

## **Methodology Development for Appropriate Male Blue Crab Reference Points in Chesapeake Bay**

### **Background:**

In 2009, the NOAA Chesapeake Bay Office (NCBO) in coordination with the state of Maryland and commonwealth of Virginia initiated completion of a benchmark stock assessment for blue crab in Chesapeake Bay. In early 2011, the benchmark assessment was completed and delivered to the NCBO which organized a Center for Independent Experts peer review. Upon acceptance by the peer review team and subsequent review by the Chesapeake Bay Stock Assessment committee (CBSAC), the CBSAC recommended that the jurisdictions adopt the female-specific target and threshold reference points that were developed.

The CBSAC recommended that the jurisdictions place primary management focus on managing for the female-specific target exploitation fraction. If the annual exploitation fraction is, on average, equal to the target of 25.5%, the assessment model predicts that female abundance should vary around the target level of 215 million crabs. However, given the uncertainty in this component of the model, jurisdictions should focus primarily on the exploitation fraction when deliberating on management strategies, as long as the abundance of age-1+ female crabs does not depart widely from the target.

In addition, the CBSAC recommended that, for the next one or two years, stock status be updated against both the current (sex-combined) and recommended (female-specific) framework in order to assess changes in the performance of the male fishery and to fully monitor the transition from the current management framework to the recommended female-only control rule. This will also allow the management jurisdictions to fully evaluate the performance of the female-specific management framework.

To ensure that male reproductive capacity is not compromised in the face of female conservation measures, CBSAC recommended maintaining current male conservation measures such as size limits for all fisheries. Size limits are important in that they ensure that males have an opportunity to mate prior to being harvested. These conservation measures should remain in place until properly defined reference points for the male population of blue crabs can be determined.

### **Male Reference Point Development:**

In order to ensure that male abundance does not drop below a critical level relative to female abundance, the CBSAC recommends development of threshold reference points for male crabs that would provide management with a trigger for male conservation. One possibility to explore is a ratio of male to female abundance which could be derived from annual winter dredge survey results. In order to properly define a threshold based on an abundance ratio, several key analytical issues need to be addressed, and the results of ongoing research on crab reproductive biology need to be reviewed.

Key issues include:

- Estimation procedures of winter dredge survey gear efficiency;
- Estimation of winter dredge survey gear selectivity for differing sizes of crabs;
- Crab reproductive biology (sperm limitation);
- Estimation procedures for over-wintering mortality.

**Workshop Planning:**

Several CBSAC members participated on a planning conference call to define the focus of a workshop for developing male blue crab reference points. This call was held March 16<sup>th</sup>. The group agreed that the workshop would focus on developing an empirically-based male reference point that will serve as a ‘guideline’ or ‘rule of thumb’, as opposed to a formal, statistically based male reference point. The group discussed abundance, exploitation, and sex ratios as candidates for an empirical reference point. The group is leaning toward the sex-ratio as a reference point, and the workshop will focus on defining how this ratio is defined. Finally, the 4 analytical issues referenced above (and in the CBSAC 2011 report: gear efficiency, gear selectivity, over-winter mortality, and sperm limitation) remain important issues that need to be addressed in the future, but these issues do not need resolution for the development of an empirical reference point. Therefore, the workshop will not address these issues in detail, but may develop a more refined “analytical-needs” work plan that could potentially be used to solicit funding.

It is envisioned that this workshop will be held in the late summer timeframe – perhaps August 2012 – and to reduce travel for out-of-region staff (particularly NEFSC and SEFSC members), the meeting will be located at one of the NMFS Science Centers if possible.

The CBSAC spring meeting (development of the 2012 Advisory Report) will now be planned as a webinar or teleconference, again to reduce travel requirements. It is the continued expectation that the development / design of the male blue crab reference points will be completed for the state management agencies to implement for the 2013 fishing season.