COMMONWEALTH of VIRGINIA

L. Preston Bryant, Jr.
Secretary of Natural Resources

Marine Resources Commission
2600 Washington Avenue
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Newport News, Virginia 23607

Steven G. Bowman
Commissioner

November 15, 2006

MEMORANDUM

TO: The Honorable Timothy M. Kaine
Governor of the Commonwealth of Virginia
And,
Members of the Virginia General Assembly

THROUGH: The Honorable L. Preston Bryant, Jr.
Secretary of Natural Resources

FROM: Steven G. Bowman

SUBJECT: Blue Crab Fishery Management Plan

On behalf of the Virginia Marine Resources Commission, I am writing to report on the status and current implementation of the blue crab fisheries management plan, in accordance with the provisions of Section 28.2-203.1 of the Code of Virginia.

EXECUTIVE SUMMARY

The Chesapeake Bay blue crab stock is not overfished (an overfished condition would mean that stock maintenance capability could be jeopardized) and overfishing is not occurring.

All findings from recent reviews of the status of the Chesapeake Bay blue crab stock indicate a continuation of a low abundance of both exploitable size blue crabs and mature female blue crabs. The most recent exploitation rate (2005 season) indicates that 37% of the stock is being removed on an annual basis, and this exploitation rate is below the target exploitation rate for the first time in several years. Managers within the Chesapeake Bay jurisdictions have the benefit of a control rule, whereby annual estimates of abundance and the exploitation rate can be

referenced against standards, to guide management efforts.

The Chesapeake Bay Commission's Bi-State Blue Crab Technical Advisory Committee (BBTAC) released an August 2006 report, "*Blue Crab2005, Status of the Chesapeake Population and its Fisheries*" presents the findings and advice, following the 2005 crabbing season and the 2005-2006 winter dredge survey. The report states that 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.

More recently, the final draft of the 2006 Chesapeake Bay Blue Crab Advisory Report, prepared by the Chesapeake Bay Stock Assessment Committee (CBSAC), compared the current status of the blue crab stock to thresholds and targets defined by the control rule initiated by the stock assessment of 2005. Stock abundance in 2005 was greater than the overfished threshold (an empirically observed minimum level of abundance thought necessary for stock maintenance). Exploitation (U), defined as the proportion of the legal-sized crabs available at the beginning of the year that were harvested has decreased in recent years and in 2005 was lower than the target level for the first time since 1997. However, low abundance, combined with an extended period of high exploitation rates, indicated a stock condition that warrants concern for the ninth consecutive year

The Marine Resources Commission is currently discussing several problems associated with managing this important resource, and its Blue Crab Citizen Advisory Committee has been discussing these issues, summarized below, in detail.

1) Since 1996 the Commission has banned the harvesting of dark-brown and black-colored sponge crabs, but recent scientific evidence from VIMS suggests that a large fraction of sponges, and even some of the female crabs, suffer mortality from the harvesting and handling by the harvesters. The conservation benefits of this regulatory requirement appear to be less than originally promoted by VIMS and the Commission; 2) In recent months, the Commission's Blue Crab Citizen Advisory Committee has been assessing current harvest areas that may be suitable for incorporation into the 927 square-mile summertime Virginia Blue Crab Sanctuary. An area that includes ocean waters that stretch south, from near the Capes of Virginia to the North Carolina-Virginia Line has been viewed favorably for inclusion in the sanctuary; and, 3) The Potomac River Fisheries Commission has proposed an increase in the current minimum size limit on male and peeler crabs harvested in the Potomac River tributaries to Virginia. The requested increase would align the minimum size limits of the Potomac tributaries to those of the mainstem Potomac River.

The Commission will convene its Blue Crab Citizen Advisory Committee, prior to the start of the 2007 crab potting season, for the purpose of discussing solutions to these problems.

THE 2006 VIRGINIA BLUE CRAB FISHERY MANAGEMENT PLAN

A new stock assessment completed and reviewed in 2005, updates the management control rule that defines the thresholds for abundance (overfished) and exploitation (overfishing). The assessment examines the health of the Chesapeake Bay blue crab spawning stock, and determines the effects of the annual harvest rate on the blue crab stock. This most recent stock

assessment found the population to be below its average abundance levels. In particular, the report noted that the low abundance of spawning female crabs in the lower Chesapeake Bay was worthy of close monitoring.

Following completion of the stock assessment, the Chesapeake Bay Commission's Bi-State Blue Crab Technical Advisory Committee (BBTAC) released an August 2006 report, "*Blue Crab2005, Status of the Chesapeake Population and its Fisheries*." This report presents the findings and advice of the BBTAC (the technical committee that advises the Chesapeake Bay Commission on blue crab science-based issues) 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. 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. The BBCAC report listed the following blue crab status highlights:

The Good

- ✓ The most recent report of the winter dredge survey conclude 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.

More recently, the final draft of the 2006 Chesapeake Bay Blue Crab Advisory Report, prepared by the Chesapeake Bay Stock Assessment Committee (CBSAC), compared the current status of the blue crab stock to thresholds and targets defined by the control rule initiated by the stock assessment of 2005. Stock abundance in 2005 was greater than the overfished threshold (an empirically observed minimum level of abundance thought necessary for stock maintenance). Exploitation (U), defined as the proportion of the legal-sized crabs available at the beginning of the year that were harvested has decreased in recent years and in 2005 was lower than the target level for the first time since 1997. However, low abundance, combined with an extended period of high exploitation rates, indicated a stock condition that warrants concern for the ninth consecutive year. This final draft of the 2006 Chesapeake Bay Blue Crab Advisory Report is attached to this report.

The 2005 Chesapeake Bay commercial harvest of approximately 60 million pounds was virtually unchanged from 2004, but below the long-term (1968 – 2005) average harvest of 73 million pounds. A summary of the Virginia harvests of blue crab during the last 10 years is included in this report. The Virginia harvest of hard crabs in 2005 was 25.4 million pounds and represents the third lowest harvest, since 1996. The 2005 harvest of peeler crabs from Virginia waters totaled 1,116,153 pounds and was the lowest harvest during the 10-year period (Table 2). Lower harvests are not only a function of abundance levels, as the Marine Resources Commission has adopted regulations designed to constrain harvest. Reduced industry infrastructure, especially in the processing sector, and associated market prices also exerted negative effects on the amount of harvest in recent years.

There was a consensus among CBSAC members that harvest restrictions should not be lifted until abundance indices show a clear improving trend and stock abundance and exploitation rates are consistently within the target ranges.

The Marine Resources Commission maintained all of its blue crab management measures in place in 2006, and a summary of the 20 management measures that have been adopted, from 1994 through 2002, are provided below. Additional management measures may be necessary to maintain or to improve the status of the blue crab resource, and the Marine Resources Commission has recently initiated investigations into several potential conservation measures, with the assistance of its Blue Crab Citizen Advisory Committee and scientific advisors at the Virginia Institute of Marine Science and Old Dominion University. The Commission's final decisions for management action will be made prior to April 1, 2007, the start of next year's crabbing season.

CURRENT ISSUES:

A summary of the Commission's recent blue crab issues and discussions have centered on the issues presented below. The Commission will convene its Blue Crab Citizen Advisory Committee, prior to the start of the 2007 crab potting season, for the purpose of discussing solutions to the problems identified below.

Conservation of female blue crab sponge crabs:

Prior to spawning, a female blue crab extrudes its eggs onto its abdomen. Following approximately a 15-day period, these eggs (larvae) are released or rubbed off by the female crab. During summer months, especially mid-July to mid-August, an abundance of sponge crabs is distributed throughout the lower Chesapeake Bay. Since 1996 the Marine Resources Commission has banned the harvesting of dark-brown and black-colored (developmental stages of the larval case or sponge that precede spawning by a few days) sponge crabs, except for a small tolerance per bushel. For 10 years harvesters have caught sponge crabs in their crab pots but have been required to return them to the water.

Recently, scientific evidence from VIMS suggests that a large fraction of sponges, and even some of the female crabs, suffer mortality from the harvesting and handling by the harvesters. The conservation benefits of this regulatory requirement appear to be less than originally promoted by VIMS and the Commission.

Expansion of the current 927 square-mile Virginia Blue Crab Sanctuary:

The purpose of the original 146-square mile sanctuary (adopted by the General Assembly in 1942) was to relieve harvest pressure on female blue crabs during peak spawning times, June 1 – September 15 continues as the time when harvest within the sanctuary is prohibited. The Marine Resources Commission expanded this important spawning sanctuary by 75 additional square miles in 1994. In 2000 the Commission protected another 434 square miles from the harvest of blue crabs during June 1 through September 15, with an additional 272 square miles of sanctuary established in 2002.

In recent months, the Commission's Blue Crab Citizen Advisory Committee has been assessing current harvest areas that may be suitable for incorporation into the summertime Virginia Blue Crab Sanctuary. An area that includes ocean waters that stretch south, from near the Capes of Virginia to the North Carolina-Virginia Line, has been viewed favorably for inclusion in the sanctuary. This area is dense with sponge crabs during summer, and should the current dark sponge crab ban be eliminated, it would be essential to remove this area from harvesting pressure. The Blue Crab Citizen Advisory Committee does want to promote savings of sponge crabs, and should the dark sponge crab ban be lifted, the committee views this ocean sanctuary as a beneficial conservation measure.

A proposal to increase size limits of male and peeler crabs within select Virginia harvest areas:

The Commission's Blue Crab Citizen Advisory Committee has also reviewed a proposal from the Potomac River Fisheries Commission, for an increase in the current minimum size limit on male and peeler crabs harvested in the Potomac River tributaries to Virginia (a similar proposal, for Potomac tributaries to Maryland is under review by The Maryland Department of Natural resources). The requested increase would align the minimum size limits of the Potomac tributaries to those of the mainstem Potomac River. The proposal is shown below:

The Potomac River Fisheries Commission (PRFC) has several elements designed to have a uniform crab fishery within the Potomac basin, through a uniform size limit on hard crabs.

1. Start the 2007 season, and each year thereafter, with a 5 ¼-inch minimum size limit on male hard crabs, and then moving to 5 ½" July 10th through the end of the season.
2. No size limit on mature female crabs (no change for PRFC).
3. A 3 ½-inch size limit on peelers (no change for PRFC).
4. No size limit on soft crabs (no change for PRFC).
5. This would be a 3 or 4 year experiment with an automatic sunset provision for the tributaries.

This proposal would apply only to the Maryland and Virginia tributaries of the Potomac River.

The PRFC indicates that an assessment of the size limit changes and the resulting harvest data from the Potomac indicate a significant increase in number one male crabs (jimmies) harvested after the size limit increased in the middle of the year. The percentage of #1 males harvested has increased by 15% to 19% on average, while the total harvest has risen from 49,000 bushels in 2003, to 73,000 bushels in 2004, and 106,000 bushels last year. The PRFC also notes that this proposal is designed to increase the harvest as well as optimize the economic yield and to provide these larger crabs earlier in the season.

Recently, an informational public hearing was held at Colonial Beach to afford Virginia harvesters who crab within the Potomac tributaries to learn about the elements of the PRFC proposal. This proposal will be reviewed by the Commission later this year or early in 2007 during a public hearing.

Ghost Pots

"Ghost pots," refer to lost or abandoned fishing gear and crab pots. When left alone, the pots sink to the bottom of the water but continue to trap and kill marine life. They are typically lost during storms or when boat propellers accidentally slice through a marker buoy and rope that holds them in place. Ghost pots are also considered marine debris.

Only recently, through studies by the Virginia Institute of Marine Science, has any quantification of the extent of impacts to blue crab from ghost pots emerged. VIMS estimated 60,000 crabs are trapped in ghost pots each year in the lower York River alone. Similar studies funded by the National Oceanic and Atmospheric Administration in the South River in Maryland showed even higher numbers, officials said at a recent news conference in Yorktown, Virginia. Results from the studies have led scientists and government officials to call for a program to identify and remove ghost pots and other gear that collectively pose risks to boating, fishing, water quality and conservation.

VIMS has proposed that underwater side-scan sonar could be used to map densities of ghost pots in other areas of the Chesapeake Bay. In turn, these "maps" could be used for a ghost pot removal program. Many details still need to be addressed before a ghost pot retrieval program can be initiated, but citizens and local, state and federal officials agree that these efforts deserve serious consideration.

2005 Chesapeake Bay Blue Crab Advisory Report

Approved by the Fisheries Steering Committee: xx xxxxxx 2006

Status of the Stock: Analysis of long term fishery-independent surveys conducted in Chesapeake Bay (Baywide winter dredge survey, Virginia and Maryland trawl surveys, Calvert Cliffs peeler pot survey) indicate that overall abundance of blue crabs in 2005 remained low (Figures 1-3). Some indicators of juvenile crab production show a positive trend when averaged over the most recent three years (Figure 1) though recruitment declined between 2004 and 2005. Most survey results placed recruitment within the average range. The Maryland trawl survey and the Calvert Cliffs pot survey indicated the exploitable stock was average in abundance, but the winter dredge survey and the Virginia trawl survey estimated the age-1+ crabs as below average (Figure 2A and B). Three of four surveys estimated female spawning stock biomass (Figure 3 A and B) as average but as measured by the Virginia trawl survey, abundance of mature female crabs remained below average for the 9th consecutive year (12 of the past 14 years).

The 2005 Chesapeake Bay commercial harvest of approximately 60 million pounds was virtually unchanged from 2004 (Figure 4A). When adjusted for changes in estimation methodology, harvest was at or near historical lows (Figure 4B). While 2004 and 2005 harvests were substantially higher than those of 1999-2003 they are still below the time series (1968 - 2005) average of 73 million pounds (75 million pounds using data adjusted for changes in reporting systems). The low harvest in 2005 corresponded to low exploitable stock abundance. However, the harvest was also constrained by management measures implemented in 2001 and 2002.

Relatively low stock levels, combined with the fact that higher levels of exploitation in the Chesapeake Bay blue crab fishery tend to occur at low crab abundance levels (i.e. depensation) continue to create a risk of recruitment overfishing. A new stock assessment completed and reviewed in 2005 updated the management control rule that defines threshold for abundance (overfished) and exploitation (overfishing). The current status of the stock was compared to thresholds and targets defined by this control rule (but not yet endorsed by regional management agencies). Stock abundance in 2005 was greater than the overfished threshold (Figure 5). Exploitation (U), defined as the proportion of the legal-sized crabs available at the beginning of the year that were harvested has decreased in recent years and in 2005 was lower than the target level for the first time since 1997. However, low abundance, combined with an extended period of high exploitation rates, indicated a stock condition that warrants concern for the ninth consecutive year.

There is a consensus among committee members that harvest restrictions should not be lifted until abundance indices show a clear improving trend, and until stock abundance and exploitation rates are consistently within the target ranges.

Landings, survey results, and estimates of fishing mortality are summarized below, in tabular form (Table 1).

Data: Four fishery-independent surveys are used to determine stock status: the baywide winter dredge survey, Virginia trawl survey, Maryland summer trawl survey, and Calvert Cliffs crab pot survey. For all life stages, CBSAC considers the winter dredge survey to represent the most reliable and representative data source, with other surveys providing additional information. We note however, that because of the relatively short dredge survey time series (currently 17 years) that each additional year of data changes the time series average to a greater extent compared to the other surveys. Data from the two trawl surveys and the Calvert Cliffs pot survey are based

on calendar year collections through 2005. The winter dredge survey data represent seasonal collections from December through March of each year. Indices from the winter dredge survey are expressed as estimates of the number of crabs per unit area. All other indices are expressed as the geometric mean catch per unit effort. Standardized width-age cutoff values were used to differentiate age classes for three of the four surveys (Maryland and Virginia trawl and Calvert Cliffs pot survey) used to derive the abundance indices.

Biological Reference Points: This year, a new set of targets and thresholds are available to assess the status of the Chesapeake Bay blue crabs. These reference points are based on methods and data included in the new assessment[1]. The targets and thresholds, along with the Control Rule that defines them, have not yet been approved by regional fishery managers. However, the Fisheries Steering Committee recently approved a preliminary draft of the new Control Rule and formal adoption is anticipated in the near future.

The new reference points are based on total abundance as measured by the winter dredge survey and the exploitation fraction (U). The exploitation fraction is the ratio of the number of crabs in the population prior to harvest (as measured by the dredge survey) and the number of crabs removed during the following year. Estimation of this ratio does not depend on estimation of the natural mortality rate.

A control rule, adopted by the BiState Blue Crab Advisory Committee in 2001[2], and updated in the recent stock assessment[1], is the foundation to guide sustainable management of the blue crab fishery in Chesapeake Bay (Figure 5). The control rule shows the relationship between crab abundance (millions of crabs), exploitation (the fraction of crabs removed by the fishery in a year) and management reference points. The vertical red line on Figure 1 is the overfished definition for this stock. It is based on the lowest abundance of crabs observed in the winter dredge survey. The current estimate of the overfished limit (threshold) is 90 million crabs, the abundance in the winter dredge survey in 1999. This value updates the threshold that had been based on composite data from all surveys used in previous reports. Analyses indicate that the 90 million crab value is equivalent to an abundance that is slightly lower than the estimate derived from the prior methodology. Although a stock abundance less than the overfished value has not occurred, the committee expects that such a low level of abundance may not support a sustainable fishery. The horizontal red line is the overfishing definition (or exploitation threshold) for this stock. It is based on the consensus that a minimum of 10% of the spawning potential of an unfished population must be maintained to reliably produce the next generation of crabs. This level of spawning potential will be realized if 53% or less of all crabs vulnerable to the fishery are caught in a single year[3]. The horizontal green line is the target exploitation fraction. It represents an exploitation fraction that would maintain 20% of the virgin spawning potential.

Based on the definitions above, the blue crab stock in 2005 was neither overfished, nor was it experiencing overfishing. The estimated exploitation fraction (0.37) was below the target rate for the first time since 1997. The estimated abundance (170 million) was almost twice the abundance that defines the overfished condition. However, abundance remained below the median value observed in the winter dredge survey, suggesting continued potential for recovery in this stock if exploitation remains controlled at current levels.

CBSAC recommends work to define a precautionary zone (which would result from drawing a diagonal line from the intersection of the vertical red threshold line at the abundance axis, to a point on the horizontal red exploitation threshold line). This zone would warn managers that management actions should occur before overfishing or an overfished condition exists.

Achievement of this goal requires establishing the theoretical relationship between exploitation fraction and abundance (a line through the blue points). Such a relationship cannot be reliably defined at present.

Recruitment (2003-05): Recruitment, averaged over the most recent three years, was near the long-term average for the Maryland and Virginia trawl surveys, and was within average bounds for the baywide winter dredge survey for the second straight year (Figure 3). CBSAC considered replacing the fall-month index from the Virginia survey with and index based on spring months. This spring index would account for winter survival and would place juvenile abundance estimates closer in time to recruitment to the fishery. A spring index will be considered for use in future updates.

Exploitable Stock Abundance (2003-05): The three-year running average abundance of exploitable (Age 1+) crabs was below the lower prediction bound (i.e. 'below average'), for two of the four surveys (winter dredge and Virginia trawl surveys – Figure 4) and was within the prediction bounds (i.e. 'average'), for two surveys (Calvert Cliffs and Maryland trawl surveys). For both the dredge survey and the Virginia trawl survey the three-year running average abundance has been below average for the past six years.

Spawning Stock Abundance (2003-05): The three-year running average of female spawning stock abundance was within the prediction bounds (i.e. 'average') for three of the four fishery independent surveys (baywide winter dredge, Calvert Cliffs, Maryland trawl). The three-year running average for the fourth survey (Virginia trawl survey) was below the prediction bound for the twelfth straight year.

The measure of abundance based on winter dredge survey data was changed by CBSAC for this stock status review. The dredge survey measures abundance during the dormant winter period, and all female crabs 60mm and greater will potentially enter the spawning stock during the following season. Therefore, an estimate of 'potential spawning stock biomass' including all females 60mm and larger, is considered to be the most appropriate measure of abundance and was used for this update.

Harvest: The three-year (2003-2005) average, commercial Baywide harvest (56.5 million pounds) remained well below the long-term (1968 - 2005) average of about 73 million pounds and was considerably below the prediction bounds (Figure 2A). The 2005 baywide harvest of approximately 60 million pounds was below average and was nearly identical to the 2004 harvest. The recent assessment presented harvest estimates which were adjusted for historical changes in estimation methodology. When these adjustments are made, harvests in recent years are at the time series lows (Figure 2B).

Management Advice: Management measures implemented during 2001-2003 to conserve the blue crab stock were necessary, given the persistent condition of low stock abundance. Until both exploitation rates and abundance levels are consistently within target ranges, Bay jurisdictions should, at a minimum, keep all current management measures in place.

Special comments: As a result of a comprehensive update of the blue crab stock assessment, a number of changes and improvements have been made to our analysis of stock status. Harvest is presented both as raw estimates and adjusted to account for a number of changes in estimation methodology. The most important change is to move away from any reliance on estimation of fishing mortality rates to annual estimates of the exploitation fraction. An exploitation fraction is a far more comprehensible estimate of removal rate and does not depend on the difficult to

estimate and possibly variable, natural mortality rates. In constructing the Control Rule, the estimate of biomass now uses data only from the winter dredge survey, and the estimate of removals is the exploitation fraction. While these changes mean that three different Control Rules have been used in the past three years, each change has meant a significant improvement.

We also make note that this update is being produced during the fall instead of the spring, as had been our practice in earlier years. As the new assessment was published just prior to the time when we traditionally construct this report, it was not considered necessary to do so during spring 2006. Further, it was hoped that by delaying the report to the fall months would allow CBSAC to incorporate data for the current calendar year, thereby providing management agencies with the most recent data. Due to necessary lead times and to necessary lags in data collection and management, that was not feasible. This report covers data only through 2005, including the 2005-2006 winter dredge survey.

Critical data needs: As was stated in previous advisory reports, it is critical that a carefully designed, Baywide data collection program be implemented for blue crabs in Chesapeake Bay. The design of the data collection program should be based, in part, on the need for improved information on: (1) harvest and especially effort data for the commercial and recreational fisheries, (2) growth rates, and (3) the age, size, sex and maturity composition of the harvest and stock.

Chesapeake Bay Stock Assessment Committee Members:

Chris Bonzek VIMS, Chair
Lynn Fegley Maryland DNR
John Hoenig VIMS
Tom Miller CBL
Rob O'Reilly VMRC
Derek Orner NMFS/NCBO
Alexei Sharov Maryland DNR
Mark Terceiro NMFS/NEFSC
Doug Vaughan NMFS/SEFSC

Also participating: Romuald N. Lipcius, VIMS

Figure 1. Age-0 abundance estimates from the winter dredge survey.

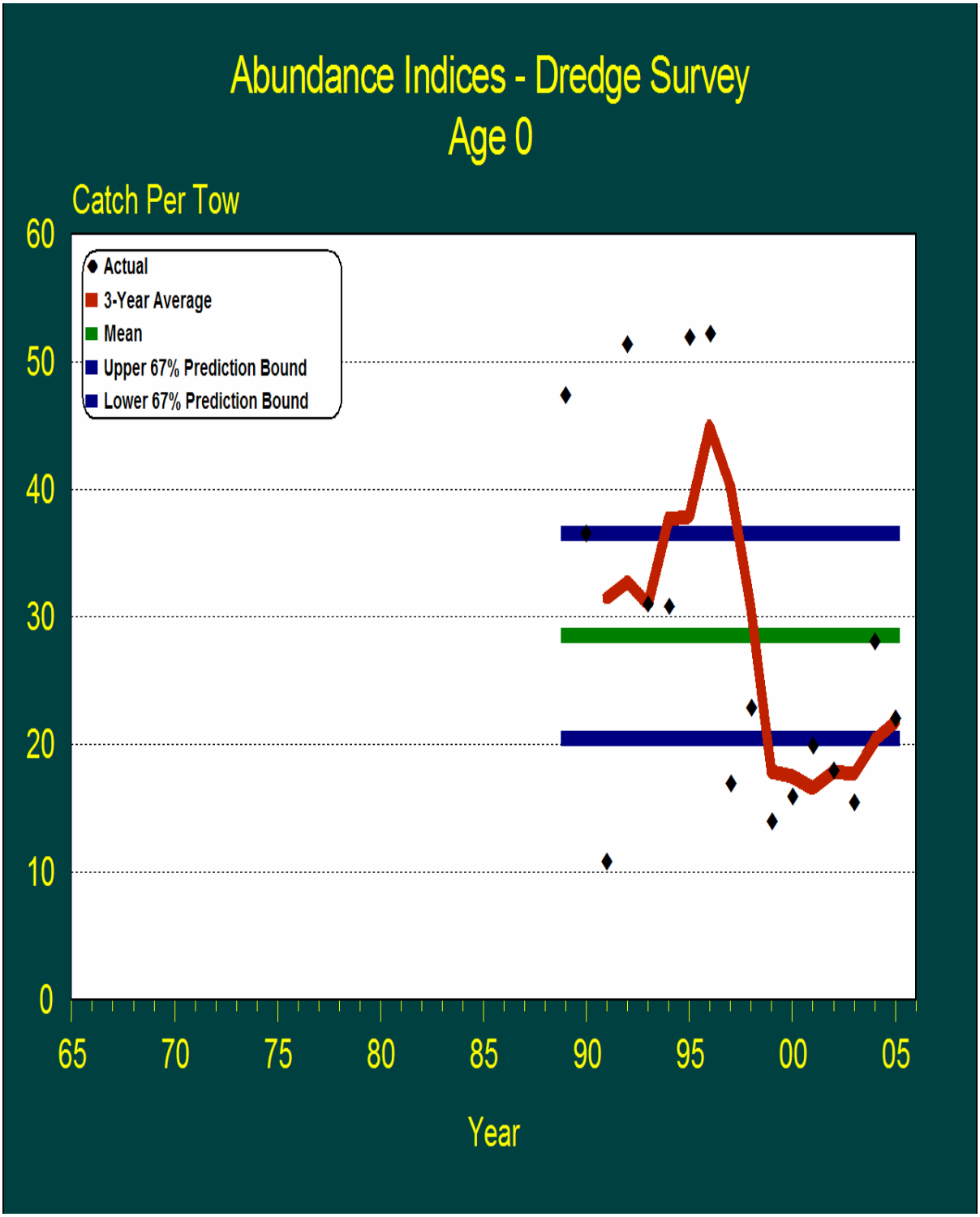
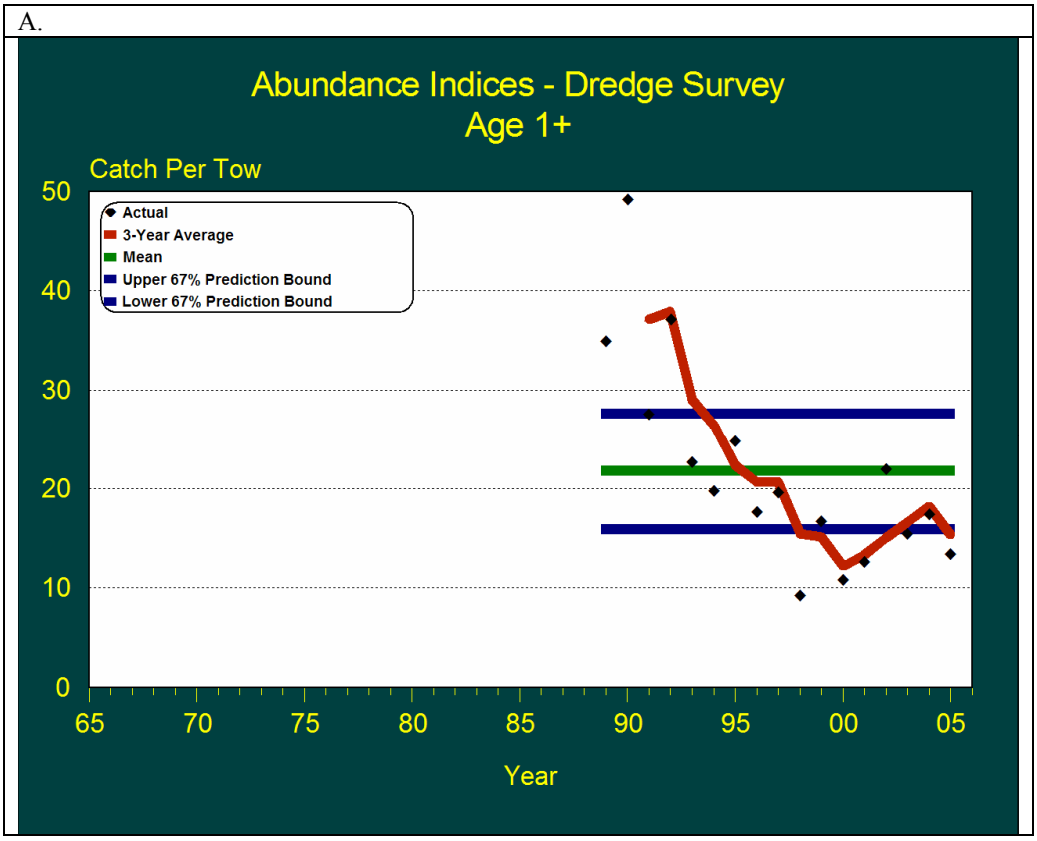


Figure 2. Exploitable stock abundance indices from the winter dredge and Virginia trawl surveys.

A.



B.

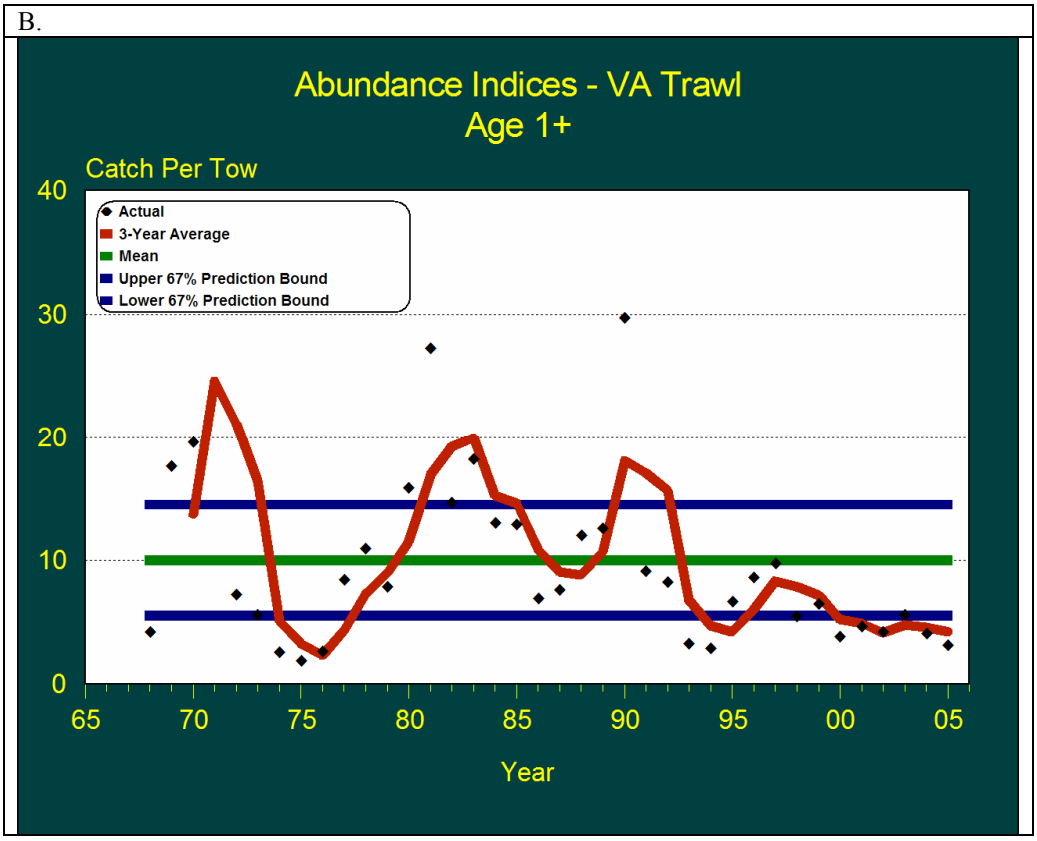
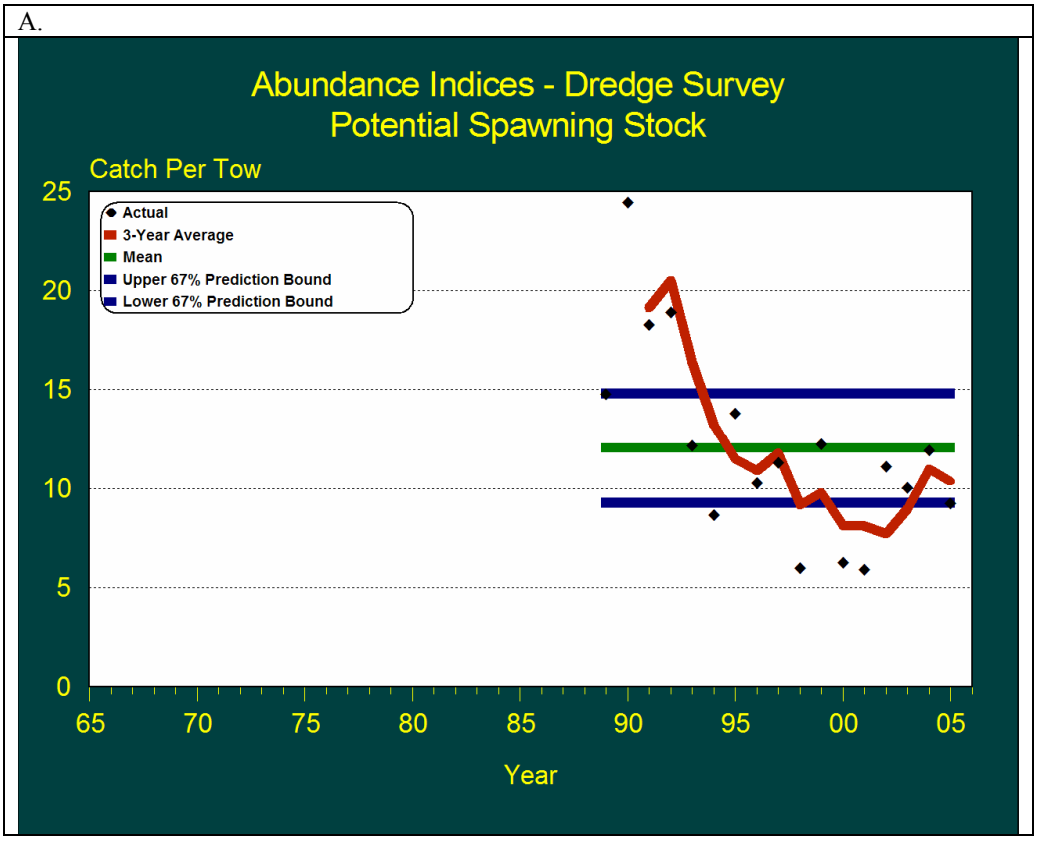


Figure 3. Potential spawning stock abundance from the winter dredge survey and mature female abundance from the Virginia trawl survey.

A.



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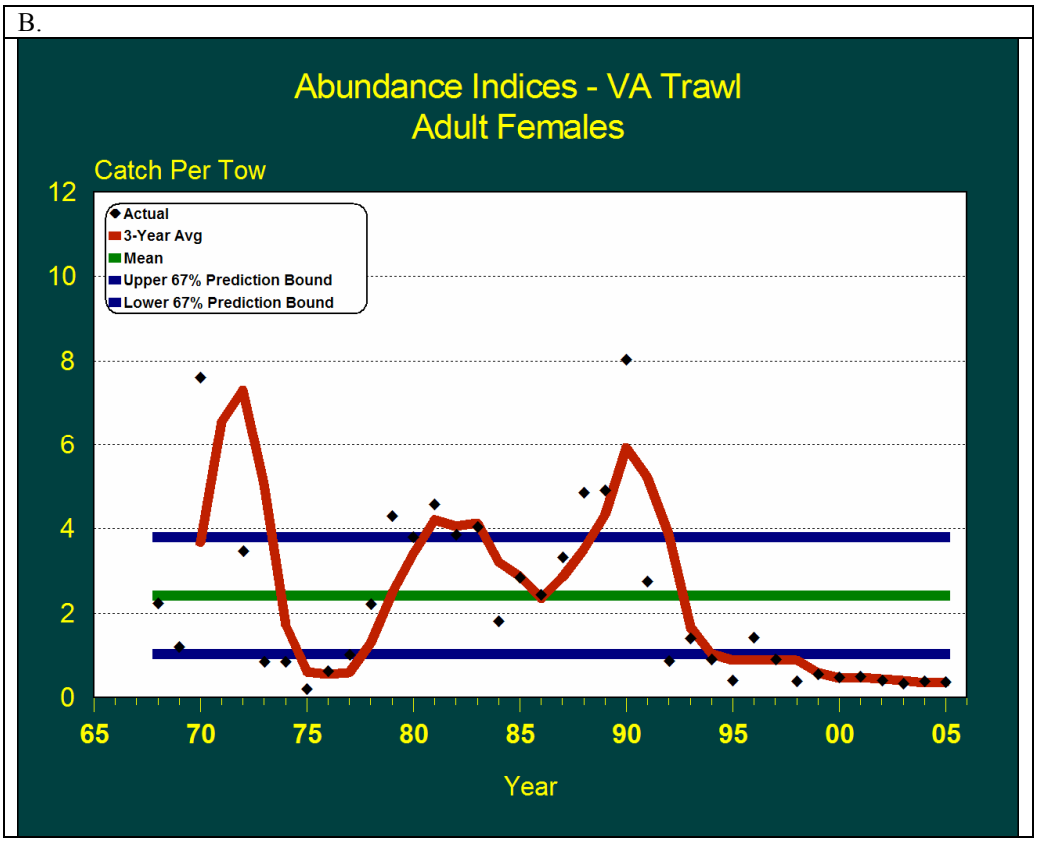
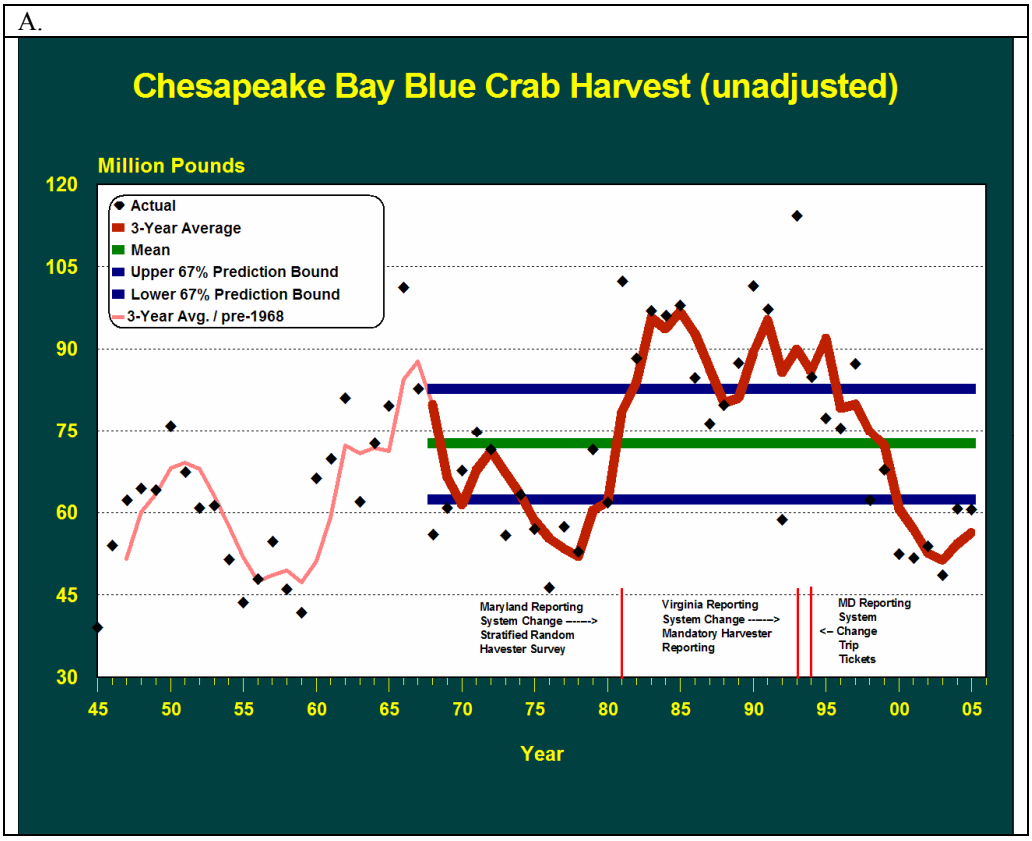


Figure 4. Combined Chesapeake Bay blue crab harvest.

A.



B.

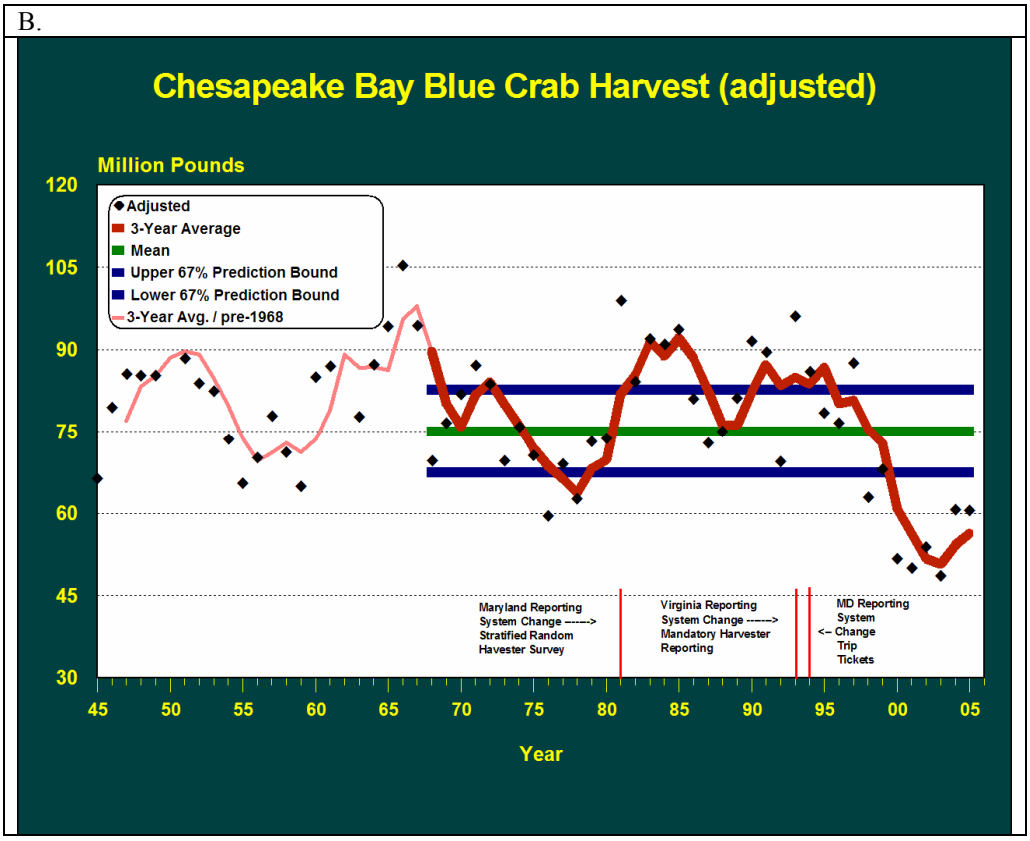
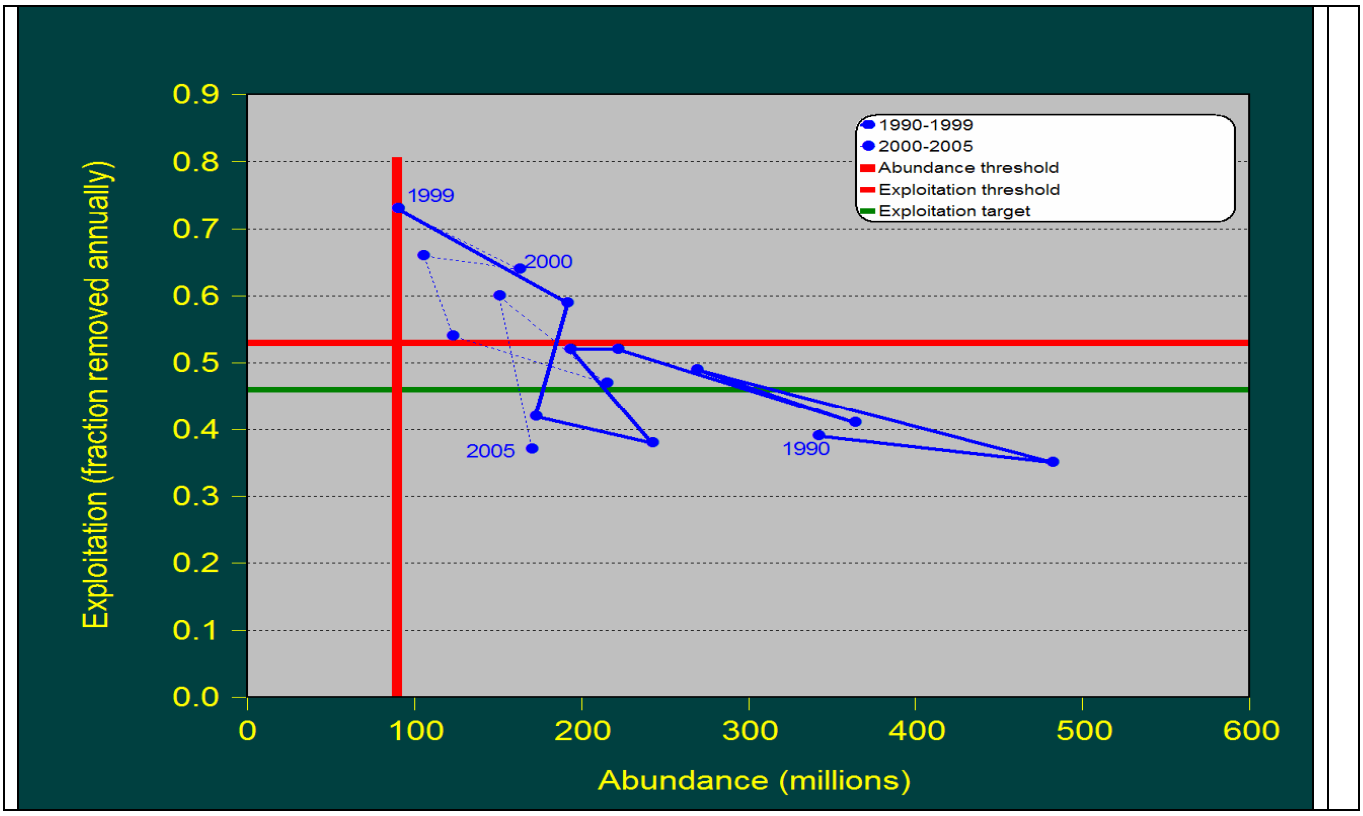


Figure 5. Blue crab control rule.



Year	Abundance (million) (threshold)	Exploitation fraction (overfishing, below target)
1990	341.74	0.39
1991	481.99	0.35
1992	269.31	0.49
1993	363.63	0.41
1994	221.91	0.52
1995	193.54	0.52
1996	242.22	0.38
1997	172.64	0.42
1998	191.78	0.59
1999	90.00	0.73
2000	162.82	0.64
2001	105.60	0.66
2002	123.07	0.54
2003	215.04	0.47
2004	150.75	0.60
2005	170.38	0.37

Table 1. Blue crab landings, survey results, and fishing mortality estimates.

Harvest (in millions of pounds)			Surveys			
Jurisdiction	2005	2003 - 2005 Average	Survey	Recruits (Age 0)	(Age 1+)	Mature Females
MD	30.1	29.1	Winter Dredge	Average	Below Average	Average
VA	26.1	24.2	VA Trawl	Average	Below Average	Below Average
Potomac	4.2	3.1	MD Trawl	Average	Average	Average
Total	60.5	56.5	Calvert Cliffs	N/A	Average	Average
Trend	Steady but below average		Trend	Relatively steady for past 3 years.	The two surveys with the best geographic coverage are both 'below average.'	Steady but low. VIMS survey below average for past 12 years.
Legend:						
Above Average:	Greater than Mean + 1 Standard Error					
Average:	Mean +- 1 Standard Error					
Below Average:	Less than Mean - 1 Standard Error					

Literature Cited

1. Miller, T. J. et al. 163 (University of Maryland Center for Environmental Science Chesapeake Biological Laboratory, Solomons, MD, 2005).
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Table 2. Harvests (in pounds) of hard crabs and peeler crabs from Virginia waters, 1996 – 2005.

Virginia harvests of hard crabs by month (all areas), 1994-2005.

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	1,620,518	1,765,253	1,045,613	375,856	752,751	438,042	807,441	367,964	853,879	815,052
February	678,958	903,453	527,340	93,525	993,359	177,227	304,811	440,521	671,744	800,793
March	201,972	172,351	333,793	51,301	236,910	132,056	198,129	237,910	306,942	330,845
April	601,437	2,813,466	3,300,654	3,253,588	4,287,438	1,290,719	3,417,745	1,208,053	2,722,471	2,201,070
May	2,168,338	2,669,977	1,958,251	2,074,695	3,162,424	1,643,394	2,494,483	2,159,471	2,578,277	2,541,080
June	3,278,371	5,116,924	4,359,075	3,046,710	3,591,376	2,723,672	3,211,911	1,906,196	3,851,955	2,642,184
July	4,302,239	6,011,618	5,061,836	4,427,563	3,325,680	3,220,089	4,055,830	3,051,304	3,659,893	3,317,113
August	4,659,500	5,223,631	4,108,799	4,062,842	3,432,835	3,895,212	3,707,174	3,366,307	3,505,588	3,644,700
September	4,261,491	3,658,057	4,002,663	3,986,883	3,124,198	3,625,598	2,980,198	2,487,301	3,096,670	3,279,249
October	4,635,921	4,078,321	3,878,969	3,990,888	3,089,210	4,154,181	2,881,012	3,361,607	3,315,339	3,172,401
November	1,205,341	1,272,374	1,422,609	1,929,515	1,172,115	1,884,885	1,128,805	1,660,737	1,320,622	1,714,238
December	4,417,598	3,679,732	932,180	3,045,408	1,662,921	1,193,376	1,025,707	1,565,595	1,344,505	951,111
Totals	32,031,684	37,365,157	30,931,782	30,338,774	28,831,217	24,378,451	26,213,246	21,812,966	27,227,885	25,409,836

Virginia harvests of peeler/soft crabs by month (all areas), 1994-2005.

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
April	9,767	14,818	248,364	65,174	104,312	48,457	342,847	18,450	40,730	9,155
May	558,449	838,822	1,014,099	850,840	886,698	1,121,529	855,394	649,379	823,406	425,818
June	320,427	361,182	356,982	432,637	261,362	375,376	242,217	248,193	209,308	225,531
July	374,823	406,350	415,914	398,187	357,006	369,651	357,018	292,041	260,302	222,049
August	379,563	395,941	324,759	303,196	353,313	378,025	231,098	334,730	205,959	161,202
September	93,046	129,462	151,950	111,519	161,243	168,682	132,220	100,717	121,207	65,715
October	9,473	8,088	12,743	13,442	8,541	9,397	10,995	19,899	8,705	6,635
November	6	2	124	310	329	258	2	1,037	32	48
Totals	1,745,554	2,154,665	2,524,935	2,175,305	2,132,804	2,471,375	2,171,791	1,664,446	1,669,649	1,116,153
Total	33,777,238	39,519,822	33,456,717	32,514,079	30,964,021	26,849,826	28,385,037	23,477,412	28,897,534	26,525,989

Blue Crab Management Efforts of the Virginia Marine Resources Commission

The first Blue Crab Fishery Management Plan, adopted in 1989, placed controls on fishing effort and established other measures to reduce or eliminate wasteful harvesting practices in the blue crab fishery. By 1995, the Commission expanded, by 75 square miles, the Blue Crab Spawning Sanctuary (146 square miles), originally established by the General Assembly in 1942. It also shortened the crab pot season to the current April1 through November 30 period, and for the first time, required two cull rings in each crab pot to allow for the escapement of the smaller, immature, crabs.

In January 1996, the Commission reinforced it prior management efforts, by adoption of the following additional measures:

1. Prohibited the possession of dark-colored (brown through black) female sponge crabs, with a 10- sponge crab per bushel tolerance.

A sponge or cushion of eggs is caused by the extrusion of eggs onto the abdomen of the female crab. Prior to that time, female crabs carry their eggs internally, from the onset of maturity and mating (at approximately 1 ½ years of age), and can produce 2 or more batches of eggs within its lifetime. The prohibition on the taking of dark-colored sponge crabs is projected to protect approximately 28 percent of female crabs. This action effectively increases the spawning potential of the blue crab stock, yet allows the lower Bay crabbing industry, which depends on egg-bearing female crabs, to continue. Crabs are available to the fishery, within a few days after they release their eggs. Protection of the dark sponge crabs occurs over the entire spawning season, increasing the probability that those crabs that are allowed to spawn will do so during a period of favorable environmental conditions.

2. Limited license sales of hard crab and peeler pot licenses, based on previous eligibility or exemption requirements.

This moratorium on the sale of crab pot and peeler pot licenses was proposed for one year. Eligible participants for the 1996 crabbing season were limited to those who participated in the 1995 fishery. This element was considered as critical to preventing further expansion of the fishery in order to stabilize the resource and its fisheries.

3. Established a 300-hard crab pot limit for all Virginia tributaries of the mainstem Chesapeake Bay. Other Virginia harvest areas were limited to a 500-hard crab pot limit.

The 300-pot limit was the second element needed to cap effort and attempt to stabilize the resource and its fisheries. Only eight percent of the crabbers, from 1993 – 1995, reported fishing more than 300 hard crab pots. This measure was designed as a cap on effort and was not intended to reduce effort substantially.

4. Established a 3 ½-inch minimum possession size limit for all soft shell crabs.

The 3 ½-inch minimum size limit for soft shell crabs provides additional protections for the resource, by reducing harvests of small peeler crabs, at a time of low crab abundance. The measure complimented similar action in the State of Maryland and at the Potomac River Fisheries Commission to protect small soft crabs. Continued concern over excess effort in the

blue crab fisheries and a persistent trend of low spawning stock biomass during most of the 1990's led the Commission to adopt additional crab conservation measures in 1999 and 2000:

1. Lowered the maximum limit on peeler pots per licensee from 400 to 300 pots.

Effort reductions were clearly needed in this fishery that had grown significantly since 1994, but severe reductions on an immediate basis would result in severe economic burdens on the industry. Consequently, the Commission lowered the pot limit by 25 percent to minimize the economic impacts of the provision. Reports from many fishermen indicated that many did not fish the maximum 400 pots previously allowed.

2. In May 1999, the Commission initiated a one-year moratorium on the sale of all additional commercial crabbing licenses. In May 2000, the crabbing license sales moratorium was continued until May 26, 2001. The moratorium was again extended for 2002 and 2003, and, recently, this moratorium on the sale of additional crabbing licenses was extended through 2007.

Although scientists continue to debate the finer points of the blue crab stock assessment, all agree that the levels of effort in the peeler and hard crab fisheries have increased substantially, are too high to support viable incomes for many industry members, and may be eroding the abundance of the spawning stock

3. Established (in 2000) the Virginia Blue Crab Spawning Sanctuary. This additional sanctuary of 435 square miles was closed to all crabbing during the spawning season of June 1st through September 15th.

Through extensive research by Dr. Rom Lipcius (VIMS), the Commission was able to identify the proper boundaries of the sanctuary, in order to protect female crabs during their spawning migration down the Bay. To effectively protect females during their entire migration in Virginia waters and their entire spawning period, the sanctuary is closed from June 1 through September 15 and stretches from the VA-MD line to the mouth of the Bay. The sanctuary was further supported by research that indicated the blue crab abundance continued below average levels and the stock was fully exploited. Recruitment of young crabs to the fishery was also below average. Scientists also reported studies documenting a 70 percent decline in female spawning stock.

In 2000, the Commission entered into crab management discussions with the State of Maryland and the Potomac River Fisheries Commission, through the Bi-State Blue Crab Advisory Committee, a subcommittee of the Chesapeake Bay Commission. An Action Plan was adopted that recommended a harvest threshold that would preserve 10 percent of the blue crab spawning potential and a minimum stock size threshold that would be set at the lowest stock size that had been shown to have subsequently sustained a fishery. Managers further recommended the adoption of fishing targets that are more conservative than the thresholds and are the levels of fishing to be achieved each year. The recommended target level for blue crab fishing mortality was that level which achieves a doubling of the blue crab spawning potential. More importantly, it is estimated that a 15 percent decrease in harvest (based on the 1997-1999 landings average) was needed to achieve the target (F=0.7) in 2001. The Chesapeake Bay Commission recommended that the reductions be phased in over one to three years to minimize economic impacts associated with large reductions in harvest. The Marine Resources Commission endorsed the recommendations of the Chesapeake Bay Commission and its Bi-State Blue Crab Advisory Committee and promulgated the following regulations in 2002 to achieve the agreed upon harvest reduction target.

1. Enacted an 8-hour workday for commercial crabbers (2002) that replaced a prior closure of crabbing on Wednesdays.

In April 2001, staff conducted analyses of the harvest reductions associated with a variety of restrictions such as hourly workday limits, day of week closures, seasonal or monthly closures, and catch limits. Percent harvest reductions were calculated for each targeted fishery as well as the contributions each measure provided to the overall goal of a five percent reduction in blue crab harvest for the first year. The Commission adopted a Wednesday closure of the crab pot and peeler pot fisheries from June 6 through August 22, calculated as a 5.7 percent reduction in harvest in the crab pot/peeler pot fishery. The advantages of this measure included equal treatment of all fishermen and ease of enforcement.

In January 2002, the Commission removed the Wednesday closure, at the request of industry, and replaced it with an 8-hour workday. There appeared to be more support from industry members for an 8-hour workday than there was in 2001. The new measure also was endorsed by the industry-based Crab Management Advisory Committee

2. Established a 3-inch minimum size limit for peeler crabs in 2002.

The size limit on soft crabs had proven to be difficult to enforce on the water, where conservation is best served, since the fishery harvests mostly peeler crabs. Consequently the Commission adopted a 3- inch size limit on peeler crabs, with the intent to improve enforcement and to protect a significant portion of the immature female crab population.

The previously adopted crab sanctuary and the ban on harvesting dark sponge crabs protects over half the female spawning stock. Yet, these measures are meaningless, if crabbing effort is redirected to the immature female crab portion that has not had an opportunity to spawn. The minimum peeler size limit provides protection for those immature females. Thus, the combined efforts, to protect the adult spawners and the immature portion of the population, work together to provide more biological stability to the population.

3. Reduced the winter dredge fishery trip limit from 20 to 17 barrels per boat per day in 2001.

The Crab Management Advisory Committee supported this measure and noted that it should be enforceable. Staff determined that a reduction of the catch limit of 20 barrels during the Virginia winter dredge season to 17 barrels would result in a 3.1 percent reduction in harvest from that fishery.

4. Augmented (2002) the Virginia Blue Crab Sanctuary by 272 sq. miles.

The expansion of the Virginia Blue Crab Sanctuary increased the closed area from 661 square miles to 947 square miles. Commercial and recreational harvesting of crabs is prohibited in the Sanctuary from June 1 through September 15. The benefit of the expanded sanctuary is its significant protection of spawning female crabs, about 70 percent of the spawning stock.

5. Reduced unlicensed recreational harvester limits to 1 bushel of hard crabs, 2-dozen peelers (2002).

Recreational fishermen willingly supported reductions in their crab harvest. The regulations established a harvest limit for the vessel regardless of the number of crabbers on board. Since most recreational harvesters take well less than one bushel per day, the total reduction in harvest was expected to be minimal. A 2001 study concluded that the Virginia recreational harvest was only a fraction (< 5%) of total blue crab harvests, but other studies show the Bay-wide recreational fishery can be significant when blue crab abundance is not low.

6. Reduced licensed recreational harvester limits to 1 bushel of hard crabs, 2 dozen peelers, with a vessel limit equal to number of crabbers on board multiplied by personal limits (2001).

This measure was supported by the Crab Management Advisory Committee.

Since 2003, the Commission has followed the management advice provided by the Chesapeake Bay Stock assessment Committee and has maintained recently implemented conservation management measures, without any changes.