

Number of European Green Crabs Caught in 2015 - 2017 at Fort
Popham, Griffith's Head and Todd's Landing

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Abstract

European green crabs have been wreaking havoc of the native habitat since only 2013 and they are already are severely damaging the marine ecosystem. The purpose of our study is to find out why the green crabs are extremely resilient and what we can do to the green crabs that will harm them, but not harm others native species. We used the catch and release method to fully understand the size of the population; measuring the size of their carapace, the color of the crab, the sex of the crab, if the crab was aggressive and if there was anything that stood out about the crab. We marked the crab with quick dry nail polish and then release them to the place of their capture, the next day, we would repeat the steps and also look for nail polish on the crabs. I found that 2016 was a particularly good year for the green crabs at Griffith's Head and Todd's Landing but at Fort Popham the crab population went down. 2016 winter had many extremes, in some places it was the coolest and the driest and in other places it was the warmest and wettest, on the east coast it was one of the warmest winters on record. That information would explain the population at Griffith's Head and Todd's Landing, but not at Fort Popham. The conclusions that I have made is that green crabs are a menace to the environment and if the ocean temperatures keep rising at the rate that they are now, the green crab population will rise with it.

Introduction

European green crabs are an invasive species from Europe and North Africa introduced to North America in the early 19th century via shipping. It wasn't until 2013 when they started to demolish the native species and ruin their habitat. Green crabs have taken a major liking to soft shell clams, which is diminishing the soft shell clam industry. The soft shell clam industry is the third largest fishery in Maine in terms of value, but in 2016 clammers only harvested 1.5 million pounds an all time low for the century and for the past ten years this industry has been employing between 1,700 and 2,000 clammers but this industry is slowly collapsing. (Boston.com, July 4 2017) That is not the only thing that green crabs are hurting they are constantly tearing up eelgrass in search of food. Eelgrass provides shelter for juvenile fish, and invertebrates, it serves as a sanctuary for the larvae of some bivalve mollusks and other invertebrates, and in certain locations helps to stabilize unconsolidated sediments and shorelines. (Maine.gov, 2016)

The work that we are doing is very important because it is one of the longest green crab study in Maine of its type. We have been doing this study since the population boom in 2013. Our work is looking at more than just the population or number of crabs we caught, but looking at if the was male or female and what the color of the crab was so we can get a more meaningful and deeper understanding of the European green crab to eventually come up with a way to wipe out or significantly decrease their population in North America.

The essential question that we are trying to answer is *how are invasive crabs impacting the marine ecosystem?* We choose this topic because we feel like it is important to the

environment and to the community to have understanding of what is happening to the marine ecosystems. This question also is trying to help the soft shell clam fishery and other fisheries being affected by green crabs which many Mainer's rely on.

Methods

On October 23th through to the 27th, 7th grade Bath Middle School science classes traveled to Reid State Park to catch green crabs, mark them, record their data, and release them. When we took their data, we measured the length of their carapace, we looked to see if they were male or female, we looked at their color, we found out if they were aggressive or not and if they were previously marked with nail polish by us. With this data we put it in spreadsheets and graphs. To make sure that we had valid data we always put the traps in the same place, we used the same bait, always put a new can of bait in the traps each day, we use the same traps and we left the traps in the water for at least one full tide cycle each time.

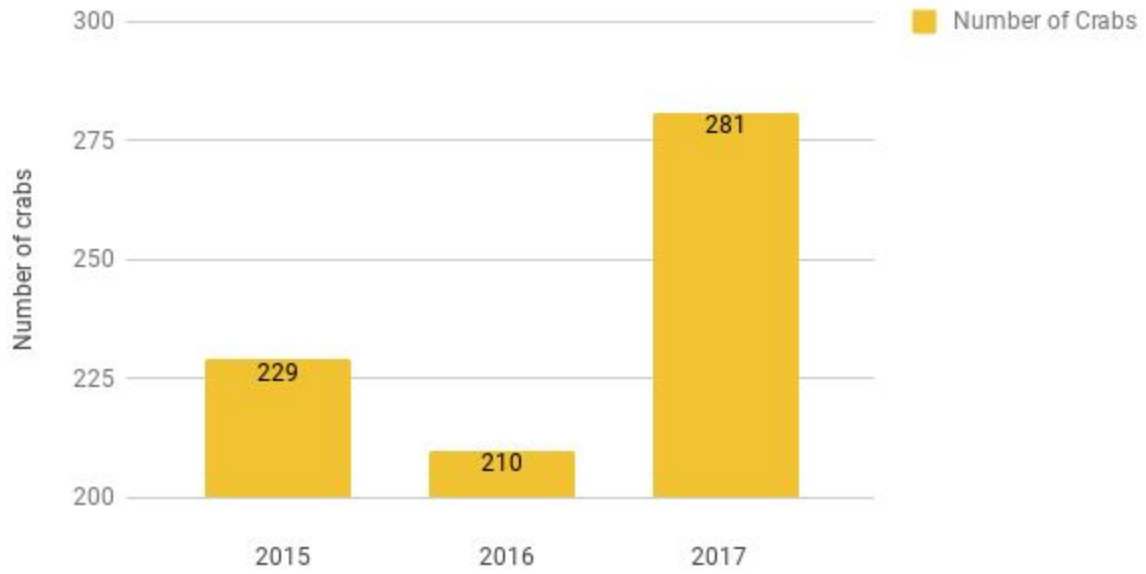
On Monday, the traps were set and left in the water until Tuesday morning when we pulled up the trap collect data from the crabs marked them with quick-dry nail polish, then we reset the traps. On Wednesday, we did not go due to heavy rain. On Thursday we pulled up the trap collected data from the crabs marked them with quick-dry nail polish, then we set the traps again and we used a fresh can of sardine in oil. On Friday, we pulled up the traps took the crabs data, but we did not mark the crabs and we did not reset the traps.

When we went to Reid State Park we used the catch and release method. When the traps were pulled up two or three people grabbed all the by-catch, fish, lobsters, rock crabs and put them back in the water. Then we took all the green crabs and put them in buckets. Next we had to reset the trap so we took out the old bait and opened a new can of sardines, put it in the trap and placed the trap in the same place from where we pulled it. After that we had small groups of people measuring the crabs with a centimeter ruler, we determined if the crab was male or female by looking at their abdomen. If their abdomen was a bell shape and skinny it was a male. If it was a bloated triangle shape, then it was a female. We also looked at the color of the crab underneath the claws and we used a color reference sheet to do so. We marked down if there was paint present, and if they were aggressive or not. It was sometimes easy to tell if they were aggressive because they were try to fight with other crabs or with us but other times we gave them a pencil and see if they grab on. The last thing that we recorded was if there was anything interesting about the crab like if it was missing claws or if seaweed was growing on it. There was one person in each group marking down all the data on data sheets. Once we got all the data down we wiped down the carapace with nail polish remover to remove the grime on the crab. It was important that we did this before we painted a small mark of insta-dry nail polish on their back. It is very important to use insta-dry nail polish so the nail polish is dry when the crabs are released. The last thing that we did was release the crabs back to the location of the trap they were found in.

Results

Number of Crabs Caught

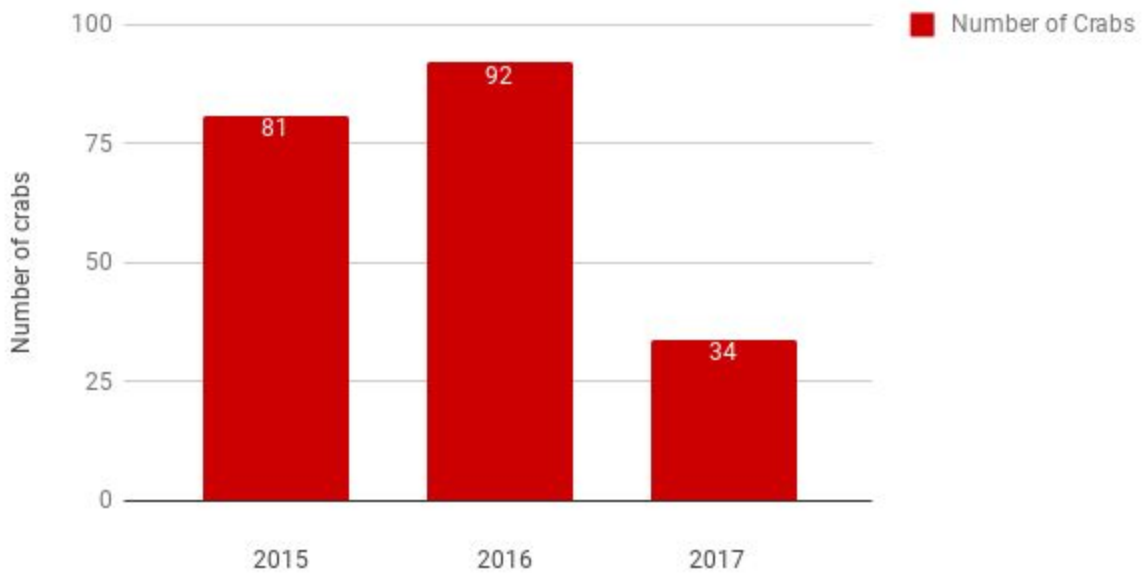
Fort Popham



Fort Popham	
Year	Number of Crabs
2015	229
2016	210
2017	281

Number of Crabs Caught

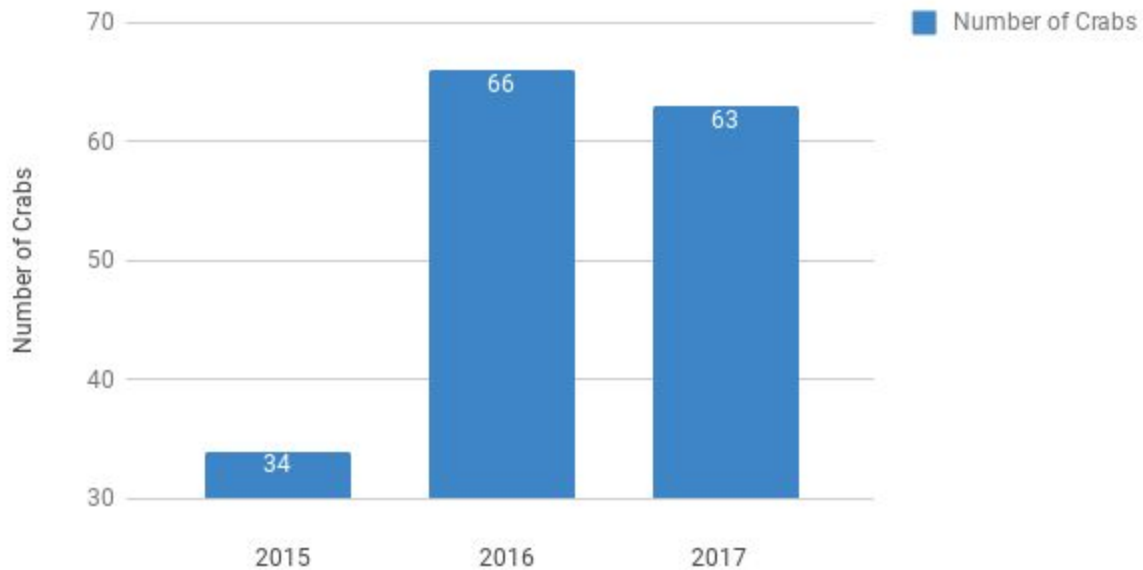
Todd's Landing



Todd's Landing	
Year	Number of Crabs
2015	81
2016	92
2017	34

Number of Crabs Caught

Griffith's Head



Griffith's Head	
Year	Number of Crabs
2015	34
2016	66
2017	63

These graphs show the population of green crabs over three years in three different locations. In Fort Popham the graph forms a 'v' shape with a dip in the population in 2016 and a major population boom in 2017. Unlike Fort Popham, Griffith's Head and Todds Landing form an inverted 'v' with a population boom in 2016 and a dip in 2017. In Griffith's Head the population almost doubled from 2015 to 2016 and only decreased very little. In Todd's Landing there was not that much of an increase from 2015 to 16 but the population decreased more than half of its size. 2016 winter had many extremes, in some places it was the coolest and the driest and in other places it was the warmest and wettest, on the east coast it was one of the warmest winters on record. That information would explain the population at Griffith's Head and Todd's Landing, but not at Fort Popham.

Conclusion

Our claim that we are trying to prove is that green crabs are butchering the maine marine ecosystems. Green crabs are incredibly resilient and are quick to recover. If they lose a limb, the limb grows back. The only way to effectively kill green crabs without harming the other species is to catch them and kill them with your own hands.

When we went to catch the crabs there were 282 green crabs caught at Fort Popham in one day and there were no recaptures. Over the whole study this year there was only one recapture from Todd's Landing. This means that the population is thriving and there are so many that none of them make their way back to the trap.

My graphs show that in some places the crabs a successful year and in others they had poor year but that doesn't mean that their population is in decline, over the years green crabs population varies greatly but they are still harming the marine ecosystem. The final conclusions that I have made is that green crabs are a menace to the environment and if the ocean temperatures keep rising at the rate that they are now then the green crab population will rise with it.

Reference

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