



August 25, 2023

REQUEST FOR PROPOSALS

Wells National Estuarine Research Reserve (Wells Reserve) is soliciting proposals from a qualified consultant to develop a regional GIS-based Suitability Analysis for Nature-based Approaches.

PROJECT SUMMARY

Southern Maine coastal communities are on the front lines of climate change and already experiencing damage and disruptions from intensifying coastal storms and rising seas. Significant work during the past decade has helped coastal managers to understand, assess, and plan for the impacts of climate change. Several recent and ongoing regional planning efforts, including [Climate Ready Coast—Southern Maine](#), have sought to identify strategies and solutions for protecting people, property, and the environment from coastal climate hazards.

While these efforts have recommended nature-based approaches broadly, managers lack vital information and guidance about where and what type of approach might be most appropriate for specific locations and coastline characteristics within the region. For example, not all sites where marshes exist can support marsh migration, nor are all sites appropriate for living shorelines. Site-specific conditions (exposure to waves and tides, slope, and adjacent land use, for example) will dictate the appropriateness of these strategies and should be evaluated to aid communities in planning for coastal adaptation.

The Wells Reserve is leading a two-year grant-supported project with Southern Maine Planning and Development Commission and York County and Soil Water Conservation District to identify sites that may be suitable for specific nature-based approaches to address erosion and flooding hazards along the tidal shoreline of southern Maine (Kittery to Scarborough). Building on geospatial living shoreline site suitability modeling approaches conducted in other states and regions, this assessment will integrate hydrodynamic, geophysical, and ecological characteristics of the tidal shoreline and also attempts to incorporate characteristics unique to the northeast such as a short growing season, effects of ice, nor'easters and a large tidal range.

EXPERIENCE AND EXPERTISE

The consultant will demonstrate their expertise in the following areas:

- Regional shoreline analysis in New England
- Creating decision support tools and mapping tools
- Maine's coastal conditions/geomorphology and climate change impacts

- Living Shorelines and broader nature-based methodology and technology
- Publicly available datasets and their limitations
- Maine's shoreland regulations and federal regulations affecting living shoreline projects

KEY DATES

- Deadline for submission of written questions and requests for additional information: September 18, 2023
- Deadline for submission of proposal: September 22, 2023
- Project start: within two weeks of contract signing
- Project completion: February 28, 2024

CONSULTANT SCOPE OF WORK

The total budget for this consultant's work is not to exceed \$28,000.

A consultant will be selected to prepare data, carry out the GIS-based analysis, and develop a web-based mapping tool. The consultant will assist with evaluating available datasets and the proposed analysis methodology and will make recommendations for implementation of this scope including adjustments or additions that may improve the overall utility of the tool. The following scope outlines the general approach the analysis will take and the tasks that the consultant will be asked to complete

Outputs from the tool will include two-point layers representing the shoreline each with a suitability score attribute as follows:

- A range of scores representing the relative suitability of the site to support a living shoreline solution.
- A range of scores representing the relative suitability of the site to support a beach/dune restoration or enhancement solution.
- A second iteration of each score calculated with no coastal structures, indicating suitability for removing structures in favor of nature-based approaches.

Potential Target audiences and intended uses:

- *Climate Ready Coast - Southern Maine* technical assistance providers and working group members to identify locations for nature-based approaches implementation.
- Maine Department of Environmental Protection wetland permittees, municipal planners and planning boards, and other regulatory agency staff to evaluate proposed shoreline stabilization projects and to inform conversations with applicants about potential living shoreline approaches at specific sites.
- Engineers, consultants, and landscape architects, to inform conversations with prospective or active clients about suitable living shoreline options at specific sites.

- Public and conservation landowners such as Rachel Carson National Wildlife Refuge, Maine Department of Inland Fisheries and Wildlife, land trusts, and other government agencies to understand suitable living shoreline approaches at eroding sites.
- Private property owners to learn about their site and identify potential living shoreline approaches at eroding sites.
- Researchers to acquire baseline site suitability data for monitoring and other research.

Data

Data sets to be used in the suitability analysis will be obtained from publicly available sources and may be modified to suit the needs of the analysis. Some datasets listed here may be redundant and will be evaluated for inclusion, or there may be additional datasets that have not been included which will be assessed by the project team, project advisors, and the project consultant. For the living shoreline suitability score, all datasets will be evaluated relative to the shoreline.

Spatial data layers to be used for calculating living shoreline suitability scores:

- Marsh Migration Areas
- Eelgrass extent
- Tidal crossings
- Current velocities
- Federal navigation channel
- Shoreline structure inventory
- FEMA Flood Zones

Spatial data layers to be modified or created for calculating living shoreline suitability scores:

- Annualized Fetch
- Northwest Fetch (292-degree direction)
- Northeast fetch (90-degree direction)
- Landward shoreline type
- Seaward shoreline type
- Nearshore bathymetry
- Aspect
- Landward Relief
- Landward Percent slope
- Shoreline (MHHW)

Spatial data layers to be used for calculating dune/beach restoration or enhancement suitability scores:

- Dune Crest Points
- Dune erosion rates
- FEMA Base Flood Elevations
- Coastal Structure Points

Spatial data layers to be modified or created for calculating dune/beach restoration or enhancement suitability scores:

- Dry beach width (distance from MHW to dune or structure)
- Distance from dune to nearest structure

Supplemental layers for planning that are not included in the scoring system:

- Special Habitat Types (Tidal Waterfowl and Wading Bird Habitat, eelgrass, shellfish)
- Land ownership (municipal data)
- Climate Ready Coast - Southern Maine Vulnerability Assessment Infrastructure and Habitat Layers

Quality Control

The project consultant will evaluate datasets for their coverage within the study area, and propose steps to fill any gaps where possible to enable the analysis. Data sources and metadata will be documented. All attributes included with suitability layers will be defined.

Geoprocessing and Data Preparation

Some datasets will be ready to use in the analysis without additional geoprocessing while other datasets may require geoprocessing steps before they are able to be used in the analysis. Many of the geoprocessing steps necessary for the preparation and analysis of each dataset are included in supporting documents listed in the references below. The consultant will be asked to provide recommendations for additional geoprocessing as needed. All geoprocessing steps will be documented in the layer's metadata.

Scoring

Scoring systems will be developed in consultation with the advisory team and the project consultant and may be modeled from either the NH Living Shoreline Site Suitability Analysis (L3SA) or Maine Geological Survey tools. Scores will be calculated with and without the shoreline structures to assess the potential to replace hardened structures with nature-based approaches.

Web Map Development

The two living shoreline and beach restoration suitability layers and the supplemental layers will be presented in an ArcGIS Online Web Map. The project team will work with the consultant to determine the best format for the online tool and how it should be hosted online. The project team and the consultant will explore possible ways to generate interpretive information from the scores and component attributes to generate information similar to what is presented in the living shoreline profiles in the Northeast Regional Ocean Council (NROC) State of the Practice document.

Develop Future Recommendations and Lessons Learned

As the project progresses the project team will work with the consultant to document key decision points and lessons learned which will be used to create recommendations for interpreting or improving the analysis and web tool.

Reference Documents

Living Shoreline Decision Support Tool. Maine Geological Survey.
https://www.maine.gov/dacf/mgs/hazards/living_shoreline/faq.htm

New Hampshire Living Shoreline Sites Suitability Assessment (L3SA). New Hampshire Department of Environmental Services Coastal Program.
<https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/2020-01/r-wd-19-19.pdf>

Living Shorelines in New England: State of the Practice. Northeast Regional Ocean Council.
http://www.northeastoceancouncil.org/wp-content/uploads/2018/12/Final_StateofthePractice_7.2017.pdf

PROPOSAL SUBMISSION

Please submit proposals electronically to Annie Cox (contact information below) via email by 5:00 p.m. on Friday, September 22, 2023.

Proposals should be limited to 5 (five) pages and include the following information:

- A brief outline of proposed work, specific tasks, deliverables, timeline, and budget, based on the information contained in the Project Summary and Scope of Work sections above.
- Suggestions and creative ideas for modifying and/or expanding the scope of work to improve the process, outcomes, and outputs of the project.
- A brief explanation of how you will interact with the project team throughout the project and communicate results and findings to the project team.
- Brief summary of relevant experience.
- List of personnel who will be completing each portion of project work and their qualifications.
- Three (3) references, including current contact name and phone number for similar projects.

Please submit any questions about the project or this request for proposals to:

Annie Cox

acox@wellsnerr.org

342 Laudholm Farm Road, Wells, ME, 04090

(207) 646-1555 ext. 157

GIS-based Suitability Analysis for Nature-based Approaches Potential Data Types and Sources

Data Type	Description	Reason for using data	Source
Nearshore bathymetry	The depth of water within 100 feet of the shoreline	Measure of seaward slope	Available LIDAR
Landward shoreline type	The dominant landward shoreline type	Indicates hardness of landward shoreline	NOAA ESI Layers
Seaward shoreline type	The dominant seaward shoreline type	Indicates hardness of seaward shoreline	NOAA ESI Layers/MGS CMGE Maps
Aspect	The direction which the shoreline faces	Proxy for sun exposure	Available LIDAR
Shoreline (MHHW)	Points spaced 10 feet apart delineating the Mean Higher High Water elevation	Use of MHHW will allow for most tidal marsh to occur seaward of the shoreline and represent an area more likely to be suitable for living shoreline installation.	Available LIDAR
Sand Dunes Crest	Point file representing points (approximately 5 meter spacing) along the digitized dune crest line where elevations were extracted from available LiDAR data and compared with available preliminary FEMA 100-year BFE values.	Indication of beach restoration potential and presence of flood hazard mitigation value	MGS Dune Points
Marsh Migration	Areas mapped by MNAP that could accommodate future tidal wetland habitat.	To identify future favorable locations for salt marsh	MNAP
Eel grass extent/saltmarsh extent	Mapped areas of eel grass beds	Proxy for wave attenuation	Maine DEP
Tidal crossings	Mapped tidal crossing points	To identify potential high scour areas	Maine Tidal Restriction Atlas
Current velocities	Stream or river velocity	Proxy for ice formation and scour potential	unkown
Northwest Fetch (292 degree direction)	Calculated from USGS fetch tool.	Proxy for ice shoving	USGS Fetch Tool
Northeast fetch (90 degree direction)	Calculated from USGS fetch tool.	Proxy for storm exposure	USGS Fetch Tool
Distance from federal navigation channel	Measured from channel points to shoreline	Proxy for erosion	MEGIS
Shoreline structure inventory	Seawalls and other hard shoreline structures	Negative influence on adjacent shoreline, potential for removal	MGS Structure Lines
Annualized Fetch	The dominant direction and percent time over the year the wind comes from that direction	Indicator of wave exposure	USGS Fetch Tool
Relief	The relief of the shoreline 50 feet landward of the mean high water line	Indicator of feasibility for living shoreline installation	Available LIDAR
Percent slope	The percent slope of the shoreline 50 feet landward of the mean high water line	Indicator of feasibility for living shoreline installation	Available LIDAR
Special Habitat Types (TWWH, eel grass, shellfish)	Presence or absence within 100 ft	Indication of nearby sensitive habitat that may influence permitting.	MEGIS
Infrastructure Proximity	Presence or absence within 100 ft	Indicator of the need for shoreline protection.	Building footprints
Beach Erosion Rates	Maine geological survey dataset	Indicates vulnerability of shoreline to ongoing erosion	MGS
FEMA Flood Zones	Coastal zones with wave exposure	Proxy for wave exposure	FEMA