



Elise Leduc, M.E.M.
Coastal Scientist

Expertise

Coastal environmental management, wetland delineation and restoration, shellfish and eelgrass surveys, coastal planning, geospatial analysis, shoreline change analysis, environmental impact analyses, ecological risk assessment, conservation prioritizations, field and water quality sampling, Massachusetts environmental regulations.

Education

M.E.M., Coastal Environmental Management - 2011 Duke University
B.A., Biology – 2006 Williams College

Certificates of Training

OSHA 40-Hour HAZWOPER
Wetland Delineator Certification

Publications and Presentation

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Qualification Summary

- Adept at spatial data acquisition and geospatial analysis using ESRI's ArcGIS to analyze and display data for coastal and marine projects.
- Experience conducting shoreline change analyses.
- Experience with wetland delineation, shellfish and eelgrass surveys, and field data collection of sediments, water, and invertebrates for environmental studies.
- Experience with local, state, and federal permitting of coastal and environmental projects.
- Experience developing beach management plans, and coastal management and conservation documents.
- Strong written and verbal communication skills, and the ability to engage diverse groups of stakeholders.
- ESRI ArcGIS; ETGeowizards; MATLAB; Microsoft Office; Adobe Photoshop and Illustrator

Work Experience

2012-Present	Coastal Scientist, Woods Hole Group, Inc.
2011-2012	Watershed Management Fellow, Charles River Watershed Association
2011	Coastal Conservation Planner, North Carolina Division of Coastal Management
2010	Conservation GIS Analyst, Great Land Trust
2009-2010	Wetland Laboratory Technician, Duke University Wetland Center
2006-2008	Rural Aquaculture Extension Agent, Peace Corps Zambia

Key Projects

Ninigret Pond Salt Marsh Restoration, Charlestown, RI, Coastal Scientist

Conducted a wetland evaluation and provided restoration planning guidance for a large scale (~40 acre) salt marsh restoration project using thin layer sediment deposition. Selected targeted restoration areas based on level of existing vegetation degradation and elevation. Compiled and analyzed tidal, salinity, vegetation, soil core, and elevation data to develop a restoration plan and target marsh platform elevations. Developed adaptive management guidelines for moving forward with maintenance and monitoring of the project in the future.

Flood Mitigation and Ecological Resilience Project, Weymouth, MA, Coastal Scientist

Conducted a site evaluation and wetland delineation of a salt marsh wetland, which is currently tidally restricted due to an improperly sized and poorly maintained culvert. Performed vegetative community assessments, an evaluation of hydrology, and a hydric soils assessment. Reconnaissance level assessments were also conducted at two reference wetlands to identify opportunities for function improvement and restoration design. Based on the wetland survey and evaluation of the site, the results of the hydrodynamic modeling, and the information obtained from the two reference areas, a permit level restoration plan will be developed.

Evaluation and Restoration Plan for Whidah Road Salt Pond, Chatham, MA, Coastal Scientist

Served as project manager for a salt pond evaluation to determine the best course of management for the pond, which was experiencing frequent inlet closures. Conducted an elevation survey of the salt pond, salt marsh, inlet, coastal beach and nearshore area, collected water quality measurements, and performed a vegetation and habitat assessment for the pond and marsh. Combined an analysis of historical aerial photos to determine the frequency of inlet closure, with an assessment of the hydraulics at the site to determine at what tidal elevations and for how long during the daily tidal cycle water would flow between the pond and the bay, to evaluate the need and the feasibility of opening the inlet. Prepared a summary report and graphics detailing the findings of our study.

Dredge Disposal Analysis, Chatham, MA, Coastal Scientist

Developed selection criteria to choose areas that are best suited for disposal of dredge material. Calculated fill capacity and designed potential nourishment templates for 14 potential disposal sites in Chatham, Harwich and Orleans. Potential dredge disposal site rankings were based on physical logistics (i.e. location, volume, equipment access, etc.), as well as each site's potential benefits (i.e. erosion protection, habitat restoration, coastal resiliency, etc.) and potential permitting and regulatory constraints (i.e. shellfish resources, presence of salt marsh or eelgrass, etc.). Compiled final rankings, analyses, maps, and fill cross-sections into a final report for the Town.

Town of Sandwich Beach Management Plan, Coastal Scientist

Conducted a review of historical documents, maps, and existing data for Sandwich public beaches. Reviewed, mapped and described existing conditions and historical shoreline change through site visits and geospatial analysis. Performed historical shoreline change analysis for Sandwich public beaches. Documented existing activities being undertaken by the Town as on-going management of the public beaches. Identified and proposed new management activities that could improve the recreational or conservation functions of the public beaches. Compiled all existing management practices and new recommendations into a final Beach Management Plan document.

Comprehensive Plan for Docks, North Haven, NY, Coastal Scientist

Conducted field reconnaissance to characterize existing docks, public access, shoreline aesthetics and nearshore habitat. Wrote a Comprehensive Plan for Docks in North Haven, which highlighted existing dock policies, detailed the potential dock impacts on public access, aesthetics, water quality, and nearshore habitat, and documented the physical environment present along the coast of North Haven, including wave heights and flood elevations during storm conditions. Provided a series of recommendations for the Village to

Key Projects (continued)

consider when approving new dock regulations. Attended a Village Meeting where the plan was presented to the public, approved and adopted by the Village.

Modeling the Effects of Sea Level Rise on Coastal Wetlands, MA, Coastal Scientist

Worked for the Massachusetts Office of Coastal Zone Management to model the effects of sea level rise on coastal wetlands statewide. Data inputs required by SLAMM, such as topographic data, mapped wetlands, accretion and erosion rates, salinity, tide levels and ranges, percent imperviousness, and freshwater inputs, were identified, compiled and processed in order to run the model. The North Shore's Great Marsh was chosen as a sub-site for pilot testing and sensitivity analysis due to the amount of data available for the system. Final model simulations were run for both the sub-site, as well as state-wide simulations involving 18 regional panels, for three out-year scenarios and four projected sea level rise rates based on IPCC predictions. These results will aid CZM in identifying areas along the Massachusetts coast where wetlands can and cannot migrate and adapt to sea level rise, given current elevations and development.

Shellfish Survey, Chatham, MA, Coastal Scientist

Conducted a shellfish survey in Pleasant Bay consisting of 9 transects and 162 sampling stations, in response to a proposed pier development. Utilized a 12-inch modified bullrake to collect samples. Identified and recorded all live animals. Reported information on sediment type and grain size from each sample. Summarized resulting data in tabular form and wrote a final summary report detailing findings from the survey.

Newtown Creek CERCLA Environmental Risk Assessment, New York City, NY, Coastal Scientist

Review and comment on ecological risk documents, such as the RI/FS Work Plan, Screening Level Ecological Risk Assessment (SLERA), Baseline Ecological Risk Assessment (BERA), Risk Analysis Plan (RAP), etc. Conduct data synthesis and analysis, calculations and research to support CERCLA comments and recommendations. Provide technical review and recommendations on toxicity tests, site selection, benthic community analysis, weight-of-evidence method, and technical documents. Create presentations, figures, maps and comments to submit to EPA on behalf of the City.

Chilmark Pond Property Evaluation, Chilmark, MA, Coastal Scientist

Served as project manager for a coastal property evaluation along the southern coast of Martha's Vineyard. Researched and investigated the historic and potential future shoreline changes, and how they might impact a new house to be built on site. Conducted a site visit to evaluate the existing conditions at the site. Acquired and georeferenced historical aerial photographs and charts from the 1800s to the present, and utilized these to document the location of mean high water over time along 2 miles of the southern Martha's Vineyard coastline. Performed a shoreline change analysis using the digitized shorelines to compute a historical shoreline change rate, and help inform projections of future shoreline change rates. Compiled data and wrote a summary report of findings to provide guidance for future planning and construction on the property.

Status and Resilience of the Westport Harbor Barrier Beach, Westport, MA, Coastal Scientist

Compiled and georeferenced aerial photography and historical charts to perform a shoreline change analysis for the Westport Harbor Barrier Beach system. Used the data generated through the shoreline change analysis to project future shoreline change with and without sea level rise. To incorporate sea level rise into future estimates, LiDAR elevation data in conjunction with the predicted sea level rise scenarios in *Global Sea Level Rise Scenarios for the United States National Climate Assessment* were used. Developed projections for 25, 50 and 100 years into the future.

Key Projects (continued)

Coastal Pond Management Plan, Chilmark, MA, Coastal Scientist

Managed a project for a private client to develop a comprehensive pond management plan for a coastal salt pond on Martha's Vineyard. Conducted a site visit to evaluate existing conditions, investigate pond depth and sediment type, and make observations about the stability of the nearby barrier beach. Performed a shoreline change analysis for the southern barrier beach, a critical component to the future management of the pond and the rest of the property. Gathered background information on past and current practices for *Phragmites* control and pond management activities, as well as on general geology and soil conditions in the area, flood zone designations, and ecology of the pond to accurately identify and understand the problems facing the pond, and to develop alternatives for managing the pond. The Pond Management Plan will address preserving and/or restoring the open water pond habitat, and minimizing erosion on the barrier beach, which is necessary for the longevity of the pond. Alternatives considered for preserving and/or restoring the open water pond habitat included mechanical *Phragmites* removal, seasonal targeted herbicide use, and dredging to increase the depth of the pond. Alternatives considered for reducing erosion along the barrier beach included installation of sand fencing, localized dune restoration or reconstruction after major storms, and restoration of current dune footpaths. The plan provided background and reasoning, estimated effectiveness, estimated cost, and projected time frame for each proposed alternative.

Technical Evaluation of Preliminary 2013 FEMA FIRMs for the Towns of Scituate, Marshfield, and Duxbury, MA, Coastal Scientist

Evaluated draft FEMA maps, and identified errors and inconsistencies in FEMA's analyses, such as oversights along a particular transect or a flawed assumption. Reanalyzed flood area delineations along FEMA's existing transects, and created additional transects to document and accurately map the flooding potential around location-specific topography. Utilized a geographic information system (ArcMap) to adjust and reclassify mapped flood zones and Base Flood Elevations (BFEs) to reflect updated modeling. Produced updated flood maps.

Shoreline Change Analysis for Saco Bay, ME, Coastal Scientist

Acquired and georeferenced historical aerial photographs and maps for use in project analyses. Analyzed multiple historical aerial photographs to digitize the shoreline and to calculate long-term rates of shoreline change along transects through the beach and dune. Utilized MATLAB to compute annual rates of shoreline change between all available time periods between 1864 to 2010 using the end point method, as well as the linear regression method. Contoured LiDAR data from three time periods to compare to contemporary shoreline positions and incorporate into the shoreline change analysis. Performed error analyses for shorelines derived from aerial photos and LiDAR data.

Publications and Presentations

Cura, J.J., E. Leduc, C. Prabhu, and E. Mahoney. 2015. "Sediment Toxicity in Different Classes of Reference Area and in the Newtown Creek Superfund Site." Poster Presentation at the Society of Environmental Toxicology and Chemistry (SETAC), Salt Lake City, UT, November 2015.

Leduc, E. 2011. "An Evaluation of GIS Prioritizations for Selecting Wetland Mitigation Sites: Cook Inlet Case Study" Master's Project, Duke University's Nicholas School of the Environment, Durham, NC.

Leduc, E., K. Price, and T. Miller. 2011. "State of North Carolina 2011 Coastal and Estuarine Land Conservation Program (CELCP) Plan" NC Department of Environment and Natural Resources, Division of Coastal Management.

"A Prioritization of Land Parcels for Wetland Mitigation around Knik Arm" prepared for Great Land Trust, Anchorage, AK. 2011.

Publications and Presentations (continued)

“A Prioritization of Land Parcels for Conservation in the Matanuska-Susitna Borough” prepared for Great Land Trust, Anchorage, AK. 2010.

Leduc, E. 2006. “Effects of the invasive ant, *Myrmica rubra*, on the local ant-treehopper mutualism” Senior Thesis, Williams College Biology Department, Williamstown, MA.