

What's at stake? *Understanding and communicating the impact of coastal wetland loss*

March 30, 2016



Applicant: National Estuarine Research Reserve Association

Contact: Rebecca Roth

Roth@neraa.org

(202) 236 4819

342 Laudholm Farm Road

Wells, ME 04090

1. Background and Introduction

The United States lost well over 360,000 acres of wetlands between the years of 2004 and 2009; despite years of federal, state and local regulations to protect them. The loss is attributed to storms, sea level rise, and changing land use patterns (USFWS 2011). To make informed decisions about how to manage the coast, natural resource management authorities and non-profits need to understand what is at stake when we lose our wetlands. Ecosystem service valuation has become an important emerging topic at NOAA and with Digital Coast Partners, and several projects around the country have been working to describe ecosystem services of coastal areas both quantitatively and qualitatively. Although these individual projects are generating innovative information, there are still practical limitations for how this site specific information can be used, how transferable it might be, and what questions it can directly answer both locally and nationally.

This project aims to map who makes decisions related to coastal wetlands locally, and the kind of ecosystem service valuation information that they want or need. It will also pilot the use of Digital Coast Tools and emerging ecosystem service valuation work being done within the NERRS to articulate the value of coastal wetlands/saltmarshes in a way that resonates with local land protection and restoration partners, local communities and national Digital Coast partners. Through this project, the fellow will be exploring the way NERRS staff and local decision makers use (or do not use) Digital Coast now, and will provide recommendations for how Digital Coast could refine tools, data or products related to coastal wetland change and ecosystem service valuation.

The 28 National Estuarine Research Reserves are focused on protecting and restoring estuarine water quality and habitat and informing coastal management. One of the most common and critical habitats that reserves study and protect are salt marshes and the wetland systems surrounding the Great Lakes. Saltmarshes are valuable ecologically as nurseries for commercial and recreationally important fisheries, as sponges that absorb excess nutrients and flood waters, as important carbon sequestration sites and are important aesthetic and recreational resources for coastal communities.

Understanding the distribution, function and changes in coastal wetlands has been a focus of the NERRS for years. Several Research Reserve System wide efforts currently monitor wetland extent (System-Wide Monitoring Program Habitat Mapping and Change) and health (System Wide Emergent Biomonitoring and Sentinel Site Module 1). This foundation of biological, mapping and physical data about our marshes has positioned the reserves well to observe and predict impacts from sea level rise and to facilitate informed restoration and protection decisions. Several reserves have modeled predicted changes in coastal wetland extent through tools such as the Sea Level Affecting Marsh Migration (SLAMM) model and the Marsh Equilibrium Model (MEM). As a system of reserves, the NERRS are beginning to see a national picture of marsh and coastal wetland vulnerability, and the potential change in distribution under future sea level rise scenarios.

Understanding the potential loss draws on the NERRS capacity to understand ecological trends across spatial and temporal scales; but urging action to help reverse or stop the loss is also a key role of the NERRS through our own management actions, our work with partners to restore

and protect marshes, and through delivery of science based information to coastal communities through our system-wide Coastal Training Program.

This fellowship will help evaluate how and when to use ecosystem service valuation information while working with local decision makers. In addition, the fellow will evaluate the Digital Coast tools that currently exist relevant to ecosystem services valuation in order to assess the capacity of these tools to inform coastal decision making. Through these tasks, the fellowship will contribute to Digital Coast's capacity to efficiently share ecosystem services information across partners at the national scale.

This project will use a case study approach at two pilot NERR sites (Great Bay NERR and Wells NERR) that have done work with ecosystem service valuation to understand when, who and how this information can influence decisions relative to wetland loss, restoration or protection locally. The fellow will also explore how ecosystem service valuation information may be used at larger regional or national scales, directly informing communications strategies for NERRA and other Digital Coast Partners. This will include understanding the scale of information, ways to frame the information, and how to combine ecosystem services valuation information with other tools and data that are available from the Digital Coast platform or are available locally. Through this work, the fellow will identify gaps on the Digital Coast platform related to how local decision makers access and use the site, and if and how Digital Coast could incorporate additional or different data or tools related to ecosystem service valuation.

2. Goals and Objectives

Goal 1: Understand the way key audiences receive, understand, and use information about ecosystem services in the context of coastal wetland protection and restoration decisions

Objective 1.1. By August 2017, NERRA and Digital Coast partners will complete two Reserve-based case studies at Wells (ME) and Great Bay (NH) Reserves, where decision making about coastal wetland conservation and restoration and the links between coastal wetlands and community resilience are described. Decision-makers will be identified. A conceptual map of the context and motivation of decision-making related to management, conservation and policy will be developed and the availability and use of Digital Coast tools to support decision making will be evaluated. Any barriers to the use of Digital Coast tools in the context of ecosystem service decision making in these case studies will be described.

Objective 1.2 By November 2017, NERRA and Digital Coast partners will understand how language, data, and tools associated with ecosystem service valuation are understood by and best communicated to a) local professionals, elected and volunteer positions directly involved in decisions related to wetland change; and, b) local and regional land partners that influence wetland change at a minimum of two pilot sites. Specific understanding with respect to existing Digital Coast tools will be highlighted for the partners to use as soon as possible.

Objective 1.3 By November 2017, NERRA and Digital Coast partners will understand how language, data and tools associated with ecosystem service valuation are understood and best communicated at a national scale to NOAA, and other relevant federal partners.

Goal 2: Identify the coastal wetland change related decisions that Digital Coast tools and data can assist with locally, how those tools are currently used, and recommend how Digital Coast could potentially refine or add ecosystem services information to enhance local decision making.

Objective 2.1 By August 2017 Digital Coast partners will have a synthesis of two case studies of the local, regional and national decisions that are most relevant to wetland loss in those places; who makes those decisions; and where they look for information.

Objective 2.2 By December 2017 Digital Coast partners will have representative information about how coastal management professionals are currently using the Digital Coast website to inform decisions, and what any barriers to its use are.

Objective 2.3 By February 2018 Digital Coast partners have an assessment of current tools and data on Digital Coast that may be helpful in assessing ecosystem services associated with coastal wetlands, and what the strengths and weakness of those tools are, as perceived by potential users.

Goal 3: Enhance the use of Digital Coast Tools, along with more detailed wetland change models and economic valuation information where available, to articulate ecosystem service values and tradeoffs associated with coastal wetlands locally and nationally.

Objective 3.1 By August 2018, Digital Coast partners have guidance for how to use Digital Coast tools in concert with local data to summarize the changes in wetland ecosystem services related to different scenarios of change (sea level rise, etc.).

Objective 3.2 By August 2018, Digital Coast Partners have a guide for how to find current Ecosystem Service Valuation data, summaries and experts and communicate the value of protecting and restoring marshes locally that is science based, grounded in audience assessments and local wetland change scenarios (created by the NERRS where possible).

Objective 3.3 By August 2018, Digital Coast partners have a set of recommendations and an estimate of the effort and resources needed to work with Digital Coast products, data and tools at both local and national scales to address ecosystem service valuation; using this project as a pilot.

3. Milestones and Outcomes

Outcomes:

1. Digital Coast partners are able to communicate information about ecosystem service change, values and tradeoffs related to coastal wetland loss accurately and effectively to decision makers who have the authority to protect and restore coastal wetlands.
2. The Digital Coast platform has information about how well current information and tools can support decision makers interested in wetland loss and ecosystem service valuation, and recommendations for how to make the site and associated tools, training and data more useful to decision makers.

Milestones:

1. Decision Context Analysis: objective 1.1.

This analysis will have a local, regional and national component. The local analysis will be conducted in partnership with staff at Wells and Great Bay and their local partners. It will explore how local decisions about coastal wetlands are made, and who influences those decisions. The regional aspect will look at local and regional land trusts, non-profits, and regional authorities that do not work at the municipal scale, but do have influence over coastal wetland change. The third tier of the analysis is to map what national decision makers are critical to coastal wetland change and summarize how decisions are made in that context.

2. Analysis of how ecosystem services information is used and best communicated: objective 1.2

Once key decision makers are identified the fellow will explore how ecosystem service valuation or tradeoff information is used now or could be used to influence decisions relevant to coastal wetland change. This will include understanding how this type of information can specifically influence local, regional or national decisions and decision makers, and explore the way the information is best communicated. A summary will be completed that gives tips for how to communicate on this topic in a way that can practically inform decisions.

3. Digital Coast Utility assessment and recommendations: objective 2.2 and 2.3

As the fellow works with decision makers at multiple scales, the fellow will conduct formal or informal analysis of if and how Digital Coast tools are being used now to understand coastal wetland change and/or ecosystem services related to coastal wetlands.

Develop a method for partners to use mapping results to quantify ecosystem service change: objective (objective 3.1. and 3.12)

The fellow will explore specific examples of how to use Digital Coast and local mapping data to quantify predicted or tracked coastal wetland loss, and how to quantify the ecosystem service change and if possible the associated economic value. This will be explored with pilot sites, with up to two other reserves that have the available data and a use for this information, and will explore if or how to do this at a national or regional scale using tools such as the Sea-Level Rise Viewer.

4. Develop a suite of local products that use decision context results and the assessment of how to use and communicate ESV information that are tailored to specific decisions that could influence coastal wetlands. (objective 1.1, 1.2, 3.2)

Timeline

September 2016: First meeting of steering committee to review detailed workplan

November 2016: NERRS/NERRA annual meeting feedback opportunity on Digital Coast use, and on use of ecosystem service valuation. This meeting will also confirm the five reserves that will be used to assess transferability of results.

June 2017: Decision Context Analysis Complete

Fall 2017: NERRS/NERRA annual meeting feedback session on decision context analysis to assess transferability of methods or results; solicits feedback on analysis of ESV information, preliminary results of Digital Coast utility assessment and solicits feedback on recommendations.

December 2017: Analysis of how ecosystem services information is used and best communicated is complete for local audiences.

February 2018: Digital Coast utility assessment and recommendations drafted. Meeting held with Digital Coast partners to review and refine.

May 2018: Suite of local products are complete that use decision context results and the assessment of how to use and communicate ESV information that are tailored to specific decisions that could influence coastal wetlands. These are distributed and shared with other reserves and NERRA and Digital Coast partners to assess ability to scale, and transferability.

June 2018: Method for partners to use mapping results to quantify ecosystem service change is complete and distributed to Digital Coast partners.

August 2018: Final recommendations for Digital Coast platform changes, and recommendations for communicating about ESV locally and at multiple scales are summarized in a report.

4. Project Description

The work of the Digital Coast Fellow will occur in four stages: 1) explore existing resources; 2) assess to fill gaps; 3) pilot the use of data and tools and, 4) produce products and evaluate them. It is understood that the work will not follow this framework in a strictly chronological manner; rather the stages are illustrative of how each part of the project will be informed by and build upon the other pieces.

1. Explore what is out there, how it is organized, etc. to ensure that this study uses the best available information, avoids duplication, and advances work done by others in this field.

What do we know about coastal decision makers whose decisions influence the ecosystem services provided by coastal wetlands? The fellow will explore the current literature, NERRS Coastal Training Program Needs Assessment information, and other relevant background information that delineates and characterizes the decisions and decision makers whose choices and tradeoffs affect the ecosystem services provided by coastal wetlands and the ability of those wetlands to contribute to coastal community resilience. In addition, the fellow will work NOS Digital Coast staff to obtain feedback from those who have used or are using any of the current tools to identify use challenges and data/information that may be missing.

What tools are in Digital Coast now that can help summarize coastal wetland values? First the fellow will explore existing tools in Digital Coast that are focused on coastal wetlands, ecosystem services, or tools and data that could inform these topics. The fellow will work to see if and how ecosystem services related to coastal wetlands can already be articulated through a combination of Digital Coast Tools (INVEST, Sea Level Rise viewer, etc.). This step will be informed by and done in concert with willing staff from the Office of Coastal Management to

ensure that the effort is not duplicative, and fills gaps in our collective understanding of how Digital Coast is or could be used to inform coastal wetland valuation work.

How are changes in the ecosystem services of coastal wetlands currently measured and assessed? The fellow will conduct a literature review of coastal wetland ecosystem services research and projects. The review will include tools used to connect ecosystem services valuation with decision making for policy and management. Examples of methods developed and used by Environmental Protection Agency, The Nature Conservancy, and Earth's Economics will be part of the literature review. Tools currently used by NERRS such as SLAMM, Sea Level Rise Mapper and MEM will be compared to the tools used less frequently by the NERRS.

What do we know about talking about Ecosystem Services in economic terms? The fellow will look at existing studies about how to communicate economic or ecosystem service values within the environmental field. This will include literature review and exploring work that has recently been presented at meetings, workshops and symposiums nationally. It may include informal interviews with experts as well.

2. Conduct an Assessment to understand if and how articulating Ecosystem Service Valuation (ESV) information could inform or influence coastal wetland restoration and protection.

The fellow will conduct an assessment to first confirm and/or determine which decision makers have the highest impact on coastal wetland change at different scales (municipal types, local land trust types, potentially state or regional players, and national organizations that could promote this work). Once those decision makers are identified, the fellow will use current ESV values, data, or studies and test how this information resonates, what language works, what kinds of decisions this might inform, and how that information is considered in the context of other factors and information that influence decisions.

3. Pilot using Digital Coast tools, local saltmarsh modeling, best available ESV info on saltmarshes in 2 reserves to come up with estimated ESV change associated with coastal wetland loss.

This will likely be focused on 2-3 services. Services would be determined locally based on what is most relevant and what data is available, but examples of services include: flood storage, carbon sequestration, and fish habitat. At this stage, other Digital Coast partners would be invited to participate in the pilot, and we would intentionally use as many Digital Coast tools/data/etc. as possible. At the end of this pilot we would summarize a) a recommendation on how to articulate a clear goal for determining ecosystem service value locally; b) see how far we could get at articulating the change in value of ecosystem services when you lose X acres of coastal wetlands; c) describe how Digital Coast Tools were used to help get that number and put it in context; d) identify what some challenges or gaps in data or context are that need to be filled locally and/or could be considered for Digital Coast in the future.

4. Determine how to use the pilot information from two reserves to create products that will resonate with the key decision makers identified in #2 above.

These products will be driven by audience assessments, and could include outputs such as one pagers, powerpoint slides, and maps that show change in coastal wetland and associated change in value. The fellow would create pilot products, then test them with local decision

makers that have been identified as most influential. Next, the fellow would share the locally driven products with staff from NERRS in other regions (up to five reserves, using a virtual focus group or face to face time at an annual meeting) to identify if and where they might be useful to other NERRS Coastal Training Programs, and what would need to be done to tailor the approach or products to other places. Finally, the fellow would test the products with decision makers at regional and national scales, to determine how those outputs and products need to be adapted to serve their needs. This would inform national Digital Coast partner's efforts, and provide guidance on if a nested product that articulates wetland values in relation to predicted loss both locally and nationally would be possible for the NERRS.

5. Fellow Mentoring

The lead mentors for this project will be Christine Feurt, Coastal Training Program Coordinator at the Wells NERR, with assistance from NERRA and a team of reserve colleagues as described below. Chris has led projects related to ecosystem services, has spearheaded audience assessments, mentored students in her role at the University of New England, and is located at the Wells NERR, which is also the home office for NERRA. Rebecca Roth, NERRA Executive Director and Cory Riley, NERRA President and Great Bay Manager will serve as "Deputy Mentors," engaged weekly (Roth) and monthly (Riley) with the fellow to assist with their understanding of coastal management throughout the NERRS and as a matter of public policy. Cory will serve as the lead for the second pilot of the fellow's project. Rebecca, Cory and Chris will also engage the help and guidance of a small steering committee made up of 7-9 individuals. This group will include OCM expertise on Digital Coast and Ecosystem Valuation, NERRS staff who have had experience working with Ecosystem Service Valuation and/or Digital Coast, at least one expert on ESV from outside NOAA and the NERRS and at least one representative from another Digital Coast partner organization.

The project will expose the fellow to decision makers at multiple levels (locally through research reserves, and nationally through NERRA), and at the NERRS pilot sites they will gain experience with local decision makers and NERRS staff and partners. The fellow will also be exposed to how a national non-profit organization (NERRA) works to communicate and educate around environmental issues. The fellow will be invited to present at the NERRA Executive Committee, the NERRA Fall Board Meetings, and at the NERRS/NERRA annual meeting. He/she will be encouraged to design and lead a panel session for Social Coast 2018 focused on Digital Coast partners work on this topic, and working explicitly with the NERRA Executive Committee and any communication support contractors to ensure that key results are incorporated into NERRA communication strategies.

6. Project Partners

Beyond the Wells and Great Bay Reserve, the project would partner with approximately five other research reserves that were working on ecosystem service valuation. These partner reserves would be part of the steering committee and would provide the fellow the experience of understanding stewardship and coastal management from different geographic perspectives. NERRA intends for the fellow to interact with the OCM's regional technology staff, as well as OCM's digital coast staff throughout the fellowship. NERRA intends to identify and collaborate closely with one or more colleagues from the Digital Coast partnership. The Nature

Conservancy's land acquisition work is most closely aligned with the work and goals of the fellowship project; and therefore, should this project be selected, NERRA would actively recruit a colleague to serve as a member of the steering committee that advises the fellow and provides project feedback. Likewise, the Coastal States membership would likely have land use planning activities that would greatly benefit from the fellowship, and NERRA would work to identify a local representative to participate in providing feedback to the fellow. In addition, the New Hampshire ESV project would be one of the two selected pilots and would provide the fellow with face to face time with project partners outside to the Great Bay reserve. Other partners for this project would include colleagues doing work in ESV with the NERRS such as NCCOS work in NJ, COMPASS, the Marine Ecosystem Services Project, the Center for the Blue Economy, and Resources for the Future.

7. Cost Share Description

NERRA will provide the cash match required for this fellowship. The Wells NERR will donate space at the reserve for the fellow to work and the associated internet, phone, etc. support. Travel to the Great Bay Reserve would occur, and mileage for that travel would be reimbursed by NERRA. In addition, the fellow will also be asked to travel at three different times during the project, the NERRS Annual Meetings in 2016 (Virginia, Chesapeake Bay Reserve) and 2017 (Texas, Mission Aransas Reserve), as well as to the Digital Coast conference (Charleston, South Carolina). These additional travel costs of approximately \$2,500 will be covered by NERRA.

8. The Project will address the following strategic focus areas:

- Understand, quantify, visualize, and communicate ecosystem services of key natural areas along the coasts to inform decision-making.
- Build innovative natural and social science research capacity, products, and applications that react user-driven science, and synthesize, visualize, communicate, and transfer research results to strengthen policies and decisions, and effectively manage coastal and ocean resources.
- Foster user-driven science and assessment efforts to enhance understanding of natural, social, and economic impacts of coastal hazards and climate change, and the approaches needed to adapt to and communicate about these threats.
- Assist coastal decision makers in conserving active and passive recreational uses and in preparing for existing and emerging coastal and ocean uses by providing socioeconomic data, information, visualizations, technical assistance, funding, and tools.