Article

The Blue Crab Fights Against External Challenges

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Abstract

Being a part of the supplemental summer diet all along the east coast, the Maryland Blue Crab has seen its share of changing times. Throughout the crab's history, the iconic, colorful animal has met external factors out of its control that have affected its population.
In its earliest years, The Maryland Blue Crab can be traced back to the diet of Native Americans and early settlers from 1600 through the 1700s. As soon as the modern technology of refrigeration hit America in the early 1900s, the crab became a main commodity for those who live along the length of the eastern shore. In this day and age, modern challenges to the Blue Crab include pollution, increased human population, and global warming; all of which contribute to what seems like a steady decline in the population of this iconic species.

The people who most enjoy the Blue Crab have felt the effects of the population decrease as well. Prices of Blue Crab, in any form, have increased almost exponentially in the past fifty years. In the past five years alone, prices of the crab in the mid-east coast have nearly doubled in price compared to fifteen years prior. Although far from being endangered, it becomes increasingly important to understand why this historic species cannot hold its own in the fight against external challenges.

Introduction

Callinectes Sapidus goes by many names: the Atlantic Blue Crab, the Chesapeake Blue Crab, and the Virginia Crab; however, to most people living on the East Coast, it will always be the Maryland Blue Crab (Figure 1). In recent years, the Blue Crab has seen its share of modern times, more specifically modern challenges. Whether it be pollution, increased human population along the coastline, or global warming, there are many factors that are contributing to what seems like a steady decline in the population of this iconic species. Not only are the crabs themselves being affected, the ecosystem of the Chesapeake Bay, including the people that enjoy the benefits that it produces, have felt the effects of the declining population.

Content

As the world swells in population size, so does the number of mouths to feed. Since water covers 75% of the Earth, it is only natural to turn to the ocean and freshwater bodies of water to feed the ever-growing world. The Blue Crab has been providing a source of food and nourishment, whether it be to humans or to its fellow species in the aquatic ecosystem. Maryland, however, is not the only source of crab; Louisiana and the Gulf Coast are some of the biggest exporters of crab in the United

States.1 It may not specifically be Blue Crab, yet it is still part of the economic input of the eastern shore. Recently there have not been many crabs pulled out of the Louisiana/Gulf Coast area, which means that Maryland has to pull out more Blue Crabs from the Chesapeake in order to meet the demand for crab in general. This problem has especially been prevalent since Hurricane Katrina and the numerous oil spills around the Gulf Coast region1. Weather fronts have also been known to play a part in whether the population of crabs will be greater or lower than the previous year (Figure 2).

Natural disasters, including weather patterns, are not the only contributing factor to a steady decline in the population of Blue Crabs. One of the biggest threats to the population is man-kind. Pollution and overfishing have been the most detrimental challenges the Blue Crab species has come to face. In the 1990s the most prevalent cause of population decline was overfishing2. Human production around highly populated areas, such as the Chesapeake region, produces a lot of pollution, which disrupts the natural environment2. One of the biggest sources of pollution in the region emanates from excess nitrogen run-off originating from poultry farms along the eastern shores of Maryland, Virginia, and Delaware. Poultry waste is rich in nutrients, especially nitrogen, however seemingly endless poultry farms are popping up, causing a massive increase in nitrogen run-off which finds its way into the Chesapeake, damaging the fragile ecosystem3. Crabs cannot live in an environment rich in nitrogen, as it disrupts the water-to-oxygen flow on which their bodies depend. Additionally, it damages the algae food source that the crabs depend on for survival. Pollution leads to lower population, which in turn leads to over fishing of the crab population. Male Blue Crabs are especially prone to dangerous declining levels in population, as male crab meat is usually of higher value compared to female meat. For the past twenty years, on average, male population declines about threefold for a three-year average, compared to the female population which decreases twofold for a three year average3.

The decline of the Blue Crab population follows a peculiar trend; the population increases right before it decreases2, 8. In 2016 the population of the Blue Crab in the Chesapeake increased 35%, however researchers warn that this sudden increase shouldn't mean loosening public policy about harvest quantities4, 5. There are many laws and public policies in place that describe when, where, and what size crabs can be harvested. The economic benefit of this partial increase spreads across the east coast, not only into consumers' pockets but to producers as well. (Figure 3) shows the monetary values across the most predominant states that benefit from Blue Crab production, which is labeled under the general fish category. The recent success of the population increase in Maryland seems to be due to the fewer cold days Maryland experienced in the past winters. This ensured that fewer crabs die from the frozen water. In addition to this, warmer days lengthen the spawning period for female crabs, which in turn, ensures that more crab eggs will be able to hatch and reach maturity. Each female crab has the potential to lay three million larvae three to five times a season, so per season a single female crab can lay from three to fifteen million larvae6; only a small percentage of these larvae reach full adulthood with sexual maturity.

Multiple scientific studies have been performed concerning the topic of the Blue Crab. Since studying something under the ocean is extremely difficult, researchers use a method called "Trapping and Tagging" which is where a large population of crabs are lured into an area and trapped there, so they can be researched. Some of those crabs are then tagged, much like sharks and dolphins are tagged to track their movements; crabs are given a small tag, thus allowing their migration patterns or movements to be tracked. Stocking has been a method that has attempted to replenish the population of the Blue Crab. In order to replenish the population properly (Figures 4 and 5), one has to consider the time of year, and at what point/age in formation the Blue Crab can be released into the wild. For example, the female population potential survival rate increases if it is released in the spring, in order to mate properly by the summer. This is done in attempt to lay eggs more than once a season (April-September)7. Male crabs can be released earlier than females, since their size usually protects them longer against predators. Recently, however, male size has been declining overall8, 9. Since larger male Blue Crabs are preferred in market because of their quantity of meat, they are generally harvested in greater numbers when compared to smaller male crabs and female crabs. Thus, only the smaller Blue Crabs are left to mate with the females,

passing on the lower size gene10.

Conclusion

The Maryland Blue Crab has been a symbol of many states along the east coast: Maryland, Virginia, Delaware, and the entire Chesapeake Bay region. The crab has been a major part of the supplemental summer diet for millions of citizens living along the east coast. For the past fifty years, the blue crab population, both male and female, has been on a steady decline. Much has been done to figure out why; research, trapping and tagging, stocking, etc., seeking to discover how to save this colorful and iconic species. While it fights against constant changing weather patterns, pollution, and overfishing due to a growing human demand, the Blue Crab continues to survive against what seems like a countless number of external challenges.

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Figure References

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Figure 1. Maryland Blue Crab

Figure 2. Overall median temperatures during 2014, which show that the east coast was cooler than average; this possibly being a factor of the lower population and overall harvest.

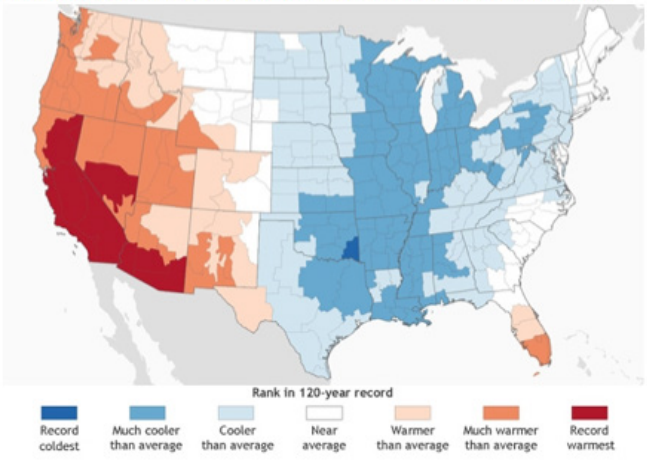

Figure 3: Fish Values from 2000 to 2016 for the four top exports of Crabs in the United

Fishery value in millions of dollars (and percentage of national harvest weight)

Year	Maryland	Virginia	North Carolina	Louisiana	National
2000	31 (12.3)	24 (15.5)	37 (21.8)	34 (28.0)	164
2001	35 (16.3)	26 (15.8)	32 (20.2)	32 (26.3)	158
2002	30 (15.1)	21 (15.5)	33 (21.5)	31 (28.5)	147
2003	35 (16.3)	19 (12.6)	37 (25.0)	34 (28.1)	154
2004	39 (19.4)	22 (15.8)	24 (19.6)	30 (25.4)	146
2005	40 (21.9)	21 (16.4)	20 (16.0)	27 (23.9)	141
2006	31 (17.7)	14 (13.7)	17 (15.3)	33 (32.1)	126
2007	42 (19.6)	16 (16.0)	21 (13.6)	35 (28.7)	149
2008	50 (21.5)	18 (14.3)	28 (20.3)	32 (25.7)	161
2009	52 (22.0)	21 (18.6)	27 (16.8)	37 (30.1)	163
2010	79 (33.2)	29 (19.3)	26 (15.4)	30 (15.4)	205
2011	60 (25.3)	26 (19.6)	21 (14.9)	37 (21.7)	184
2012	60 (24.4)	25 (18.5)	23 (14.9)	39 (22.8)	188
2013	50 (17.9)	24 (18.0)	30 (16.5)	51 (28.8)	192

Figure 4. Amount of Blue Crab in Chesapeake Bay: Showing a steady decline over time in the total pounds of crab harvest in the Chesapeake Bay