



2007 Chesapeake Bay Blue Crab Advisory Report

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Status of the Stock:

In 2006, the NOAA Chesapeake Bay Stock Assessment Committee (CBSAC) adopted the Bay-wide winter dredge survey (WDS) as the primary indicator of blue crab stock status because it is the most comprehensive and statistically robust of the blue crab surveys conducted in the Bay¹. At the beginning of the 2007 commercial season, results of the 2006-2007 WDS indicated that the abundance of age 1+ crabs remained depressed compared to historical levels. The overall decline in abundance that began in 1993 ended in 2001. However, since 2002, abundance has stabilized below the survey average (Figure 1). Recruitment, as measured by the abundance of age 0 crabs, was low in the 2006-2007 WDS, and was the second lowest estimate of recruits since the survey began in 1989 (Figure 2). This low level of recruits continues a prolonged period of low recruitment that has persisted since 1997-1998. In the 2006-2007 WDS, female spawning potential (abundance of females greater than 60mm or 2.4 inches carapace width) was below the average level for the WDS (Figure 3).

A management control rule is used to determine the status of the stock (see Control Rule below for explanation). Despite continued low abundance, the blue crab stock remains above the abundance (overfished) threshold of 86 million age 1+ crabs (Figure 4). Age 1+ abundance from the 2006-2007 WDS was estimated as 122 million crabs. The exploitation fraction for 2006 (percentage of crabs removed from the population by fishing) was estimated as 50%, which is below the overfishing threshold of 53%. Therefore, overfishing is not occurring. Although the exploitation fraction has been below the overfishing threshold for 3 of the last 4 years, it has been above the target exploitation fraction of 46% in 8 of the last 10 years.

Data from three supporting blue crab surveys (the Maryland and Virginia trawls and the Calvert Cliffs Pot study) were reviewed. Results of these surveys are presented in Appendix 1 of this report. These data show differing trends to the WDS. The divergent results of these supporting surveys are possibly a reflection of patchy distribution of crabs in space and time within the overall low abundance measured by the dredge survey.

Harvest:

The 2006 Bay-wide crab harvest of 48.9 million pounds is among the lowest recorded since 1945 (Figure 5). The 2006 Maryland harvest of 28.1 million pounds is among the lowest recorded, but above the historical low of 20 million pounds observed in 2000. Virginia's harvest of 20.8 million pounds was below the time series average for the state, but above the lowest values observed in the 1940's, 1950's and 1970's (Figure 6). Based on the historical relationship between crab abundance estimated from the WDS and the subsequent harvest, the 2007 harvest is predicted to be 48.7 million pounds with a possible range of 32.3 to 65.1 million pounds based on 95% prediction intervals (Figure 7).

Projected Harvest and Exploitation:

The 2006-2007 WDS resulted in an estimated total abundance of 273 million crabs. Given this estimate of abundance and the projected harvest described above, we can predict a range of exploitation fraction (U) for the 2007 crabbing season. The predicted harvest of 48.7 million lbs would result in a U of 63% which exceeds the overfishing threshold of 53%. The range of values for the 2007 U, based on the possible range of the 2007 harvest (32.3 million lbs to 65.1 million lbs) is 44% to 80%. It is important to note that a harvest of 32.3 million lbs would represent an historical low for the Bay-wide crab fishery, and the associated U of 44% is only slightly below the target of 46%. Therefore, it is unlikely the 2007 exploitation fraction will fall below the target. The blue crab fishery is recruitment driven, meaning that the harvest in any given year is highly dependent on the influx of age 0 crabs from the previous year. Given the low recruitment observed in the 2006-2007 WDS, the 2007 harvest will rely heavily on age 1+ crabs surviving from the previous year. The reduction in recruitment levels apparent after 1996, combined with continued low levels of adult abundance, indicate that the blue crab stock and associated fisheries continue to warrant concern.

Control rule:

The control rule, which was adopted by the BiState Blue Crab Advisory Committee in 2001², and updated in the 2005 stock assessment³, is the foundation for sustainable management of the blue crab fishery in Chesapeake Bay. The control rule represents the relationship between adult crab abundance (millions of crabs), exploitation (the fraction of crabs removed by the fishery in a year) and management reference points. In 2006 the CBSAC defined the overfished limit to be 86 million age 1+ crabs. This value, observed in the 1999-2000 WDS, is the lowest value in the 17-year WDS time series, and delineates the overfished threshold based on a lack of historical evidence that a sustainable fishery can be maintained at an age 1+ abundance that is less than 86 million crabs. The overfishing definition, or exploitation threshold, for this stock is based on the consensus that a minimum of 10% of the spawning potential of an unfished population must be preserved to reliably produce the next generation of crabs. The target exploitation fraction of 46%, maintained over several years, represents an exploitation fraction that would preserve 20% of the unfished spawning potential.

Special comments:

The CBSAC recommends that management jurisdictions work with stakeholders to define goals for the blue crab fisheries, and subsequently develop a comprehensive management plan for achieving these goals. This plan should include specific management actions for rebuilding a depressed stock, for promoting sustainability, and for ensuring blue crab do not become overfished.

As a result of the 2005 blue crab stock assessment, a number of changes and improvements have been made in our analysis of stock status. Harvest has been adjusted to account for a number of historical changes in estimation methodology employed by the Maryland Department of Natural Resources and the Virginia Marine Resources Commission⁴. In constructing the Control Rule, the annual estimates of abundance and exploitation fraction use data from the WDS and reported fishery harvest. We no longer use an estimate of natural mortality rate (M) to calculate annual exploitation rates. An estimated M of 0.9 was employed to estimate the threshold and target exploitation rates.

Although the WDS is the most robust sampling program for blue crabs, the 17-year time series of the survey is significantly shorter than that of the supporting surveys. Therefore, the time series average for the survey is sensitive to each additional annual estimate. As a result, if abundance continues to be depressed, the survey average and the annual estimates of abundance will begin to converge. It must be noted that an annual value that appears ‘average’ for the WDS is still well below historical levels estimated from the supporting survey indices. This phenomenon of ‘shifting baseline’ highlights the importance of selecting a stationary reference period to which the current blue crab stock status can be compared.

Critical data needs:

It is critical that robust, fishery-dependent data collection programs be implemented for blue crabs throughout the Chesapeake Bay. The design of these programs should be based on the need for improved information on biological characteristics of the harvest and reliable effort data for the commercial and recreational fisheries. Additionally, a collaborative and coordinated Bay-wide fishery-independent survey focused on the spring through fall distribution and abundance of blue crabs remains important.

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