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Blue Crab Tolerance of Environmental Change  
*Comparison of male and female juvenile blue crab growth rates may help predict how  
climate change could affect blue crab populations*

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Blue crab (*Callinectes sapidus*) has a long history in Lowcountry culture and is one of the top three commercial fisheries in South Carolina. Climate change is expected to impact environmental conditions of coastal waters but it is unknown how this will affect many important marine species and ecosystems. Estuarine systems such as tidal creeks and salt marshes may be disproportionately affected if precipitation patterns alter salinity as certain species can only tolerate a certain a small range of salinities. This could potentially pose a threat to the health and stability of important ecosystems and fisheries.

In order to better manage the blue crab fishery in the future, it is important to understand conditions that blue crabs can tolerate and how salinity may play a role in migration and habitat preference and potentially affect males and females differently.

Estuaries are important habitats to blue crabs because they utilize various parts of the estuary throughout their life history. Larval blue crabs enter the estuary and mature into the juvenile stage. During this life stage, males move up tidal creeks into low salinity habitats to mature, while females remain in the high salinity lower estuary to mature. Once they have reached maturity, adult males return to the lower estuary to mate with the females before moving back into low salinity habitats to live out the remainder of their life. After mating, females will move out into high salinity ocean habitats to spawn, and then return to the lower estuary.

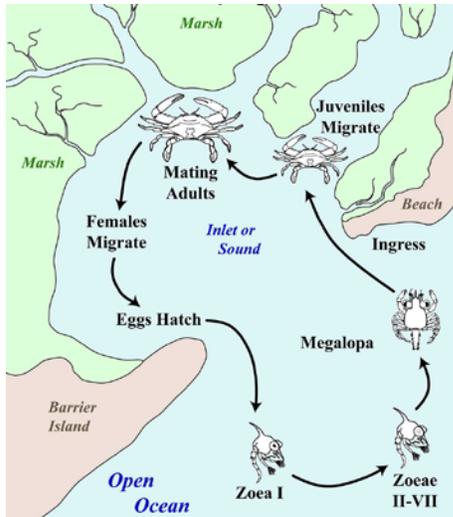


Figure 1: Blue crab life cycle showing different uses of estuary throughout life stages.

Nicole Doran, an undergraduate student from Ohio State University, is participating in the College of Charleston's summer REU program. Her research is being conducted at the South Carolina Department of Natural Resources, and focused on juvenile blue crabs' growth rates in high and low salinity.

Doran will compare the growth of crabs in high and low salinity, but the main objective of her project is to determine variation between males and females in different salinities. Growth rates can be used as a measure of well-being and tolerance of animals to a set of conditions, so this experiment will hopefully provide information on the range of salinities blue crabs tolerate. Growth was measured by taking initial body measurements and wet weights of each crab and tracking how they changed in size over the course of the five week experiment.

Doran hypothesized that females grow at greater rates in high salinity conditions, and males grow at greater rates in low salinity conditions. Analysis of current data and the initial results seem to support this hypothesis as they show a significant difference between male and female growth rates. This could indicate salinity is an important factor in blue crab life history and help explain why males and females seem to prefer different salinity habitats.

According to Doran's mentor Dr. Michael Kendrick at the South Carolina Department of natural resources this research is important because, "Despite the economic and ecological importance of blue crab in South Carolina, we understand relatively little about the habitat use and ecology of juvenile blue crab in this state. This research project provides valuable information on how juvenile blue crab may respond to future shifts in environmental conditions." Blue crab fisheries are already experiencing a decline in annual catches, so if they cannot adapt to future environmental conditions this may further affect the abundance of blue crab. Therefore, understanding how blue crab respond to a wide range of conditions can help resource managers protect this important species.



Figure 2 (Above): Doran collecting crabs in the field

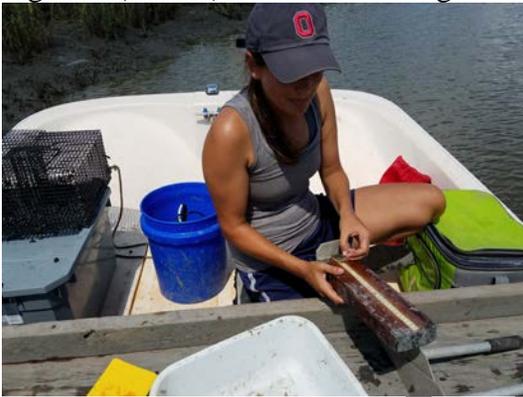


Figure 3 (Left): Doran measuring a juvenile blue crab



Figure 4 (Right): The environmental room where Doran's experiment is set up.

This work was supported by the Fort Johnson REU Program, National Science Foundation Award No. DBI-10-25312 to the Grice Marine Lab, College of Charleston. For more information visit the Fort Johnson REU webpage and blog site to learn more about this year's interns:

<http://reu.cofc.edu/>

<https://blogreu.wordpress.com/>

To learn more about the work being done at the South Carolina Department of Natural Resources visit their website: <http://www.dnr.sc.gov/>

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