




CHESAPEAKE BAY COMMISSION  BI-STATE BLUE CRAB TECHNICAL ADVISORY COMMITTEE

# STATUS OF CHESAPEAKE BLUE CRAB 2015

*Status of the Chesapeake Population and its Fisheries*

 Since 1997, the Chesapeake's blue crab has experienced an unprecedented prolonged period of low abundance.  In 2005, we saw signs of improvement, but preliminary data for 2006 show another dip in population levels.

 To return the crab population to its long-term average, managers must remain committed to the protection of the spawning stock and the restoration of healthy crab habitat.

# BLUE CRAB 2005

*Status of the  
Chesapeake  
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**AUGUST 2006**





# Blue Crab 2005

## Introduction

In January 2001, the Chesapeake Bay Commission's Bi-State Blue Crab Advisory Committee (BBCAC) released its report, *Taking Action for the Blue Crab: Managing and Protecting the Stock and Its Fishery*. The report and associated management actions drew from extensive scientific review and five years of deliberation among fisheries managers, scientists, legislators and stakeholders. For the first time, a Baywide goal was adopted to reduce harvest pressure on blue crabs and to double the size of the blue crab spawning stock from the 1997–1999 average level as measured by four major independent blue crab surveys.

Between 2001 and 2003, Virginia, Maryland and the Potomac River Fisheries Commission implemented a suite of new regulations in order to meet these goals. From 1999 to 2003 harvest pressure on blue crabs in Chesapeake Bay dropped, then in 2004 rose again, then dropped in 2005. Surveys estimate that crabs removed some 37 percent of the crab population in 2005 as compared to a staggering 72 percent in 1999. Despite this lessening of harvest pressure, the unexpected rise in crabbing (the exploitation rate) in 2004 over the agreed-upon threshold suggests that this downward trend may prove erratic. More importantly, the Bay's blue crab population — the actual number of crabs thought to live in the Bay — remains below the long-term average.

Although the BBCAC disbanded in July 2003 due to insufficient state funding, a Baywide team of scientists and technical experts continues to advise the Chesapeake Bay Commission. This group, known as the Bi-State Blue Crab Technical Advisory Committee (BBTAC), is composed of nearly thirty of the top blue crab scientists, economists, anthropologists and fisheries managers from the Bay region. The BBTAC serves as the Commission's primary advisor on the Chesapeake Bay blue crab.

The year 2005 marked the fifth year since the implementation of the BBCAC's recommendations to adopt a threshold and target approach to Baywide crab management. This milestone presents us with an opportunity not only to evaluate the status of crab stocks and fisheries, but also to revisit commitments agreed to by the jurisdictions for implementing the 2001 Action Plan.

This report presents the findings and advice of the BBTAC following the 2005 crabbing season and the 2005–2006 winter dredge survey. With the unpredictable blue crab, results can be categorized as good, bad or uncertain. Taken collectively, 2005 can be reported as a slightly above average year in nearly a decade of low abundance. The lower stock levels of the winter dredge survey in 2005–2006 offer a preliminary indication that modest improvements seen in 2005 may not mean the beginning of a long-term trend. Cautious management should continue.

## Bi-State Blue Crab Technical Advisory Committee

Twice each year, the Bi-State Blue Crab Technical Advisory Committee (BBTAC) has met to review the status of the population and its fishery and to assess our progress. The Commission, which is comprised of members of the General Assemblies of Maryland, Virginia and Pennsylvania, then uses this scientific information to advise its legislative colleagues, the crab management agencies and other partners in the Bay Program.

Several notable improvements in analytical techniques allowed scientists to make more precise estimates of important variables such as crab abundance, fishing mortality and spawning potential in 2005. In particular, a newly completed comprehensive stock assessment offered improved data for management of crabs within the framework of the 2001 Action Plan.<sup>1</sup>

While these new tools allow us to improve our ability to assess crab stocks and to determine the status of the fishery, considerable uncertainty remains. This is due in part to the indeterminate effects of events such as the catastrophic eelgrass die-off in the lower Bay in 2005 and the unevenness of survey results (especially with regard to female crab abundance). Questions about crab biology also remain, including the current reproductive capacity of both male and female crabs.

In the face of this uncertainty, the Technical Advisory Committee continues to promote a precautionary approach to the management of blue crabs. A few months, or even seasons, of good crabbing in certain parts of the Bay do not signal a recovery of the entire population. Most important, the Committee reiterates the need to double the blue crab spawning stock. While the analysis for 2005 shows that harvest pressure has fallen to a point that, if sustained, would conserve 20 percent of the spawning stock, time will tell whether exploitation will stabilize at this level. Only if this positive trend continues will the crab stock return to levels near the long-term average.

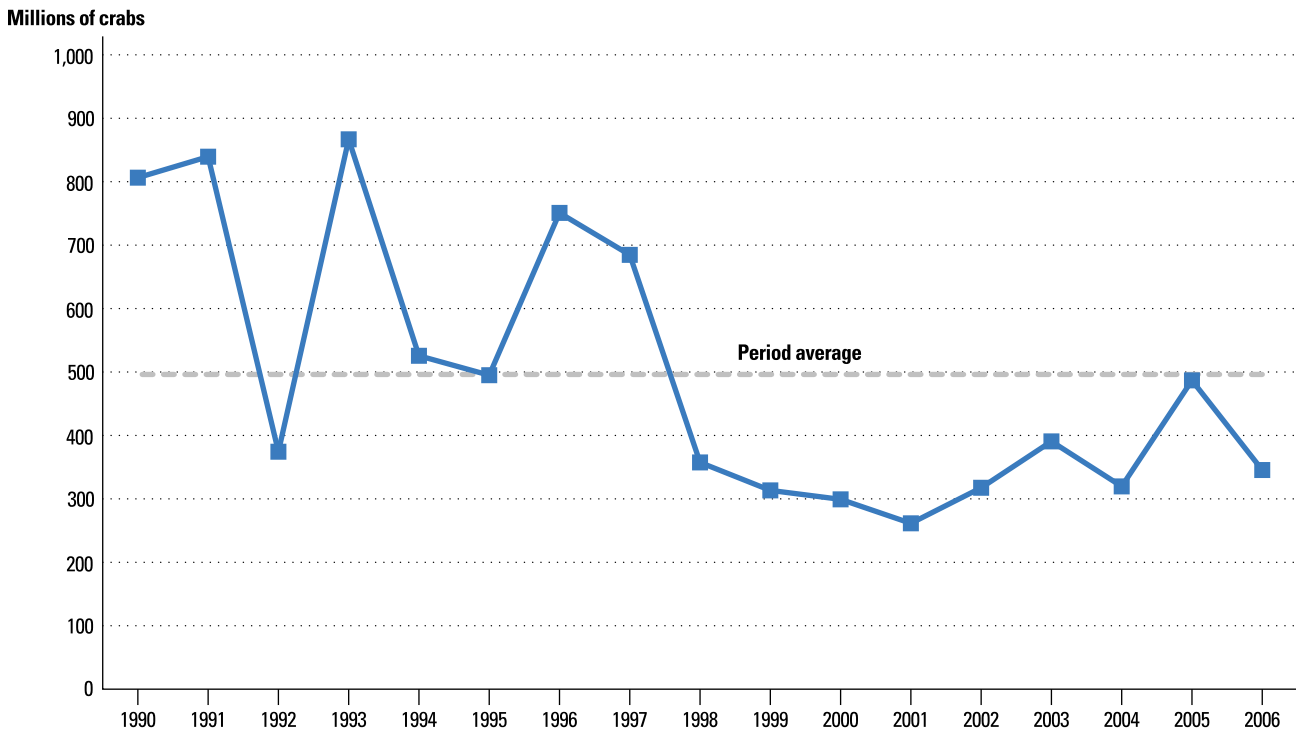
BBTAC members will continue to conduct research to improve our understanding of factors influencing blue crab health and abundance, and will coordinate, through this committee, the development of scientific consensus to assist policymakers and managers in protecting the Chesapeake Bay blue crab.

## Status of the Stock: *The Song Remains the Same*

In 2005, the status of the Chesapeake's blue crab looked promising, yet its future remains uncertain. As shown in Figure 1, crab abundance showed modest improvement in 2005 following nearly a decade of low abundance. But this bright spot was quickly tempered by the early results of the 2006 winter dredge survey, which documented overall abundance returning to levels similar to those of 2003 and 2004. Those levels prompted the *Chesapeake Bay Stock Assessment Committee* (CBSAC) to conclude in their 2005 advisory that “relatively low stock levels continue to create a risk of recruitment failure.”

FIGURE 1  
**Total Abundance of Blue Crabs**

SOURCE: Maryland Department of Natural Resources, Winter Dredge Survey





# The Bottom Line

## 2005 Blue Crab Status Highlights

### The Good

- ✓ The most recent report of the winter dredge survey concluded that in 2005, for the first time, harvest pressure on the blue crab (the exploitation rate) met the target set in 2001, and actually fell slightly below it. That target sets crab harvesting rates at a point that will conserve 20 percent of the spawning stock.
- ✓ There is evidence suggesting a gradual increase in overall crab abundance since 2001, perhaps due to reduced fishing effort.
- ✓ The Baywide decline in crab harvests witnessed from 1993 to 2000 appears to have leveled off.

### The Bad

- ✓ Despite small gains, crab stocks remain at historic low levels of abundance, and there has been an unprecedented prolonged period of low abundance.
- ✓ When stocks are low, crabbers end up harvesting a larger proportion of the crab population. This makes sustainable management of the fishery a challenge.
- ✓ Summer 2005 saw near-record low dissolved oxygen conditions in many parts of the Bay. The Chesapeake Bay Program reported that less than one-quarter of the Bay met dissolved oxygen goals designed to protect aquatic life.
- ✓ Loss of structured habitats such as submerged grass beds and oyster reefs, combined with low oxygen conditions, may contribute to high rates of juvenile crab mortality and a reduced crab forage base.

### The Uncertain

- ✓ Large numbers of juvenile crabs observed during the winter dredge survey are not appearing as proportionally higher numbers of adult crabs in subsequent surveys. The concern is that when the Bay's crab stock is low, the fishery takes a higher proportion of maturing crabs, potentially diminishing the stock to very low levels.
- ✓ Survey measures of adult female abundance have not been uniform over the past 5 years. The winter dredge survey and the Calvert Cliffs pot study show mature female abundance increasing to average levels, while the Virginia trawl survey indicates that female abundance has persisted at very low levels since 1999.
- ✓ Baywide studies in 2000 and 2001 — and in Maryland in 2005 — quantified fishing pressure by recreational crabbers, but there is no formalized Baywide monitoring program that describes the magnitude and spatial distribution of recreational crabbing on an annual basis.
- ✓ A large number of inactive licenses, should they become active, could push fishing effort beyond the threshold or make achieving the targeted spawning potential more difficult.

Despite slight gains in abundance in 2005, estimates still place the Bay’s crab stock (the number of crabs thought to be in the Bay) not far from the “precautionary line” established by the Bi-State Blue Crab Advisory Committee in 2001 — a cause for continued vigilance (see Figure 2).

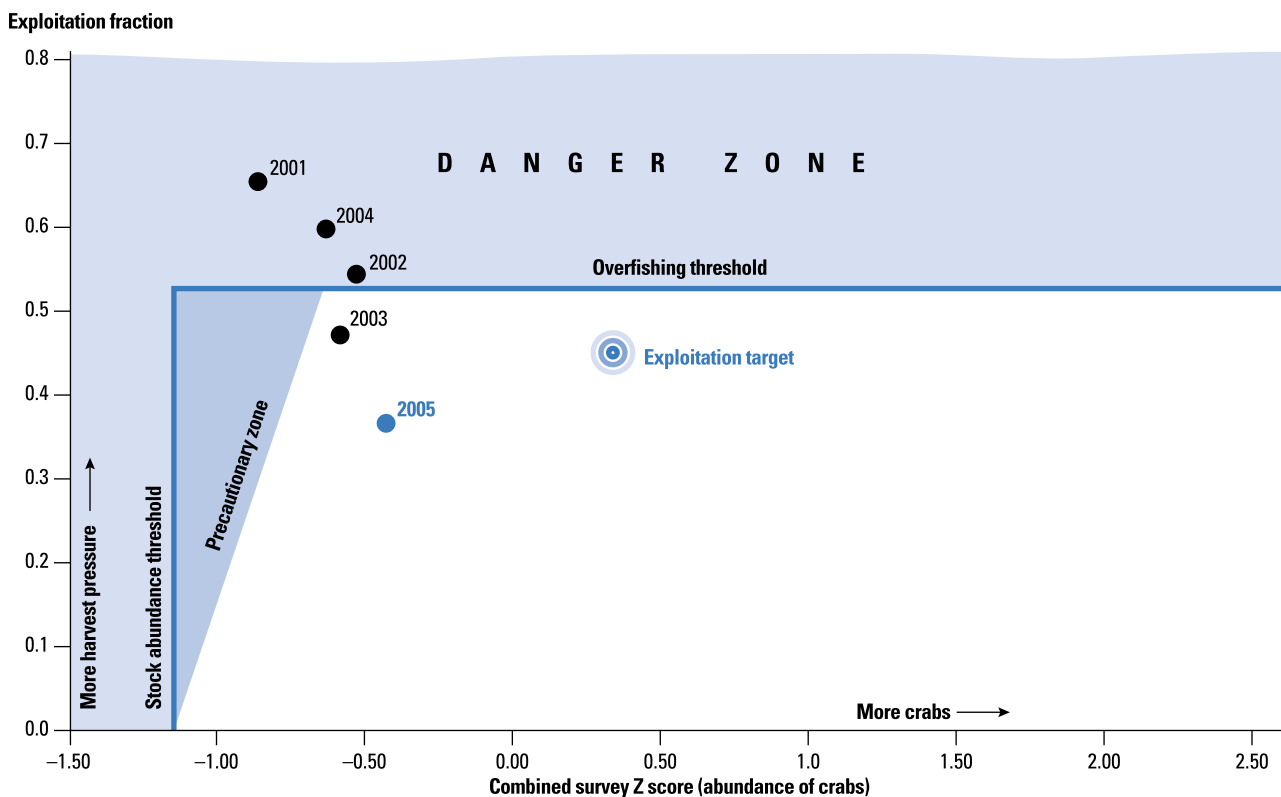
As discussed later in this report, harvest pressure, measured by an exploitation fraction, has in recent years reportedly risen not only near but well above the overfishing “threshold.” A threshold, in fisheries science, represents a theoretical boundary between biological sustainability and potential instability. On the safe side of the threshold, stocks or harvests should maintain a healthy, reproductive fishery; on the other side lies the risk of stock collapse. Crossing the threshold sends a warning to management that they should consider corrective action. Fortunately, in 2005, harvest pressure (exploitation) fell well below the threshold.

In terms of legal-sized (“exploitable”) crabs, CBSAC noted near-historic lows in 1998, 2000 and 2001, and relatively higher abundances in 2002 through 2004. Looking at the recent past, they point out that for 10 of the past 11 years the abundance of exploitable blue crabs has remained below the long-term average. Data from the winter dredge survey indicate that in 2005 exploitable crab abundance was similar to 2004 and that exploitable crab abundance in 2006 will likely be slightly less than the previous 2 years. The new analytical tools developed for the 2005 stock assessment should provide a valuable account of the Bay’s crab population in the coming years.

As indicated in Figures 3a and 3b, adult female crab abundance also appears uncertain. The winter dredge survey shows a relatively positive trend, while the Virginia Institute of Marine Science (VIMS) trawl survey shows a prolonged decline. More study is needed to resolve this uncertainty.

**FIGURE 2**  
**Baywide Fishing Pressure Since Adoption of the 2001 BBCAC Action Plan**

SOURCE: Bi-State Blue Crab Technical Advisory Committee



**SEARCHING FOR BALANCE.** In 2005, after years of effort, harvest pressure dropped below the exploitation target, yet the stock size remains too low. The bullseye depicts the desired balance between crab abundance and harvest pressure.



# Tracking the Abundance of Adult Female Crabs

FIGURE 3A  
**2005 Virginia Summer Trawl Survey**

SOURCE: Virginia Institute of Marine Science

Average number of crabs per tow

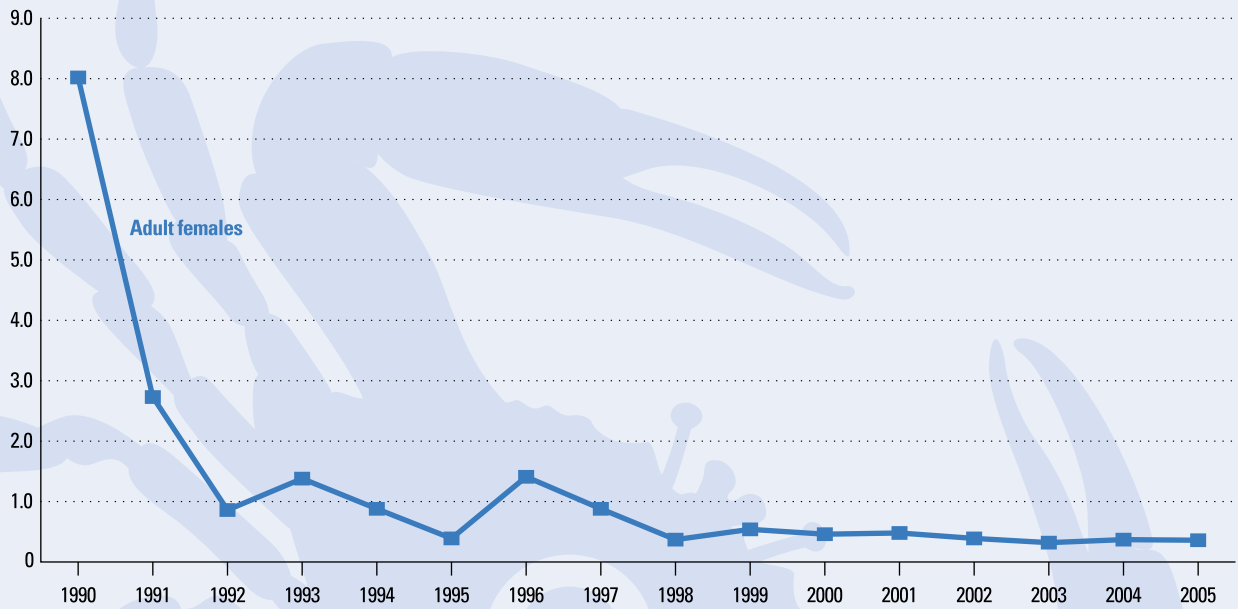
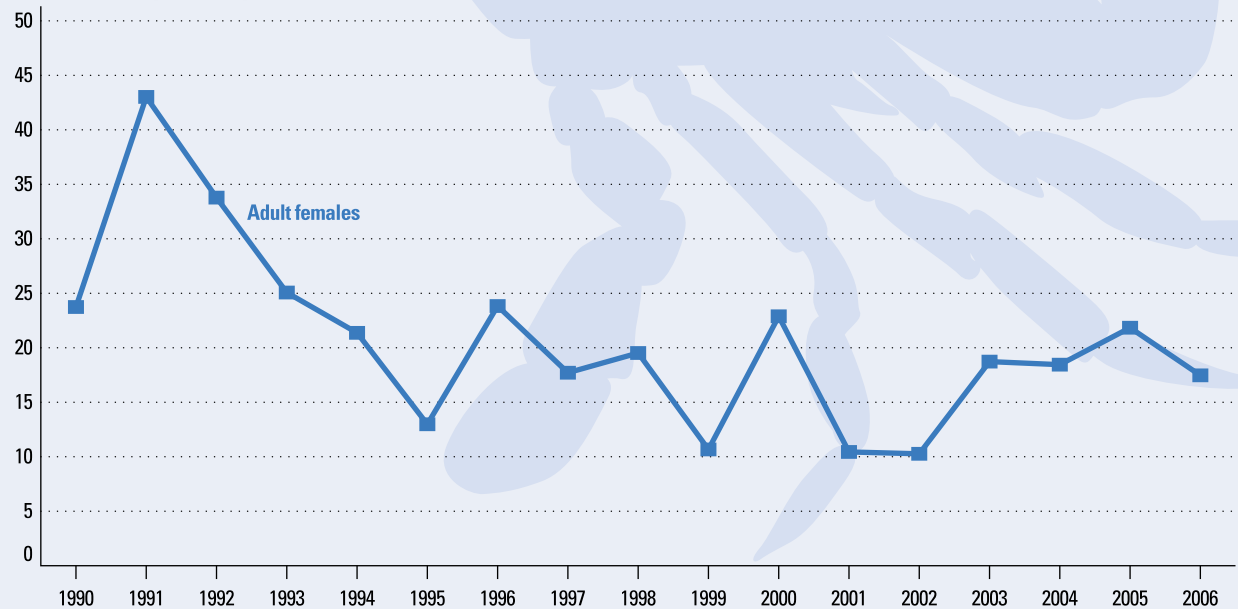


FIGURE 3B  
**2005–2006 Baywide Winter Dredge Survey**

SOURCE: Winter Dredge Survey, Maryland Department of Natural Resources

Average number of crabs per 1,000 square meters



Further investigation is also warranted in the case of juvenile crabs. The 2005–2006 winter dredge survey recorded the highest density of small or “juvenile” blue crabs since 1997, a figure nearly double that of the previous year’s juvenile crab density. In general, an increase in juveniles documented by the winter dredge survey does appear to correlate with an increase in subsequent harvests. But there is also a disturbing pattern that suggests that as the stock size decreases the fishery takes a greater proportion of crabs as they mature.

Scientists will need to track this large year class, to determine what percentage will survive to mate and reproduce.

## The Status of the Fishery

The Bay’s hard crab harvest in 2005 showed a decrease of about 1.6 million pounds (see Figure 4). Virginia’s crab harvest was down from about 29 million pounds in 2004 to about 26 million pounds in 2005 (preliminary). This appears to

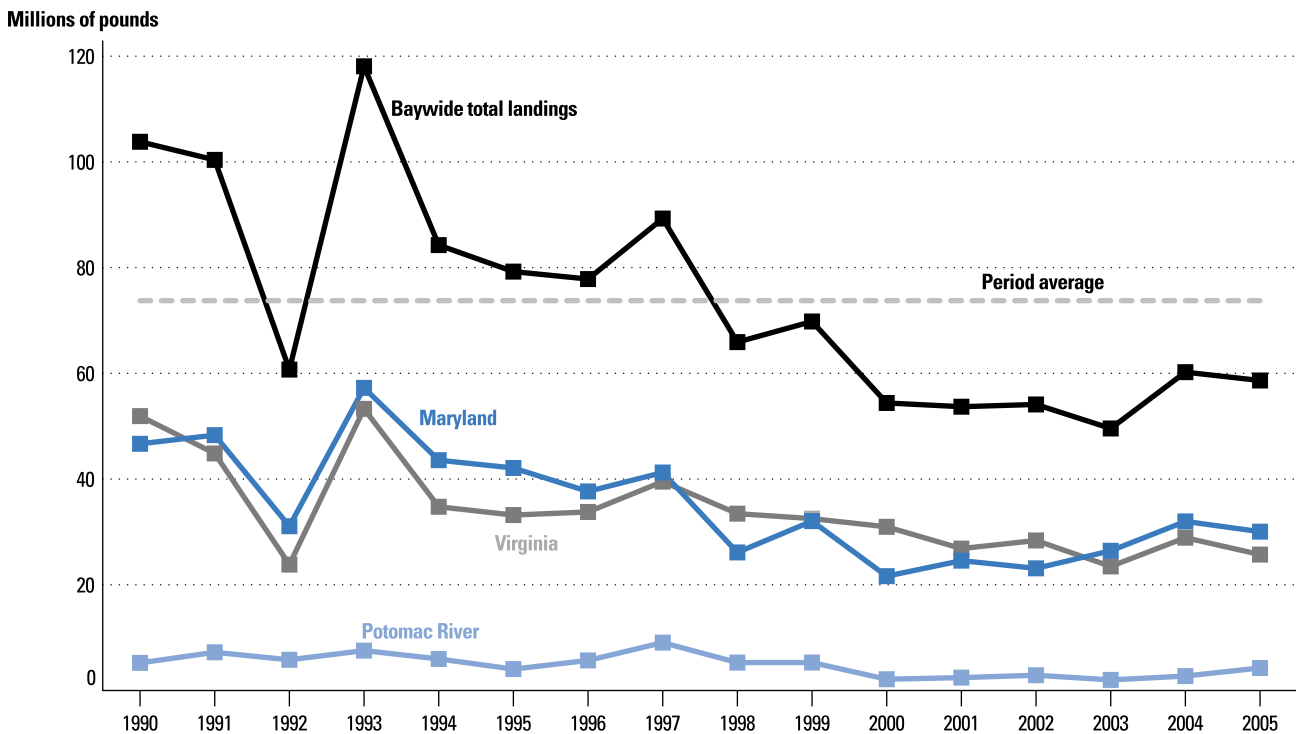
represent a prolonged period of low harvests after a long downward trend from 1997 through 2001. Maryland’s hard crab harvest decreased by about 2 million pounds, from almost 32 million in 2004 to 30 million in 2005 (preliminary).

**Trends among the Jurisdictions.** Over the years Maryland and Virginia have traded the lead in hard crab harvests. A decade ago, in 1995, Maryland’s strong harvests put it about 9 million pounds ahead of its sister state. After 1997, both states saw a decline in hard crab harvests, with Maryland experiencing the sharpest declines until 2000, putting Virginia in the lead almost every year until 2002. Since 2000, however, Maryland has seen a gradual increase. In 2003 and 2004, Maryland harvests were about 3 million pounds greater than Virginia harvests and in 2005 this pattern continued. In 2005 the Potomac River hard crab harvest was up from about 2.9 million in 2004 to about 4.2 million (preliminary).

**The Soft and Peeler Crab Fishery.** Soft and peeler crab harvests have been declining since 2001 after a prolonged period of slightly above-average harvests

FIGURE 4  
**Chesapeake Bay Hard Crab Harvest**

SOURCES: Maryland Department of Natural Resources, Virginia Marine Resources Commission and Potomac River Fisheries Commission



from 1995 through 2001 (see Figure 5). The 2005 Baywide soft and peeler crab harvest was about 2.2 million pounds. This was about a million pounds below the average for 1994–2004 and the lowest harvest observed during that period.

In Maryland, the harvest has hovered around the state average of 1.5 million pounds for the 1994–2005 period. Virginia harvests increased from 1.4 million pounds in 1994 to about 2.5 million pounds in 1998. Between 1998 and 2001, Virginia soft and peeler harvests remained around 2 million pounds. Since 2001, however, Virginia harvests have declined steadily, with just over a million pounds harvested in 2005.

Potomac River soft and peeler crab harvests are generally much lower than those of Maryland and Virginia. Between 1994 and 2005 Potomac harvests averaged about 59 thousand pounds. Since 2000, Potomac soft and peeler crab harvests have been declining steadily from more

than 80 thousand pounds in 2000 to about 23 thousand pounds in 2005.

## Trends in Harvest Pressure

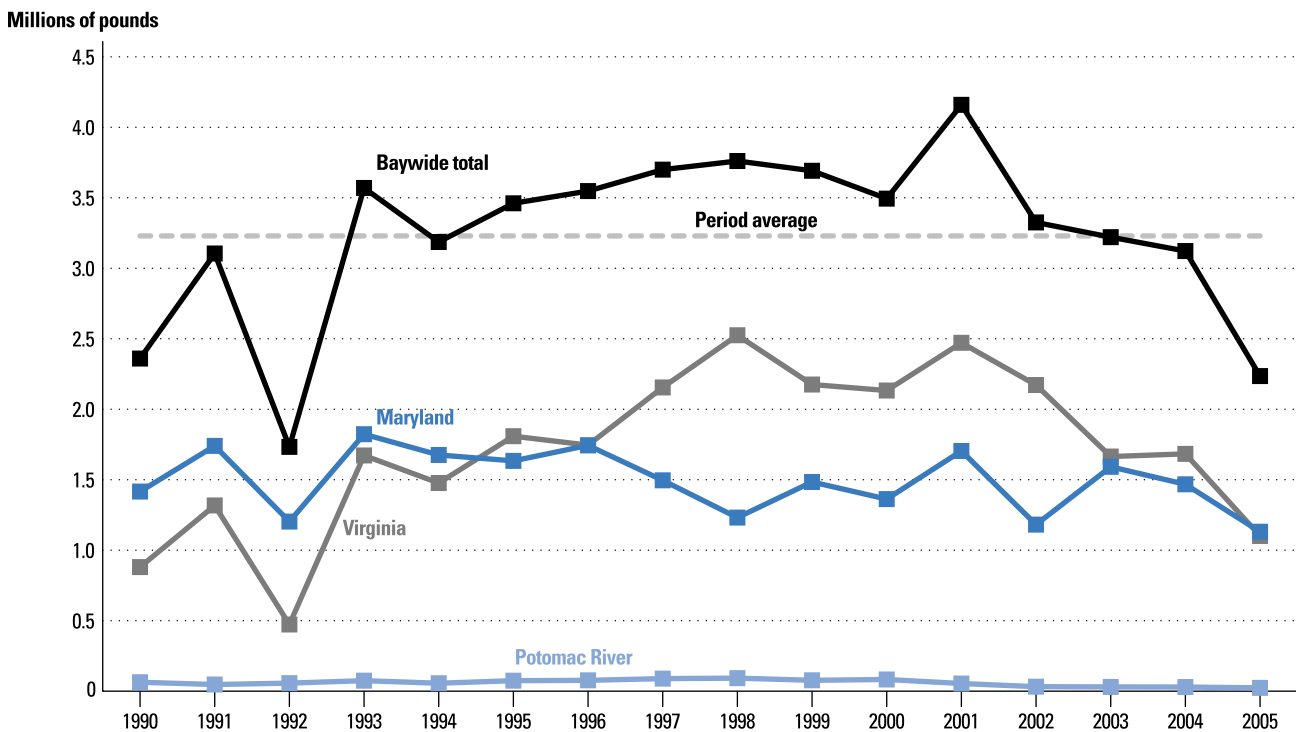
The 2005 Blue Crab Stock Assessment recommended a new approach (known to scientists as the “direct enumeration” method) for measuring harvest pressure. Previously, annual estimates of fishing mortality relied on estimates of natural mortality, which contains considerable uncertainty. The revised method uses the “exploitation fraction” (an estimate of crabs removed from the stock) as a direct measure of fishing effort. This number is simply the total crab harvest divided by the estimated population size according to the winter dredge survey, and requires no assumptions about natural mortality.

Using the new method to analyze data from 1990 through 2005 revealed some

The abundance of legal-sized crabs has remained below the long-term average for 10 of the past 11 years.

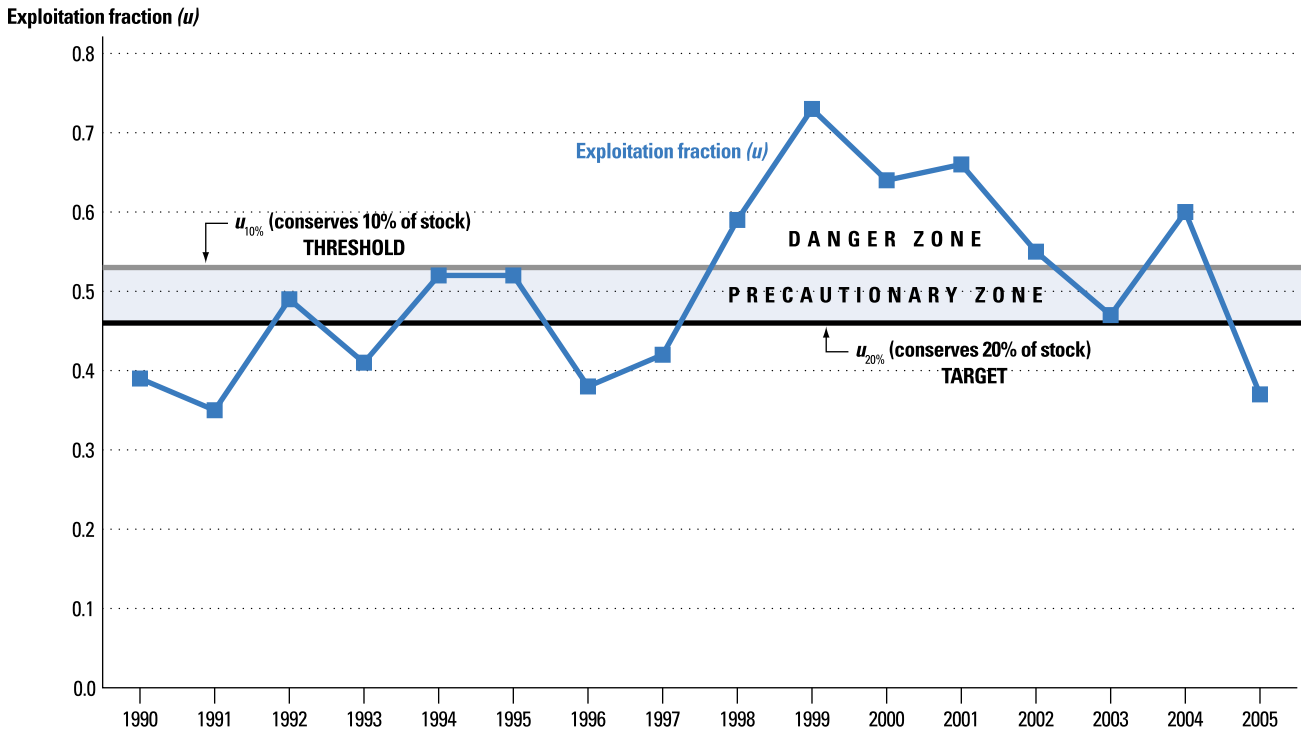
FIGURE 5  
Chesapeake Bay Peeler and Soft Crab Harvest

SOURCE: Maryland Department of Natural Resources and Virginia Marine Resources Commission



**FIGURE 6**  
**Trends in Fishing Pressure**

SOURCE: Maryland Department of Natural Resources Blue Crab Program



**BALANCING HARVEST PRESSURE WITH STOCK SIZE.** Scientists calculate fishing pressure (exploitation fraction) by dividing annual harvests by the number of crabs estimated to be in the Bay based on the winter dredge survey. According to this calculation, fishing pressure dropped in 2005, after an unexpected increase in 2004.

interesting findings. As shown in Figure 6, between 1998 and 2002 harvest pressure rose above the limit meant to conserve at least 10 percent of the spawning population, the threshold set by the BBCAC. Recall that the BBCAC Action Plan called for the fishing mortality rate not only to remain below this threshold, but also to aim for a target that would conserve 20 percent of the spawning stock.

Now for the good news: It appears that in 2005 the target exploitation rate — intended to conserve at least 20 percent of the spawning population — was achieved for the first time since the BBCAC recommended Baywide targets and thresholds in 2001. This represents real progress in controlling harvest pressure

The Baywide soft and peeler crab harvest has continued to decline since the BBCAC issued its 2001 Action Plan, with the 2005 harvest the lowest observed since 1993.

on crabs, though it remains to be seen whether this trend will continue.

While it appears that harvest pressure has fallen, the blue crab stock — the actual number of crabs thought to be in the Bay — remains below average. The new measurement techniques that use direct enumeration to calculate stock abundance should

help to determine if, over time, conserving at least 20 percent of the spawning population each year (the target) allows the crab to gradually rebuild its stocks.

Scientists also caution that a large number of inactive licenses, should they become active, could push fishing effort above the threshold or make achieving the targeted spawning potential more difficult. There is currently no agreed-upon

management action to implement should harvest pressure exceed the overfishing threshold. The Technical Advisory Committee also notes that the magnitude and spatial distribution of fishing effort by recreational crabbers warrants further investigation to insure that we are not underestimating their impact.

## Recommended Actions

As Baywide harvests continue below the long-term average, the Chesapeake's blue crab population hovers near historic lows. While crab abundance improved in 2005, survey data in 2006 documented a return to the lower levels seen in 2002 and 2004. We must remain committed to management efforts and habitat improvements that will result in a long-term sustainable spawning stock.

Five years have passed since the adoption of the BBCAC's Action Plan. The effort to reduce harvest pressure by 15 percent was to be phased in over three years, but the plan also called for additional long-term strategies to reconcile harvest pressure with crab abundance. It also expressed concerns about the threat of declining water quality and degraded crab habitat in the Bay.

According to our most recent data, fishing effort (the exploitation rate) has dropped, but concerns remain about the blue crab's stock size, its reproductive capacity and the health of its habitat. The BBTAC suggests that it is time for the Bay jurisdictions to re-examine the plan, with a particular focus on ecosystem-based management and sustaining the size and health of the crab stock.

### To better understand the impact of commercial and recreational crabbing on that stock we need:

- Baywide, coordinated commercial monitoring programs that capture biological characteristics of the crab harvest, including:
  - size, gender, and life-stage composition of the harvest over space and time, as well as sub-legal bycatch.

- spatial and temporal patterns in catch per unit effort by gear type (crabs per pot, crabs per trotline yard, etc.).

- Baywide, coordinated recreational monitoring that will better quantify recreational effort and harvest each year.
- A clear strategy for dealing with latent effort, should inactive licenses become active again.

### To better protect the biological health of Bay blue crabs, we need to:

- Improve our understanding of the stock's reproductive capacity.
- Document more clearly the relationship between degraded habitats — such as diminished seagrass beds and areas of low dissolved oxygen — and the health of the crab population, including molting crabs.

As we pursue this important information, however, we must also act. It is imperative that management agencies responsible for water quality improvements implement changes on the ground that will reduce the nutrients, sediment and other pollutants harmful to underwater grasses, bottom dwelling organisms, and dissolved oxygen levels. It is essential that fisheries managers complement this emphasis on water quality and habitat improvements with effective tools that will assure the survival of a robust crab population, even in the face of scientific and environmental uncertainties. The goal, as expressed in the BBCAC Action Plan, should be a crab fishery that is sustainable biologically, economically, and socially.

To achieve this goal, we must continue our effort to return the current crab population to levels that approach the long-term average. The future of the Chesapeake's blue crab stocks is too important to leave to chance. ■

## Credits

The Chesapeake Bay Commission would like to thank the members of the Bi-State Blue Crab Technical Advisory Committee for volunteering their time and effort to provide information and advice on the current status of Chesapeake blue crab. For their assistance in gathering data and information, we are grateful to Lynn Fegley (MDNR), Marcel Montane (VIMS), A.C. Carpenter (PRFC) and Rob O'Reilly (VMRC). We would also like to thank the University of Maryland Sea Grant College for its support, and especially William Rodney and Jack Greer, without whom this effort would not have been possible. Many thanks to the Chesapeake Bay Trust for generously providing support.

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## Note

1. Thomas J. Miller et al. 2005. *Stock Assessment of Blue Crab in Chesapeake Bay 2005*. A final report to the National Oceanic and Atmospheric Administration.



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The Commission maintains offices in Maryland, Virginia and Pennsylvania. Commission staff are available to assist any member of the General Assembly of any signatory state on matters pertaining to the Chesapeake Bay and the Chesapeake Bay Program. Through its Bi-State Blue Crab Technical Advisory Committee, the Commission has led the effort to provide scientific support for coordinated management of the Chesapeake blue crab among the three management jurisdictions — Maryland, the Potomac River Fisheries Commission and Virginia.

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