

Blue Crabs in Barnegat Bay

by Christine Moran, BBVMN, 2017



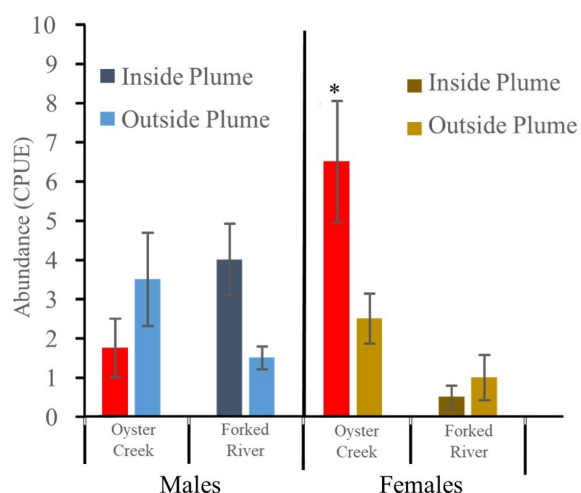
Although the pandemic has made fieldwork challenging for the past several months, Dr Paul Jivoff's enthusiasm for his work on blue crabs has not waned. The Rider University professor was happy to talk about his research on blue crabs (*Callinectes sapidus*) in the Barnegat Bay. Dr Jivoff works with students from Rider University, as well as volunteers, interns and students from the Rutgers Marine Field Station and JC NERR (Jacques Cousteau National Estuarine Research Reserve). In addition to teaching, Dr Jivoff has three current research projects underway: studying the effects of the September 2018 shut-down of the Oyster Creek Power Plant, heavy metal accumulation in various blue crab tissues, and chemical signals that influence mating.

Oyster Creek Study

Blue crabs begin their lives as planktonic larvae in the open ocean and require higher salinities for early development. As they mature, they move into the bays and estuaries where they remain for the rest of their lives. Their development may have been affected by the warmer waters emitted from the Oyster Creek Power Plant during its operation. A plume of warmer water extended from the mouth of the creek into Barnegat Bay. The plume was 4 degrees Celsius warmer than the surrounding water. The tidal flow was restricted going into the creek, so the plume was constant.



Black dots represent sampling areas outside the plume. Red dots represent sampling areas inside the plume.



In field sampling using crab traps, more adult female crabs were found within the warm plume than outside, and many of these females carried advanced stage eggs. Males were trapped equally inside and outside the plume. This phenomenon was somewhat different in warmer weather. This observation raises several questions. Do the eggs develop faster in these females due to the warmer water temperatures? Do the females tend to remain in the plume and not move towards the inlets to release the larvae into their preferred habitat? Larvae released in the creek may not survive, as the sa-

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Heavy Metals

For this study, the effects of urbanization on blue crabs were measured as the presence of heavy metals in various tissues. Crabs were sampled in the Toms River area (highly urbanized) and compared to crabs sampled in the Tuckerton (less urbanized) area, as well as in the Great Bay/Mullica River estuary (less urbanized).

Muscle, hepatopancreas and reproductive tissue from both males and females were sampled. Inductively Coupled Plasma (ICP) instrumentation was used to determine the concentrations of mercury, cadmium, copper and other metals in the tissues. This study is unique in that it sampled multiple tissues from both males and females and from crabs captured in areas of different urbanization.

In some samples, the heavy metal concentrations were greater in the Toms River crabs vs the Great Bay crabs. This would imply that crabs from urban areas may be less safe to eat than crabs from less populated areas. This study is ongoing.

Mating Pheromones

When a female is approaching her final molt and thus ready to mate, she releases a pheromone in her urine to elicit courtship by the males. The urine is produced by a gland near the face. Dr Jivoff wanted to answer the question of whether a female's molt stage influences when the pheromone is released and the concentration of the pheromone.

Crabs often spray urine when you pick them up. So, urine is often collected by holding the crabs out of the water and collecting sprayed urine on waterproof paper. This study is continuing.

Other Challenges

We also discussed the many other challenges to blue crab survival in the bay:

- Loss of habitat, especially the destruction of submerged aquatic vegetation (SAV)
- Excess nitrogen from runoff can cause toxic algae blooms
- Commercial and recreational fishing pressures can influence the crab population

Many thanks to Dr Paul Jivoff for sharing his passion for blue crabs in the Barnegat Bay!



Blue crabs have natural predators including birds, turtles, sharks, large fish like striped bass and other crabs.