

Background

Over the past two decades a large body of work has established a clear link between endocrine disrupting compounds (EDCs) and deleterious physiological impacts on aquatic organisms. EDCs act at low concentrations, and originate from a variety of sources, including urban or agricultural runoff (e.g., pesticides) and components of treated wastewater effluent.

Endocrine disruption in crustaceans is of particular concern to North Carolina considering the importance of the blue crab fishery. The Division of Marine Fisheries issued a draft report in November 2011 that emphasizes the need for research on endocrine disruption in blue crabs.

Although there have been anecdotal reports of an increase in intersex crabs, to date the biological impacts of EDCs in NC blue crab populations have yet to be assessed.

Methodology

Initial sampling surveys were conducted from spring through fall in 2013 to assess potential land-use impacts on populations of blue crabs.

field sites

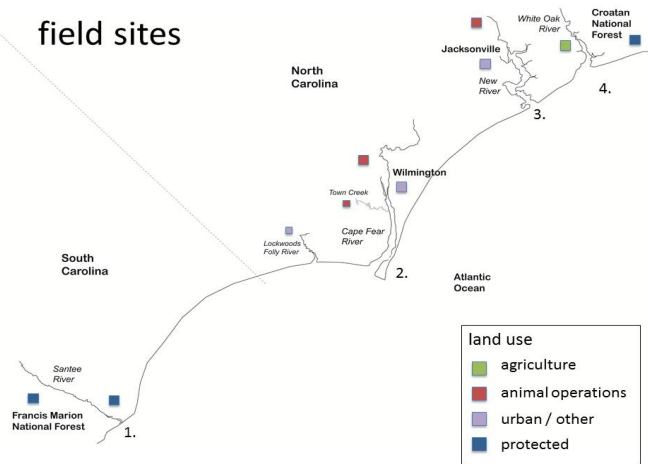


Figure 1. Map of Sampling Locations for 2013. WB - Wilson Bay (3), CF - Cape Fear (2), JI - Jones Island (4), and SR - Santee River (1). Abbreviations apply to Fig. 2.

- Crab pots were deployed at each site for a period of 3-5 days.
- Specimens were evaluated for morphological differences.
- Hemolymph was collected, and hepatopancreas (males & females) and vas deferens (males) removed, snap-frozen and stored at -80 deg C.
- RNA has been extracted from samples with qPCR analysis scheduled for summer 2014.

Preliminary Results

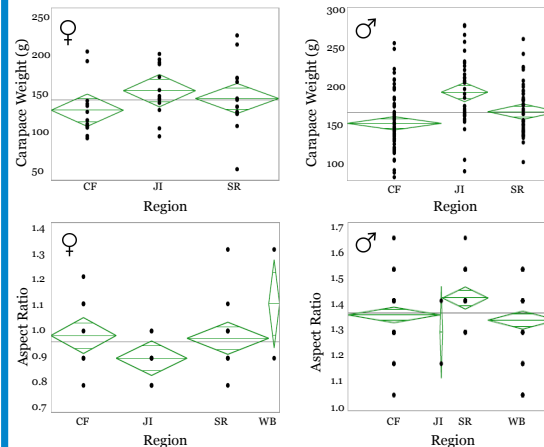


Figure 2. Statistical analysis of variations in carapace weight* and aspect ratio of abdomen* (height : width) in populations of *C. sapidus* (ANOVA, $p < .05$).

- Although preliminary, our results indicate smaller crabs originating from sites with heavy pollutant loading (CF).
- Abdominal Aspect Ratio is utilized to highlight the sexual development of male and female crabs by examining the shape of the abdomen.
- Preliminary data indicate an effect of site on abdominal aspect ratio.

Ecdysteroid (molting hormone) concentrations in hemolymph differ among collection sites.

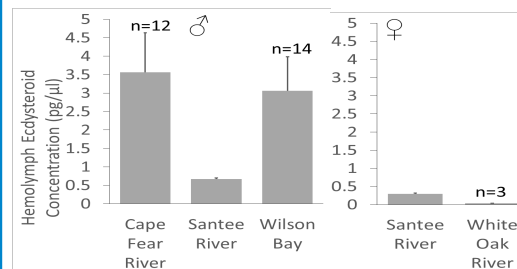


Figure 3. Hemolymph concentrations from male and female crabs collected at four locations along the coastal Carolinas.

Future Directions



- Sites will be sampled again in 2014.
- Molecular analysis of vitellogenin (egg yolk protein) and insulin-like androgenic gland hormone (masculinizing hormone) is currently being conducted.

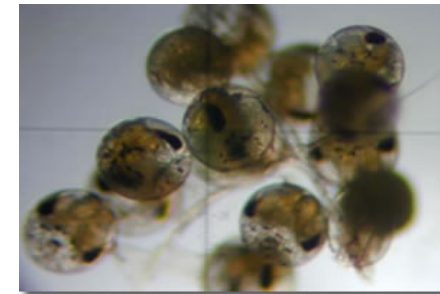


Figure 4. Pregnant female, or sponge crab, above. Blue crab embryos, below.

- Chemical analysis on suite of common EDCs is being performed on eggs and embryos from each site.
- Vas deferens and ovaries have been collected for RNA analysis.

References

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- Ford, A.T., Interspecificity in Crustacea: An environmental issue? *Aquatic Toxicology* 2012, 108, (1), 125-129.
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