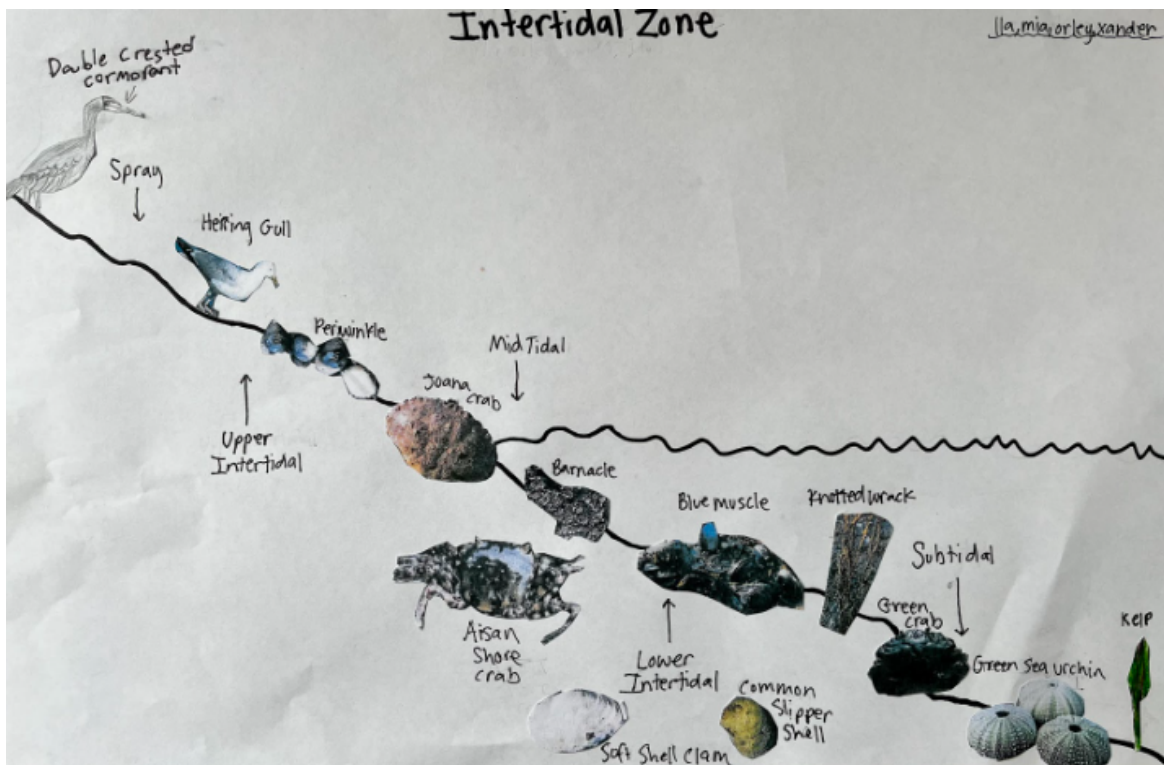


Trouble in the Intertidal
By Alexander Hutchinson

Where do we predict Native, European Green and Asian Shore crabs will be in the future?

Asian Shore crabs will out-compete Green crabs up and down the coast as the climate warms.

Crabs, like many creatures, usually live in the intertidal zone. This area, where the land, sky and sea meet, churning in such a way that it's hard to believe anything can live there, is one of the most diverse habitats on the planet. This diversity stems in part from the multitude of zones: From the spray zone with its seabirds to the subtidal with its kelp, from the upper intertidal with its periwinkles to the lower intertidal with its muscles. The high tide line is the border between the spray zone and the upper intertidal, and the low tide line is the border between the lower intertidal and the subtidal.



Its creatures must be able to survive in and out of water. They fight desiccation (drying out), Extreme heat, Extreme cold, Hypersalinity (too much salt) Hyposalinity (too little salt) and wave energy constantly. This area also supports the livelihoods of thousands of fishermen and has a cultural importance to the Wabanaki peoples. However, this habitat is in danger. Among other threats, two species of invasive crabs found their way to Maine and now threaten to destroy the intertidal zone.

These are the European Green Crabs:

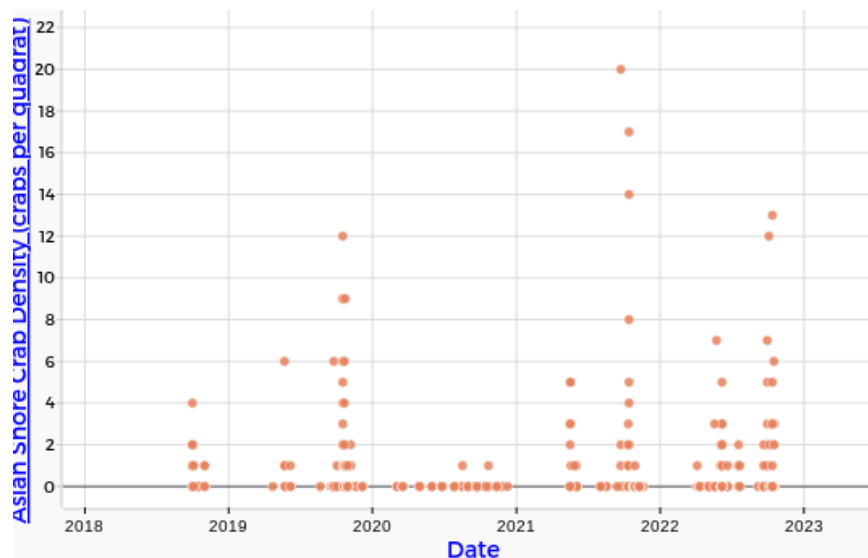


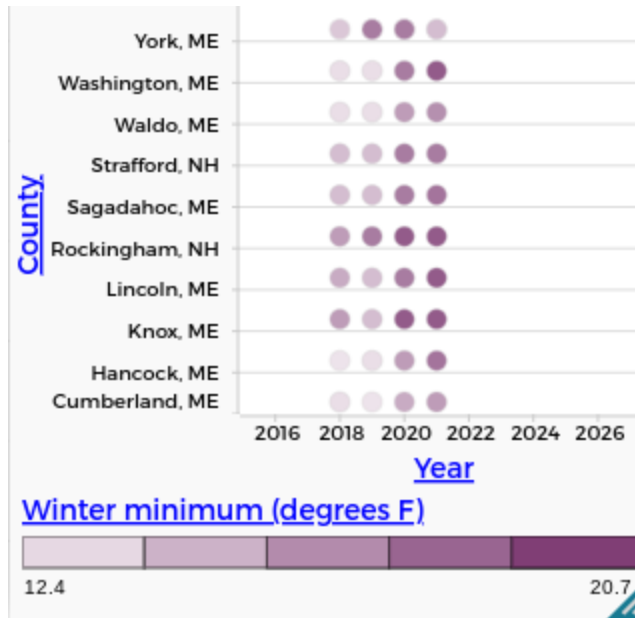
and Asian Shore Crabs:



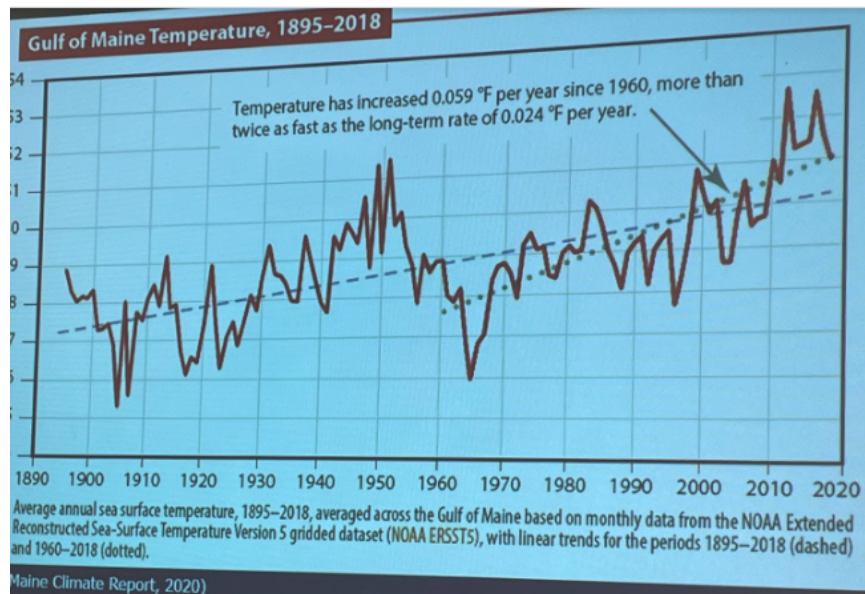
You can identify green crabs by their five spines on each side. Do NOT go by color; They aren't always green. Asian shore crabs are notable by their three spines on each side and black and white legs. Both are voracious eaters and cannibals that destroy the native ecosystem. The asian shore crab, however, is somewhat smaller.

According to GMRI, 84% of crabs in the gulf of Maine are Green crabs. 11% of them are Asian Shore, and 1.8% were native. The rest were unidentified. One thing we can take from this data is native crabs are very uncommon, probably because they were weeded out by the Green and Asian Shore crabs, and perhaps also by the warming temperatures. The other point of interest is, although Green Crabs are by far the most common, Asian Shore Crabs are also thriving. As shown below, over the years, as the temperature rises, more Asian Shore crabs are found.

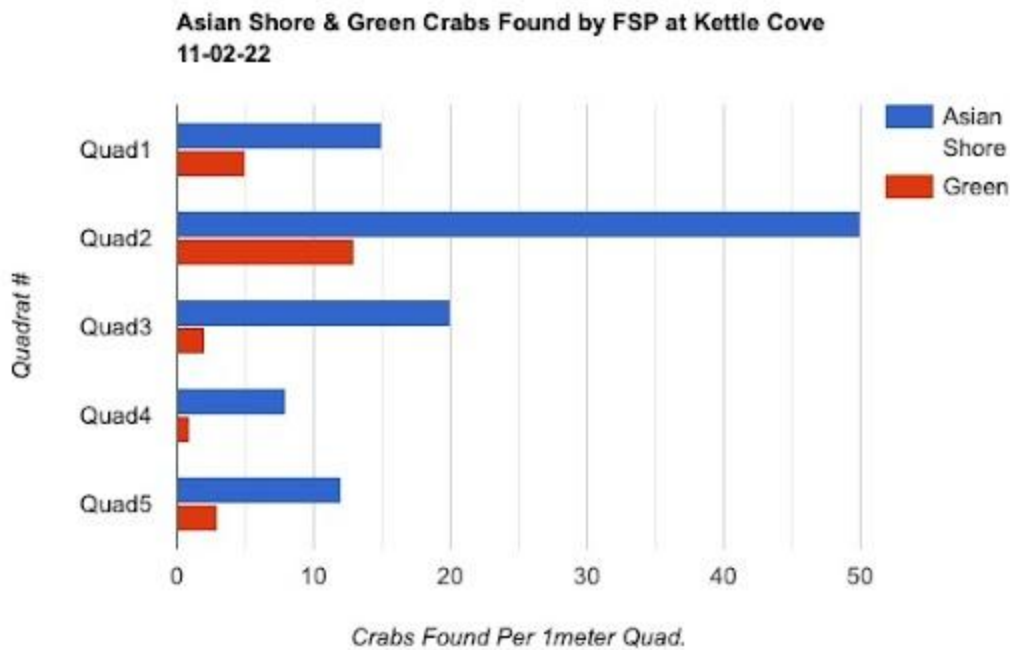




As you can see in this graph, 2021 was exceptionally hot, and though it doesn't show 2022, it's not impossible that 2022 was cooler. This graph from Wells Reserve shows the gradual increase of temperatures in the gulf of Maine.

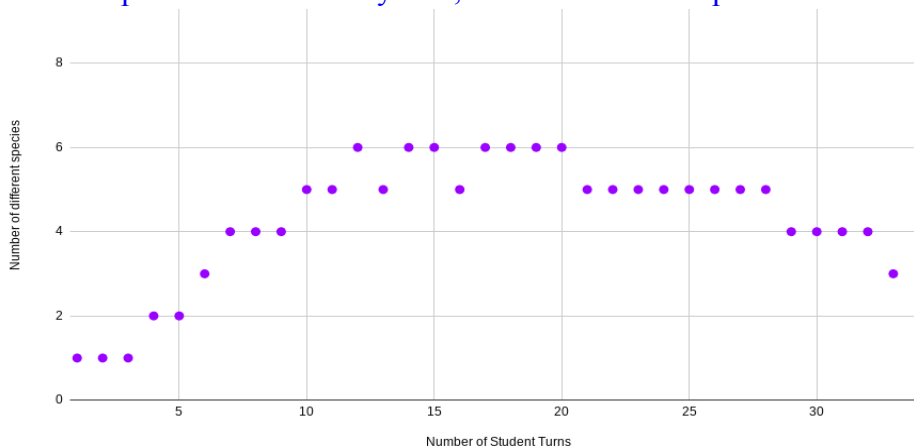


Also, as stated by GMRI, “We are seeing lots of Asian shore crabs! Groups from Schoodic Peninsula identified Asian shore crabs in multiple quadrats, where they have been rare to find in the past. At Kettle Cove in Cape Elizabeth, students from Waynflete found more Asian shore crabs than green crabs at each spot they searched along their transect, including one quadrat with 13 Asian shore crabs. We know from research in Massachusetts that Asian shore crabs are now the most abundant intertidal crab in the southern Gulf of Maine, but we have not seen this in our project data up to now.” This, in addition to this graph from my class’s recent trip to Kettle Cove, is evidence that Asian Shore Crabs may have already begun their invasion.



is Lastly, according to Maine's Department of Marine Resources, Asian Shore Crabs have been known to eat Green Crabs, despite their diminutive size. Asian Shore Crabs, though they are small, may well be capable of out-competing Green Crabs.

This matters because, as we see in this graph which represents a game we played designed to teach us about what invasive species do to an ecosystem, when an invasive species enters the picture, biodiversity



plummets.

As you might be able to guess, it was around turn 15-20 that we added invasive crabs to the mix.

Though this data may seem irrelevant in the real world, I think it does a fairly good job of showing what happens when invasive species invade. Of course, whether the European Green Crabs or the Asian Shore Crabs win out in the end, we will be stuck with an invasive species, which will decimate our industry unless we do something about it. The real reason this competition matters is, if we plan to eliminate the species which is beaten by the other one, we would be unprepared for this winner of the evolution game.

I am not certain in my claim because, despite all my evidence, not enough time has passed to see whether or not Asian Shore Crabs will be able to thrive in Maine, as for all we know, the habitat may simply be too different for them. I do feel confident that the evidence I have is very accurate, as over 1500 people participated, following this protocol: [Project Intertidal Crabs Detailed Protocol](#).

People may say that, since there are few sites where Asian Shore Crabs outnumber Green ones, the Asian

Shore Crabs will never invade Maine. However, I would like to observe that Asian Shore crabs have had less time to adapt than Green Crabs, therefore they will be disadvantaged until either the water warms or they adapt, which WILL happen if we don't do something.

In the example my class looked at, the opinion was that it would be very helpful to this investigation if, in a lab, we were to test which between Green Crabs and Asian Shore Crabs would triumph in various temperatures, with which I very much agree. Also, even now, I still don't know just how cold-tolerant Asian Shore Crabs are, and I would like to know.

Works Cited

“Asian Shore Crab.” *Asian Shore Crab* | *Department of Marine Resources*,

www.maine.gov/dmr/science/species-information/invasives/asian-shore-crab.

“Ecosystem Investigation Network.” *GMRI*, investigatea.gmri.org/project/intertidal_crabs/.