

REQUEST FOR PROPOSALS AND QUALIFICATIONS (RFPQ)
Hydraulics & Hydrology Study for Scarborough Marsh

Context:

The Maine Climate Council has determined that Maine will face increasing sea level rise (SLR) and that by the year 2100, projected mean sea levels will be 4.0 feet higher than mean sea levels in 2000. This has motivated the Scarborough Land Trust (SLT) and Project Partners (Table 1) to assess the likely impacts of SLR on Scarborough Marsh, Maine’s largest contiguous tidal salt marsh, and to identify opportunities for restoration as well as strategies to enhance the marsh’s resilience to expected future conditions. This project is funded by a NOAA grant awarded to SLT for restoration planning of the Scarborough Marsh (project titled: Planning for the Resilient Restoration of Scarborough Marsh; funding provided through Coastal Zone Management Habitat Protection and Restoration Bipartisan Infrastructure Law) in collaboration with related efforts by MaineDOT, the Maine Department of Inland Fisheries and Wildlife, Maine Coastal Program, the Town of Scarborough, the Maine Geological Survey, and other Project Partners.

Dates:

Released Date: Friday Sept 5

Deadline for Written Questions: Friday Sept 19

Qualifications & Proposal Packets Due On: Mon Oct 6

Review of Proposals Completed By: Friday Oct 17

Interviews for Top Qualifying Firms, if needed: start week of Oct 20

Final Selection: Friday Oct 31

Scope Development and Negotiation: week of Nov 17

Goals:

Our goal is to maintain as much as possible of a functioning tidal marsh ecosystem under projected 2100 SLR. As part of this effort, we are requesting qualifications and work proposals for engineering services to create a hydraulic and hydrological modeling study. The Hydraulics & Hydrology (H&H) Modeling Study will, together with our Project Science Advisory Committee, contribute to the following goals:

1. Develop a detailed understanding of the Marsh’s current hydrology using a marsh-wide model. This model should incorporate the findings of a H&H model commissioned by MaineDOT that was completed by GEI (Portland, ME) in January 2025 on the portion of the Marsh north of the Eastern Trail in the Dunstan River sub-watershed. Please see the technical summary of this modeling study in our Supplementary Documents. All model files will be made available to the selected firm.
2. Leverage CoastWise standards and principles* in evaluating tidal crossings to determine if and to what degree crossing contribute to tidal restrictions under current conditions and 1.5 ft and 4.0 ft of SLR. The evaluation should also help inform crossing designs and marsh impacts to crossing modifications.
 1. The major tidal crossings on the marsh are:
 - (i) Libby River @ ME207 (Black Point Rd)
 - (ii) Nonesuch River @ ME207 (Black Point Rd)
 - (iii) Cascade Brook @ ME9 (Pine Point Rd)
 - (iv) Eastern Trail Bridge

- (v) Jones Creek @ ME9 (Pine Point Rd)
- (vi) CSX/Amtrak railroad bridge
- (vii) Route 1 (does not need to be included as this is addressed in a separate MaineDOT project)

The response to this RFPQ should include sizings for (i)-(iv) above. We request that Jones Creek and the CSX/Amtrak railroad bridge be included as **separate** breakout costs as the decision to include these crossings will be made during scope negotiation. In addition, there are minor crossings that the consultant may choose to include in the model.

*see [Maine Department of Marine Resources CoastWise: Rethinking Tidal Road Crossings](#) and additional CoastWise Sizing Criteria information available in Supplementary Documents.

3. Evaluate potential for high-marsh hydro-period improvement using features such as at-grade culverts that would allow Spring Tides to readily flood the entire high-marsh.
4. Develop model-based estimates for high-marsh hydroperiods for current, 1.5 ft, and 4.0 ft SLR conditions. Work with Project Partners to assess the suitability of each hydroperiod for supporting high-marsh flora and fauna.
5. Work with Project Partners to help identify and prioritize current and future potential marsh restoration areas to help improve marsh resilience to SLR and related infrastructure resiliency in the face of projected SLR. Use modeling results and additional simulations to inform the design of future restoration projects in collaboration with Project Partners. Note, the budgets and detailed modeling for these future restoration projects may be part of future project-specific funding requests.
6. Evaluate potential adverse flooding impacts to marsh-adjacent private property and infrastructure from SLR.
7. Identify possible marsh migration corridors for land conservation.
8. Gain insight into sediment transport throughout the marsh (e.g., likely areas of sediment mobilization, deposition, and transport) based on suitable model-output hydraulic indicators (primarily velocity magnitude and direction).

Project Area:

Tidal salt marshes provide many critical ecosystem services such as carbon sequestration and storage, water filtration, coastline protection from wave action and flooding, as well as food and shelter for numerous species of birds, fish, mammals, and shellfish – many of which are economically important fisheries species. Covering more than 3,000 acres, the Scarborough Marsh is the largest contiguous tidal salt marsh system in Maine and arguably the most significant of Maine’s coastal Focus Areas. The primary landowner of the Scarborough Marsh is the Maine Department of Inland Fisheries and Wildlife, while local nonprofits such as the Scarborough Land Trust and Maine Audubon provide stewardship, education, research, and recreation within the marsh. Unfortunately, like most tidal marshes, Scarborough Marsh is faced with multiple threats. The Town of Scarborough is among Maine’s fastest growing towns and was responsible for 17% of all growth for the entire Maine coast for the decade of 2010 to 2020. Extensive development has already occurred on the three landward sides of the marsh and tidal flow is currently affected by multiple road crossings. Development and existing roads and infrastructure, in conjunction with sea level rise and the legacy effects of historic marsh

modifications such as drainage ditches for agriculture and mosquito control, threaten the marsh's ability to sustain itself through natural positive feedback loops involving vegetation and sediment accretion. To address this, the Scarborough Land Trust, in collaboration with numerous project partners (Table 1), is undertaking an investigation into the future potential of the marsh and opportunities to increase its resilience. The project entails evaluating and proposing restoration projects to increase the survival probability of as much of the marsh habitat as possible considering the consequences of an estimated 4-ft of sea level rise in the next 75 years. The project is one of three currently in progress to assist in preserving both the marsh and local infrastructure in relation to climate change. The other projects are a future vulnerability study by the town of Scarborough and redesigns of the causeways and crossing structures on US Route 1 and State Route 9 by MaineDOT.

The study area corresponds to the area within the Scarborough Marsh boundaries (Figure 1), i.e. the areas of the marsh that are inundated under current highest astronomical tide conditions.

Scope of Work:

Task 1. Project Coordination

- Excluding the pre-contract scope development meeting, the Selected Consultant will hold four (4) coordination meetings and up to two (2) additional meetings with the project team. Coordination meetings would be held at the following milestones:
 - a) Project kick-off meeting
 - b) Presentation of calibrated model
 - c) Progress update meeting
 - d) Presentation of final results, observations, and recommendations
 - e) 2 additional meetings with SLT and Project Partners
- The Selected Consultant will deliver a brief monthly project update report which shall include budget, timeline, remaining work, challenges encountered, expectations for next work period.
- All meetings shall be in-person at locations to be determined.

Task 2. Develop Marsh Geometry and Assemble Water Level Dataset

- Marsh geometry data will be assessed and compiled by the Selected Consultant in collaboration with the Project Team. The geometry will be based upon existing data including most recently available LiDAR data, available bathymetry data (collected in part by MaineDOT and by NOAA), marsh surface points and transect data provided by Project Team, historical water-level data for key marsh tributaries, and the model data and findings of the previously referenced GEI/MaineDOT model developed for a portion of the Dunstan River sub-watershed north of the Eastern Trail. MaineDOT will supply relevant available survey data for roadways (e.g., US-1 and ME-9), as well as raised roadway elevations for resilience improvements. All model files will be made available to the selected firm.
- If data gaps exist, it is expected that these gaps will be identified and communicated to the Project Team. If necessary for the completion of this Task, the Selected Consultant and Project Team will discuss and may need to collaboratively plan the collection of additional data (as a separate task) to reduce these data gaps.

Task 3. Develop and Calibrate Existing & Future Conditions Model

- Based on the geometry developed, the Selected Consultant will develop a 2-Dimensional (2-D) model of the Scarborough Marsh system using the most recent version of the SRH-2D (Sedimentation and River Hydraulics) model developed by the U.S. Bureau of Reclamation and favored by MaineDOT and the Federal Highway Administration. A 2-D model will allow for identification and evaluation of the impacts of tidal restrictions, flooding risks to private infrastructure from SLR, locations of marsh migration, potential opportunities for hydrological restoration, and sediment transport modeling.
- *Key aspects of existing conditions model development will include:*
 - a) Establishing hydraulic boundary conditions, defining the model domain, mesh layout and resolution, spatial attributes (i.e., channel depth, bottom roughness), and representation of any connections (i.e., culverts).
 - b) Comparisons between measurements collected (e.g., water level data and topographic data) and the model output will be made to ensure the calibrated model is adequately reproducing measured conditions within a reasonable range.
 - c) A statistical error analysis will be provided to quantify the model uncertainty.
- *The Selected Consultant shall collect and review any existing data from the Project Partner Scientific Advisory Committee and any existing hydrologic/hydraulic studies in and around the Scarborough Marsh area. This may include:*
 - a) Data from previous water-level monitoring efforts by Scarborough Land Trust and Partners, dating back to 2000 (summarized in Table 2 and in Supplementary Documents).
 - b) Bathymetry and topography data. While bathymetry data are available for the study area, the Selected Consultant may need to supplement existing bathymetry data as needed for calibration. We recognize this could be an additional task.
- *Outputs from the existing conditions model will include:*
 - a) Hypsometric curves for the entire model domain and selected sub-watershed (e.g. Jones Creek, Libby River, Nonesuch River, Cascade Brook, and possibly others to be determined during scope of work negotiation)
 - b) Inundation maps for the complete model domain and selected sub-watershed areas under existing HAsT, MHW, MTL, MLW, MHHW at 1.5 ft and 4.0ft of SLR conditions
 - c) Work with Project Partners to identify and map possible marsh migration corridors in response to SLR with the existing tidal restrictions in place and under unrestricted conditions, (i.e., all tidal crossings have been mitigated to provide unrestricted tidal flow)
 - d) Identification of public and private buildings and infrastructure around the marsh which are at risk from projected SLR
 - e) Identification of hydrologically impaired marsh areas in need of restoration.
 - f) Identification of likely areas of sediment mobilization, deposition and transport, based on suitable model-output hydraulic indicators

Task 4. Development of Conceptual Restoration Alternatives

- Develop an unsteady 2-D hydraulic model using SRH-2D software to achieve the following objectives:

- a) Determine appropriate generic rectangular or trapezoidal opening sizes (rectangular or trapezoidal) for major tidal crossings.
 - b) Work with the Project Partner Scientific Advisory Committee to identify infrastructure and restoration design alternatives for further simulation.
 - c) Support marsh-wide restoration planning and project design for restoration of approximately 500 acres of the Scarborough Marsh.
- *The tidal crossing opening dimensions shall be selected in accordance with the following criteria:*
 - a) Natural channel invert elevations
 - b) Simple rectangular or trapezoidal openings
 - c) Meeting the maximum “peak hydraulic head difference” (PHHD¹) @ Highest Astronomical Tide selected in consultation with the Project Team. Potential examples are 0.10 ft and 0.25 ft (see CoastWise documents linked under Goals).
 - d) Meeting the maximum “instantaneous hydraulic head difference” (IHHD²) @ Highest Astronomical Tide selected in consultation with the Project Team. Potential examples are 0.25 ft and 0.5 ft (see CoastWise documents linked under Goals).
- *Simulations will be run for:*
 - a) A synthetic tidal sequence of repetitive HAsT under existing tides, 1.5 ft SLR and 4.0 ft SLR, length of time to be determined
 - b) A representative 28-day lunar cycle with an annual high spring tide sequence at existing sea levels, 1.5 ft, and 4.0 ft SLR
 - c) HAsT with Q1.1 steady upland inflow
 - d) Evaluate replacement crossings according to MaineDOT Bridge Design criteria
- *Model Outputs:*
 - a) Inundation maps for redesigned crossing sizes under existing tide levels and with 1.5 ft and 4.0 ft of SLR for HAsT, MHW, MTL, MLW, MHHW.
 - b) Working with project team, identify and map marsh migration corridors in response to SLR with new crossing geometry.
 - c) Identification of public and private buildings and infrastructure at risk under existing tides and SLR from change in crossing geometry.

¹ the difference between upstream and downstream peak water levels on a tidal cycle

² the largest difference between upstream and downstream water levels during the continuous time series including the high and low tides, and the intervening flood and ebb running tides

Overview of Phase 1

Phase 1 modeling is for determining simple rectangular or trapezoidal structure opening sizes commensurate with marsh tidal flow requirements. The tides of interest are existing and projected “normal” spring and HAsT cycles; “normal” meaning that they do not include storm or surge effects.

The project kick-off meeting will be used to clarify and refine the work scope.

Items for discussion and resolution as part of scope negotiation will include:

1. Strategies to support improving timeliness and efficiency of Phase 1 modeling such as:
 - a) Modeling tidal crossing structure openings as simple rectangular or trapezoidal open channels or structures
 - b) Sequencing optimization of separate openings
 - c) Other considerations to improve efficiency of the modeling effort
2. How to incorporate SLR
 - a) Simply additive to HAsT and tidal datums
 - b) Based on available larger offshore model results (e.g., Maine Coastal Flood Risk Model (ME-CFRM), if available)
3. Areal extent of the model domain to evaluate potential flooding impacts to private and other properties from projected SLR
4. Roadway Elevations
 - a) Simulate only new raised roadways
 - b) Simulate existing and raised roadways.
5. Compare and combine H&H models using data from this scope of work with that acquired from the GEI/MaineDOT model (see Supplementary Documents).

Overview of Phase 2

The Consultant chosen for Phase 1 will automatically continue with Phase 2 dependent on satisfactory completion of Phase 1 and timeline adherence. The purpose of Phase 2 is to conceptualize tidal crossing structure types and dimensions in accordance with tidal flow requirements as well as to address typical hydraulic design requirements. Based on the findings of Phase 1, Scarborough Land Trust and Partners will work with MaineDOT to identify specific tidal crossing structure types and dimensions to be evaluated in Phase 2 with the H&H model developed for Phase 1. The structures will conform to MaineDOT design criteria and CoastWise Principles. The H&H model developed for Scarborough Land Trust will also be used to evaluate areas of the Marsh that the project restoration team will evaluate for potential restoration. In addition, the model must be capable of simulating sediment transport in the Marsh under current conditions and projected 2100 SLR, both with current tidal restrictions in place and without tidal restrictions. All project files and products developed for and delivered to Scarborough Land Trust will be shared with the MaineDOT to support highway and bridge design efforts.

Deliverables & Commitments:

- Report documenting model development and findings, in Word and PDF formats
- All SRH-2D input and output files (and associated SMS files, if utilized), including the model mesh, such that Scarborough Land Trust or other party could run the model and visualize/query outputs
- Inundation maps, marsh migration corridors, and public and private buildings and infrastructure at risk. These maps should be provided in open geospatial formats
- Tables of current and projected tidal datums for Scarborough Marsh sub-watersheds, including Dunstan River, Cascade Brook, Jones Creek, Libby River, Mill Brook and Nonesuch River.
- Hypsometric curves for Cascade Brook, Dunstan River, Jones Creek, Libby River, Nonesuch River and the PAR rail crossing marsh sub-watersheds.
- Excel worksheets for Excel-generated graphics
- Any additional data developed for the model and requested by Scarborough Land Trust and Project Partners.
- Meetings (in-person)

Project Timing after selection, completion of scope development, and execution of contract:

- All days are working days, and timing is open to revision during scope negotiation.
- Within 15 days after receipt of Notice to Proceed from SLT, the Selected Consultant should submit a detailed schedule with key milestones to achieving the Project Tasks identified.
- All required technical work and findings for Phase 1 must be complete and delivered no later than 180 days from the project kick-off meeting. Final deliverables may be submitted later, as described below.
- The Consultant will work with Scarborough Land Trust and Project Partners to develop the Phase 2 work scope, to be finalized no later than 20 days after delivery of Phase 1 technical findings.
- The Phase 2 kick-off meeting will be held no later than 15 days after acceptance of the Phase 2 work plan.
- All required technical work and findings for Phase 2 must be complete and delivered no later than 105 days after the Phase 2 kick-off meeting.
- All project deliverables must be submitted no later than 150 days after Phase 2 kick-off.
- The consultant is responsible for allowing adequate time for Scarborough Land Trust and Project Partners to review the deliverables.

To respond, please submit the following via email as a single pdf attachment to Therese Lamperty at Tlamperty@scarboroughlandtrust.org:

1. Title Page
 - a. Name of Firm, Local Address, Number, Name of Primary Contact Person, and Date
2. Table of Contents
 - a. Include a clear identification of materials in each section by page number
3. Conceptual Workplan

- a. State understanding of work to be done and provide overview of relevant experience, anticipated project approach, and confirmation that the Respondent can accommodate the anticipated workload
 - b. Timeline and task completion (task, expected time to complete, major milestones, human resource allocation)
4. Qualifications and Relevant Experience
- a. Summarize experience of individuals who will perform work. Include examples of three completed relevant projects that demonstrate experience and expertise in performing tasks related to this project. This should include evidence of experience with the SRH-2D model.
 - b. Chart illustrating all team members and their responsibilities
 - i. If more than one firm is part of a team, the lead firm shall be clearly identified with all subcontractors and their roles identified
 - c. Contact information for 3 references able to comment on the consultant's qualifications and experience in hydrologic and hydraulic modeling
 - d. Curriculum vitae or resumes for project personnel, not to exceed two pages per person
5. Capabilities Statement
- a. Include core services the Respondent can provide related to technical, analytical, planning, and execution of the Project Tasks.

Fee Proposal:

A Fee Proposal Shall be submitted **separately** after we contact selected firms. **Any RFPO responses that include costs will be disqualified.** After selection, we will request the cost be sent via email within 24 hours.

The Proposal shall be structured as a time and materials not to exceed (T&M NTE) contract. Provide the time and materials estimated with a not-to-exceed cost by task, including hourly labor rates for staff and associated expenses.

Final project scope and fees will be discussed and negotiated between SLT, Project Partners, and the Respondent.

Estimated project costs should include all expenses required for the project, including travel, lodging, meals, on-site meetings, teleconferences, overhead costs, etc.

Proposal costs should be organized into Tasks, and the Interested Consultant should provide a breakdown of hours and any assumptions made. Tasks:

- Project Coordination
- Develop Marsh Geometry
- Develop and Calibrate Existing Conditions Model
- Development of Conceptual Restoration Alternatives

Evaluation Criteria:

We will use a qualifications-based selection process. SLT and Project Partners will evaluate all materials submitted by Interested Consultants and rank the proposals based on:

1. Qualifications and Relevant Experience (30/100pts)
 - a. Specifically, demonstrated experience with hydrologic and hydraulic modeling in tidal marshes
2. Conceptual Workplan (30/100pts)
 - a. Includes ability to complete the project in a timely manner without conflict with existing workloads
3. Capabilities Statement (10/100pts)
4. References (30/100pts)

Cost estimates will be requested and reviewed after selection process has been completed.

Selection & Award of Contract:

- A Selection Committee comprised of SLT and Project Partners may select one, some, or all Respondents for interviews. Should interviews be conducted, the person who will be responsible for managing the contract must be present at the interview. The Committee may request that other identified key personnel be present also.
- Upon selection and execution of a contract satisfactory to SLT and Project Partners, a Notice to Proceed will be sent to the Selected Consultant.
- Once final selection has been confirmed and a contract executed, SLT will notify other Interested Consultants by email.

Proposal Acceptance Period:

- Any Proposal in response to this solicitation shall be valid for 90 days after the written notice of results. A proposal may be withdrawn at the written request of the Interested Consultant at any time.
- SLT and Project Partners reserve the right to award to another Interested Consultant in the event that a mutually acceptable agreement cannot be reached.

Table 1. Project Partners

Federal Partners	State Agencies & Representative	Local Agencies & Organizations	Non-Profit Organizations
NOAA Office for Coastal Management (Project Funder and Collaborator), USFWS, Gulf of Maine Program, USFWS, Wildlife and Sport Fish Restoration	Maine Coastal Program, Department of Marine Resources, Maine Department of Inland Fisheries and Wildlife, Maine Geological Survey, Maine Natural Areas Program, Maine Department of Agriculture, Conservation & Forestry, Maine Department of Transportation, Governor's Office of Policy Innovation & the Future	Town of Scarborough, Scarborough Land Trust (Project Lead), Maine Audubon Society (Project Co-Lead), Eastern Trail Alliance	Ducks Unlimited (Great Lakes/Atlantic Region) (Project Co-Lead), Maine Chapter of The Nature Conservancy, Maine Coast Heritage Trust

Table 2. Existing Water Level Monitoring Data for Scarborough Marsh

These data can be found in Supplementary Documents.

Monitoring Period	Data 'Owners'	Participating Entities	Rivers Monitored
2000-2001	Woods Hole Group	Woods Hole Group	Cascade Brk, Dunstan River, Finnerd Brk, Scarborough River
2019_April-May	USFWS	USFWS	Libby River upstream and downstream of Black Point Road
2022_June-Nov	NOAA	NOAA and MCP	Jones Creek, Libby River, Nonesuch River
2023_Oct-Nov	MaineDOT	MaineDOT	Cascade, Dunstan, Finnerd, Phillips
2023_Oct-Nov	USFWS	USFWS	Marsh Wells at Cascade Brk and Seavey Landing
2024_July-Oct	USFWS	MCP and USFWS	Scarborough River by Eastern Trail
2024_July-Oct	USFWS	USFWS	Nonesuch River

2024_June- Oct	NOAA	NOAA	Jones Creek
2024_May- Oct	MaineDOT	MaineDOT	Cascade Brook, Dunstan River, Finnerd Brook, Dunstan River
2024_May- Oct	MaineDOT	MaineDOT	Libby River

Figure 1. Approximate Extent of H&H Model Domain Under Current Conditions

