



Enhancing Coastal Resiliency with Tidal Marsh Restoration at Crab
Meadow Marsh

Request for Proposals

January 13, 2025



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Project Goals

The goals of this project are to 1) increase ecosystem function and species diversity by creating, restoring or enhancing high marsh meadow habitat and 2) increase salt marsh resiliency to sea level rise.

Background

Crab Meadow Marsh/James A. Ambro Memorial Wetland Preserve (CMM) is a 250-acre complex along the North Shore of Long Island (40.9247, -73.3214) owned by the Town of Huntington (Fig. 1). As the largest contiguous salt marsh on the North Shore, CMM has been recognized by the Long Island Sound Study (LISS) as a Stewardship Area for its ecological and recreational importance to Long Island Sound and its residents. The New York Department of State has identified the CMM and beach as a Significant Coastal Fish & Wildlife Habitat due to its abundant bird, fish, and shellfish populations. In addition, Crab Meadow has been identified as a priority site for birds by Audubon, the US Fish and Wildlife Service (USFWS), and the Atlantic Coast Joint Venture.

Due to its ecological importance, concerns are mounting over continued loss of marsh habitat due to erosion. Between 1974 and 2005, creek and ditch width at CMM increased 1-72ft (152-2800% change in size), and the marsh lost 61.6% of its high marsh extent and 20 acres of marsh overall (Cameron Engineering & Associates LLC, 2015). While the Sea Level Affecting Marshes Model indicates that the CMM can withstand some sea level rise, existing areas of high marsh are predicted to be replaced by low marsh habitat, many areas of marsh will convert to open water, and dry land adjacent to the marsh will see an increase in inundation. An updated assessment using the 1887-2016 USGS CoNED Topobathymetry (compiled 2016) DEM and local water level data collected by the USFWS in 2023 estimated that over 90% of the marsh surface is currently below the mean high water elevation, evidence that the marsh is transitioning from a high marsh to low marsh system and, without intervention, it will continue to transition due to increased flooding. This project aims to restore the ecosystem at CMM to make the site more resilient to climate change, retain ecosystem services, and provide the habitat necessary for fish, invertebrates, and birds like the Saltmarsh Sparrow.

Site Description

Crab Meadow is a back barrier marsh dominated by short form *Spartina alterniflora*, with invasive *Phragmites australis* encroaching along the perimeter. The west and east are bordered by low-density residential development, in the north there are seasonal homes along the barrier beach, and to the south is undeveloped woodland, county parkland, and a golf course. The Crab Meadow watershed encompasses an area of approximately 3,560 square acres of land that drains directly to Crab Meadow Beach and the surrounding salt marshes and intertidal beaches before draining into Long Island Sound.



Figure 1. Site map with the Town of Huntington property outlined in blue. (Imagery source: USDA National Agricultural Imagery Program, 2019).

Scope Overview:

Audubon New York is seeking a qualified engineering firm/consultant to co-lead a collaborative project design effort. The successful firm will work with Audubon and project partners to leverage existing data collected by USFWS; collaborate on supplemental field investigations; develop a suite of project design alternatives that may be employed on site; lead an iterative project design process that will incorporate feedback from project partners, the Project Advisory Committee (PAC) and stakeholders; and produce project design plans and cost estimates.

Proposals should include project understanding, background and design approach, and a detailed description of tasks required to meet the project goals. The proposal should include an anticipated timeline for completion and costs for each individual task.

Applicants should demonstrate proven experience with EPA QAPPs or similar, salt marsh ecological restoration, hydrologic and hydraulic modeling in tidal environments, relocation and placement of dredged material, nature-based solutions, habitat mapping, hydrologic improvement techniques like runneling and ditch remediation, culvert assessments and replacement design, environmental permitting, and project management.

Modification of tasks based on consultant input and experience is encouraged as long as Audubon is given advance notice.

Phased Approach

Due to the timing of funding opportunities, we are anticipating the work to be completed in phases. In Phase 1, the firm will leverage existing data collected by USFWS (See Appendix C for StoryMap detailing existing data) to develop an existing conditions report, drainage evaluation, and preliminary restoration schematic with a rough cost estimate. Ideally, this preliminary conceptual design will be used for a grant application that Audubon and partners are targeting for mid-April 2025. In Phase 2, the consultant will complete the EPA Quality Assurance Project Plan (QAPP) for the remaining work; perform an alternatives analysis of project designs; complete 30%, 60%, 90%, and 100% design plans; identify and secure necessary permits; and prepare the bid package for implementation.

Scope Detail

Phase 1

Task 1 Project Management and Coordination

The firm will oversee the engineering services project and manage subcontractors (if required) during Phase 1 and throughout all phases to ensure the project remains on schedule and within budget.

Responsibilities include selecting subcontractors, facilitating communication among the project team, coordinating and documenting project objectives, managing deadlines, distributing documents for client and stakeholder feedback, tracking progress, maintaining regular schedules, and organizing deliverables.

Deliverables

1. Hold kick-off meeting with the core project partner team, regulators, and PAC (composed of local/regional salt marsh restoration experts), discuss design plans, and receive feedback
2. Meeting agendas, minutes, action items
3. Monthly reporting
4. Project timeline

Task 2 Existing Conditions Mapping and Drainage Evaluation

Phase 1 will be funded by USFWS through a cooperative grant to Audubon NY and will utilize existing data collected by USFWS. The selected firm will develop Existing Conditions and Drainage Evaluation maps using the most recent publicly available data such as aerial imagery and LiDAR, as well as recent data collected by USFWS including water levels, elevation by plant species, site-wide proportions of vegetation and other cover types, and ditch cross-sectional elevations. Existing Conditions maps should also include sub-aqueous soil data from the NRCS Long Island Sound Coastal Zone Soil Survey, if available, and marsh health metrics such as the Unvegetated: Vegetated ratio. To conduct the drainage evaluation, the firm will separate the marsh into sub drainages using existing public LiDAR and Real Time Kinematic (RTK) GPS data collected by USFWS. Channel density and geometry within sub drainages will be calculated to develop a portfolio of hydrologic improvements throughout the drainages, which would include: ditch filling, channel excavation, and/or runneling. The firm will collaborate with USFWS to collect any additional data that might be needed to assess existing conditions and/or drainage. Lastly, the firm will generate a report summarizing the existing conditions, results of the drainage evaluation, and a literature review of similar salt marsh restoration projects in the northeast. The literature review will build upon the 2015 Crab Meadow Marsh Watershed Hydrology and Stewardship Plan (GEI Consultants, Inc., P.C., 2015), extracting relevant information as appropriate for this project, and

updating it with summaries of recent salt marsh restoration projects in the northeast found in the scientifically reviewed and grey literature, and documenting lessons learned. It is expected that the selected firm will work with the PAC to identify the latest information on salt marsh restoration techniques.

Deliverables

1. The firm will convert data collected by USFWS to base design format
2. Existing conditions map(s) showing habitat types (low marsh, high marsh, *Phragmites*, etc.), elevations, available soil data, and other relevant information
3. Drainage evaluation to determine sub drainages and channel density
4. Report summarizing results of existing conditions, drainage evaluation, and literature review

Task 3 Conceptual Design Schematic and Preliminary Cost Estimate

Audubon and partners plan to apply for implementation funding through a grant in April 2025. A preliminary conceptual design outlining potential restoration actions and providing rough cost estimates is a critical component of this application. While the goal is to complete Phase 1 and have a rough cost estimate by April 1, 2025, this timeline may be challenging due to contracting processes and scheduling constraints. Any progress toward completing Phase 1 will strengthen Audubon's grant proposal for implementation funds. Therefore, Audubon is seeking firms that can get started quickly to maximize the proposal's competitiveness.

Deliverable – Preliminary design schematic and cost estimate

Phase 2

Task 4 Quality Assurance Project Plan

Phase 2 of this project is funded with Federal Environmental Protection Agency (EPA) dollars through the National Fish & Wildlife Foundation (NFWF), and therefore the firm must create (using an approved NFWF template), complete, and submit a QAPP that thoroughly describes the project objectives, data collection activities/procedures/methods, and quality assurance criteria that will be utilized during Phase 2. The firm will be expected to address any reviewer comments required for final EPA approval. To allow for adequate time for review, the first draft of the plan must be submitted 3-4 months before any environmental data can be collected or used for Phase 2 of this project.

Deliverable – submission and approval of EPA QAPP

Task 5 Alternatives Analysis

The firm will provide an assessment of various alternatives addressing the project goals. The assessment will include a cost-benefit analysis of potential restoration approaches such as sediment placement to increase marsh elevation, ditch remediation, runneling, dam removal, invasive species removal, and no action. Potential regulatory hurdles, feasibility, logistical challenges, and costs of each alternative should be thoroughly assessed.

Deliverables

1. Site plans for alternatives along with regulatory constraints and cost estimates for each alternative
2. Rank of alternatives based on cost-benefit analysis

Task 6 Design Plans and Permitting

Using an iterative approach, the firm will develop 30%, 60%, 90%, and 100% design plans where feedback is solicited from partners and members of the PAC following each design phase. Each design plan should be presented to partners and the PAC, virtually or in-person, and provide rationale for the design decisions. In addition, the firm should plan to hold at least one public meeting. PAC feedback should be incorporated into the next design phase. Designs must include plans for adaptive management and monitoring. USFWS is prepared to collect additional field data as needed, and the firm must coordinate with USFWS and Audubon for collection of any additional data necessary to inform the design. In addition to the design plans, the firm will provide a Basis of Design Report (BoDR) describing how the preferred restoration alternative will meet the project goals and metrics for success. The BoDR should also include the existing conditions report, drainage assessment, cost-benefit analysis, and the justification for selecting the preferred alternative as well as potential regulatory or logistical challenges. All necessary permits (federal, state, local) should be submitted to regulators for review at the 60% design phase and secured at the 90% design phase.

Deliverables

1. 30%, 60%, 90%, and 100% design plans including cost estimates, adaptive management, and monitoring plans
2. Basis of Design Report describing the reasoning behind the preferred restoration approach and expected outcomes
3. Final project cost estimate
4. All necessary permits (federal, state, local) are secured

Task 7 Bid Package

The firm will complete bid documents for implementation including cost estimates, construction specifications and materials sourcing.

Deliverable – RFP bid package

Submittal Requirements

- The anticipated timeline for proposal submission:
 - Pre-bid meeting and Crab Meadow Marsh site visit **Monday, January 27, 2025, 1pm**. We will meet at Crab Meadow Beach at Waterview St W, Fort Salonga, NY 11768 (40.9283, -73.3249). Attending this meeting is optional but is strongly recommended.
 - Proposals must be submitted by email to Andrew Payne as a single PDF file at andrew.payne@audubon.org by **Wednesday, February 5, 2025 at 5 pm EST**
- Proposals must include:
 - Cover letter (1 page)
 - Project understanding and scope of services including a list of deliverables, a detailed budget itemized by task, and a proposed timeline and schedule for completing each of the individual tasks.
 - List of current and previous design experience with coastal restoration projects (maximum one page for list) and three examples of projects like the proposed project (maximum one page per project). Provide references for these three projects that include a contact name and phone number.

- List of key personnel that will be working on the project, including a duty statement and brief resume of each key person, by name and title, with experience in pertinent fields (up to five people, one page per person).
- Evidence of authority and qualification to do business in New York or ensure in writing such authority and qualification will be obtained prior to award of the Contract. Bidder should provide their state contractor and certified engineer license numbers, as applicable.
- If subcontractors may be used, include a description of those persons or firms, their roles in the project, and their qualifications to do the anticipated work. The Bidder assumes responsibility for all work contracted or subcontracted from this Bid.
- Audubon and partners are actively targeting implementation funding for this project. As such, we are interested in firms that can prioritize this project and move the project through the design phase quickly and efficiently. Proposals must include an estimate of the progress that could reasonably be achieved toward Phase 1 by the April 2025 deadline for implementation funding.
- Bidders are required to complete and submit Conflict of Interest Questionnaire (Appendix A).
- Page limit- The proposal shall not exceed 25 pages including background information on the firm, projects lists, and contacts. Page limit excludes cover letter and administrative paperwork.
- All questions should be directed to Andrew Payne, Senior Manager of Coastal Resilience, Audubon NY at andrew.payne@audubon.org;

Anticipated Timeline

RFP Issued	January 13, 2025
Recommended Pre-Bid Meeting	January 27, 2025, 1 pm EST
Proposal Due Date	February 5, 2025, 5 pm EST
Firm Selected/Start Date	March 1, 2025
Completion Date	Fall 2026

Notes

- Audubon reserves the right to accept or dismiss proposals received as a result of this Request for Proposals or to cancel this request, if it is in the best interest of Audubon and involved parties to do so.
- This RFP does not commit Audubon to award a contract, to pay any costs incurred in preparation of a response to this request, or to procure or contract for further services or supplies. Audubon also reserves the right to waive any irregularity, informality, or technicality in the proposal in its best interest, and is not obligated to award a contract.
- Funding for this project is limited. Audubon reserves the right to contract a portion of the tasks identified. Some negotiation with preferred contractor may be required. Contract will be awarded to the design team who is cost competitive, shows the best understanding of the project, and provides best value.

- If the work to be performed by your firm requires the hiring of subcontractors, you must clearly state this in your proposal and identify the subcontractors and define the work to be executed. Audubon will not refuse a proposal based on the use of subcontractors; however, we retain the right to refuse the subcontractors you propose to engage.
- If Audubon enters into a professional services contract with your firm, compensation for the services rendered will be based upon percentage of completion with an agreed maximum not to exceed value. Work should adhere to the strict project timeline.
- Audubon values diversity in its staff, in the communities we serve, and in our business partners. Therefore, among the factors Audubon will take into account as it looks to hire the most qualified business for the job is whether the vendor itself has diversity goals in hiring, retention and promotion. We also welcome the opportunity to diversify our vendor base to include businesses owned by minorities, women, veterans, members of the LGBTQ+ community and individuals with disabilities wherever possible. We welcome any information you can provide about your diversity practices.
- All firms must provide certificates of insurance evidencing the following insurance coverage. If bidder intends to request any divergence from the insurance coverages, they must specify such request ASAP, with the reason for the divergence request and proposed alternatives:
 - a. Workers Compensation and Employers Liability Insurance, including occupational disease, disability benefit, and other similar insurance required by applicable law, with a minimum limit of \$100,000 per accident, per employee;
 - b. Comprehensive General Liability Insurance with a combined single limit of \$1,000,000 per occurrence, and \$2,000,000 general aggregate for bodily injury, including death, product liability and property damage;
 - c. Comprehensive Automobile Liability Insurance (owned, non-owned, and hired) with a combined single limit of \$1,000,000 for bodily injury, including death, and property damage; and
 - d. Excess Liability (Umbrella) Insurance with limits of \$3,000,000 per occurrence and aggregate.
 - e. Professional Liability with limits of at least \$1,000,000 per claim or occurrence.
- See Appendix B for additional provisions specifically required to be included in contracts funded in whole or part by federal awards.

Appendices

Appendix A

Conflict of Interest Questionnaire

Title of Solicitation/Contract

Please complete and include this questionnaire with your final bid submittal. Not all conflicts of interest are necessarily prohibited or harmful to Audubon. However, advanced full disclosure of actual or potential conflicts are required.

When responding to the questions below, please answer about your relationship with the following organizations:

National Audubon Society, Inc.

- | | Yes | No |
|--|--------------------------|--------------------------|
| 1. Do you* have a personal, familial or business relationship with any of the above-referenced organizations? | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Do you currently or have you served on any boards of these organizations? | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Have gratuities, favors, or anything of monetary value been offered to you or accepted by you from these organizations? | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Have you been employed by any of these organizations? | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Have you made financial contributions to any of these organizations? | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Do you plan to seek or accept future employment with any of these organizations? | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Are there any other conditions that may cause a conflict of interest or the appearance of a conflict? | <input type="checkbox"/> | <input type="checkbox"/> |

If you answered "yes" to any of the above questions, please provide further information below.

I certify that I have answered the above questions truthfully and to the best of my knowledge.

*When responding to this questionnaire, please consider relationships that while not necessarily related as family, are nonetheless similar to family relationships and would give rise to a potential conflict of interest. Examples of such family-type relationships would include live-in friendships, unmarried domestic partners, dating relationships, etc.

Appendix B

Contract Provisions

In addition to terms and conditions to define a sound and complete agreement, the following provisions are to be included in all contracts and subcontracts funded in whole or part by federal funds:

(a) Contracts in excess of the \$250,000 shall contain contractual provisions or conditions that allow for administrative, contractual, or legal remedies in instances in which a contractor violates or breaches the contract terms, and provide for such sanctions and penalties as may be appropriate.

(b) All contracts in excess of \$10,000 shall contain suitable provisions for termination by Audubon, including the manner by which termination shall be effected and the basis for settlement. In addition, such contracts shall describe conditions under which the contract may be terminated for default as well as conditions where the contract may be terminated because of circumstances beyond the control of the contractor.

(c) For contracts dealing with construction or facility improvements, Audubon shall comply with all requirements imposed by its funding sources (and the government regulations applicable to those funding sources) with regard to construction bid guarantees, performance bonds, and payment bonds.

(d) All negotiated contracts greater than \$250,000 shall include a provision to the effect that Audubon shall have access to any books, documents, papers and records of the contractor which are directly pertinent to a specific program for the purpose of making audits, examinations, excerpts and transcriptions.

(e) All contracts, including small purchases, awarded by Audubon and its contractors where the source of the funds, directly or indirectly, is the federal government, shall contain the following procurement provisions, as applicable.

(i). Equal Employment Opportunity - All contracts, when funded in whole or part by monies derived from the Federal government (either directly or indirectly), shall contain a provision requiring compliance with E.O. 11246, "Equal Employment Opportunity," as amended by E.O. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and as supplemented by regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."

(ii). Copeland "Anti-Kickback" Act (18 U.S.C. 874 and 40 U.S.C. 276c) - All contracts in excess of \$2000 for construction or repair, when funded in whole or part by monies derived from the Federal government (either directly or indirectly) shall include a provision for compliance with the Copeland "Anti-Kickback" Act (18 U.S.C. 874), as supplemented by Department of Labor regulations (29 CFR part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States"). The Act provides that each contractor or subrecipient shall be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the

compensation to which he is otherwise entitled. The recipient shall report all suspected or reported violations to the Federal awarding agency.

(iii). Davis-Bacon Act, as amended (40 U.S.C. 276a to a-7) - When required by Federal program legislation, all construction contracts awarded by the recipients and subrecipients of more than \$2000 shall include a provision for compliance with the Davis-Bacon Act (40 U.S.C. 276a to a-7) and as supplemented by Department of Labor regulations (29 CFR part 5, "Labor Standards Provisions Applicable to Contracts Governing Federally Financed and Assisted Construction"). Under this Act, contractors shall be required to pay wages to laborers and mechanics at a rate not less than the minimum wages specified in a wage determination made by the Secretary of Labor. In addition, contractors shall be required to pay wages not less than once a week. The recipient shall place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation and the award of a contract shall be conditioned upon the acceptance of the wage determination. The recipient shall report all suspected or reported violations to the Federal awarding agency.

(iv). Contract Work Hours and Safety Standards Act (40 U.S.C. 3701-3708) - All contracts in excess of \$2000 for construction contracts and in excess of \$100,000 for other contracts that involve the employment of mechanics or laborers, when funded in whole or part by monies derived from the Federal government (either directly or indirectly), shall include a provision for compliance with Sections 3702 and 3704 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3701-3708), as supplemented by Department of Labor regulations (29 CFR part 5).

(v). Rights to Inventions Made Under a Contract or Agreement - Contracts or agreements for the performance of experimental, developmental, or research work, when funded in whole or part by monies derived from the Federal government (either directly or indirectly), shall provide for the rights of the Federal Government and the recipient in any resulting invention in accordance with 37 CFR part 401, "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," and any implementing regulations issued by the awarding agency.

(vi). Clean Air Act (42 U.S.C. 7401 et seq.) and the Federal Water Pollution Control Act (33 U.S.C. 1251 et seq.), as amended - Contracts and subgrants of amounts in excess of \$150,000, shall contain a provision that requires the recipient to agree to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401 et seq.) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251 et seq.). Violations shall be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).

(vii). Mandatory standards and policies relating to energy efficiency which are contained in state energy conservation plans issued in compliance with the Energy Policy and Conservation Act (42 U.S.C. 6201).

(viii). Debarment and Suspension (Executive Orders 12549 and 12689). – A contract award must not be made to parties listed on the governmentwide Excluded Parties List System in the System for Award Management (SAM).

(ix). Byrd Anti-Lobbying Amendment (31 U.S.C. 1352) - Contracts for an amount above \$100,000, shall include a certification by the contracting parties that they have not and will not use Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. and to further require disclosure of any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award.

(x). Procurement of recovered materials in compliance with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds \$10,000 or the value of the quantity acquired during the preceding fiscal year exceeded \$10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.



2023 Crab Meadow Salt Marsh Monitoring

Suzanne Paton, Jonah Saitz, Sam Apgar, Alison Kocek, Kenzie Payne
May 6, 2024



The Coastal Program

The Coastal Program works with communities to voluntarily restore and protect habitats that benefit fish, wildlife, and people. We also develop resources that help land managers and practitioners deliver habitat conservation. By working together, we can sustain the people, economies, and wildlife that rely on coastal ecosystems.



Our Office: Southern New England Coastal Program

The Southern New England Coastal Program (SNEP) office is located in Charlestown, RI, with a satellite office located in Shirley, NY.

Our office has five staff members and one intern. We specialize in ornithology/wildlife biology, tidal wetland & riverine restorations, community engagement, GIS, and hydrology.



Southern New England Coastal Program Staff

Our Focus Area

- Massachusetts (Cape Cod & the Islands)
- Rhode Island
- Connecticut
- New York (Long Island)



2023 Technical Assistance



24,000+
RTK Survey Points

9
Training /
Outreach
Events

42
Point Counts

21
Partner's
Engaged

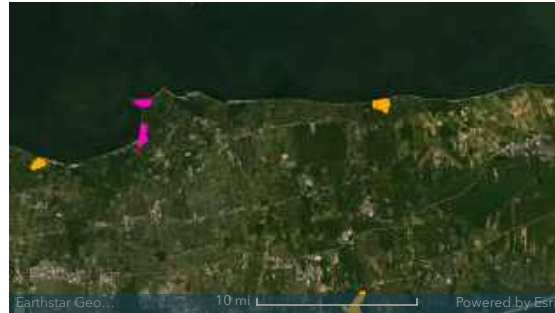
339
Birds Banded

18
HOBO Logger
Deployments

ACJV Saltmarsh Restoration Priorities for Saltmarsh Sparrow (*Ammospiza caudacuta*)

The USFWS's Atlantic Coast Joint Venture (ACJV) with input from partners created state specific

documents and an associated spatial layer (see below) to provide a roadmap for saltmarsh sparrow (*Ammospiza caudacuta*) conservation. It identifies salt marsh sites that are good candidates for restoration (“priority” and “honorable mention” sites) and/or conservation (“reference” sites) to maintain high-quality saltmarsh sparrow nesting habitat and long-term salt marsh resilience. The New York State Document identifies Crab Meadow marsh as one of four priority marshes on the north shore of Long Island.



FWS Saltmarsh Restoration Priorities for the Saltmarsh Sparrow - Atlantic Coast Joint Venture (ACJV)

-  Priority
-  Honorable Mention
-  Reference Marshes

ACJV New York saltmarsh restoration priority marshes for saltmarsh sparrow



SNEP's objectives for the Crab Meadow Marsh Monitoring Effort

1. Understand the current conditions (vegetation, elevation, hydrology, avian and saltmarsh sparrow presence) at Crab Meadow Marsh
2. Understand how conditions have changed over time.
3. Leverage monitoring information from #1 and #2 to brainstorm next steps for restoration.



Site information

Crab Meadow Salt Marsh is a ~ 250 acre salt marsh owned by the Town of Huntington, NY.

On the northside you'll find a barrier beach, home to terns, piping plover, American Oystercatcher amongst other species.



On the southside, the marsh abuts the Crab Meadow Golf Course and Makamah Park Preserve.

On the east side the marsh is flanked by Makamah Rd, while on the west side it's flanked by Waterside Rd.

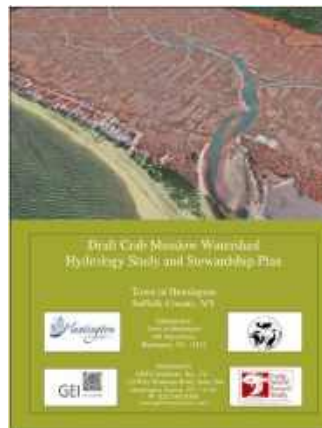
Learn more about the site with the sea level rise viewer (created by Warren Pinnacle Consulting inc. on behalf of NEIWPC, LISS, and NYSDEC): [View here](#)



Crab Meadow Marsh Watershed Hydrology Study and Stewardship Plan

GEI Consultants Inc., P.C. 2015

*Funded by NFWF, LIS Futures
Fund, and matched by the Iroquois
Gas Transmission System
Community Program with
significant community involvement*



Outlines many ongoing goals for larger watershed and marsh specifically, including:

1. "Monitor protected areas to detect changes (e.g., species distribution, sea level rise)."
2. "Continue watershed land conservation initiatives."
3. "Measure, maintain, and/or restore flows through CMW primary area"

Goals and plan for achievement, educational materials, additional data collection and analysis, trout fingerling release

Existing marsh related datasets:

- SET data since 2015 (CUNY Brooklyn College, TNC, NYSDEC in 2015)
- Soil cores (Hofstra University)
- Aerial assessment of elevation change and marsh subsidence (low aerial infra-red photography in 2014- City College of New York (CUNY) and Brooklyn College)
- Asian shore crab (*Hemigrapsus sanguineus*) invasion (SUNY Stony Brook and University of North Carolina)
- Piezometer data

Evaluation of marsh health:

- NYS GIS Clearinghouse listed Crab Meadow Marsh as a mostly high marsh system situated in a meso-tidal setting, with tidal range 2-4m
- Concern over Phragmites invasion on edges
- New York Heritage Program relevant listed species- high salt marsh- “high quality occurrence of uncommon community type”
- Rare plants- Slender Crabgrass (*Digitaria filiformis*) and Silvery Aster (*symphyotrichum concolor* var. *concolor*) both NY State Endangered and Critically Imperiled according to NYSHP
- Discussion of 1930’s grid ditching and potential impacts to marsh
- Crab Meadow Golf Course not listed as big concern- Canada Goose population control and deterrence, now seaweed program for fertilizer
- At that time (~2012)- “The consensus among workshop participants is that the Crab Meadow Watershed is principally in a healthy state and that Town efforts should be focused on protecting endangered and threatened species, preserving existing fish and wildlife habitats, and continuing to improve water quality.” P. 84
- “Monitoring the percent cover of dominant species over time will also help the Town determine if the Crab Meadow Wetland is transitioning to a more regularly flooded system that would encourage the proliferation of smooth cordgrass and expansion of the IM into the HM zone.” P. 29



Bird Monitoring

Why monitor birds?



A Recently Fledged Salt Marsh Sparrow

Birds respond quickly to changes in their environments, making them good indicators of the conditions of their ecosystems.

The saltmarsh sparrow is a tidal marsh obligate nesting species and has been found to act as an early warning signal of increased flooding rates before other ecosystem changes (e.g. vegetation) become apparent (Correll et al. 2023).

Saltmarsh sparrows are being assessed for potential listing under the Endangered Species Act (Sept. 2024).

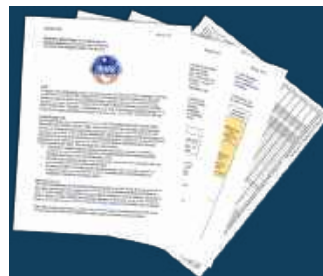
Currently it is unknown what conservation strategies could change the saltmarsh sparrow's declining trajectory, necessitating pre and post restoration data collection for saltmarsh sparrows and other tidal marsh birds that may soon be at risk.



Methodology

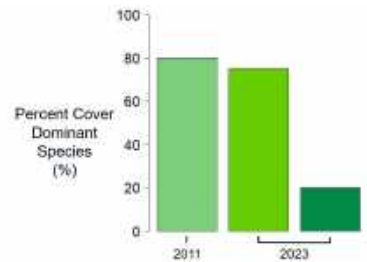
SHARP Rapid Assessment Protocol

- The Saltmarsh Habitat and Avian Research Program (SHARP) developed a protocol to rapidly assess tidal marsh sparrow productivity and tidal marsh bird community structure via two point location visits per breeding season. This protocol includes the following methods:
 - Point count surveys: Data can be used to assess species richness, occupancy, abundance, and ecological condition
 - Fixed effort mist-netting (of tidal marsh sparrows): Capture of breeding females and juveniles can be used to confirm breeding, has been found to have a positive correlation with breeding success, and can be used to assess change in breeding success over time.
 - Passive observation of breeding behaviors: Data can be used to confirm marsh bird breeding (tidal marsh sparrows, rails, willets, etc.)
 - Vegetation data: Data can be linked to tidal marsh bird abundance, breeding, and change over time.





- Point count and vegetation surveys have been completed at 3 point locations since 2011 by Saltmarsh Habitat and Avian Research Program (SHARP)
- In 2023, Rapid Assessment protocol completed including point counts, mist-netting, passive observation of breeding bird behaviors, and vegetation surveys at 3 existing point locations and one additional
- 1 breeding female was captured across 6 days and 18 total hours of netting, suggesting limited breeding is taking place at the site (Sanchez 2023)

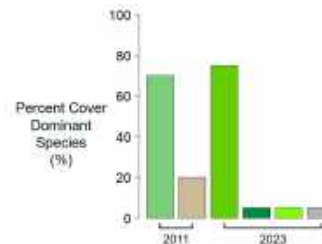


Point: 224763_p4
 No saltmarsh sparrows captured in 2023, 1 heard via point count surveys in 2023.

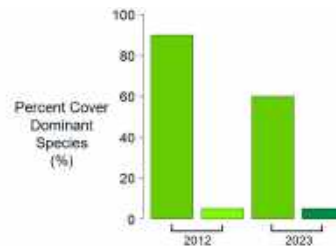
Point: 56166_p20 & p21
 No saltmarsh sparrows captured in 2023, none heard via point count surveys in 2023.



Point: 224763_p3
 1 breeding female saltmarsh sparrow captured in 2023; no males or juveniles captured. 1 saltmarsh sparrow heard via point count surveys in 2023.

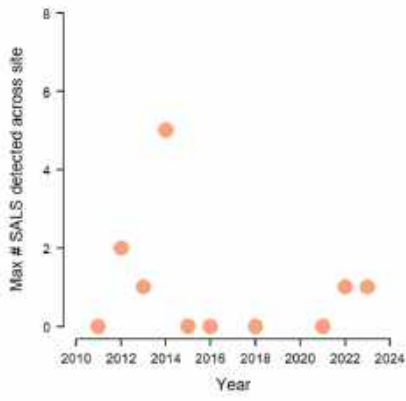


Point: 224763_p2
 No saltmarsh sparrows captured in 2023, 1 heard via point count surveys in 2023.

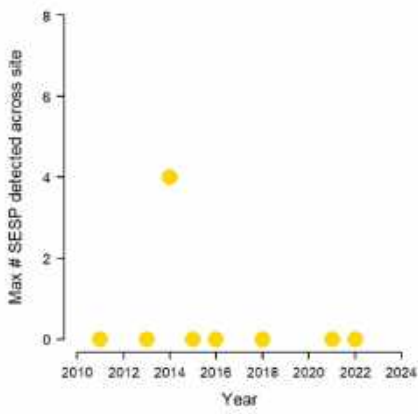


- | | |
|--------------------------------|-----------------------|
| = <i>S. patens</i> | = <i>P. australis</i> |
| = Short <i>S. alterniflora</i> | = <i>D. spicata</i> |
| = Tall <i>S. alterniflora</i> | = Other |

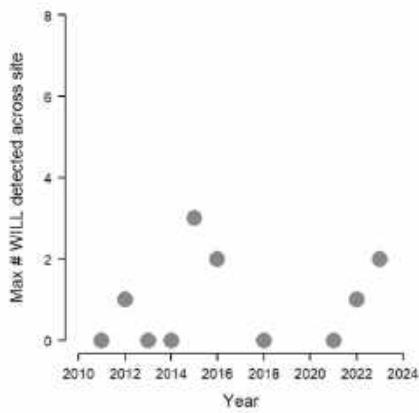
Salt Marsh Sparrow Detection's Overtime



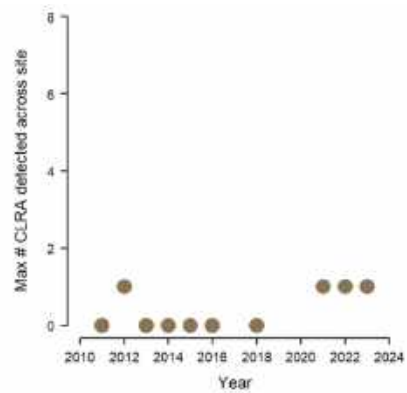
Seaside Sparrow Detection's Overtime



Willet Detection's Overtime



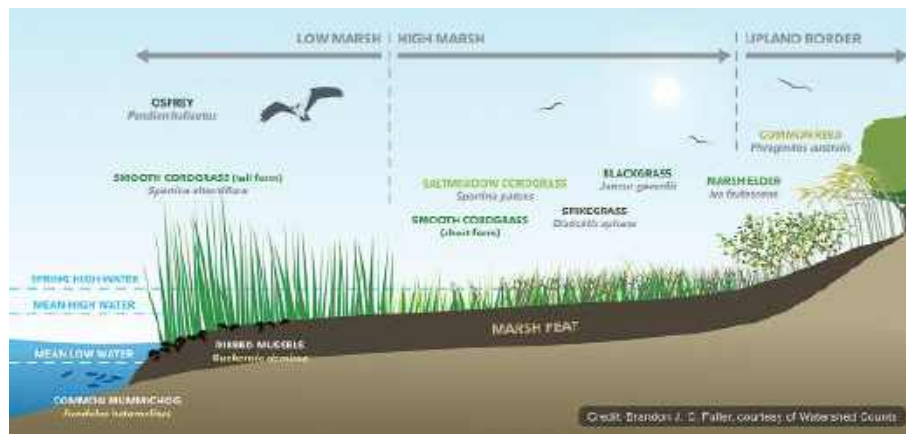
Clapper Rail Detection's Overtime



Water Levels

Why Monitor Water Levels?

- It is critical to have current and accurate water level data to inform restoration actions.
- Water level data collected throughout the marsh allows us to assess the occurrence of restrictions which may impact the tidal prism.
- Marsh vegetation is dependent on different inundation/drainage regimes.



Methodology

- Installed 3 HOBO U20 water loggers
- Data was collected from August 28th to October 5th
- Reference measurements from the field were used to calibrate the data
- Data processed using HOBOWare



2023 HOBO U20 Water Level Logger locations

Logger #1

Northeast Corner

40.92451° N,
73.31345° W

Sediment Elevation at Logger: -0.475'



Logger #2

Crab Meadow Marsh Channel Mouth
40.92616° N, 73.32243° W
Sediment Elevation at Logger: -3.438'



Logger #3

Southeast Corner

40.91955° N,
73.31221° W

Sediment Elevation at Logger: ~ -1.7' - -1.8'





The Setup

- One 6' - 8' Fence Post
- One 2' section of PVC pipe with holes drilled to ensure water flow to the sensor
- One HOBO U20 - Titanium Logger

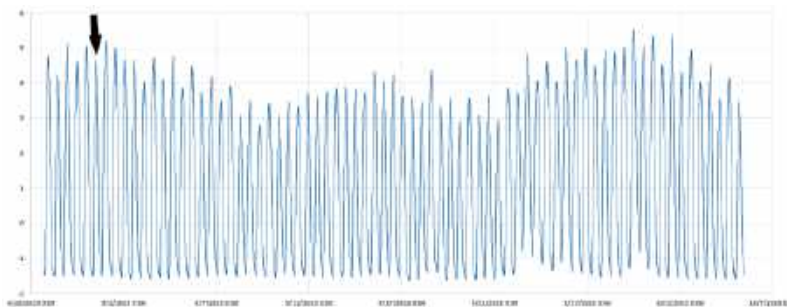
Hydrology Fellow, Kenzie Payne, retrieving Water Level Logger #3



An example of a more extreme high tide tide on 8/31/2023.

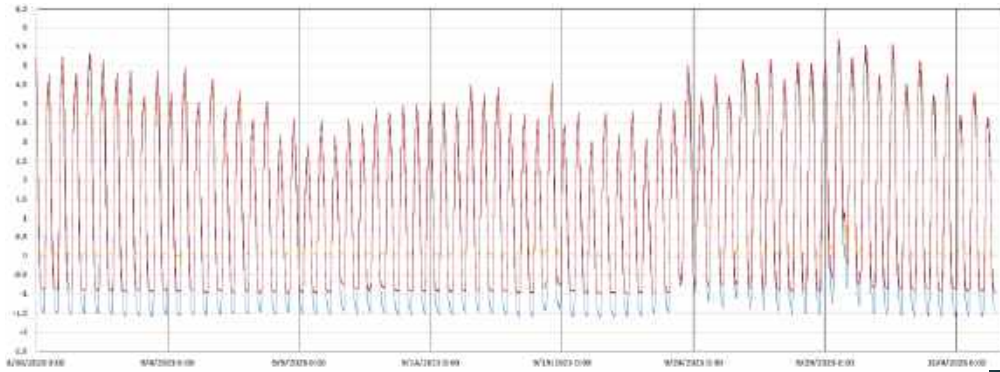
The picture on the left was taken at 1:03pm

The picture on the right was taken at 1:53pm

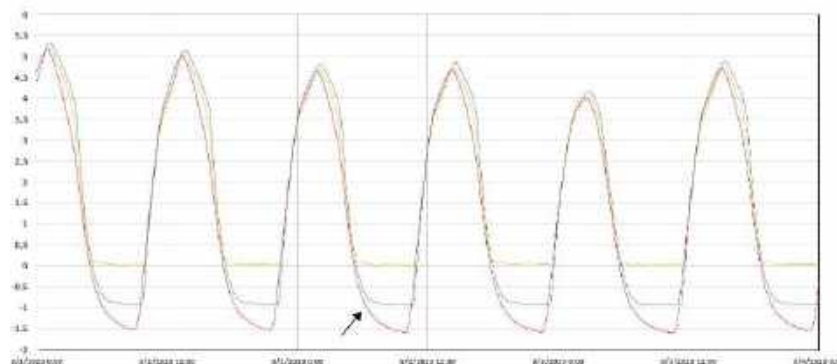
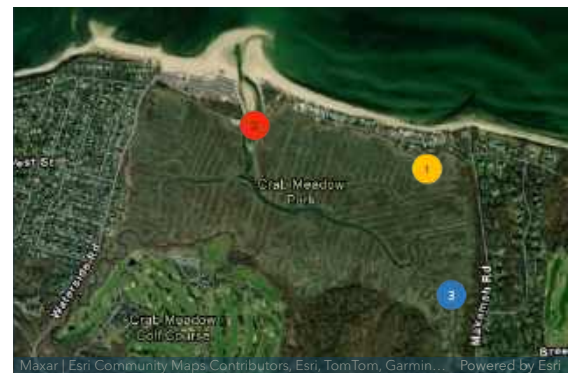
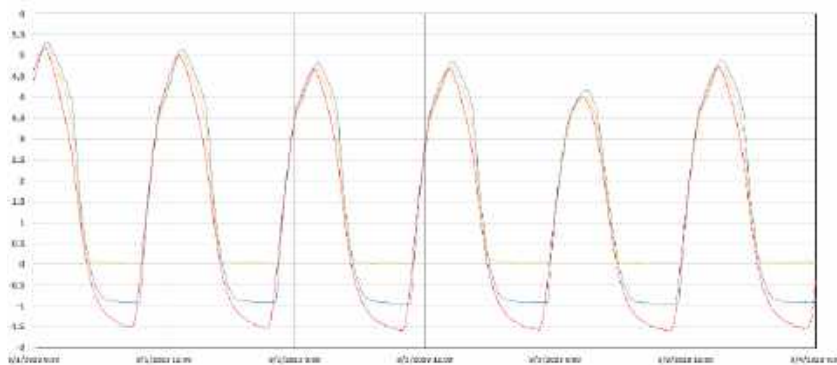


The 12:50 High Tide Indicated by an Arrow on a plot of Water Level Data collected from Water Level Logger #2

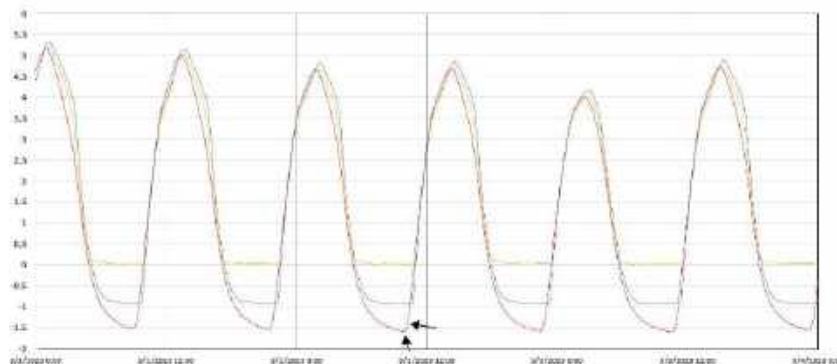
Data from Water Level Logger's #'s 1-3



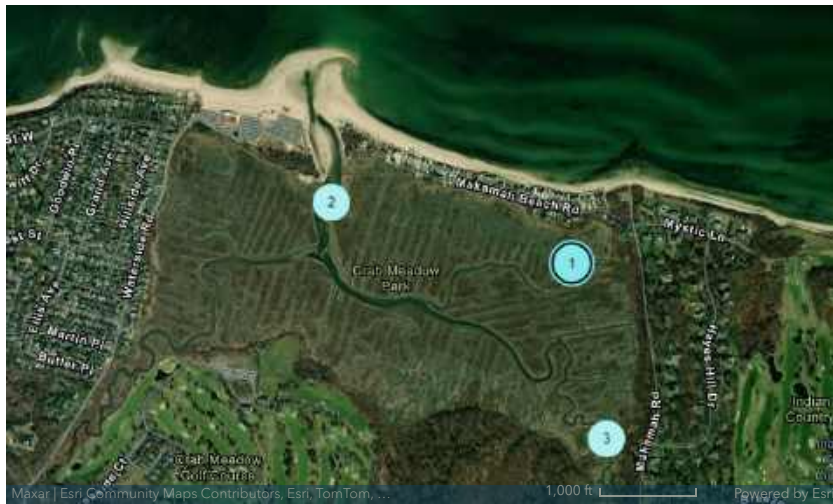
Data from Water Level Logger's #'s 1-3, over four days



The gradual slope of Loggers #2 (Red) in the graph as the tide recedes, indicates there's a minor restriction slowing the outflow.



The sharp increase shown by the arrows pointing at logger #2 (R) as the tide floods back into the marsh, indicates that the marsh is emptying until the tide starts flooding back in.



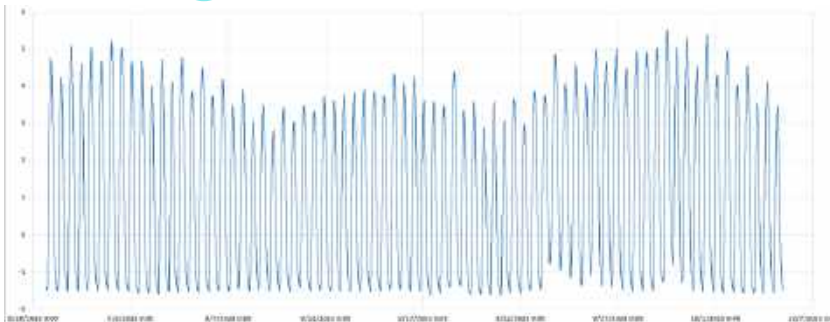
1 **Logger #1: Northeast Corner**



40.92451° N, 73.31345° W

Sediment Elevation at Logger: -0.475'

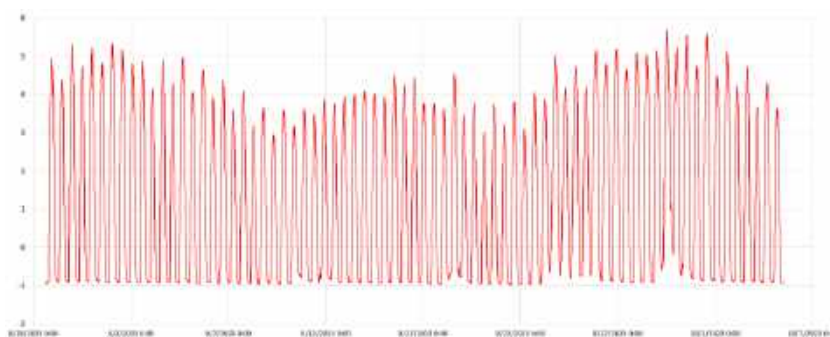
2 **Logger #2: Channel Mouth**



40.92616° N, 73.32243° W

Sediment Elevation at Logger: -3.438'

3 **Logger #3: Southeast Corner**




40.91955° N, 73.31221° W

Sediment Elevation at Logger: ~ -1.7' - -1.8'

Tidal Datum's

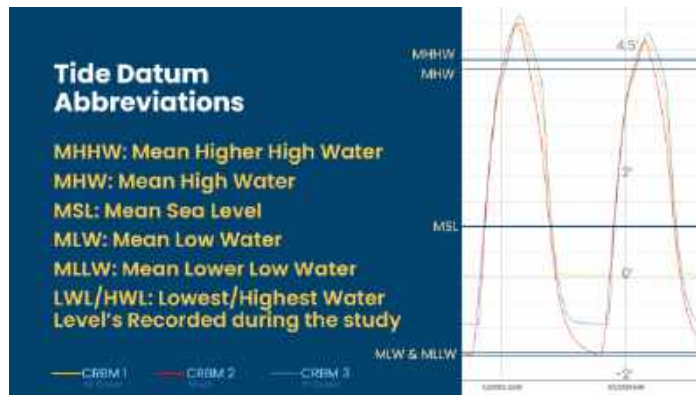
Tidal datum's were calculated using data from each of the three water level logger's

We used NOAA's Tidal Analysis Datum Calculator to calculate our Tidal Datums

<p>CO-OPS Datum Calculator</p> <p>Tidal Datum Calculator Product</p> <p>Disclaimer The tool provides water lev...</p> <p>https://access.co-ops.nos.noaa.gov/datumcalc/index.jsp</p>	
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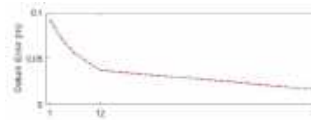
***** Tidal Datum Calculator Product Disclaimer**

The tool provides water level analysis support with computing tidal datums. A tidal datum is a standard elevation defined by a certain phase of the tide and can be used as references to measure local water levels. The accuracy of tidal datum elevations is dependent on the quality of the data input into the tool. The entire risk associated with the results and performance of these data is assumed by the user. This tool should be used strictly as a planning reference and is not appropriate for navigation, establishing land boundaries, permitting or other regulatory purposes.



Tidal Datum Limitation's

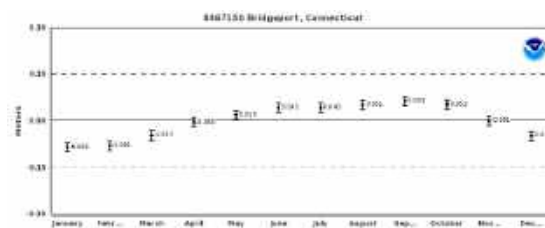
1. Datum's are reliant only on roughly one month of data
2. Datum's don't account for the position within the 19-year tidal cycle
3. Datum's don't account for the position within the seasonal tidal cycle



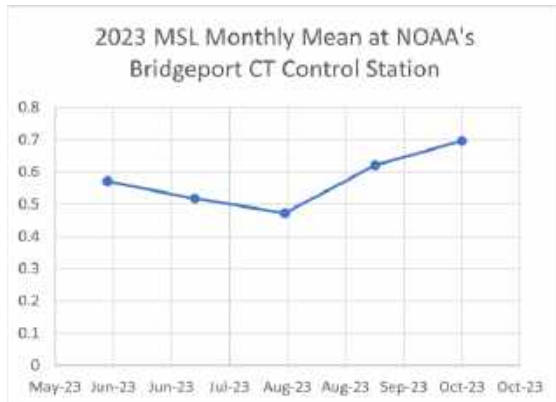
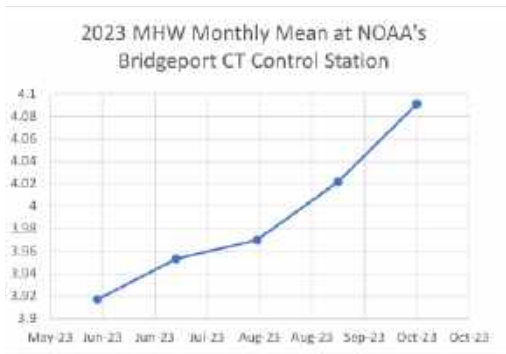
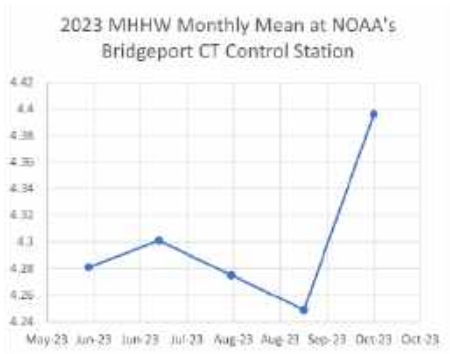
Datum Error compared to length of data collection effort in months



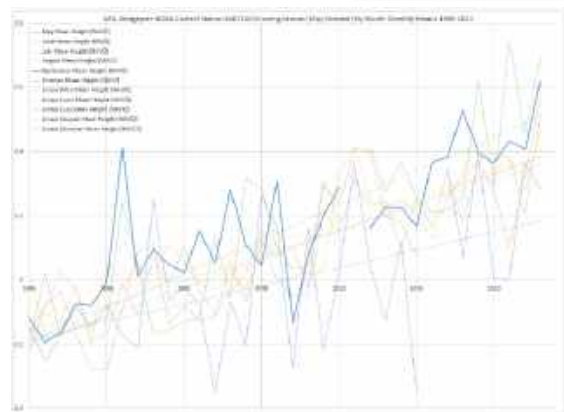
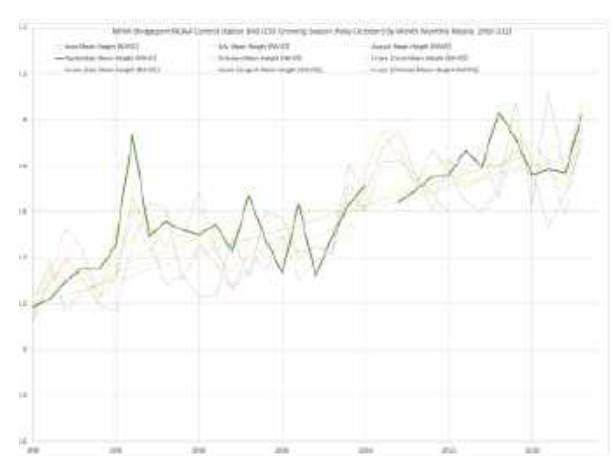
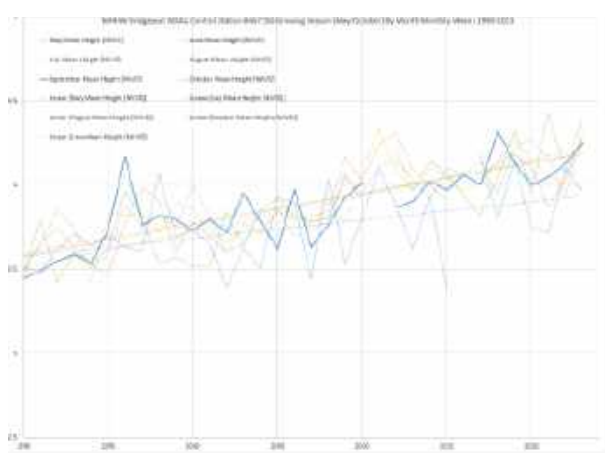
"The 19-year repeating pattern of adjustments to high and low tides occurs because of the different angles and strengths of the sun and moon pulling on the oceans. Though only creating a 2.5 inch (~ 6 cm) variation in SLR, it adds a surprising element of confusion to discussions about sea level" Englander, 2021



"The average seasonal cycle of mean sea level at NOAA control station #8467150 Bridgeport CT, caused by regular fluctuations in coastal temperatures, salinities, winds, atmospheric pressures, and ocean currents, is shown along with each month's 95% confidence interval".



2023 Monthly Mean Sea Level's by Datum at NOAA Control Station 8467150 Bridgeport, CT



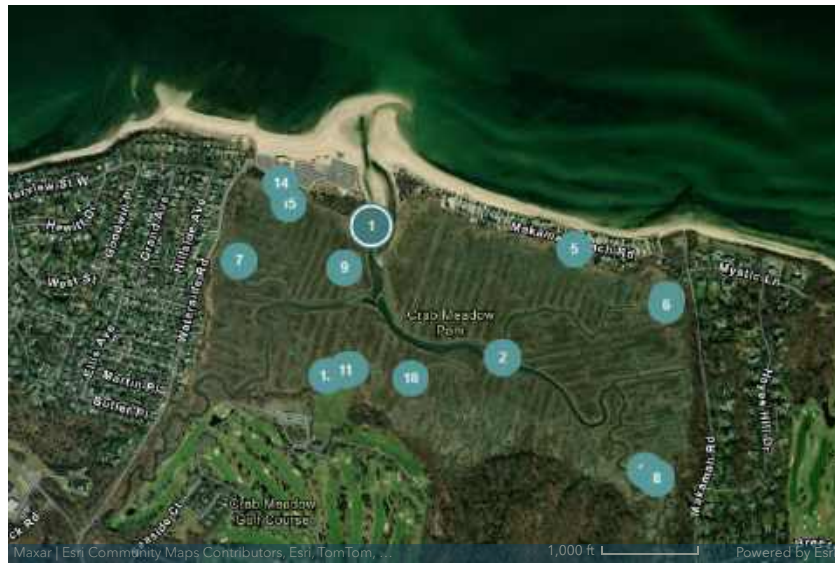
Growing Season Monthly Means at NOAA Control Station 8467150 Bridgeport, CT from 1990-2023



Comparison of Datum's

Datum	CRBM 2 (Mouth)	CRBM 1 (NE Corner)	(CRBM 3 SE Corner)
MHHW	4.36'	4.38'	4.53'
MHW	4.13'	4.14'	4.29'
MGL	1.08'	1.57'	1.34'
MLW	-1.47'	0.04'	-0.88'
MLLW	-1.52'	0.03'	-0.89'
MHW-MLW	5.60'	4.10'	5.17'
MHHW-MLLW	5.88'	4.35'	5.44'
LWL	-1.61'	0.00'	-0.96'
HWL	5.48'	5.46'	5.66'
Vertical Datum Offset	-3.438'	-0.475'	-1.7' - -1.8'

Salt Marsh Condition





2



3



4



5



6



7



8



9



10



11



12



13





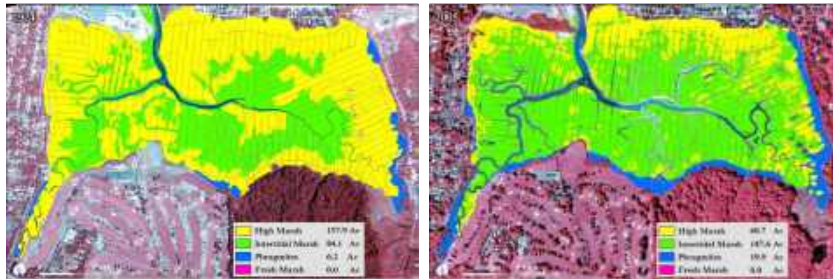
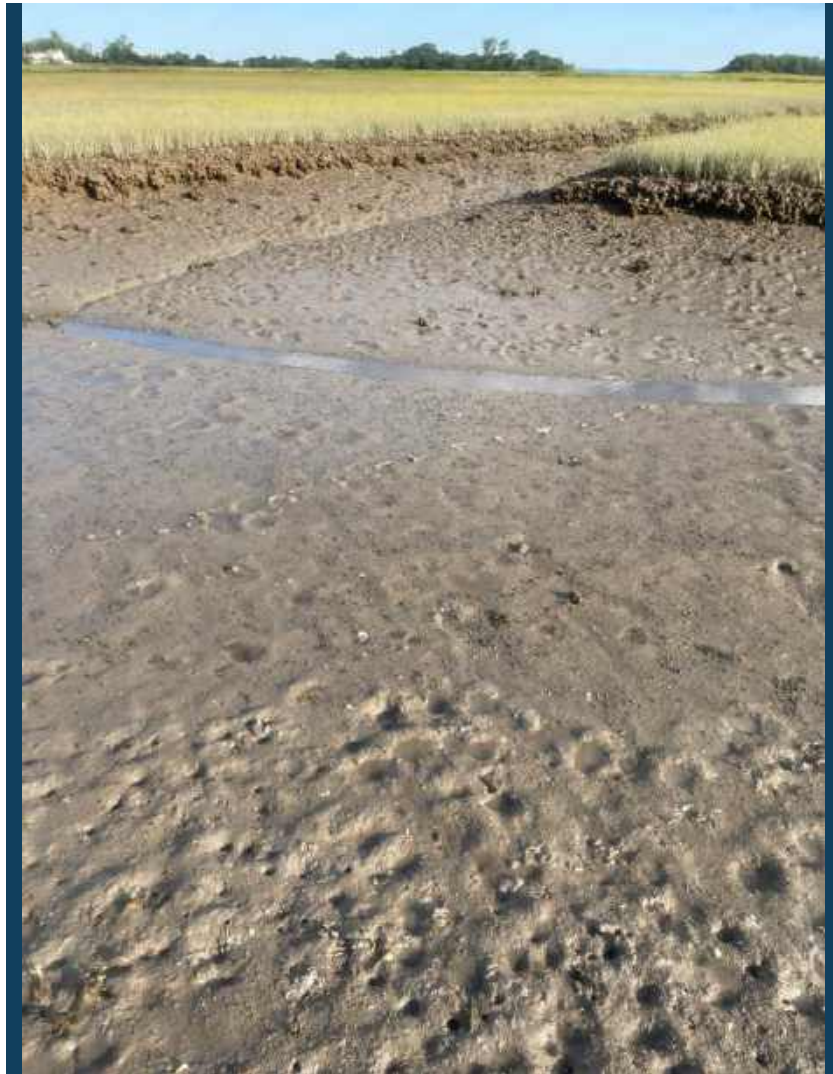
15



16







Comparison of Historic Imagery (Cameron Engineering & Associates, LLC, 2015)

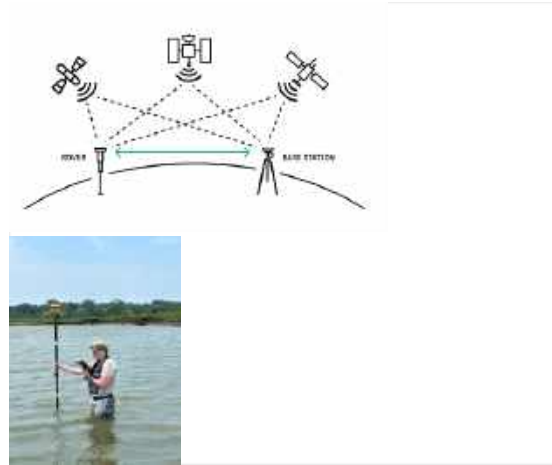
The classification above by *Cameron Engineering & Associates, LLC, 2015*, shows in the time period between 1974 and 2005

- -61.6% high marsh extent
- +75.5% intertidal extent
- +13.7% P. australis
- Seven creek and ditch locations widened by 152-2,800%

In the period between 1974 and 2005 Crab Meadow
Lost a total of 20 acres of marsh



RTK Data Collection & Marsh RAM



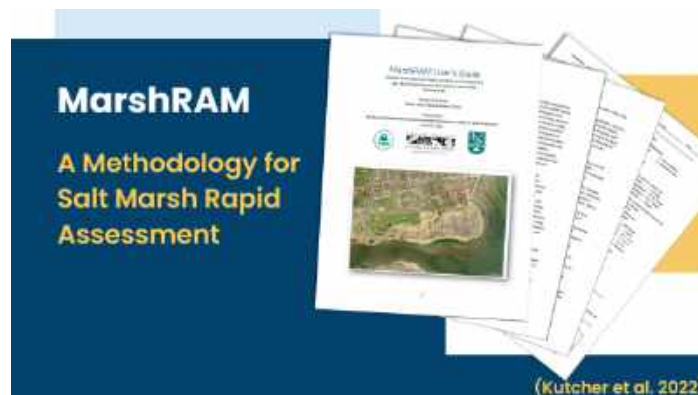
Our office's RTK GNSS Equipment

- Up to 3mm Horizontal Precision
- Up to 3.5mm Vertical Precision

Staff Collected over 16,900 RTK Elevation Survey
Point's across July, August, September, and October
2023

3 Goals Behind RTK Data Collection

1. *Collect enough data to create a surface for a small portion of the marsh*
2. *Collect data to evaluate the quality of preexisting LiDAR*
3. *Collect data along twelve MarshRAM Transects*



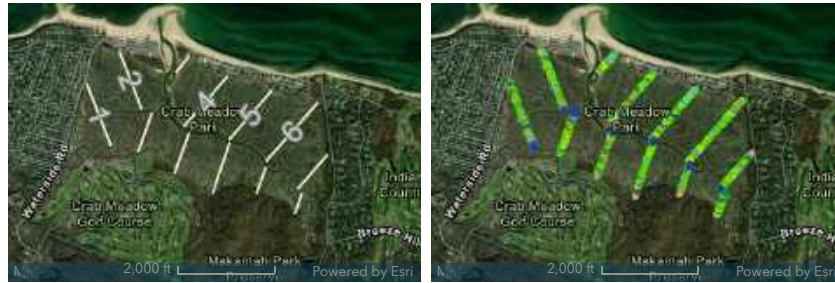
Following the "Marsh Community Composition and Index of Marsh Integrity" section of the MarshRAM user guide:

- 12 transects were established running “from the marsh-upland interface to the marsh-open water interface. Transects were established parallel to each other and were evenly spaced across the marsh following the procedures indicated by the MarshRAM user guide by Kutcher Et. Al 2022.
- Collected vegetation cover class data using ArcGIS FieldMaps on September 11th, 12th, 14th 2023
 - Assigned # steps, GPS coordinate start and end, and cover class 14 possible cover classes

14 Possible MarshRAM Cover Classes:

- **Dieback Denuded Peat** = Typically non-depression location where marsh peat is exposed from grazing, crab burrowing, or erosion, often at tidal edge, <30% vegetative cover
- **Dieoff Bare Depression** = Shallow gradual depression on marsh surface that remains flooded or saturated throughout tidal cycle, <30% vegetative cover
- **Salt Shrub** = Salt marsh shrub species including *I. frutescens* and *B. halimifolia*.
- **Meadow High Marsh** = high marsh dominated by *S. patens*, *J. gerardii*, and *D. spicata*. No *S. alterniflora* present.
- **Mixed High Marsh** = High marsh dominated by *S. patens*, *J. gerardii*, and *D. spicata*. *S. alterniflora* present.
- **Transitioning High Marsh** = short-form *S. alterniflora*
- **Low Marsh** = tall *S. alterniflora*
- **Brackish Native** = Dominated by brackish marsh species such as *T. angustifolia*, *S. robustus*, and *S. pectinata*
- **Phragmites** = >30% *P. australis* cover
- **Natural Panne** = Shallow steep-sided depression with clearly defined edge, irregularly flooded and typically dry at low tide
- **Natural Pool** = Shallow, steep-sided depression on marsh surface with clearly defined edge. Typically remains flooded during low tide.
- **Natural Creek** = Narrow, natural, unvegetated and regularly flooded waterway
- **Ditch** = Linear manmade ditches

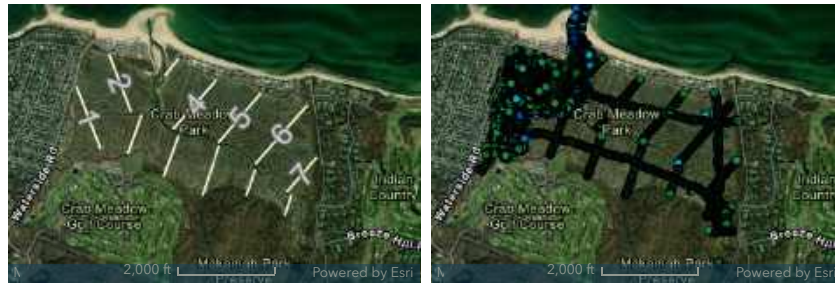
- **Bare Sediments** = Sandy or gravelly sediment deposition on the marsh surface with <30% vegetation cover



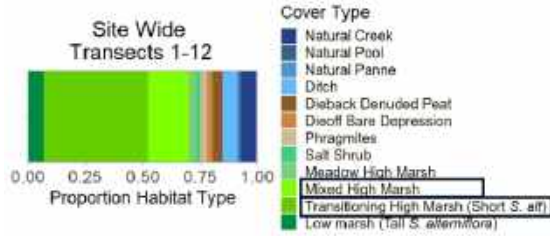
(Left) MarshRAM Transects, (Right) Marsh Cover Type Data.

Our team adapted the MarshRAM procedure to include collection of elevation data along the MarshRAM transects

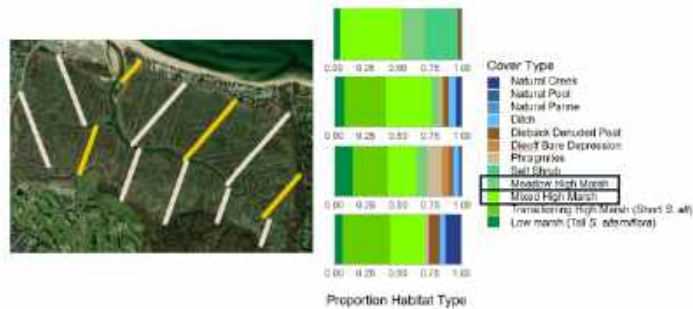
- > 13.55 - 19.37
- > 7.83 - 13.55
- > 5.11 - 7.83
- > 4.27 - 5.11
- > 3.82 - 4.27
- > 3.57 - 3.82
- > 3.37 - 3.57
- > 3.11 - 3.37
- > 2.77 - 3.11
- > 2.4 - 2.77
- > 2.07 - 2.4
- > 1.73 - 2.07
- > 1.38 - 1.73
- > 1 - 1.38
- > 0.58 - 1
- > 0.13 - 0.58
- > -0.39 - 0.13
- > -1 - -0.39
- > -1.62 - -1
- > -2.31 - -1.62
- > -3.18 - -2.31
- > -4.82 - -3.18
- > -7.27 - -4.82



(Left) MarshRAM Transects, (Right) RTK Elevation Survey Points in feet

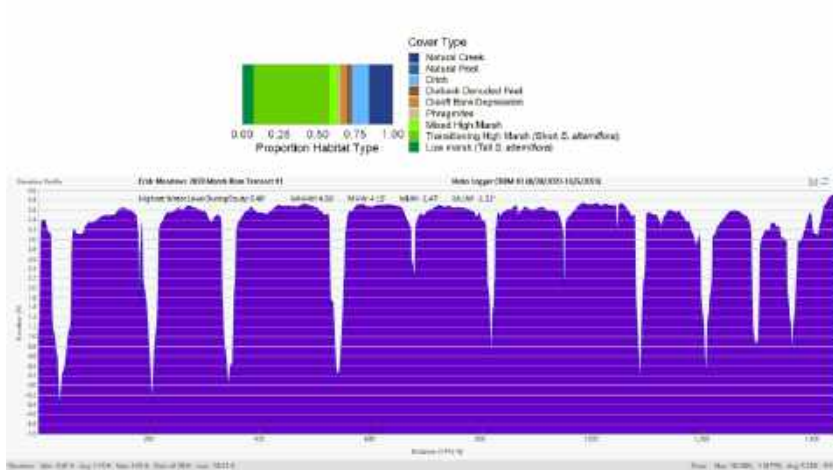


Marsh Cover Proportions



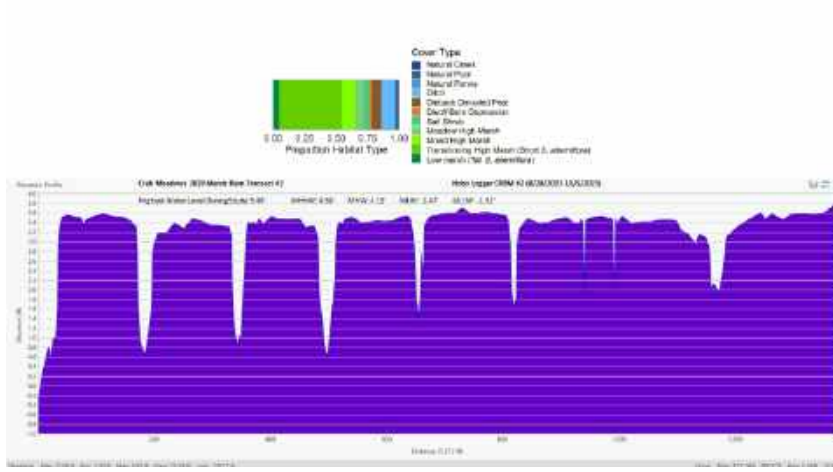


1 Marsh Ram Transect #1



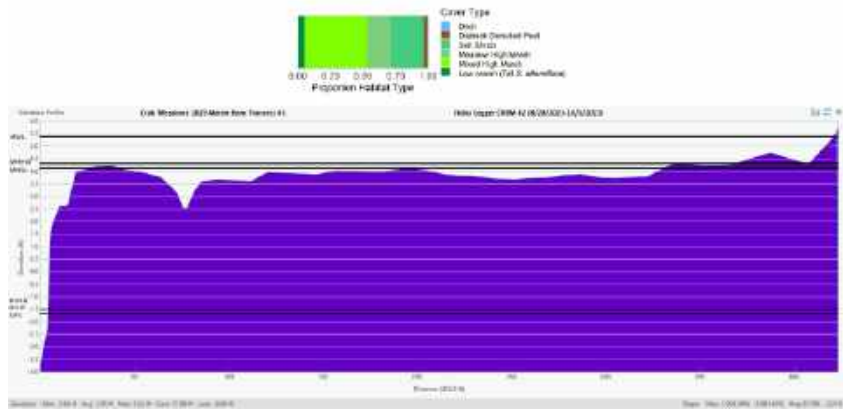
Left Side of Elevation Profile is Southern Side of Transect, Right Side is northern Side of Transect.

2 Marsh Ram Transect #2



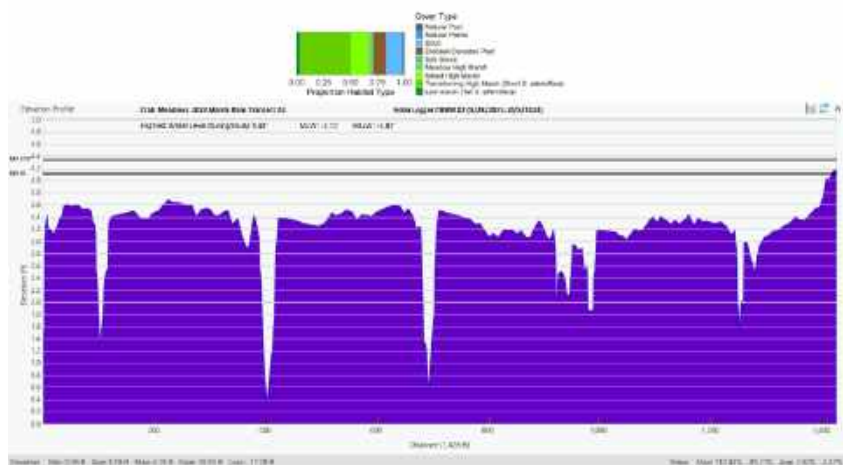
Left Side of Elevation Profile is Southern Side of Transect, Right Side is northern Side of Transect.

3 Marsh Ram Transect #3



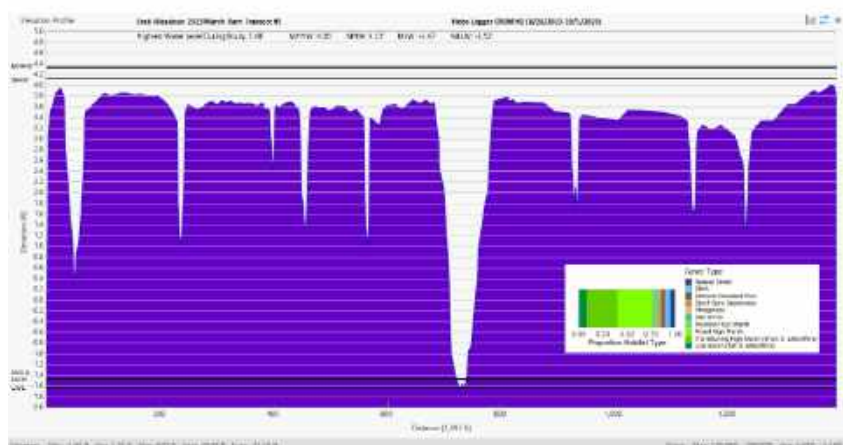
Left Side of Elevation Profile is Southern Side of Transect, Right Side is northern Side of Transect.

4 Marsh Ram Transect #4



Left Side of Elevation Profile is Southern Side of Transect, Right Side is northern Side of Transect.

5 Marsh Ram Transect #5



Left Side of Elevation Profile is Southern Side of Transect, Right Side is northern Side of Transect.

6 Marsh Ram Transect #6



Left Side of Elevation Profile is Southern Side of Transect, Right Side is northern Side of Transect.

7 Marsh Ram Transect #7



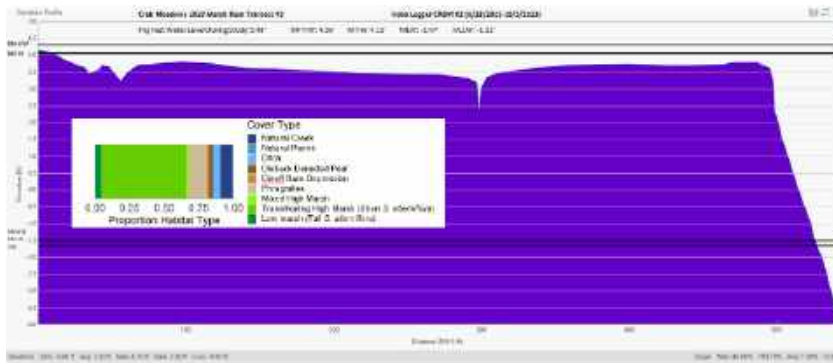
Left Side of Elevation Profile is Southern Side of Transect, Right Side is northern Side of Transect.

8 Marsh Ram Transect #8



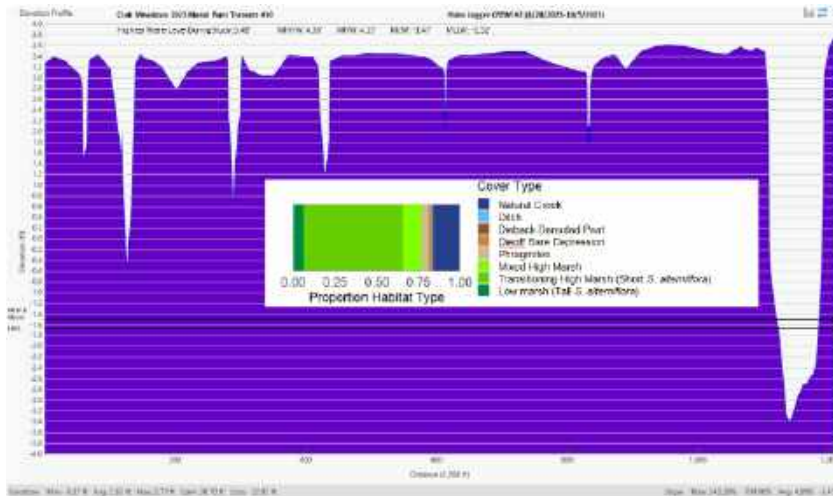
Left Side of Elevation Profile is Southern Side of Transect, Right Side is northern Side of Transect.

9 Marsh Ram Transect #9



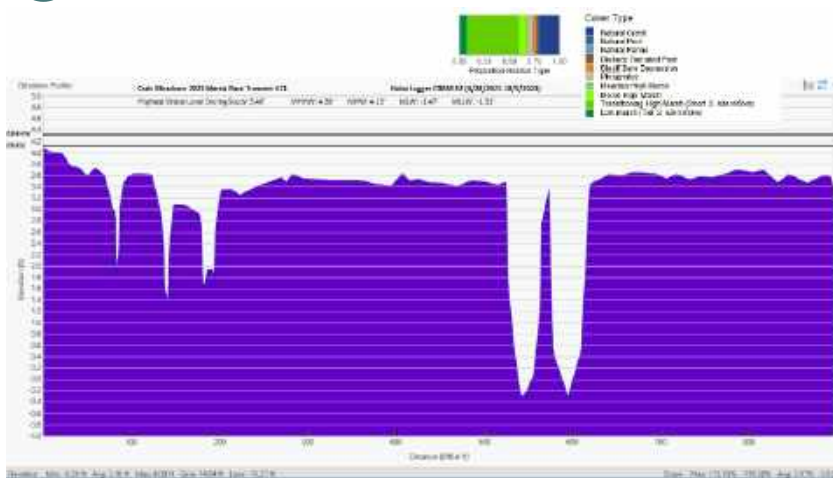
Left Side of Elevation Profile is Southern Side of Transect, Right Side is northern Side of Transect.

10 Marsh Ram Transect #10



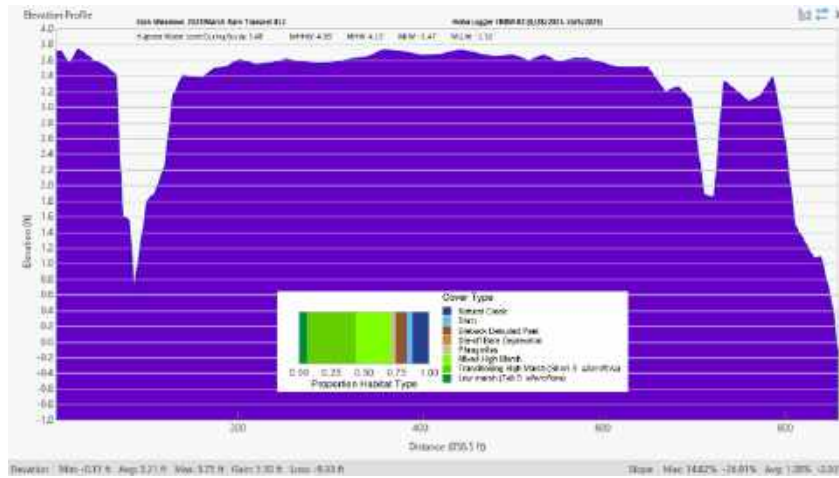
Left Side of Elevation Profile is Southern Side of Transect, Right Side is northern Side of Transect.

11 Marsh Ram Transect #11



Left Side of Elevation Profile is Southern Side of Transect, Right Side is northern Side of Transect.

12 Marsh Ram Transect #12



Left Side of Elevation Profile is Southern Side of Transect, Right Side is northern Side of Transect.

Marsh Elevation Represented by Pre 2016 LiDAR, classified by the target elevation of *S. patens* (*MHW-*MHHW)

*MHW & MHHW were calculated using only ~1 month of data collected 8/28/2023-10/5/2023. The data used for this analysis came from the coastal program's HOBO logger located closest to the marshes mouth. MHW and MHHW were calculated using the [NOAA Tidal Analysis Datum Calculator](#)

** LiDAR: 1887 - 2016 USGS CoNED Topobathy DEM (Compiled 2016): New England



Crab Meadows Marsh by Tidal Datums

- Elevation Below MHW
- Elevation Between MHW & MHHW
- Elevation Above MHHW

Crab Meadows Marsh by Tidal Datums. Click bottom left button for legend

	Elevation Below MHW	Elevation Between MHW and MHHW
Area	256.520 acres	6.768 acres
Percentage of Marsh	93.23% of the marsh area	2.45% of the marsh area

(Total Area of the marsh in this analysis is 269.128 acres)

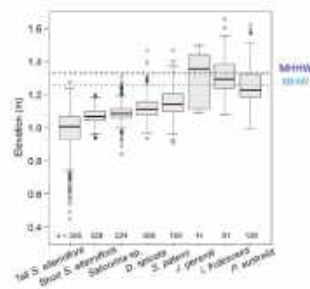
Elevation Above MHHW
11.84 acres
6.7% of the marsh area

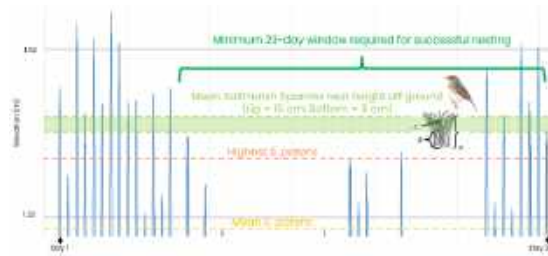
(Total Area of the marsh in this analysis is 269.128 acres)



Vegetation Data

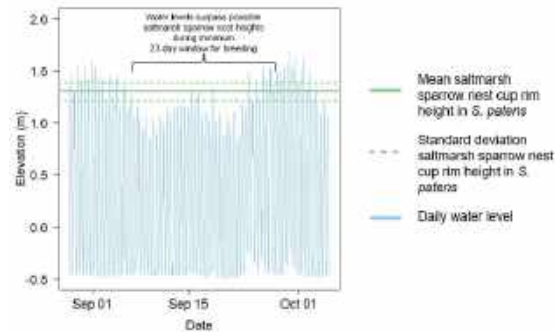
- RTK collected elevations of vegetation species along marshRAM transects and opportunistically sampled locations
- High marsh species *S. patens* and *D. spicata* elevations are below MHHW and MHW inundation levels measured during September and also below our estimates of MHW during the growing season.





Conceptual diagram of saltmarsh sparrow breeding ecology

Saltmarsh sparrows typically begin a breeding cycle after the most recent round of monthly high tides (associated with the new or full moons). They require a minimum of 23 days without water levels high enough to float out eggs or drown chicks to fledge offspring. Blue lines depict daily maximum water levels (high tides). The yellow dashed line depicts mean *S. patens* elevations while the salmon dashed line depicts the highest *S. patens* elevation available for placing a nest in. Nests are placed above the ground level in vegetation. As such, the shaded green in between the dashed green lines illustrates the elevation range of the nest cup. When water levels surpass the nest cup bottom, nest contents are inundated and when water levels surpass the nest cup rim, eggs will likely float out and chicks will drown. If multiple high tides are surpassing the nest cup rim, saltmarsh sparrow nests have very little chance of survival.



Estimated saltmarsh sparrow nest cup rim height in *S. patens* at Crab Meadow marsh relative to within-marsh water levels

- Daily water levels over September-October 2023 from water level logger #2 at the channel mouth
- Overlaid mean and standard deviations represent average saltmarsh sparrow nest height elevation at nest cup rim (0.15m) within Crab Meadow marsh *S. patens* elevations

- Water levels surpass average nest heights at the middle and end of this hypothetical reproductive window, suggesting most saltmarsh sparrow nests are very unlikely to be successful at Crab Meadow marsh



Future Data Collection Efforts

1. Collection of more water level data during the growing season, preferably for at least two months if possible.
2. Monitoring of Salinity and Groundwater
3. What other data are partner's interested in us collecting?

Conclusions

The marsh appears to have been losing ground relative to sea level rise, as much of the marsh is well below the MHW and as such the vegetation is transitioning to more salt tolerant species.



Salt marsh obligate birds have very little suitable habitat left to support nesting and it appears to mostly be along the upland margins where they would be more susceptible to predation and disturbance

There is very limited marsh migration potential at this site.

Next Steps

- We would recommend a phased approach to marsh restoration that would include a variety of techniques to help improve the hydrology (especially on the Eastern portions of the marsh) combined with elevation enhancement.
- We can assist with grant writing – to apply for funding to support a final design, permitting and implementation.
- We cannot be the applicant – but can work with the project team to draft a proposal.

Due May 13th, 2024

\$12 million in LIS Watershed (CT, MA, NH, NY, VT)

Grant range: \$50k-\$1.5m

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