Shifting Shorelines
The Beaches Conference
June 14, 2019

Moderator: Marybeth Richardson, Maine Department of Environmental Protection
Note Taker: Cory Riley, Great Bay Preserve

"What will work at my site? Encouraging living shoreline erosion management in coastal New Hampshire"

Kirsten Howard, Resilience Coordinator, NH DES Coastal Program

- Wagon Hill Farm example: in 1989 Durham purchased land, they took out a bond, they knew there was some erosion along the Oyster River. But they had just spent money on it, and just paid off the bond 3-4 years ago and then they were ready to do something about erosion. So they put some money into their budget in 2016 and the Coastal Program stepped up to help. What can we do instead of a traditional rip rap approach? Instead they wanted to design a living shoreline that is flexible, ecologically appropriate, and can adapt with sea level rise. The town got excited. Before settling on a design they tested, monitored, piloted materials and strategies, did plenty of outreach with the public, and thought about how to manage a big stressor (people and dogs walking there). There were also lots of permitting needed.
- In the last few weeks they were approved for construction, and they received a grant to move forward, and this spring they have been working on construction.
- More broadly in NH we are promoting living shorelines in a few different ways with several partners. As a region in the Northeast we also came together to look at the "state of living shorelines in NE". People have been doing living shorelines around the country, but the approaches have not been applied in NE or have not been successful. So a report was put together to talk about what is working for this region.
- Two big questions we are grappling with now:
    1) What am I allowed to build when it comes to erosion problems on private property?
        a. DES did define living shorelines in their new rule set and created real incentives for putting these projects in the ground. In the new rule set there is a new project type that is consistent with a restoration project – lower permit fee and you are allowed to fill below high tide mark. The new regulations also do not allow new seawalls unless they are protecting public infrastructure, and that is the only alternative.
    2) What will work at my site?
        a. Maine has done this in Caso Bay and so we looked at what they did and worked with a Coastal Fellow to divide the tidally influenced coast into ten

feet segments and looked at parameters that influence living shoreline suitability and then built a model that ranks living shoreline suitability for each segment ranking them from 1-6 (6 is highly suitable). It is now in a GIS mapper, and the Coastal Program will put together a property profile for any address. While we are thinking about living shoreline to deal with erosion there are many areas that are so low lying that these erosion management techniques will not help with tidal flooding that occurs on those properties.

- What is next for Living Shorelines?
    - We are having happy hours for the professional network (landscapers, engineers, developers, etc.)
    - Advancing a few projects and monitoring them
    - Landowner technical assistance. As we have meetings and getting calls from property owners, we have a program for them to voluntarily sign up for – DES Coastal Program and UNH will do site based visits to help them and give them ideas.

<u>Salt Marsh Integrity in New England: An examination of how four NWR will stack up against climate change.</u>

Sarah Dodgin, Biological Science Technician at Rachel Carson NWR

- SMI is a rapid assessment effort to determine salt marsh integrity, diversity and environmental health that was developed in 2008. We began assessments in 2012, and was the first large scale assessments of saltmarshes.
- Why? To understand how past and present changes affect ecology.
    - Past: salt marsh haying and mosquito ditching. These activities affected hydrology
    - Present: Land use, invasive species, climate change and sea level rise
- How? Use standardized measurement techniques and then normalized scoring metrics (flooding duration and salinity, nekton density, nekton richness, tidal marsh obligate bird abundance, herbicide use, percent native vegetation cover). They are scored relative to each other. We are also considering state condition and collecting other related metrics.
- When? Each metric was assessed once and the SMI assessment was completed in 2016 and they took between 1-5 years (average 3.5). We have done this for Refuges along the east coast, 3 in Maine and 1 in Massachusetts.
- Where? Moosehorn has 4 units: Maine Coastal Islands 2 units, Rachel Carson 23 units: Parker River 16 units.

- Results show differences between units within a Refuge. Different Refuges were best at different measures of integrity. All of the units were averaged together to get one score for each refuge. Example: For birds, Parker River is best. For nekton density Moosehorn was highest. Nekton richness, Rachel Carson: Native Cover was great at all of them; Parker River was the best for Flooding Duration; Salinity Maine Coastal Islands, and Herbicide use is low at all of them.
- Parker River came out with the highest Salt Marsh Integrity. You can look at the score for the different indicators and see where restoration options might be (invasive removal, bird habitat, etc) or questions to answer (why are some marshes so frequently flooded? What are better bird species to represent northern Maine?)

Conclusion: We should be doing this at all of our marshes. A healthy marsh should have mostly high marsh species and lower abundance of low marsh species; some open water, regular tidal flushing, some brackish water. Some metrics should be revised, but we should continue to document changes occurring in the marshes. We are developing SMI 2.0 after 7 years of collecting this data and analyzing it.

Unraveling the Mystery of Dune Die-Off in New England: Potential Causes and a Strategy for Recovery

Gregg Moore, University of New Hampshire

- We know dunes are important, and we live among them.
- Dune Die off is a problem, we need to work with the communities to keep dune habitats healthy. We knew engaging the community is essential.
- Through that process we had community town hall meetings to see what people care about. They care about: climate change, rare species, public access, need for restoration/outreach/education. No one said dune die off, I had to convince people. Dune die-off looks like someone had a bonfire. The literature shows that it is caused by a microscopic nematode.
- They did some aerial drone work to map where there are bare spots on the dune, then went out to the field to confirm. Most of the die off was occurring behind the crest of the dune.
- Wanted to address the die off in two ways; we had a soil amendment study to test that and we also looked at screening the sand and vegetation to see what was happening.
- Soil Amendment Study- set up four treatments and treated them with different things (four by four squares at three sites). Results- adding lime changed the pH, adding the fertilizer and lime and fertilizer treatment did increase vegetation cover. Total percent cover in the plots was also highest with the lime and fertilizer treatment. They put

together guidance for how a homeowner can do this with things they can get at a hardware store.

- What is causing the die-off? First we collected samples from a healthy dune, a die off dune, and maybe the greenhouses that provide us with dune grass. We screened and did taxonomy- cannot identify nematodes unless they are mature. Found an expert and did genomic screening. Looked at everything in the sample using genomics and sorted out through heat maps that can show what is in the sample. What they found is that there was no real pattern between where nematodes were and where die off was. There was a clear pattern between microbial community (bacteria and fungi). The genomics group found that there is a large difference in the fungal community. Do the nematodes create conditions where the fungus grows? Or is the problem the fungus? This will inform future research.
- Broader impacts: we engaged the community all along, provide a voice for the landowners. We did lots of work to make sure people understand where die off is happening. We also wanted to develop low cost solutions that landowners can be a part of.
- Scientifically: we found that nematodes are not the only problem, and leveraged future research to understand the fungus.

<u>Living Shorelines in Maine</u>

Alison Sirois, Licensing and Compliance Manager, Bureau of Land Resources

- A living shoreline is about shoreline stabilization techniques that use native materials. Usually uses vegetation alone or in combination with other approaches.
- They are barriers for absorbing wave energy, they are more resilient from storms, they create habitat.
- Regulatory framework- when wetlands are disturbed or soil is moved, you need a permit. If you have a NRPA permit, you then need a DEP review. Then you are required to avoid wetland impacts, minimization of impacts, and sometimes compensatory mitigation.
- Applicants must provide alternatives analysis to find the least damaging option. For projects in coastal wetlands, a practical alternative is presumed to exist because coastal wetlands have additional protections.
- Out of all the shoreline stabilization projects, less than 5% are living shoreline projects. Some are soft, some are hybrid, dune restoration, and beach nourishment.
- When we talk to applicants, they are concerned about the cost, the engineering expertise and how to find it and prove that it will work (hardened shorelines are considered tried

and true), monitoring and maintenance need to occur because we do not know as much about them. All of these things cause additional cost for these projects.

- We want to know what sites are most appropriate, how the project will sustain long term- we ask our scientists these questions.
- NOAA funded a Maine Geological Survey Living Shoreline Suitability GIS based tool. This is perfect for regulators because we can zoom right into an applicant's project area. They have a color coded model output that shows the scores and indicates where projects are likely to be successful.
- Maine is also setting up some pilot sites to test techniques. We would like to have a few demonstration sites to bring landowners to.
- We work in close partnership with several organizations and we are currently putting together details about what each demonstration/test site will look like.
- The goal of the overall project is to demonstrate techniques that can be used to lessen coastal marsh or bluff erosion
- Most designs will be hybrid living shoreline approaches but include beneficial reuse of either aged oyster shell, fallen trees or both.
- Projects will be 50 feet in length so costs can be compared.
- They will be trying to be low cost, volunteers will be used as well.
- Three sites are similar in their scoring for suitability, one is different. That way the three that are similar can be compared, and the outlier is a high energy area so the demonstration will be to see if it works.
- We are testing to see how these sites do with ice, and how well the techniques and materials do to prevent ice problems.
- A key to this project will be monitoring. Water levels, elevations, erosion pins, game cameras, picture posts, vegetation plots and transects will all be a part of the monitoring plan. We currently have two years of monitoring funds secured and we hope to be able to extend that to five years.

<u>Q and A</u>

Q: Are there some plants that are more resistant to nematodes?

A: Gregg: They may impact some of the other plants, but do not have as large of an impact.

Q: Where does SAV stand in helping with living shoreline projects?

A: Kirsten and Gregg: We incorporated the benefits of eelgrass in our site suitability model by making sure that if a site was close to eelgrass that you got more points assuming eelgrass would cut down on wave action. The Cutts Cove project originally had eelgrass in the plan, but we

found the site was too shallow to support eelgrass. You may want to get the stabilization first so you know you will not smother the plants.

Q: Is it considered a habitat tradeoff?

A: Alison and Kirsten: that is the battle,that is one of the reasons why we have to figure this out. In NH one justification we made to converting mudflat to saltmarsh is that our salt marshes are vulnerable in SLR models. We are likely to see more mudflat in the future, and the marshes need help. You still need to go through the Essential Fish Habitat stuff with NMFS and ACOE.

Q: Have you been monitoring the die off for a long time? Do you know if it is increasing?

A: Gregg: I did not know much about it until someone asked me about it a few years ago. I have been tracking it in dune restoration and adjacent landowners in Massachusetts. MA DCR brought us to sites where there have been plantings. The first paper on this is from the 90s- it is not new, what is new from my perspective is that there are large areas and calls from landowners. Our monitoring shows that it is expanding. We are doing restoration, so we wanted to make sure when we replant we are not perpetuating the problem.