## *A Dip After Dark: Exploring Sea Level Rise and Coastal Change in Community*

By Ava Natalino, GMRI summer intern; and Emma Barker, Resilience Corps Fellow



Photo credit: Tom Bell

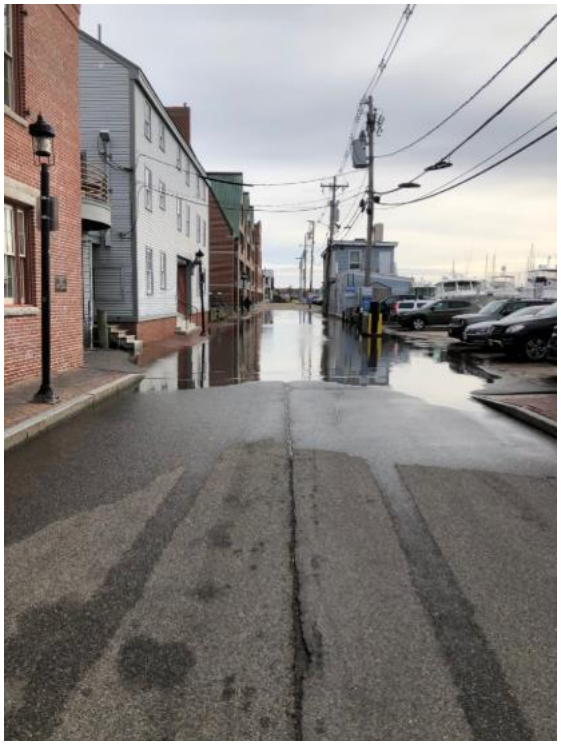
On July 13, at 10:48pm, the Gulf of Maine reached 11.4ft above mean lower low water at the Portland tide gauge, and 35 people stood in the dark on the tiny sliver of Kettle Cove beach remaining above the high tide line. This moment was one of the year's highest tides: on this occasion, the moon's elliptical orbit brought it especially close to earth, and solar and lunar gravitational pulls aligned. Drawn towards their gravity, the ocean reached far onto shore, rising inches above normal tidal height.

The slice of shore remaining at Kettle Cove was a sharp illustration of global change brought to the scale of a beloved local beach. Global seas are already 8 inches higher than they were in 1901. If we continue emitting carbon dioxide as we have, seas are expected to rise at least 8 inches again by mid-century. These changes are occurring because warmer global temperatures melt land-based ice and also cause thermal expansion of seawater, adding volume to our oceans.

With seas now rising almost 4mm per year, the highest tides of each year increasingly bring water into man-made and natural spaces that aren't accustomed to flooding. While the crew at Kettle Cove watched the ocean creep up the beach towards high tide, water also began to lap

against the causeway at East End Beach, and boards on the Portland Pier began to float as the ocean pushed up through the slats.





*Flooding at Widgery Wharf and Portland Pier in downtown Portland during extreme high tide events. Photos taken by community scientists and submitted to the Ecosystem Investigation Network.*

Now on top of a rising baseline sea level, these extreme high tides have become moments when climate change shows up, quite literally, on our shorelines. They're also moments that can be devastating if they coincide with storms, as we saw twice in January 2024. To understand and plan for the local impacts of rising sea levels, we have to be able to observe them. Community science helps us do this at GMRI, collaboratively building a flood impact dataset that spans the Maine coast.

Beyond the science, we also have to find ways to process the impacts we're seeing to the coastal spaces we love and depend on. Along Maine's coast, the ocean shapes tradition, livelihood, and recreation. It provides lobster fishermen with their workplace, sustains Passamaquoddy traditions of eel fishing, carries island commuters on ferries, and offers places to paddle, swim, and walk along the shore. What's at stake is far more than Maine's 5,000 miles of tidally-influenced coastline – it's all the ways that our coastline is a cultural and economic cornerstone in this state. Social science tells us that integrating that emotional impact with scientific understanding and hands-on action can help us move towards productive hope.

That's what brought our brave late-night crowd out past bedtime at Kettle Cove, for an evening understanding sea level rise by engaging head, heart, and hands. The event was a collaboration

between GMRI and the Two Maine Mermaids, a local organization that spreads joy, creates community, and connects with the elements through cold-water ocean dips. During an evening workshop, participants reflected on the changes they have noticed in the places they know best, describing increased waterfront damage from coastal flooding, more frequent sightings of Lion's Mane jellyfish, massive coastal erosion, and the collapse of fishing cabins on Willard Beach in the January storms. When asked to draw what they love most about Maine's coast, they drew sailboats, snorkels, and sweeping ocean views—reminders that these places are woven into everyday life, not just visited on vacation.






*Left: participants place a dot on their favorite coastal location while at the Dip After Dark event. Right: luminaries decorated by participants show how they interact with the coast. Photo credit: Steph Sun.*

Then participants learned about GMRI's community science program, before heading to the beach to document one of the season's highest tides and experience it together in the water. As the waves crept up the beach, dozens of people carrying waterproof lights marked the high-water line before wading into the waves, driven by curiosity and appreciation for the place they call home. In many ways the ocean represents a community keystone: it is the backdrop of sandcastle building competitions and the source of buttery lobster rolls, but also the backbone of many community events, including this one.

Sea level rise is often discussed in measurements and projections, but those numbers don't fully capture what coastal change means for the people who experience it every day. Higher tides may shorten a favorite beach walk, tidal flooding can disrupt a morning commute or accelerate damage to vehicles exposed to salt water, and changing coastal conditions affect the

livelihoods of Maine's fishing communities. By observing and documenting these changes, we can provide valuable information that helps Maine communities understand coastal change and plan for a resilient future. And we can build community while we're at it.

You can contribute your own data to this collective community science project through the Ecosystem Investigation Network. Find a place you love along the coast, venture out solo or bring a crew, take some photos at high tide, and add to the dataset that can help Maine tailor sea level rise response to the unique uses and needs of the coastal places we care about. Visit gmri.org/flood-observations to get involved!

You can join collective cold water dips by getting engaged with the Two Maine Mermaids community. More information at twomainemermaids.com!