



Stone Living Lab

Quarterly Summary

Research, Monitoring & Education Projects



Summer 2024

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About the Stone Living Lab

The Stone Living Lab (SLL) partnership is an innovative and collaborative initiative focused on testing and scaling up nature-based approaches to climate adaptation in Boston Harbor and beyond. We are a unique partnership between government agencies and nonprofits: UMass Boston School for the Environment, Boston Harbor Now, the City of Boston, the Massachusetts Department of Conservation and Recreation, the Massachusetts Executive Office of Energy & Environmental Affairs, and the National Park Service.

As a “Living Lab,” we bring research into the real world by engaging scientists and the community in collaborative design and exploration. Our work brings us not only along the coastline of Boston Harbor, but into the water itself and out among the Boston Harbor Islands and other locations. Our areas of focus are Research & monitoring, Education & engagement, policy innovation, and climate preparedness.

Letter from the Directors

This month, we experienced [record-setting extreme heat](#) around the globe.

Events like this serve as urgent reminders of the importance of considering nature-based approaches for climate adaptation in urban areas, which not only help address climate risks like sea-level rise and coastal storms, but also help address increased stormwater and extreme heat.

Our team's work on nature-based approaches at the Stone Living Lab is inspired by the needs of our [municipal partners here in Boston](#) and by [cities everywhere](#), and we are tailoring our research and education projects to meet these needs.

Projects such as Living Seawalls will help us learn how to create more, and safer, space to help marine life to thrive and increase biodiversity in our urban harbors, while helping to build connections between neighborhood residents and their waterfront as well.

To learn more about Living Seawalls and other projects, please read through this Quarterly Summary, and let us know if you have any questions, thoughts, or ideas for collaboration.

Sincerely,

Joe Christo, Managing Director

Paul Kirshen, Research Director

For feedback and recommendations for this quarterly summary, please reach us at info@stonelivinglab.org, jchristo@bostonharbornow.org, or paul.kirshen@umb.edu.

Featured Project

Cobble Berms

June 2024 marked two years since the Lab's cobble berms research, monitoring, and education project began. Over the course of the project thus far, staff from the Stone Living Lab, Duxbury Beach Reservation, and Woods Hole Group have led research, monitoring, and education efforts at cobble berm sites across coastal Massachusetts. The project has been supported by various funding sources, including a Massachusetts Office of Coastal Zone Management [Coastal Resilience grant](#).



Led by input from [focus groups](#) and our [first year of field courses](#), the cobble berm project team put together three education programs in Spring 2024: two field courses and a [virtual permitting workshop](#). Almost 200 individuals and over 85 unique organizations have engaged with our programming for this project. From recent graduates to seasoned municipal leaders, this program has connected practitioners and enhanced local understanding of cobble berms as a coastal resilience strategy.

Throughout our programming, there have been consistent themes and questions about cobble berms that come up again and again from attendees: **How much do they cost? Where do you source cobbles from? What is the permitting process?** And, perhaps most importantly: **How do they work?**

In-field and in-person experiences are crucial to build connections and familiarity between people *and* field strategies – but this project also focuses on creating resources that will support the coastal community beyond this individual project. Using input from attendees and MA CZM itself, the project team also created [factsheets](#), videos (available soon), a [coastal professionals listserv](#), and an [interactive Storymap](#) to support ongoing learning and research.

Supported by the efforts of the project team's researchers from Woods Hole Group and the Stone Living Lab, this program has amplified cobble berms as an effective nature-based approach for coastal communities.



Rather than falling back on familiar gray infrastructure strategies, municipal staff are becoming more familiar with nature-based approaches as a whole. By highlighting the scientific backing of cobble berms, creating space for in-person discussions, and creating user-friendly outreach materials, we have already seen a shift in public perception of cobble berms as an effective means of coastal resilience.

[Click Here for Cobble Berms Resources](#)

The Falmouth Enterprise

Volume 134 Number 9 Friday, June 14, 2024 Falmouth, Massachusetts Three Sections - Thirty-Six Pages Plus Special Section \$2.00
Devoted To The Interests Of The Falmouth Community



A team from the Stone Living Lab uses a drag net to collect samples of marine life off of Trunk River Beach Tuesday. The goal is to assess whether a cobble berm used for coastal protection farther up the shore line is affecting marine life in the area. UMass Boston Doctoral student Curtis Morris (left) and summer techs Ingrid Comella, Lily Knudsen, and Colette Carter examine the catch for anything unusual.



Photographs by GENE M. MARCHAND/ENTERPRISE

In addition to the education and outreach programs, the biological monitoring team from the [Byrnes Lab](#), led by graduate student Curtis Morris, finished their June sampling comparing berms to adjacent non-berm control sites. As observed previously, the number of species across multiple sampling techniques was slightly higher in berms as compared to adjacent controls. This preliminary finding further highlights that, if anything, cobble berms might provide additional ecological co-benefits. While sampling in Duxbury, the team also did some unexpected outreach. A reporter from The Falmouth Enterprise happened to be talking to beach goers, and was so intrigued by the project that the team got an above-the-fold front page feature!

Some additional context about key research findings so far from the analysis of the project's monitoring data include:

- Where existing salt marsh was monitored in proximity to the installed cobble berm, no measured loss was shown on the landward side of the marsh. There was some evidence of loss/degradation along the seaward edge of one of the marsh stands, but this was not due to the cobble berm, which was located landward of the marsh. At the other site, no change in salt marsh areas was observed over the 2 years.
- Full community species richness was higher in the summer at berm sites as compared to controls (no cobble berm sites) across all locations. Richness had the largest increase at Coughlin Park cobble berm site. Overall the cobble berms indicate a positive impact on total species richness, or at minimum no change to species richness at the observed sites.
- Biodiversity, which incorporates abundance in addition to richness, increased on cobble berms when compared to control units.
- Neither richness of organisms nor biodiversity changed with season. Meaning these observational metrics remained higher at the cobble berm sites than at the control (no cobble berm sites) for all sample events.

- Our monitoring data show that cobble berms do not have a negative impact on species diversity in an area and are a potential solution for a nature-based approach in New England at viable locations.
- At nearly all of the monitored sites, the individual cobbles were observed to move landward, not seaward.
- Sites were shown to effectively protect the shorelines (and reduce erosion) at all locations.

A more detailed, comprehensive summary of all the research and monitoring data is being prepared, including more details on the movement and geomorphic change of the cobble berms, and key highlights will be detailed in the next Quarterly Summary.

While the CZM Coastal Resilience grant was for two years and is now wrapping up, the work on this project is continuing, of course! Researchers with the Lab will continue to support monitoring efforts at a number of cobble berm sites, and SLL educators now have a jumping-off point to create even more factsheets, videos, and public events centered on this and other nature-based approaches.

Core Research & Monitoring Projects

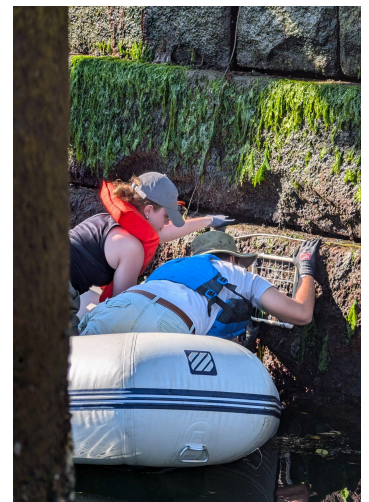
Living Seawalls



It's been an exciting and action packed summer for the Living Seawalls project team. The panels themselves arrived in the late spring, and now await the final permit from the US Army Corps of Engineers before they can be installed. Project team members from the Byrnes Lab, including graduate students Daniel Lopez and Melba Torres Sosa, have commenced a fast-paced final round of before-installation sampling of the walls to help the Stone Living Lab gain a better understanding of how Living Seawalls might change the intertidal of the urban harbors. This second year of before-sampling will enable the team to conduct more accurate analyses to assess the impacts of Living Seawalls once installed.

Melba Torres Sosa and Marcia Campbell from the Byrnes lab survey the organisms living on a seawall in Chelsea Creek.

The LSW team has also moved forward on a project to examine the impacts of current coastal protection materials for what can live in and around urban New England harbors. This study part of Daniel Lopez's masters thesis. Aboard the M/V *Algae Rat*, Lopez and his team of students are conducting paired video and intertidal quadrat surveys on harbor walls built of concrete, granite, wood, and metal. The goal is to link the built environment to changes in temperature, and then tease apart how this alters interactions between predatory crabs, grazing snails, and algae. Are our current seawalls functioning like a natural intertidal environment, or are the species interactions strange and different? Do the rules of Nature function the same in an urban harbor? Daniel hopes to shed new light on this fast-growing area of urban marine ecology that pairs with the changes we could observe on the Living Seawalls themselves.



The Living Seawalls team on the R/V Algae Rat surveying life on the seawalls of Fan Pier in the Seaport.

The Living Seawalls project team has also been working with the Museum of Science. In late spring, Jarrett Byrnes and Joe Christo talked about the Living Seawalls at the [Museum's Rise Up Boston Climate event](#) while Rebecca Shoer taught visitors about what these walls could look like into the future. As part of future exhibits, the team has also begun printing sample mini-panels for the Museum's Earthshot exhibit.

Core Research & Monitoring Projects

Real-Time Monitoring in Boston Harbor

All real-time monitoring data can be accessed from the [Lab's website](#)!

Overland Flood Stations

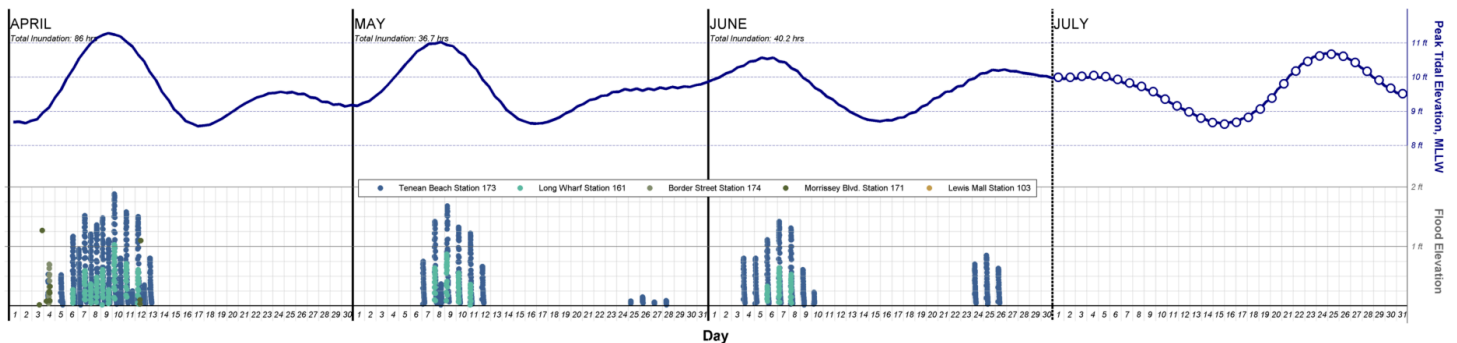
The Lab now has five active stations ready to capture high tide events! A new Hohonu overland flood sensor was installed at Lewis Mall in East Boston in May. The station is designed to capture overtopping of the Lewis Mall Pier, where high tide flooding has been observed along Lewis Street.



This quarter (April - June), a total of 162 hours of high tide inundation were recorded across the five stations (*figure below titled Hohonu Flood Elev Tidal Peak*). The majority of this inundation is driven by the record at Tenean Beach. The April spring high tides from April 4th - April 13th resulted in the most overland flooding.

Keep an eye out for these predicted high tides next quarter:

- August 19-24
- September 17-22

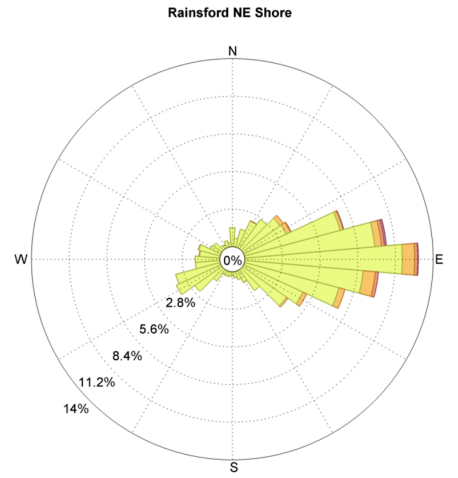
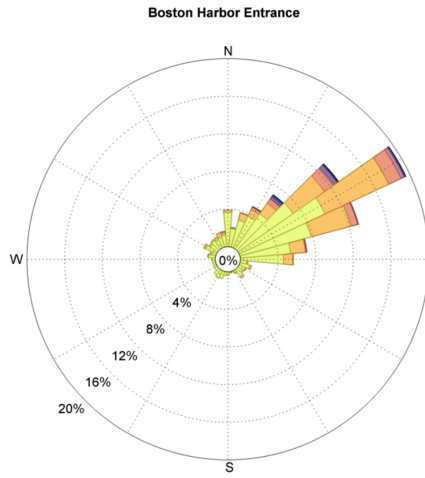
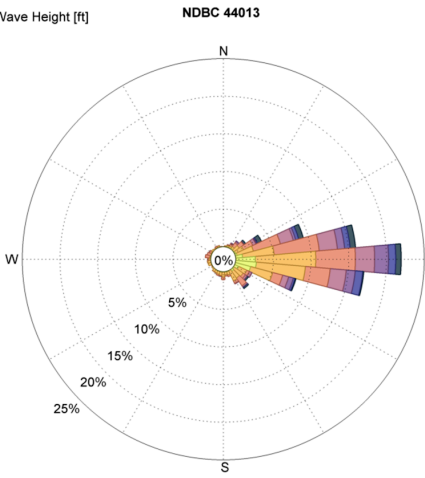
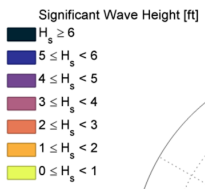


Hohonu Flood Elev Tidal Peak

Boston Harbor Waves and Tides

While the Lab has been busy, May and June have been calm in the Harbor! Wave heights in May peaked at 1.4ft at the Rainsford Island Nearshore Buoy and 3.1ft Boston Harbor Entrance Buoy respectively, and June wave heights peaked at 1.0ft and 1.7 ft respectively.

An April 4th nor'easter was the largest storm event recorded this quarter, where wave heights of up to 8.4ft were recorded at the Boston Harbor Entrance Buoy, and 3.5ft at the Rainsford Island Nearshore Buoy.



Core Research & Monitoring Projects

Camp Harbor View Partnership



The first year of field data collection is coming to a close, and the project team has lots of data to process and analyze for the final report. In addition to mapping the topography and bathymetry, on- and offshore, data on waves, tides and currents were also collected to help the project team better understand the ongoing natural processes and recent island evolution. The Stone Living Lab also conducted an intertidal biological survey (pictured) to document the presence/absence of marine flora and fauna, which, like all of the data collected for this project, will be a vital baseline inventory data set, but will also be used to measure future change.

The intertidal biological survey was led by Dr. Agnes Mittermayr (Center for Coastal Studies), with help of Samantha Cirillo (Left: National Park Service staff) and Cody Pajic, a graduate student from UMass Boston. (Photo by A. Mittermayr).

Education & Engagement Projects

Climate Cart & More

The Climate Cart is in full swing with programming at the Boston Harbor Islands Welcome Center on the Rose Kennedy Greenway, community events, cruises, and more! New programming features our sea-level rise activity (*pictured above*), a tree-ring activity, and a Living Seawalls activity created in collaboration with the Boston Children’s Museum. Outlines of our activities can be freely [downloaded on our website](#), and requests for the Climate Cart to join additional events can be submitted by [emailing](#) our Senior Manager of Education & Engagement, Rebecca Shoer.



Check our [calendar](#) for upcoming opportunities to visit the Climate Cart!

Returning Summer Teacher Institute Fellow Daria Healey and Summer Programs Intern Nicole Castañeda at the Boston Children’s Museum.



High Tide Trail

Over April vacation, we piloted a new self-guided tour in collaboration with National Parks of Boston, Rose Kennedy Greenway, BPDA, and the City of Boston: [the High Tide Trail!](#)

Six stops between Dock Square and Long Wharf highlighted the story of Boston’s changing coastal landscape, from the time that present-day Boston was known as the Shawmut Peninsula to our uncertain future.

The trail will return in Fall 2024, though you can learn more any time [on our website](#).

Education & Engagement Projects

Youth Engagement

This summer the Stone Living Lab continues to support local Boston youth and partner summer employees through field excursions and outings.

The Lab has already worked with Save the Harbor/Save the Bay youth employees, and will be joining youth from City Apprentice and Trustees to demonstrate authentic scientific protocols out in the field.

There are also a number of free, standards-based lesson plans for middle school students [available on the SLI website](#)! Check out these place-based lessons that incorporate climate change and participatory science protocols, developed in collaboration with the National Park Service or by the Summer Teacher Institute participants!

Education & Engagement Projects

Summer Teacher Institute

Eleven teachers will join the Stone Living Lab's Summer Teacher Institute in July for a week of place-based learning, participatory science, and exploration!

The project team is working with over 10 local organizations to connect teachers with work happening right now in Boston, including a visit to Eastie Farms' geothermal greenhouse, Carson Beach, learning from previous program alumni, and a trip to Spectacle Island!

Stay tuned for updates after the course, and follow social media to see what the participants are up to.