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During 2018-2021 Green Crab Populations Take Over Intertidal Zones in Georgetown, Maine

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Abstract

Research was conducted to figure out how well green crabs in Georgetown, Maine are prospering and just how much they are taking over the intertidal zone. Green crabs destroy the environment around them, ruining the coastline and the lives of its inhabitants. Students from Bath Middle School traveled to Reid State Park and Todd's Landing in Georgetown, Maine to collect data on green crabs, which were caught in traps. From the year of 2018 until 2021, the green crab's population exploded, going from around forty crabs caught to over one hundred fifty. Green crabs are indeed taking over Georgetown, Maine, prospering incredibly well.

Introduction

Even though the coast may seem peaceful, if you look closer it is not as calm as you may think. There are invasive species taking over our coastline, driving out the native species and disturbing our coastal environment. One of those invasive species is the green crab (*Carcinus maenas)*.

Green crabs originate from Europe, and they traveled here in the 1800's on large ships. The invasive species population soon began to spread and bloom, extending all along the East Coast. The green crab population is currently covering from the New York coastline up to Maine in the US; as Dr. Marissa McMahan, a Maine scientist, states, since 2018 the green crab population has gone up 600% in Maine.

The green crab lives in the intertidal zone and salt marshes, and they cause havoc in those two habitats. In the intertidal zone the green crab pushes most all native species into deeper waters, which gives them less of a chance to survive. They take up most of the space, occupying the best places to hide, which leaves other sea life, native sea life, to scramble for an open spot. In the salt marshes the green crab eats a lot of the native inhabitants, for the salt marsh is a sea life nursery, providing easy prey for the crab. As Dr. Hilary Neckles states from the article *Scientists Battle to Save Maine's Eelgrass from Destructive Invasive Crab*, "...the green crabs uproot the plants in search for food...", and those plants are eelgrass. That means that as the green crabs are digging for prey, they displace the roots of the native eelgrass, which is quite important to the ecosystem. Eelgrass helps the salt marsh environment by holding the soil together, preventing erosion, and also by filtering the waters of pollutants. Without eelgrass many inhabitants of the salt marsh (shellfish, young fish, and others) are left in the open sea without protection they have had their whole lives.

The research conducted answered the question: how well are green crabs prospering, and how much are they overtaking the intertidal zone in Georgetown, Maine from 2018-2021. The research shows how bad the green crab situation is, which impacts the communities around us all. In the areas surrounding Reid State Park crabbing, clamming, and lobstering are

a large part of the economy. Green crabs drive out and eat those native inhabitants, causing the stock levels to deplete. This research will add to the existing knowledge of green crab overpopulation, letting scientists and interested people know just how bad it is.

Methods

On Monday the 25, Thursday the 28, and Friday the 29 of October, 2021, students from Bath Middle School went to Reid State Park and Todd's Landing in Georgetown, Maine. Students collected data on the crabs in the intertidal zone, recording the size of the crab in millimeters, the sex of the crab, number of claws, the color of the crab, aggresiveness, and whether the crab was carrying eggs. Crabs were caught in traps to record data from not only one location, however several locations for a better understanding of the green crab population numbers. The data we collected contributes to years of data, showing how the green crab population has changed over time, and grown.

The first trap pulled was at Todd's Landing in Georgetown, Maine. The trap had been set in a location where even at the lowest tide it would be underwater. The trap was then pulled out of the water and the crabs were placed in a bucket for future measurements. The traps set on Monday, the 25 of October, had been sitting in the water for 25 hours, approximately a day. The traps then were left there, and due to the rainy weather it was decided to postpone the other groups from pulling out the traps until Thursday and Friday. As a result of that decision, on Thursday the traps had been underwater for three days, then once again the traps had been underwater for approximately a day to be pulled out on Friday. Those extra days affected the data collected by allowing more crabs to enter the trap than what would have normally happened, therefore changing the consistency of the data.

At Reid State Park three traps had been set, with the same time underwater as the traps from Todd's Landing according to the day. One trap had been placed somewhat close to the ocean, while the other two had been placed across the bridge on seperate sides of the Sheepscot River. All three traps were pulled, and the crabs then placed into buckets just as the crabs from Todd's Landing were. After the crabs were placed in buckets, the old bait of sardines in oil were removed and freshly opened cans of bait were placed in the trap. The rebaiting process happened at all sites.

Students then recorded the attributes of each crab from each trap. Each trap caught enough crabs to approximately fill a gallon bucket a quarter of the way up. After recording the facts of the crabs a student or two would clean and then paint a small portion of the crab's carapace using nail polish. This was done so that future groups could know if a crab had been recaught. The color changed each day, and Friday's group of students did not paint any crabs. Monday had a color of red, and Thursday had a yellow-green color. Students went back through the bucket of painted crabs to make sure they missed none, and the missed crabs, if any, were painted and recorded. Once the paint had dried all the crabs were released near the trap they had been caught in, even the Todd's Landing crabs. There however is a possibility that the paint on the crab's carapace had rubbed off, therefore making it possible for the same crab to be caught twice without being identified as the crab from before.

In past years nearly the same exact process was followed at Reid State Park and Todd's Landing. The years of 2018 and 2020 had one less trap at Reid State Park, and in 2018 data was collected in four days, unlike years after where data was collected in only three days.

 (A painted green crab)

Results

Trapped Green Crabs at Reid State Park 2018-2021

Year	Number of Crabs	Number of Traps	Days Crabbing	Recaptured Crabs (paint present)
2018	67	2	4	2
2019	45	3	3	1
2020	42	2	3	0
2021	163	3	3	1

The data collected displays how many green crabs were caught each year, in the year of 2018 sixty-seven crabs were caught, in the year of 2019 forty-five crabs were caught, the year of 2020 forty-two crabs, and in the year of 2021 one hundred sixty-three green crabs were caught. Only four crabs in total were recaptured, two in 2018, one in 2019, and another in 2021. The number of traps and days crabbing vary, however they still are close in range. Despite the extra submerged time for some traps, in 2021 approximately fifty crabs were caught each day. In 2020 approximately twenty crabs were caught each day. In 2019 approximately 10 crabs were caught each day. Lastly, in 2018 approximately twenty crabs were caught each day.

Trapped Green Crabs at Todd's Landing 2018-2021

Year	Number of Crabs	Number of Traps	Days Crabbing	Recaptured (paint present)
2018	45	1	4	0
2019	35	1	3	1
2020	39	1	3	0
2021	28	1	3	0

This data is from Todd's Landing, where in the year of 2018 forty-five crabs were caught, in the year of 2019 thirty-five were caught, the year of 2020 thirty-nine crabs, and the year of 2021 twenty-eight crabs were caught. Only one crab was recaptured, and that was in the year of 2019. The number of traps stayed the same each year, and the only thing that changed was the number of days spent crabbing, where in 2018 four days were spent while all the other years only spent three days crabbing.

Discussion and Conclusion

The green crabs of Georgetown, Maine are indeed taking over. Their population is blooming, with their numbers doubling and in some cases even tripling from past years. In more enclosed habitats (Todd's Landing) the green crab population is decreasing, however not by great proportions.

The data shows that in previous years at Reid State Park the amount of green crabs caught in the short periods of time varied around forty or fifty, while in a year from 2020 until 2021 the crabs increased up to one hundred sixty. That supports the fact that the green crab population is indeed thriving, or at least shifting their habitat. Despite the data from Reid State Park, the data collected at Todd's Landing displays that the green crab population at that location is steadily decreasing. In past years the population of the green crabs varied around forty, while in a year from 2020 to 2021, and also from 2018 to 2019, the population dropped to around thirty.

Only five crabs were recaptured in total, showing that the green crab population is truly flourishing. That means that not only in each short session of crabbing many crabs were caught, but that each day the crabs caught were not the same crabs as the days before.

This evidence suggests that the green crab population is prospering incredibly well, as well as shifting and blooming in intertidal zones off the mouths of rivers. As the data shows, the crab population has had an incredible increase in the past year at Reid State Park, which is located at the mouth of the Sheepscot River. Todd's Landing, which is located off the Sasanoa River, has maintained a population of around thirty or forty crabs.

Some factors to consider are that no researcher knows whether or not the recaptured ratio is true, due to the fact that the paint applied to the crabs' carapaces may have rubbed off due to having been scraped off by rock, gradually taken off by sand, or whether the salt water caused the paint to no longer stick, therefore making the paint much easier to rub off. Another factor is that only a portion of the green crab population was sampled, for it would be nearly impossible to collect every single green crab in the intertidal zones.

As a result of the investigation, new questions to further investigate have surfaced, such as whether or not the weather affects the amount of crabs captured per day. As the data for this investigation was collected over a course of three days, the weather changed.

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References Cited

Crabs Temperature. Performance by Dr. Marissa McMahan, 2021, https://drive.google.com/file/d/14xrGj2Fs81uOfRYdt6anKvL6dd3Captf/view. Accessed November 2021.

Maine Public. “Scientists Battle to Save Maine's Eelgrass from Destructive Invasive Crab.” *Maine Public*, Maine Public, 31 August 2015, https://www.mainepublic.org/environment-and-outdoors/2015-08-31/scientists-battle-to-save-maines-eelgrass-from-destructive-invasive-crab. Accessed 8 November 2021.