Changing Submerged Aquatic Vegetation (SAV) Communities and Impacts on Blue Crabs: Potential Ecosystem and Fisheries Impacts of Climate Change - NC Sea Grant funded project

September 27, 2021 – Stakeholder Meeting

In attendance:

- Ann Deaton – N.C. Division of Marine Fisheries
- Dan Zapf – N.C. Division of Marine Fisheries
- George Easterly – UNC Wilmington
- Gloria Putnam – North Carolina Sea Grant
- Jessie Jarvis – UNC Wilmington
- Martin Posey – UNC Wilmington
- Mike Wheeler – UNC Wilmington
- Sam Romano – Blue Crab Fishermen/Seafood Packing Industry Representative
- Scott Baker – North Carolina Sea Grant
- Trish Murphy – N.C. Division of Marine Fisheries
- Troy Alphin – UNC Wilmington
- Whitney Jenkins – N.C. Coastal Reserve

Unable to attend:

- Brandon Puckett – N.C. Coastal Reserve
- Brian Boutin – The Nature Conservancy
- Doug Cross – Seafood Packing Industry Representative
- Joe Facendola – N.C. Division of Marine Fisheries
- Mike Blanton – Blue Crab Fishermen
- Todd Miller – North Carolina Coastal Federation

Meeting notes

Objective: discuss ecological indicators that will develop ecological vulnerability assessment and begin to rank them

<u>Seagrass EVI</u>

- Water clarity
  - attenuation of PAR
  - secchi depth
  - chlorophyll a
  - turbidity
  - CDOM
- Temperature
- Salinity
- DO
- pH
- Competition between species

<u>SAV Exposure</u>

- Trish: do we need to consider CDOM? Only an issue in lower salinity seagrasses – maybe drop? Jessie: good point but may need to keep for certain sites (New River)
- Gloria: Add wave energy? Depends on boat traffic as well
- Troy: Should we look at direct anthropogenic factors – boat traffic?

SAV Sensitivity

- Macroalgae – turd Moss plays a big role – need % cover or relative abundance
- Areal extent should stay
- Depth distribution of maximum seagrass biomass? May correlate to boat/wave energy influence or storm effects? Ann doesn't seem so sure about this
- Macroalgae gets caught in seagrass
- Gloria: general health of the seagrasses? If healthy it may be able to withstand exposure. Blue crab maybe disease presence?
- Trish: macroalgae (hypnea, gracilaria) do provide extra habitat and places for smaller species to hide in
- Troy: work on invasive gracilaria that provided a ridge habitat – doesn't know if uniform/function the same everywhere. Potential positive impacts of macroalgae as well.

SAV Adaptive Capacity

- Apical meristem or rhizome elongation to get measure of asexual reproduction

Blue Crab Exposure

- Juvenile blue crab density – better quality of habitat leads to greater density
- Specific chemicals of concern for blue crabs? Endocrine disruptors, etc.
- Sam: list is good – growth of juveniles is critical
- Mortality sources and rates for juveniles as well – Predators is huge, this year more than ever (Sam). More molting lately = more likely to be eaten. Add this to Sensitivity also.
- New category = substrate characteristics – this can also impact SAV. Substrate type/organic content
- Food availability

Blue Crab Sensitivity

- Add in predation effects and mortality
- General overall health? Disease present, size to weight, size to volume
- Adult male to female ratio

Blue Crab Adaptive Capacity

- Cold snap/weather corresponding to what stage the crabs are in. Cold spring, or quick cold snap in Fall that goes to winter – crabs may end up mudding down earlier
- Intensity, frequency, duration, or timing of weather exposures/rain events may have large impacts – maybe it can be modeled?
- Scott: Changing rate of rainfall has an impact. It does impact shrimp industry – long term issue
- Sediment varies natural throughout the system, but contaminants are not natural so I think that would be a higher priority related to blue crab sensitivity

- Factors exacerbated by anthropogenic factors. Water basin – slow heavy rain into estuary

Ranking SAV indicators

- First step is to rank the indicators
    - Rank 1: 0 = no impact; 1 = low impact, 2 = medium impact; 3 = high impact
- Next step is to examine the biases – and weight each rank
    - Rank 2: 0 = no empirical data; 1 = limited evidence or expert certainty, 2 = some evidence/expert certainty (e.g. info for only 1 area); 3 = moderate evidence/expert certainty; 4 = extensive empirical data/high expert certainty

- Water clarity: 3 (overall)
    - Attenuation of PAR: 3 (second ranking 2 or 3)
    - Secchi Depth: 2
    - Chlorophyll a:
    - Turbidity:
    - CDOM: 1

- Temperature:
- Salinity:
- DO:
- pH:
- Competition between species:

- Gloria: validity of the modeling based on the input that is obtained
    - Jessie: if you are not comfortable ranking, leave the ranking blank and we will keep a count of how many people respond to each one.
- Gloria: send ranking out to experts
    - Jessie → get ranking down and then we can send it out to experts
- Trish: Secchi depth → highly variable
- Jessie: A 0 does not mean it is not important, it just means that there is a knowledge gap.

Ranking Blue Crab indicators

- Ex. salinity – Rank 1: Sam and Martin both rank salinity as a 3, Rank 2: Sam rank = 4, Martin rank = 3.
    - Anne: does salinity make the crabs move more or does it make them more vulnerable? Troy – this could force crabs to leave a habitat which could make them more vulnerable, this as a result could influence mortality.
- Ex. mortality rate – Rank 1: Sam (3) and Martin (2.5-3), Rank 2: Sam (2) and Martin (2)
    - Jessie: We are focusing on coastal high salinity mortalities
    - Are we going to break these down by the different habitats? We can be more specific about habitat types in the questionnaire – parse it out a bit more. Need to keep length of survey in mind. Examples: Halodule, Zostera, Marsh channel, Mixed**? Core team can work on this to make sure it's clear.**

Other stakeholders

- Two different surveys, one for SAV and one for blue crab? Can send same person two surveys, certain people may not feel comfortable doing one or the other. Anne: **send to all and only answer what you're comfortable with or what you know about.**
- How will two different surveys feed into each other when it comes to the modeling? Jessie: They're independent of each other right now, indicators we are looking at are broader.
- Any other crabbers?
    - **Sam: every region probably has a topline crabber. Sammy Corbett (sp?). Was on fisheries commission. Hampstead area. Luke Ingerham (sp?). Also has a contact in Beaufort – Sam Thomas. Sam Romano could bring the survey to them if paper copy. Gene Balance (from Anne) – crabber from Ocracoke/Outer Banks side.**
    - **Scott:** Fisheries association is good about sending out information boards with Friday emails – may reach people that otherwise would not, paragraph about project, who to contact to provide feedback.