Workshop notes
Engineering Living Shorelines in New Hampshire
Portsmouth Public Library and Cutts Cove Living Shoreline Site
Portsmouth, NH
October 26, 2017

This document provides a brief summary of questions and discussions from the Engineering Living Shorelines in New Hampshire workshop held on October 26, 2017. Additional information can be gained from the PPT presentations. If you have any outstanding questions about content provided at the workshop, please contact Steve Miller at steve.miller@wildlife.nh.gov.

Note: colons throughout the document are not intended to suggest a direct quote. They simply indicate that the following text is a summary/paraphrased version of what the individual stated.

8:45 FIELD VISIT:

Materials, equipment, and methods showcased:
Tide gauges: these range from simple tide staffs, where the user reads data every few minutes, to water level recorders that are typically set to one measurement every 10 minutes. Instruments shown included a pressure transducer (YSI, In-Situ and Onset are three manufacturers) and a capacitor type (Odyssey, NZ). Pressure transducers can be vented to include atmospheric pressure changes or non-vented with no provision for venting. A paired barometric pressure sensor is required to make corrections for non-vented instruments. Both the capacitor type and vented pressure type instruments require a structure extending out of the water that cannot become submerged. All approaches must include an elevation measurement so the data can be related back to vertical datums.

Also discussed use of clips and wire for deploying instruments and holding sill materials in place. Discussed use of wildlife cameras for monitoring site activity.

Plants: We planted Spartina alterniflora (low marsh), Spartina patens (high marsh), Spartina pectinata (just above high marsh), Panicum virgatum (just above high marsh), purchased from New England Wetland Plants in Amherst MA (www.newp.com). Pinelands Nursery in NJ is also a good supplier. Specific salt hardened plants or they will die the first day. With advanced lead time, most suppliers can collect native seed and grow locally sourced plants. Stay tuned for a more detailed plant list from GBNERR.

Planting: We recommend planting on 1-foot centers due to our short growing season. When planting into sandy inorganic soils as the site visited, we suggest adding slow-release fertilizer (Osmocoate), and above the mean high tide, some peat moss to help the soil hold moisture. We install using sharp shooter shovels or (aka spades) in soft soils and planting rods (aka dibbles) in bony soil.

Erosion control method: demonstrated on the field trip was 4ft wide jute mesh fabric cut into 88 ft lengths and rolled around Spartina wrack (last years dead stems washed to high tide line) and fastened with twine. These are staked parallel to shore to reduce wave energy and runoff erosion and should last about a year. Beware of potential seeds in the wrack from invasive species like Phragmites (common reed) and perennial pepperweed – best to include a monitoring effort that will identify and remove any invasive plants at your site in years one and two.

Discussion:
Monitoring:

- *Discussion* about how to measure the tides at your site and why this is important to do as part of the site assessment rather than relying on tide gauge data from further away. Pressure transducers were passed around.

Design:

- **How long do coir logs last?** We don't know. We've seen them disintegrate within a year in NH lakes. Coir logs installed along New Castle Avenue are intact after 10+ years. Wagon Hill Farm temporary installation will help us to understand ice effects after this winter.
- **What is the depth of the fill?** Approximately 6 inches.
- **Is the small rock armoring enough at this site?** Yes, at this site, because it's already so well protected.
- **Do the tidal heights for habitat account for sea-level rise (SLR)?** No, but we have set a template for it.
- **Why 20 inches for SLR?** Because we're planning out about 50 years. See www.nhcrhc.org for guidance on selecting a sea-level rise scenario for your projects.
- **What are the subsidence rates?** Unsure, but we need an answer for the entire Great Bay.
- **What would change in a dynamic wave environment?** It's context-dependent–need to consider factors like roots and trees.
- **How long does it take for a newly-planted site to fill in?** It takes a few years for a site to fill in, longer for higher marsh.
- *Discussion* about avoiding nearshore sill to avoid risking issues with regulation.
- *Discussion* about beneficial re-use of dredged materials and the possible issues with dredge materials in this area.

10:45 WELCOME II (AT PORTSMOUTH LIBRARY)

Compilation of participants' statements on "Why I'm here today"
according to C. Ashcraft and C. Tsiamis

Develop LS opportunities

- New business opportunities
- Communicating benefits to clients
- Cost/benefit considerations and asset management
- Get to know project partners
- Funding sources
- Planning new projects

Learn about functional values

- Habitat, ecological benefits
- Water quality
- Protect clients from sea level rise
- Adaptive capacity with regards to sea level rise, storm surge

Learn about monitoring protocols

Learn about design and techniques for shoreline stabilization/restoration

- Different project types

- Alternatives to rip rap
- Installation techniques
- Landscaping opportunities
- Relevant for New England
- Relevant for upland/high marsh

Policy considerations
- Facilitating permitting process
- Categorizing living shorelines

Education, communication, and outreach

Learn about project process from permitting to construction
- Public projects
- Private property
- Hear lessons learned
- Learn about challenges and opportunities

11:00 LIVING SHORELINES 101
- Overview of context of shoreline structures, habitats, and sea-level rise in NH as well as values provided by salt marsh and beaches and dunes.
- **When there is a sea wall, would you consider removing it?** It depends on what the seawall is protecting. In the case of Cutts Cove we did remove rip rap because it wasn't performing a function. In the case of the seawall on Route 1A, no. The main goal now is to promote and protect the living shorelines that are currently here.
- **What are the most practical, easy solutions?** A lot of uncertainty remains, because a lot of actions are untested and untried. However, there are a lot of examples around the country, so plenty of opportunity to get ideas.

12:15 LIVING SHORELINES 201
- Draft rules expected by end of 2017 for public comment (per Dave Price).
- **How have you been conducting outreach on living shorelines to the public at large?**
    - Dave Price: Right now, our outreach to other agencies is mostly project-related.
    - Tom Ballestero: In the past, on some projects, partners would meet once/twice a year, which greatly streamlined the permitting process, because partners coordinated responsibilities in advance of the project.
- **How do you deal with post-permitting issues?**
    - Dave Price: With an adaptive management framework and monitoring.
- **Will there be N.H. or New England-specific living shoreline design guidelines?**
    - Tom Ballestero: I think there will be, based on empirical evidence.
    - Kirsten Howard: We have a new grant beginning soon from NOAA that will result in monitoring guidance developed for the region. We aren't quite ready to develop design guidance—we need more projects to draw evidence from in this area.
- **Is there design guidance on ice impacts?**
    - Great interest in a design guide that's specific to N.H. or New England and considers ice. Doesn't exist yet, maybe some empirical, and NOAA grant with Maine and New England

for some metrics, but not for detailed design guidelines. NROC funded study ended with the ice question. Also, Great Lakes literature, but no tides.
    - Participant (Pete Slovinsky): There's good guidance from the Great Lakes. The expert's name is Brian Majka from GEI Consultants (https://www.hrnerr.org/wp-content/uploads/sites/9/2016/08/20161021_GreatLakesShorelinesMajkaFinal_1.pdf)
- **Bank undercut question.**
    - Dave Burdick: Undercut isn't necessarily bad, as long as roots are holding it, it provides refuge for smaller species
- ***Discussion* of ownership situation.**
    - Participant: I'm interested if it wouldn't be considered "stealing from the state," since a few years ago it was considered "land."
    - Tom Ballestero: There is some legal precedent on this question that you can look into.
- **Can wave energy data be converted to shear stress?**
    - Tom Ballestero: Yes. Look at the U.S. Army Corps of Engineers Coastal Engineering Manual from 2002 for methodology.
- **Do we have any information about the sediment supply situation in Great Bay?**
    - Wagon Hill site is, hopefully, shedding some light on sediment supply, stormwater, and as a control for demonstration options. The temporary structure seems to be holding in place and sediment is accreting slightly.
- **Is there any coordination statewide around the overall concept of Living Shorelines?**
    - It is possible for this type of coordination to take place. There is evidence that coordination can happen as seen in dam removal.
    - For Hampton's bridge, where significant erosion occurred, the take home was the importance of partners at the table—a lot of people on board—need to be able to explain what you're trying to do to people.
- **Can you explain how the stormwater management solution at Wagon Hill Farm results in denitrification?**
    - Tom Ballestero: You need to keep the soil anaerobic. The technical solution is to keep water in the site, to keep it anaerobic, with drainage only occurring when soil is saturated AND above drainage sill line.
- **What is the root depth goal and elevation, *e.g.*, with 4-foot toe**?
    - Dave Burdick: Most of the roots are just a few inches under the surface.
- **Wetlands permitting:**
    - **Who's driving the new rules – a federal authority?** NHDES, not feds.
    - **How many LS projects have gone through?** Not many, outside of vegetative stabilization projects. Cutts Cove is the first that extends below MHW.
    - **With what agencies does N.H. work and how?** Army Corps, EPA, Natural Heritage Bureau, NOAA, USFWS – but mostly project related, not general discussion, besides regulators meeting as part of this project.

1:30 GETTING LS IN THE GROUND

Panelists ask questions of the audience.

Tom Ballestero: What do you think is the biggest risk?

- Perception. The original vegetation didn't work, so why would vegetation work now?
    - Tom Ballestero: Physical parameters can change – hydrology, development nearby – but once erosion happens, the cycle has to be stopped.
- Performance. Clients worry about failure.

- Maintenance. Neither clients nor the N.H. Department of Transportation want to do it.
    - Tom Ballestero: Maintenance service could be a new business opportunity.
- Scalability (social). One property owner might be interested, but not neighboring ones.
- Engineer-contractor relationship.
    - **Kirsten to Tom Ballestero: How do you best manage "engineer-contractor relationship"?**
        - Tom Ballestero: Find an engineer who knows what to do, versus following plans.

Kirsten: Would it be useful to have a list of contractors with expertise in living shorelines?

- Some participants: Yes.
    - Tom Ballestero: You have to be careful about having a list, because you want to build capacity beyond that list; but a list is OK for a starting point. In any event, you need to supervise the contractor.
    - A couple participants: Having a list isn't the best idea, because people will assume the people on the list are the only experts.
- Participant shared stories about how contractors that had limited experience with restoration work were extremely successful. Anyone who knows how to read plans and operate their machinery well is qualified for this type of work.

Cat: Do you expect change between design and completion?

- Participant: Yes, every day; so, we use an adaptive management framework and, over time, we have benefited from the data it has generated.
- Participant: Yes. Elevations are just a target; but once achieved, we use adaptive management.

Dave Burdick: What techniques do you use to measure erosion?

- High resolution GPS for open coast (Pete Slovinsky).
- Stop-action photography (Pete Slovinsky).
- Erosions pins for small-scale.
- LiDAR for large-scale.
- Bathymetric surveying.
- Permitting benchmark and arm measures in a radius (example in Vermont), 3D laser scanner for fine detail (David Rosegarten).

Dave Price: What would make the permitting process better for living shorelines?

- Repeated interest in communicating relevancy of living shorelines to for private homeowners.
- There should be different tracks for conventional developers and developers doing restoration projects.
- Institute categories for habitat AND land stabilization.
- Avoid unnecessary dimensional constraints.
- Focus more on monitoring and adaptive management; *e.g.* how to determine the cost of adaptive management?
- Facilitate the process. Do what the N.H. River Restoration Council did: it saw projects coming down the line and helped smooth the process out in advance—*e.g.*, who's going to be working on what? What are the obstacles? Etc.
- Incentivize living shorelines; *e.g.*, by removing barriers that are present in typical development projects.
    - **Dave Price: How do we address enforcement of incentivized permits?**
        - Have conditions such as 5-year monitoring etc.

Participant question: Is ownership a major hurdle?

- Dave Price: Anything in mean high tide (MHW) is public trust.

- Tom Ballestero: There is a body of law that's developing around sea level rise and property ownership. Note, while political boundaries don't change, private property dimensions *do* change, which means people are losing property.
- Dave Price: Living shorelines vegetation is not necessarily "property." There's a difference between building a living shoreline and building out for your own private use. A living shoreline isn't usable space *per se*; it's for "stabilization," "habitat," and broader "public benefits."

Top tips from the expert panel:

- Tom Ballestero: All restoration projects are team approaches.
- Cat: Be open to learning, persistence, partnerships. Don't fear the unknown. Team approach works the best.
- Dave Burdick: Don't be surprised when you get "bitten" by unexpected agencies and unforeseen regulations. Happens all the time, and there's always a way through it if you have a solid team. It's important to save some project resources for maintenance. The system will become self-sustaining, but only after a small period of maintenance.
- Dave Price: Approach permitters for feedback early on, before spending the client's money.

2:15 NEXT STEPS AND WHERE DO WE GO FROM HERE

It's not just policy; people need to do things differently, persistently, together.

Notes taken by Jane Ballard, Vidya Balasubramanyam, Cat Ashcraft, and Christos Tsiamis. Edited by Kirsten Howard.