Findings from the Field

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Percent Change in Green crabs from 2018 to 2021

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Abstract

My investigation set out to find whether or not the green crab population has increased by over 600% in Reid State Park since 2018, as stated in Marissa's findings. This is a predominant question to local scientists because the green crab species, which was brought here by ships from Europe in the mid 1800's, have since become an invasive species to Maine's ocean ecosystems. The green crabs have been overtaking many of Maine's ocean species at Reid State Park, causing many Native species to become quite scarce. BMS seventh graders gathered data at Reid State Park on each crab caught in their traps. Their research data was used to find out whether the green crab population percentages had increased over 600% since 2018. However, unlike Marrissa's green crab population data, the Reid green crab data showed only about a 62% increase since 2018.

Introduction

It's important to know how green crabs are affecting Maine's ocean ecosystems. To understand this, you need to know how they came to Maine. According to the Maine Department of Marine Resources, "*Carcinus maenas*, aka, the common shore crab, arrived in the 1850s, hitching a ride from Europe across the Atlantic in ballast water in ships. They were seen in Maine's Casco Bay in 1900 and had made it north to Jonesport by 1951". This means that green crabs had traveled to Maine in the mid 1850's and began to overtake Maine's ocean ecosystem species. If this continues to happen, it would be very detrimental to Maine's delicate ocean ecosystem.

Fisheries Division Director, Dr. Marissa McMahan points out that the green crab populations have already increased by over 600% from 2018 to 2020. Utilizing the research obtained from BMS seventh grade students, it will be determined if this applies to Reid State Park as well.

Green crabs are incredibly crucial to scientists and humans as a whole, because the ocean holds nearly 17% of all edible food for humans. If the Native ocean creatures continue to die, humans will lose an incredibly large food source. Green crabs are also crucial to scientists because they can be extremely detrimental to eelgrass. When the crabs dig into the ground while seeking shelter, they uproot the grass. Eel grass is important for the ecosystem because its roots prevent erosion, and it also provides a shelter for small ocean creatures.

Methods:

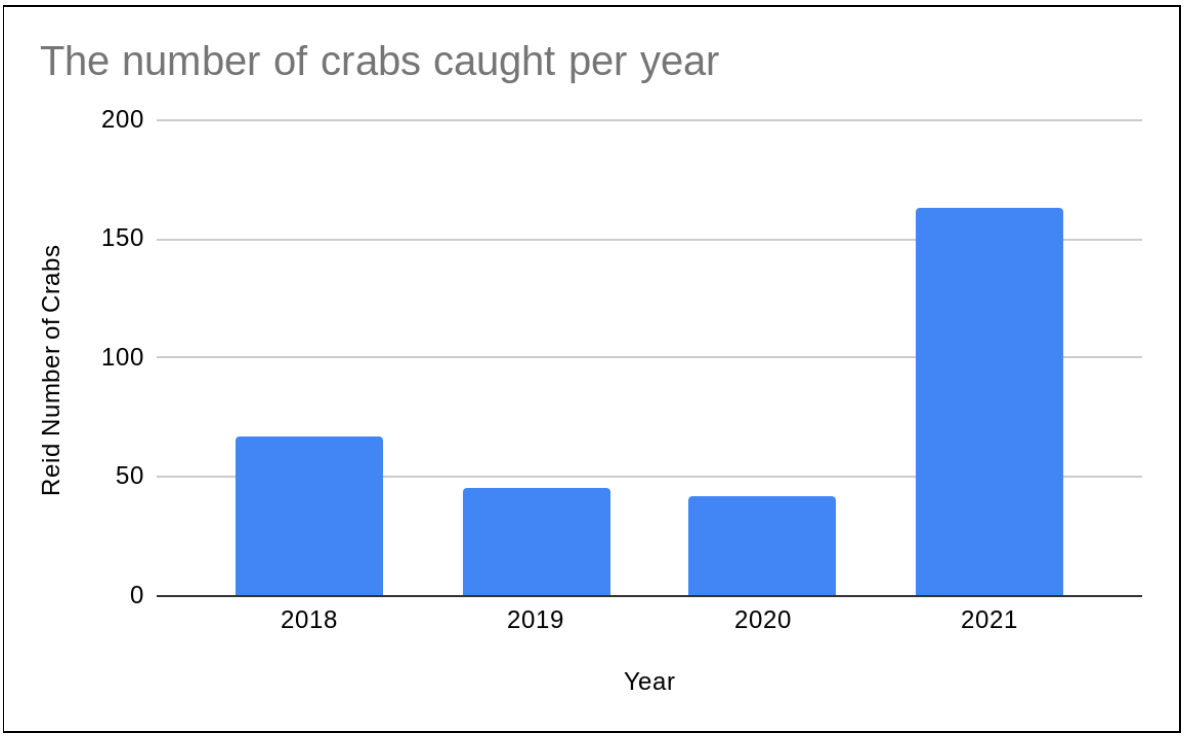
On October 25, October 28, and October 29 of 2021, seventh graders at BMS collected data at Reid State Park. Some of the data they collected included the crabs' carapace size, sex, if eggsare present, aggression, shell type (hard vs. soft), color around their mouth, if they were recaught, and the species. They collected this data by setting traps and recording the crabs that were caught in the traps. BMS Student's swabbed different finger nail polish colors on the crabs carapace so that recaptured crabs could be recorded. They set the traps on Monday, October 25 and pulled them once on October 28 and once on October 29. The traps were set at Reid State Park, fully submerged underwater. Inside two cans of sardines with oil were used as bait.

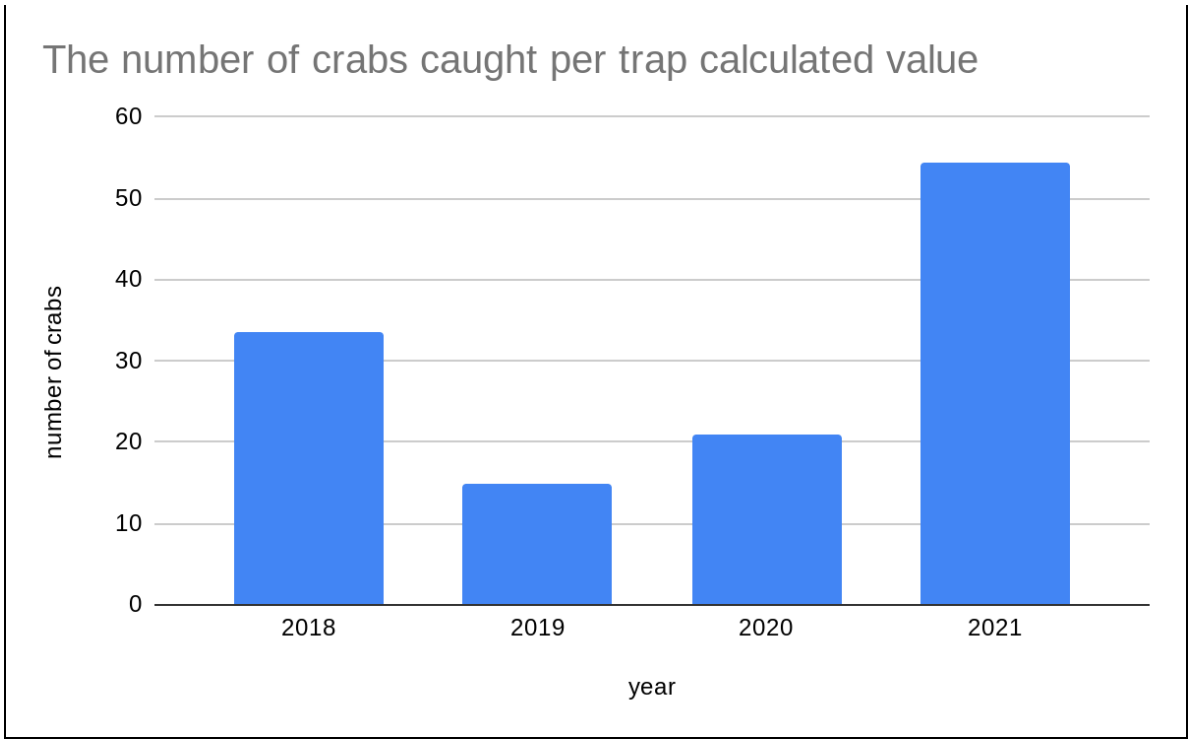
BMS Seventh graders in 2021 took the data the same way each day and set everything up the same way, so as to collect the most accurate data possible. Another thing they did to ensure accurate results was being careful to put the traps and bait back the same way after recording their data each day. BMS seventh graders also painted a large spot using fingernail polish on the crab's shell, so they could be easily differentiated from newly caught crabs. They needed this data in order to figure out what was happening with the green crabs, and learn just how fast their populations have increased since 2018. While collecting the data on the 25 of October however, it was pouring outside so the traps were left until the 29 of October. This could have impacted the results because some of the crabs would have been submerged for longer, also some of the rain may have driven crabs upward to shore. Another possible error that may have impacted the results occurred when taking the data, is that some nail polish may have washed off, especially from the 25th of October to the 29th of October due to the crabs being in the salt water for extra days.

Results:

Percent change in Green crabs from 2018 to 2021

Year	Reid Number of Crabs trapped	Number of traps	Crabs caught per trap, calculated value	% change since 2018
2018	**67**	**2**	**33.5**	**None**
2019	**45**	**3**	**15**	**-55.2%**
2020	**42**	**2**	**21**	**-37.3%**
2021	**163**	**3**	**54.3**	**62%**





Discussion and Conclusion

The findings of my research showed that in Reid State Park the green crab populations had decreased about 55.2% in 2019. However, in 2020 and in 2021 the green crab populations increased again and eventually in 2021 the populations had surpassed 2018 and increased by an additional 62%. My evidence showed this because the calculated trap value in 2018 was about 33.5 crabs per trap and in 2021 it was 54.3 crabs per trap. That means that the green crab populations have only gone up 62% since 2018 at Reid State Park.

These results surprised me because Dr. Marissa McMahan had found that the green crab populations had increased by over 600% percent so I was expecting at Reid, green crab populations to have gone up more than they did. I was also not expecting the green crab populations to go down at all, because according to Alaska Aquatic Nuisance Species', Bob Piorkowksi, " Female green crabs can reproduce twice in one season, spawning up to 185,000 eggs at a time."

To further this investigation, I would like to discover why the green crab populations increased over 600% based on Dr. Marissa McMahan's research compared to only about a 62% increase at Reid. I am especially interested in this because Reid State Park research and Dr. Marrissa McMahan's research varied so much, so what had caused the green crab populations to differ so drastically.

Acknowledgements

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References Cited

- Fact Sheet No.1: Green Crab, https://www.pwsrcac.org/wp-content/uploads/filebase/programs/nis/nis_fact_sheet_green_crab.pdf
- McMahan_crabs_tempeature, https://drive.google.com/file/d/14xrGj2Fs81uOfRYdt6anKvL6dd3Captf/view
- Maine Department of Marine Resources, https://www.maine.gov/dmr/index.html