marshes along Nantucket Sound. Establish baseline maps of elevation, vegetation, sedimentation. Predict marsh futures.

Year 2 – new CPC proposal for 2025

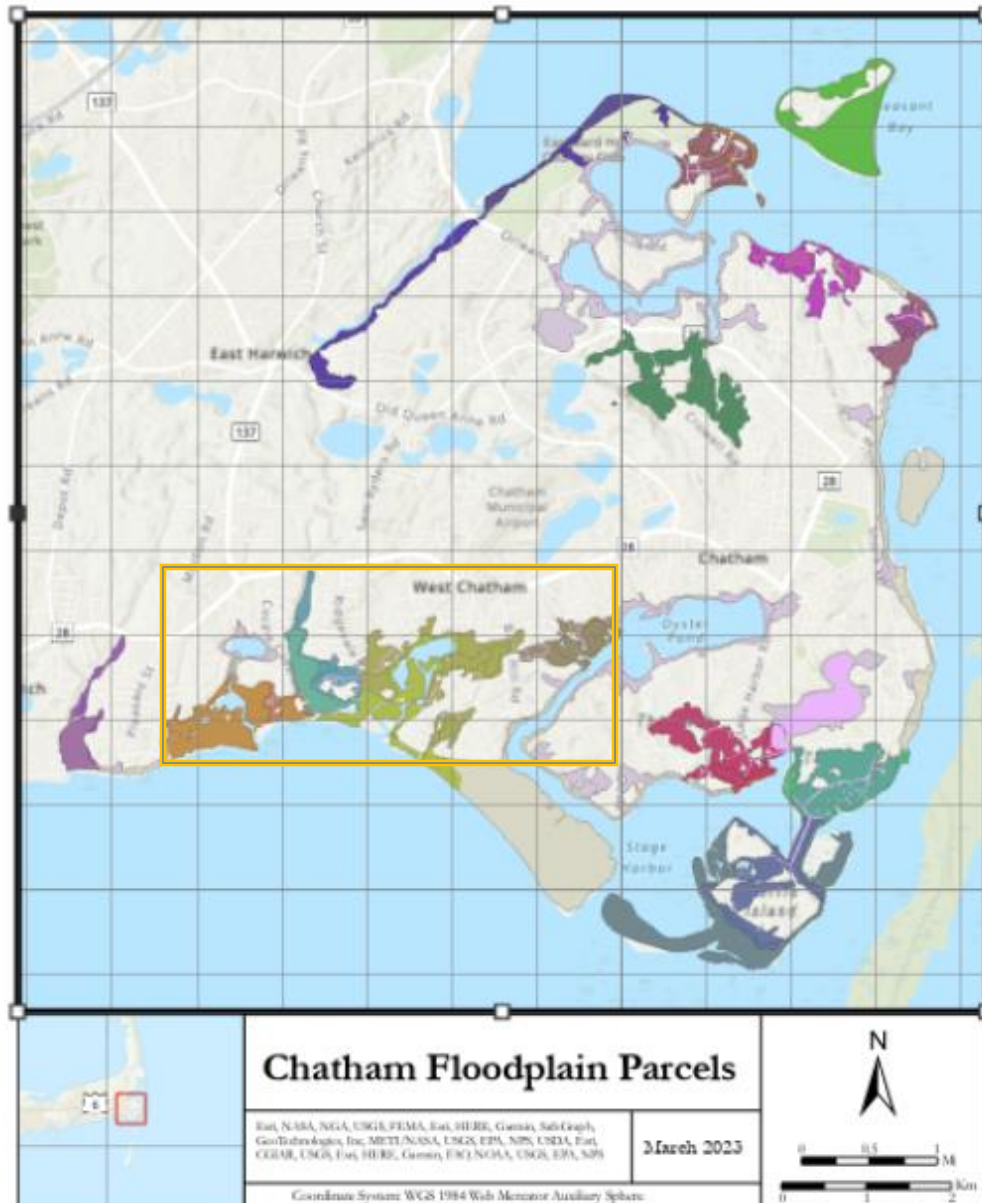
Study the other Chatham marshes. Establish baseline maps of elevation, vegetation, sedimentation. Predict marsh futures.

Future

Initiate interventions to preserve the salt marshes. Acquire wetland properties to ensure conservation and open space.

Salt Marshes in Chatham

-  Bucks Creek
-  Champlain Creek
-  Cockle Cove
-  Cotchpinicut
-  Forest Beach
-  Frost Fish Creek
-  Minister's Point
-  Morris Island
-  Muddy Creek
-  Nickerson Neck
-  Oyster River
-  Red River
-  Strong Island
-  Tom's Neck



2024 grant:
Bucks Creek
Cockle Cove
Forest Beach
Oyster River

2025 proposal:
Champlain Creek
Cotchpinicut
Frost Fish Creek
Minister's Point
Morris Island
Muddy Creek
Nickerson Neck
Red River
Tom's Neck

Model of salt-marsh preservation

Intertidal salt marsh --

Salt marsh lives on the land between low tide and high tide.

Sedimentation raises the land and sea-level rise raises the tides.

The difference between these two rates predicts salt-marsh preservation.

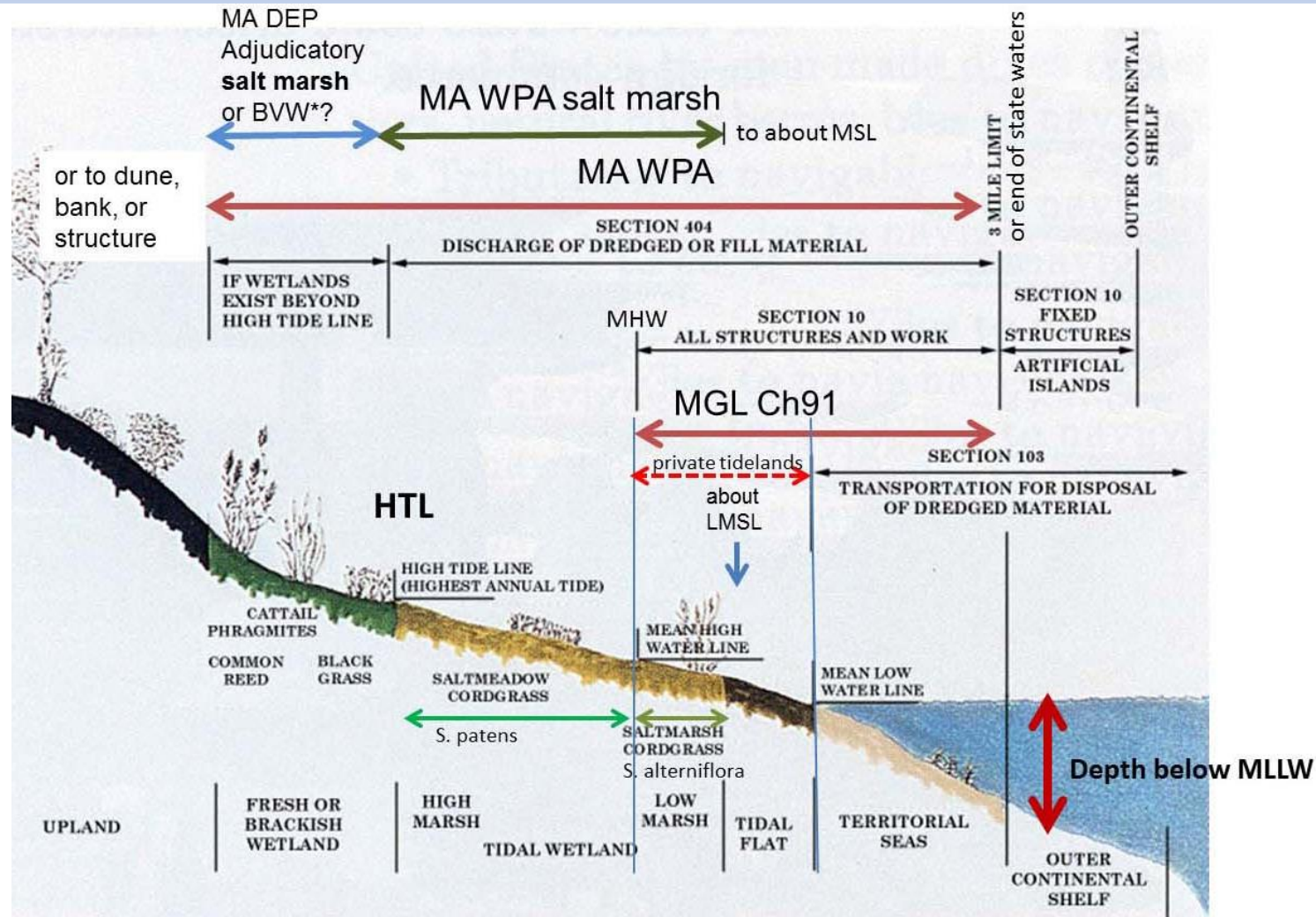
Predicted salt-marsh preservation = Elevation + Sedimentation – Sea-Level Rise

Future salt-marsh intertidal range can be predicted by taking the current ground elevation, adding anticipated accretion of marsh floor by ongoing sedimentation, and subtracting interim sea-level rise.

If the rate of sea level is greater than the sedimentation rate, then the marsh will drown and become open sea, no longer offering protection from storm surge.

Currently available elevation contours are not detailed enough for analysis of salt marsh preservation and there is little available data on sedimentation rates in the Chatham marshes. There is also a need for baseline maps of vegetation (such as phragmites) to measure future success in marsh preservation.

Salt marsh defined by tides



Tidal datums, salt marsh boundaries, and coastal wetlands and their regulation under state and federal laws. HTL = high tide line, MHW = mean high water, MA WPA Massachusetts Wetlands Protection Act.

Scope of services for CPC grant

Studies for marsh preservation

A. Elevation

- Conduct a drone survey to provide current, precise elevation contours of the floodplain around each of the marshes.
- Conduct a boat-side survey to provide current, precise elevation contours of marsh seafloor.

B. Land use (vegetation)

- Conduct a drone survey and on-ground transects to map the vegetation in the floodplain and the marshes (including marsh grasses and invasives).

C. Accretion rate

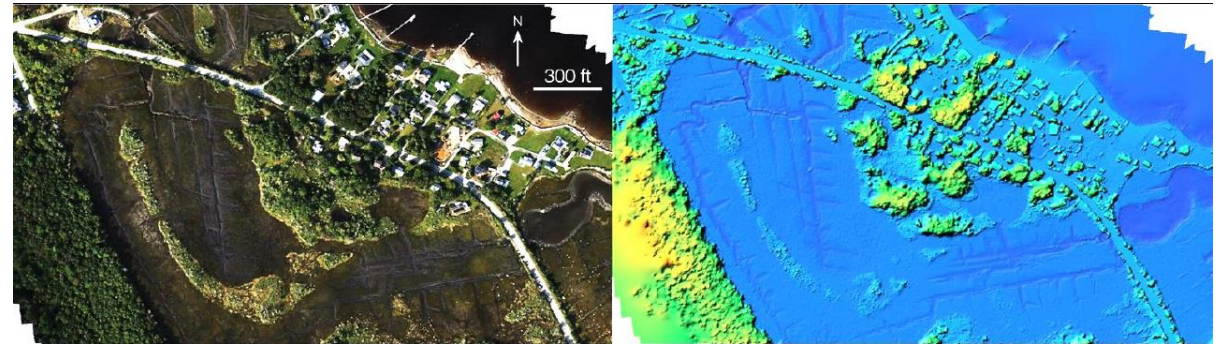
- Collect samples of current sedimentation in the marshes.
- Collect core samples, indicating evidence of historical accretion rates.

D. Analysis and recommendations

- Develop GIS analysis incorporating findings from above studies with MC-FRM maps for predicted flooding in 2050, 2070, 2100.
- Highlight areas of potential marsh migration.
- Provide recommendations for marsh preservation.

Status of current grant

Tasks		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Task 1. Elevation													



Status of current grant

Tasks		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Task 1. Elevation													
Task 2. Bathymetry													



Status of current grant

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Task 1. Elevation													
Task 2. Bathymetry													
Task 3. Vegetation													



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Task 1. Elevation													
Task 2. Bathymetry													
Task 3. Vegetation													
Task 4. Sedimentation													



Status of current grant

To be fully performed on or before January 31, 2024

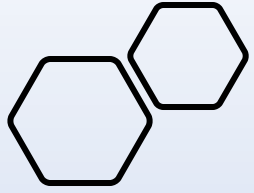
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Task 3. Vegetation													
Task 4. Sedimentation													
Task 5. Analysis and Recommendations													
Task 6. Report & Meetings													

- Predictions for future salt marsh extent in 2050, 2070 and 2100
- Potential areas of salt migration, either natural or with human intervention, will be documented and discussed
- Suitability ranking for salt marsh **intervention** options and likelihood of success
 - allowing, encouraging, or re-directing salt marsh migration,
 - thin layer placement of sediment,
 - the planting of vegetation,
 - and other practicable mitigation efforts

Marshes Protect Chatham



What Can We Do To Protect Marshes ?



Questions?
Comments?
Reactions?

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