



Blue Crab Status Report

Blue crabs are one of the best-known and most celebrated symbols of the Chesapeake. Their populations in the Bay have hovered near historic lows for much of the last decade, but have recently begun to show signs of improvement. This newsletter reviews the current status of the blue crab population in Chesapeake Bay as well as the management systems in place to monitor and protect this iconic species.

Blue crab population rebounds

How are blue crabs doing? Chesapeake Bay residents and visitors ask this question every year as they plan vacations and crab feasts. However, the answer is important to know for many other reasons as well.

Blue crabs are one of the Chesapeake Bay's most iconic species and are vital to the region's economy, ecology, and culture. They are the Bay's most valuable commercial fishery and are a key component of the ecosystem, serving as both prey and predator for various marine species. Blue crabs are also good indicators of Bay health, because they live in many different parts of the Bay during their life cycle and can therefore provide important information about the ecosystem health in these areas.

The blue crab fishery in the Bay is approximately 93% commercial and 7% recreational. In 2008, the U.S. Department of Commerce declared a commercial fishery failure for the Chesapeake Bay soft shell and peeler blue crab fisheries based on data showing a steep decline in these portions of the population. The population as a whole was very unhealthy due to overexploitation, pollution, and loss of habitat.

In response, the National Oceanic and Atmospheric Administration (NOAA), as directed by Congress, provided \$15 million each to Maryland and Virginia to supply needed economic relief to the Bay's commercial fishing industry and also to fund work designed to support the sagging blue crab population. The same year, a pivotal agreement was enacted between the governors of Maryland and Virginia to reduce the harvest of female crabs by 34%.

After two years, estimates put the 2010 population at approximately 315 million adult crabs (age 1+) at the



Clockwise from top left: Blue crabs are a key component of the Chesapeake Bay ecosystem; Scientists continue to study blue crabs; Chesapeake watermen pull up crab pots.

Photo credits (clockwise from top left): David Malmquist, NOAA, EcoCheck.

beginning of the harvest season. This is an impressive 41% increase from 2009 numbers, and more than double the 2008 population (Figure 1).

Scientists and managers remain cautiously optimistic about the abundance increases since 2008. Conservation measures that ensure removal of no more than the target exploitation rate of 46% of the population each year should be maintained so that the full effects of the measures can be studied. There is still more research to be done to assess the dynamic blue crab population.

Additionally, ensuring a commercially and ecologically sustainable blue crab fishery into the future will require continued coordination among the Bay jurisdictions responsible for blue crab management, and also greater federal commitment to sound scientific practices.

The Final Strategy that was developed by federal partners in response to the President's Executive Order 13508 on Protection and Restoration of the Chesapeake Bay places emphasis on continued support for regional blue crab management based on sound science. The Strategy calls for NOAA to work with the Sustainable Fisheries Goal Implementation Team and Chesapeake Bay Stock Assessment Committee to establish a new blue crab population target by 2012 and to incorporate this target into interstate agreements to ensure sustainable blue crab populations over the long term.

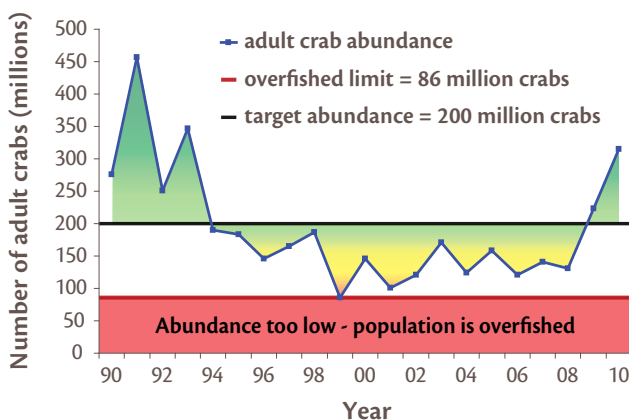


Figure 1. Winter dredge survey estimates of male and female adult blue crab abundance, 1990–2010.

Managing blue crabs in Chesapeake Bay

Assessment: The **winter dredge survey (WDS)** is the primary indicator of blue crab stock status in Chesapeake Bay and provides information critical for management.

Each year, between November and March, sampling is conducted at approximately 1,500 randomly selected sites throughout the Bay. All crabs collected at each site are measured and weighed. Sex and maturity are also determined by apron shape and size/weight.



Left to right: Adult male blue crab with inverted T-shaped apron; immature female with V-apron; adult female blue crab with U-apron.

Survey results are reported as density of crabs (#/1,000 m²). These values are then used to estimate abundance, or the total number of crabs estimated to be living in the Chesapeake Bay.

Evaluate & Revise: In response to findings in the Blue Crab Advisory Report, **management agencies can modify regulations** to adjust the exploitation rate of the stock.

The assumption is that by reducing exploitation rates, abundance will respond positively. For example, the 2008 Advisory Report determined that the exploitation rate was above the threshold rate—too many crabs had been harvested—so management agencies restricted the catch of female crabs by 34%.

The regulations put in place appear to have been successful: the crab population has steadily increased in the two years since those restrictions were enacted, leading to strong numbers of juvenile crabs in 2010.

Analysis: The Chesapeake Bay Stock Assessment Committee (CBSAC) meets annually to **determine the status of the blue crab stock and develop management advice**. The committee is composed of scientists from around the region and NOAA.

CBSAC uses WDS results as the primary indicator of stock status. They are paired with other survey and harvest data to obtain population size and removal rate estimates.

Currently, the target population is 200 million adult crabs, and the overfished limit is 86 million adult crabs. If the WDS determines that there are fewer than 86 million adult crabs in the entire Bay, the stock is overfished and potentially in danger of collapse. If more than 53%—the threshold rate—of the adult crab population is removed, overfishing is occurring. The target removal, or exploitation, rate is 46%.

Annual Report: To help prevent potential stock collapse, an **annual Blue Crab Advisory Report** is produced by CBSAC. The report provides recommendations for keeping harvest rates within safe limits, and also advises managers on stock status.

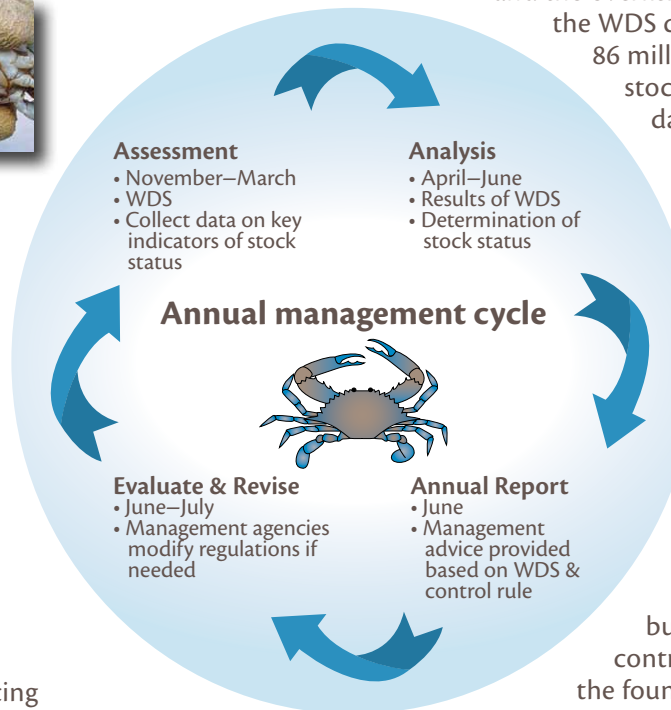
Their recommendations are

built on the control rule—the foundation for sustainable management of the blue crab fishery in the Chesapeake Bay.

The control rule describes the relationship between adult crab abundance as determined by the WDS and exploitation (the percentage of the crab population removed in a given year).



WDS results are an integral part of the annual Blue Crab Advisory Report. Photo credit: David Malmquist.



Review of 2009 harvest season

The Chesapeake Bay blue crab harvest season currently runs from April to November. In 2009, an estimated 43% of the total crab population was harvested by both commercial and recreational fishing. A total of 53.9 million pounds were harvested commercially: 28.5 million pounds in Maryland, 22.5 million pounds in Virginia, and 2.9 million pounds from the Potomac River (managed by the Potomac River Fisheries Commission). Additionally, an estimated 4.3 million pounds were harvested recreationally (Figure 2).

The reported 2009 commercial harvest for Maryland was 36.4 million pounds. However, based on continued evidence of inflated harvest reports, Maryland's final commercial harvest numbers were estimated from fishery-independent data sources. The estimated 2009 harvest of 28.5 million pounds is closer to expected values based on recent interstate distributions of blue crabs.

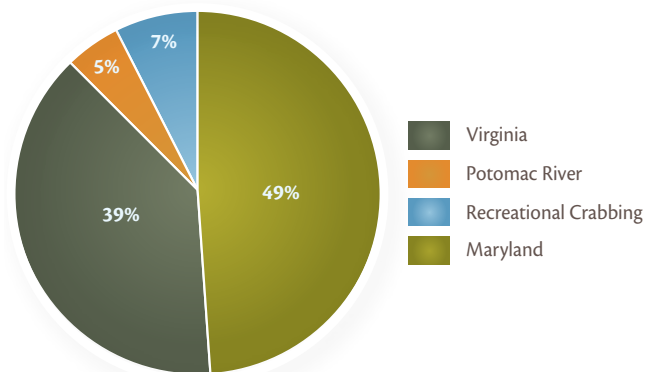


Figure 2. Chart showing percentage of total blue crabs harvested from the Chesapeake Bay by commercial and recreational crabbing in 2009.

Winter dredge survey bodes well for predicted 2010 harvest

There were several encouraging findings in the 2009–10 winter dredge survey:

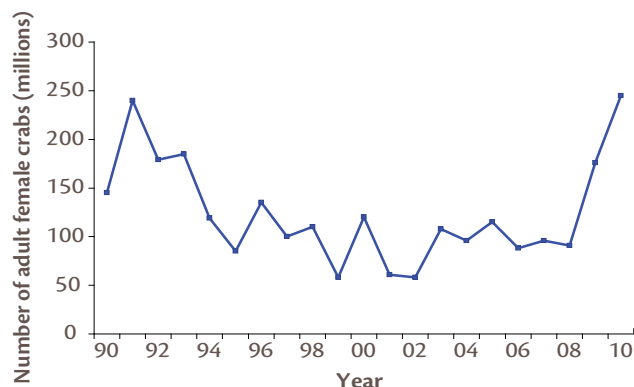


Figure 3. Winter dredge survey estimates of adult female crab abundance from 1990–2010.

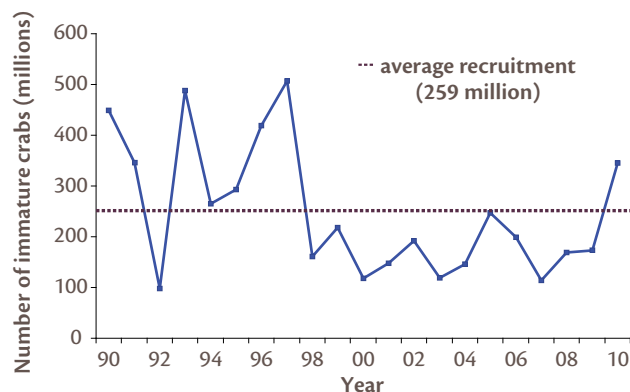


Figure 4. Winter dredge survey estimates of immature crab abundance from 1990–2010.

1. Abundance of adult crabs was estimated to be above the target level of 200 million for the second year in a row—the first time in 15 years that the adult crab abundance has been above the interim target level for two consecutive years (Figure 1).

2. The number of adult female crabs that are likely to spawn during the year increased from 165 million in 2009 to 240 million in 2010 (Figure 3). This should result in an increased crab population again in 2011.

3. Recruitment, or the number of new crabs that have entered the population in the last year, doubled from 173 million crabs in 2009 to 345 million crabs in 2010. This is the first time since 1997 that immature crab abundance was above the survey average of 259 million (Figure 4).

Based on these findings and the historical relationship between population size and subsequent year's harvest, scientists predict that the 2010 harvest should increase to approximately 90 million pounds. Scientists have determined that fisheries managers should try to keep the harvest rate around the target of 46%, but below a threshold of 53%. Harvesting 90 million pounds would fall below the threshold.

New benchmark stock assessment expected 2011

NOAA is partnering with Maryland and Virginia to support development of a blue crab 'benchmark' stock assessment to be completed in 2011. This assessment will be a rigorous, peer-reviewed analysis of stock health that looks at many factors, including life history and commercial catch and effort data.

The new benchmark assessment will reevaluate biological reference points—including the interim rebuilding abundance target rate of 200 million adult crabs—to ensure the recent success in rebuilding a sustainable blue crab population continues over the long run. The 200 million adult crab target was established in 2008 based on analyses suggesting that this is the lowest abundance associated with consistently higher levels of recruitment and was intended to be an interim goal for initial rebuilding of the stock.

A research program funded by NOAA that addresses concerns raised by the management jurisdictions and the independent review panel for the previous benchmark assessment is also under way. The program is divided into three broad themes: optimization of fishery-independent data (data that is separate from the harvest data), a critical review of current sampling programs, and quantification of blue crab life history and demographics. Findings from this research



A Virginia Institute of Marine Science researcher tags a blue crab collected during the winter dredge survey. Recapture of tagged crabs provides data about crab movement and survival.
Photo credit: David Malmquist.

will be used in the development of the 2011 benchmark assessment.

Summary

In early 2010, surveys estimated roughly 315 million harvestable crabs within the Chesapeake Bay. This is an impressive 41% increase from 2009 and suggests that blue crabs appear to be making a comeback after hovering near historic lows for much of the last decade due to overexploitation, pollution, and reduced habitat.

Coordinated management efforts across Bay jurisdictions in 2008 to reduce female harvest substantially contributed to the increased population seen in 2010. However, because crab recruitment is inherently variable, these management actions need to be maintained until their full effects can be evaluated over a longer time period.

Using the latest science, scientists and managers will work together to produce an updated blue crab stock assessment in 2011 that will help guide future management actions. Effective management strategies are crucial to sustaining a healthy blue crab industry, and any changes to regulations should be carefully evaluated before being implemented.

Recommended management strategies



Maintain conservation measures

Restrictions were put in place for the harvest of female blue crabs beginning in 2008. This action resulted in an increased population of adult females in 2009, which in turn contributed to a higher population of juveniles in 2010. CBSAC recommends that the blue crab fishery management agencies—Maryland Department of Natural Resources, Virginia Marine Resource Commission, and Potomac River Fisheries Commission—maintain conservation measures on female harvests to ensure that exploitation of the stock remains within safe limits.



Control latent effort

Currently, hundreds of licenses belong to people who have not crabbed in years, but—because they have licenses—could begin crabbing again at any time. This situation is called latent effort. The more latent effort that exists, the more potential there is for crabbers to remove more than the target 46% of the population in a year. Therefore, CBSAC recommends that managers pursue policies to control latent effort.



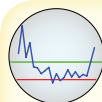
Improve catch reporting

To validate harvest reports, CBSAC recommends implementing procedures such as expanding current observer coverage, carrying out broader-scale effort surveys, and developing logbooks linked with dealers. Techniques that promote reliable and real-time reporting should also be explored.



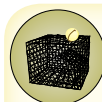
Monitor recreational catch and effort

Recreational catch and effort remains poorly quantified in the Chesapeake Bay. Managers should consider methods for more precisely calculating recreational catch and effort, possibly through licensing systems.



Evaluate a catch-based management system

A management strategy that sets annual catch levels based on estimates from the Bay-wide winter dredge survey could potentially balance annual harvests with highly variable recruitment. CBSAC recommends that managers evaluate the benefits of quota-based systems, including property rights systems.



Improve effort monitoring

Controlling effort has been the foundation of crab management in recent years. The principal tools used by managers have been limited entry, size & catch limits, and seasonal closures. However, the total amount of effort expended in the fishery remains poorly quantified, making the effectiveness of management efforts difficult to assess. As part of a long-term management plan, tighter effort controls may be necessary. Effort monitoring programs could be improved by incorporating crab pot tagging so that crab pot effort is measurable and enforceable.

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