# COMMONWEALTH of VIRGINIA

*Marine Resources Commission*
*380 Fenwick Road*
*Building 96*
*Fort Monroe, VA 23651*

Travis A. Voyles
Secretary of Natural and
Historic Resources

Jamie L. Green
Commissioner


December 1, 2024

MEMORANDUM

TO: The Honorable Glenn Youngkin
Governor of the Commonwealth of Virginia
And
Members of the Virginia General Assembly

THROUGH: The Honorable Travis A. Voyles
Secretary of Natural and Historic Resources

FROM: Jamie L. Green
Commissioner, Virginia Marine Resources Commission

SUBJECT: Blue Crab Fishery Management Plan

On behalf of the Virginia Marine Resources Commission, I am providing this report on the status and current implementation of the blue crab fishery management plan, in accordance with the provisions of § 28.2-203.1 of the Code of Virginia.


2024

ANNUAL REPORT ON THE

# BLUE CRAB FISHERY MANAGEMENT PLAN

## EXECUTIVE SUMMARY

The 35th Bay-wide Winter Dredge Survey was conducted from December 2023 to March 2024 by the Virginia Institute of Marine Science (VIMS) and Maryland Department of Natural Resources (MD DNR). Results indicate the Chesapeake Bay blue crab stock is not depleted and overfishing is not occurring relative to reference points established in the 2017 stock assessment update. The total abundance of crabs in 2024 – 317 million crabs – remained at similar levels to those surveyed in 2023.

**Winter Dredge Survey By the Numbers**

| Number of… | |
|---|---|
| All Crabs | 317 million |
| Adult Females | 133 million |
| Juveniles | 138 million |

The 2011 Chesapeake Bay Blue Crab Stock Assessment recommended reference points be set as indices of the spawning stock or the female population. The adult female population in 2024 was estimated at 133 million crabs, a decrease of 14% from 2023 and 10% below the geometric mean since female-specific reference points were put in place in 2011. This estimate of spawning-age female crabs is above the threshold of 70 million crabs established by the 2017 Chesapeake Bay Blue Crab Stock Assessment Update but below the target of 196 million crabs. Since 2008, there has generally been a continuation of management measures by all Chesapeake Bay jurisdictions to conserve the spawning-age female crabs, including an ongoing closure of the Virginia winter crab dredge fishery. The winter crab dredge fishery closure may partially account for above average spawning-age female abundance in eleven of the fifteen years since it began, because closing the winter crab dredge season allows juvenile crabs to be free of fishing pressure during the winter after they mature in fall. Mature female crabs will spawn in late spring and summer of the same year in which the Bay-wide Winter Dredge Survey is completed.

Blue crab commercial harvest from the Chesapeake Bay, as reported by the Virginia Marine Resources Commission (VMRC), MD DNR, and the Potomac River Fisheries Commission (PRFC), totaled 45.7 million pounds in 2023. This is a 9% increase from 2022 but is 24% below the mean commercial harvest since 1990. Virginia, Maryland, and the Potomac River accounted for 37%, 55%, and 8% of the Bay-wide harvest, respectively. Commercial harvest in Virginia's tidal waters has been reported through the VMRC Mandatory Harvest Reporting Program as 18.6 million pounds with an estimated dockside value of $41 million.

**Virginia Commercial Harvest**

| | |
|---|---|
| Pounds | 18.6 million |
| Value | $41 million |
| Harvesters | 772 |

In their annual meeting to discuss management responses to the Winter Dredge Survey results, the VMRC, MD DNR, and PRFC agreed to maintain status quo management measures in relation to the regulations enacted in 2024. The Commission voted to extend the daily time limits for crabbing to 3 AM through 5 PM, allowing more flexibility for crabbers, particularly on the Eastern Shore, to navigate with respect to the tides. The current crab pot season will close on December 16, 2024, and re-open on March 17, 2025, with low bushel limits in place until May 15. The season for all other commercial crab ended October 15, 2024, and will reopen April 15, 2025.

Conservation of female spawning-age crabs as well as juvenile crabs is the primary management objective to attempt to lessen variability of the blue crab stock abundance. The extensive management measures from 2008 that were implemented throughout the Chesapeake Bay jurisdictions have helped to mitigate year-to-year variability in the fisheries that previously resulted in overfishing during many prior years (see Attachment 1). Juvenile crab abundance can vary because of inter-annual differences in the entrainment of crab larvae from the ocean to the Chesapeake Bay. This process is subject to natural fluctuations in the prevailing current and wind patterns. Environmental factors including weather conditions and predation can influence all life stages of the crab population. Additionally, year-to-year variation of predators, such as red drum, blue catfish, striped bass, and adult blue crabs, can affect juvenile blue crab abundance.

A new benchmark stock assessment for blue crabs in Chesapeake Bay is in process, with completion expected in 2026.

## THE 2024 VIRGINIA BLUE CRAB FISHERY MANAGEMENT PLAN

### Status of the Chesapeake Bay Blue Crab Stock

The annual Bay-wide Winter Dredge Survey has been conducted since 1990 and was adopted as the primary indicator of blue crab population health in 2006 by CBSAC because it is the most comprehensive and statistically robust of the blue crab surveys conducted in Chesapeake Bay. Each winter from December to March, MD DNR and VIMS sample their respective portions of the Bay, recording the density (number per 1,000 square meters), size, and sex of crabs at approximately 1,500 sites throughout the Bay. The measured densities of crabs are adjusted to account for the efficiency of the sampling gear and expanded based on the area of the Chesapeake Bay, providing an annual estimate of the number of overwintering crabs by age and sex.

Managers and scientists expect annual estimates of abundance and exploitation rate to vary, so biological reference points are set to indicate stock status. Biological reference points, often including a target to manage toward and a threshold to avoid, are a primary output of stock assessments, with fishery regulations implemented to conform to those biological reference points. The 2011 benchmark stock assessment established female-specific reference points based on the biological status and harvest of adult female crabs. The 2017 update to the blue crab stock assessment resulted in slight changes to the biological reference points, which the Executive Committee of the Sustainable Fisheries Goal Implementation Team approved for use in 2020.

Based on results from the 2023-24 Winter Dredge Survey and current biological reference points, the adult female biomass is not overfished and is not predicted to be subject to overfishing. While the adult female abundance has consistently been higher than the abundance threshold, it has remained below the current abundance target for management. If at any time the Bay-wide Winter Dredge Survey results indicate the abundance of adult female crabs has fallen below the threshold, then management measures would be recommended to protect the biological stability of the blue crab stock.

The biological reference points used to monitor the status of the blue crab stock in the Chesapeake Bay are provided in Table 1. The abundance estimate from the 2023-24 Bay-wide Winter Dredge Survey of adult female crabs (age 1+) was 133 million crabs, 32% below the abundance target of 196 million adult female crabs. The adult crabs (greater than 2.4 inches carapace width) will spawn in late spring or during the July-August peak spawning period.

*Table 1. Abundance and exploitation rate targets and thresholds for the Chesapeake Bay blue crab stock.*

| **2017 Stock Assessment Update– Biological Reference Points** | | |
|---|---|---|
| **Abundance** | Overfished Threshold | 72.5 million age 1+ female crabs |
| | Target | 196 million age 1+ female crabs |
| **Exploitation Rate** | Overfishing Threshold | 37% of all female crabs |
| | Target | 28% of all female crabs |

The exploitation rate is defined as the percentage of the estimated crab abundance before the season opens that is harvested during the season by commercial and recreational fisheries. The 2023 female crab exploitation rate estimate was 25%, a decrease from 2022's 31%, and is below both the target and overfishing threshold, meaning overfishing is not occurring. Bay-wide commercial harvest in 2023 was 46 million pounds. Despite harvest being higher in 2023 than in the preceding two years, the exploitation rate is lower than both years due to higher female abundances in 2023. Annual exploitation rates are likely underestimations due to 1) lack of information on dead discards, especially in the peeler fishery, 2) the magnitude of the unreported recreational fishery, and 3) potential commercial under- reporting. For these reasons, the Chesapeake Bay jurisdictions recommend managing removals to be below the target for annual harvest levels.

It is equally important that both mature female crabs and juvenile crabs are conserved for spawning potential. Juvenile crabs surveyed in wintertime are also important to the current year's harvest, as they recruit to harvestable size in late summer and fall and contribute to the following year's spawning stock. In 2024, 43% of the estimated total population were juvenile crabs while adult female crabs made up 42%. On average, juveniles generally make up 45% of the estimated total abundance. However, the Winter Dredge Survey has lower confidence in its estimates of juvenile blue crab abundance in the Chesapeake Bay as it is unable to access the shallower regions of the Bay where juvenile crabs are more likely to be located.

Overwintering mortality—the percent of dead crabs found in late winter dredge samples—for all blue crabs in the Chesapeake system was 0.24% in 2023. This mortality rate is well below the 1996-2024 average of 5.96% and is the lowest seen in recent years. Mortality was highest for adult male crabs (5.2%), followed by juveniles (0.8%), and no female crab mortality was captured.

Table 2 provides a summary of results from the last ten years of the Winter Dredge Survey. Results from the entire 35-year survey history can be found as a table in Attachment 1. The abundance of recruits (age-0 crabs) and adult crabs (age-1+ crabs) are differentiated according to size, with

juveniles measuring under 2.4 inches (60 mm) in carapace width and adults measuring 2.4 inches or greater. Any abundance estimate represents the number of crabs that will be available to Chesapeake Bay fisheries following the end of the survey (Figures 1A, 1B, & 1C).

CBSAC has initiated a new benchmark stock assessment to incorporate newly available data, evaluate previously made assumptions about stock structure, investigate potential drivers of recent crab abundances, and revise the biological reference points. Benchmark stock assessments offer the opportunity to evaluate additional or alternative data sources and reconsider modeling decisions for use in describing a stock; the last benchmark for blue crabs was in 2011. The expected stock assessment completion date is 2026.

*Table 2. Bay-wide Winter Dredge Survey Results (Winter of 2014-15 Through Winter of 2023-24).*

| Survey Year (year survey ended) | Total crab abundance (all ages in millions) | Juvenile abundance (both sexes in millions) | Adult crab abundance (both sexes in millions) | Adult females abundance (in millions) | Bay-wide Commercial harvest (in millions of pounds) | Percentage of female crabs harvested |
|---|---|---|---|---|---|---|
| 2015 | 411 | 269 | 143 | 101 | 50 | 15% |
| 2016 | 553 | 271 | 284 | 194 | 60 | 16% |
| 2017 | 455 | 125 | 330 | 254 | 53 | 21% |
| 2018 | 372 | 168 | 206 | 147 | 57 | 27% |
| 2019 | 594 | 324 | 271 | 191 | 62 | 14% |
| 2020 | 405 | 185 | 220 | 141 | 50 | 19% |
| 2021 | 282 | 86 | 196 | 158 | 41 | 29% |
| 2022 | 227 | 101 | 126 | 97 | 42 | 31% |
| 2023 | 323 | 116 | 207 | 152 | **46** | **25%** |
| **2024** | **317** | **138** | **179** | **133** | **TBD** | **TBD** |

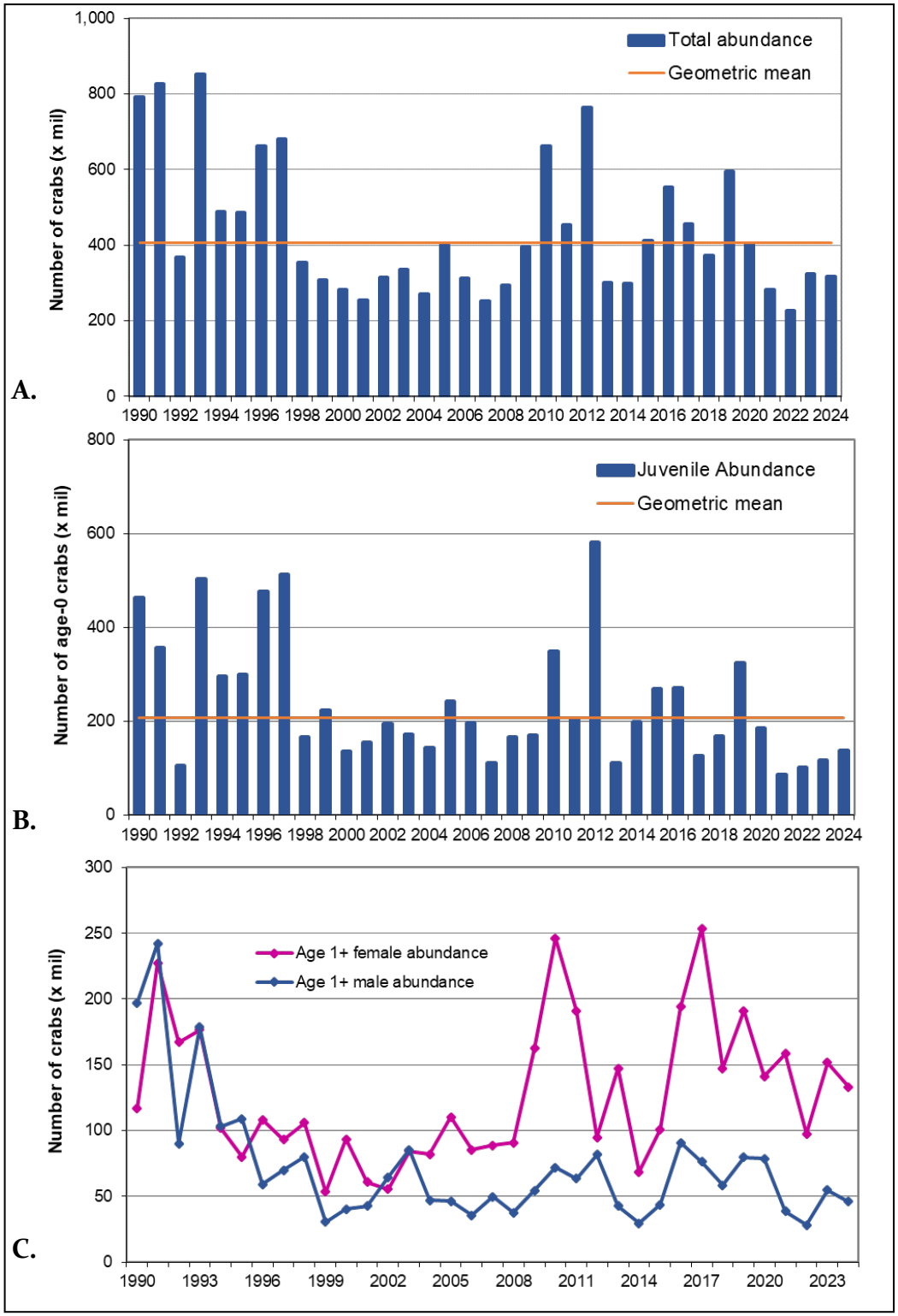


*Figure 1A, 1B & 1C. Abundance estimates (number of crabs in millions) from the Bay-wide Winter Dredge Survey for (A) total crab abundance (males and females of all ages); (B) juvenile (age-0) crab abundance (male and female); and (C) spawning-age (age-1+) female and male crab abundance, 1990 through 2023.*

## Commercial Harvest of Blue Crabs

The total bay-wide commercial harvest in 2023 was approximately 46 million pounds (Table 2), which is below both the long-term geometric mean of 60 million pounds from 1990-2022 and the geometric mean of 52 million pounds since the 2008 conservation measures were put in place. This is likely an underestimation as total harvest will be revised later once all harvest reports from the other jurisdictions have been processed. Annual harvest totals are influenced by multiple factors, to include seasonal environmental conditions, marketability (dockside value), and management measures in effect during a specific time of year. Harvest increased 9% from 2022 while changes within each jurisdiction were more variable. The 2023 commercial Bay harvest from Virginia, Maryland, and the Potomac River, respectively, was 17 million pounds, 25 million pounds, and 3.5 million pounds. This represents an 15% decrease in Virginia, 2% increase in Maryland, and an 30% increase in the Potomac River.

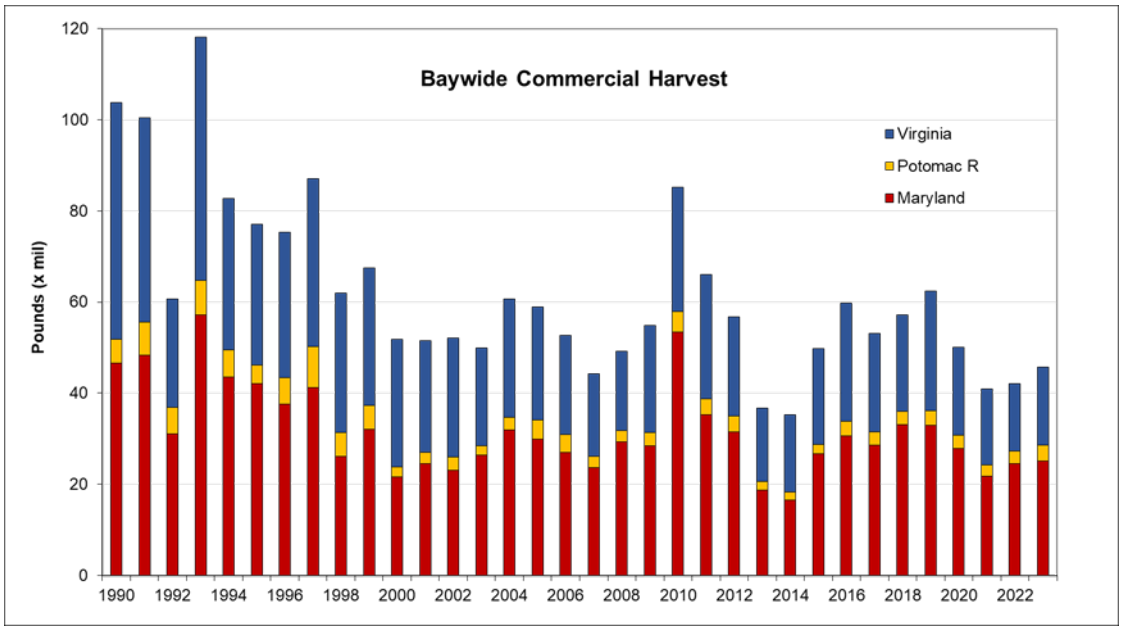


*Figure 2. Chesapeake Bay-wide commercial harvest (in pounds), by jurisdiction, 1990-2023.*

Harvest statistics have been collected from Virginia fisheries since the late 1920s; however, 1994 is the first representative year of Virginia's Mandatory Commercial Harvest Reporting Program (MCHRP). The National Marine Fisheries Services (NMFS) collected annual Virginia landings from 1929 to 1972. Between 1973 and 1992, monthly Virginia landings were collected by gear and Virginia implemented a voluntary monthly inshore dealer reporting system. In 1993, the MCHRP was implemented in which every harvester is required to report daily harvest for each month by the fifth of the following month. As of 2022, all blue crab harvest must be reported online through the VMRC MCHRP Web Application.

Figure 3 displays the commercial crab harvest for all Virginia waters in pounds and estimated dockside value (first sale from harvester) since 1994. The pre-2023 values have been adjusted to 2023 dollars using the Consumer Price Index to account for inflation. In 2023, Virginia's statewide

commercial harvest of blue crabs from the Bay as well as the seaside areas was 18.6 million pounds and the dockside value of commercial harvest was estimated at $41.5 million. Harvest in pounds increased 15% since 2022 and the economic value of total harvest increased by 31%. Fluctuations in dockside value track closely with those in harvest, although the overall magnitude depends on that year's market. Value of harvest is not considered highly accurate, as VMRC depends on voluntary buyer reporting of dockside value while harvest and effort reporting are mandatory.

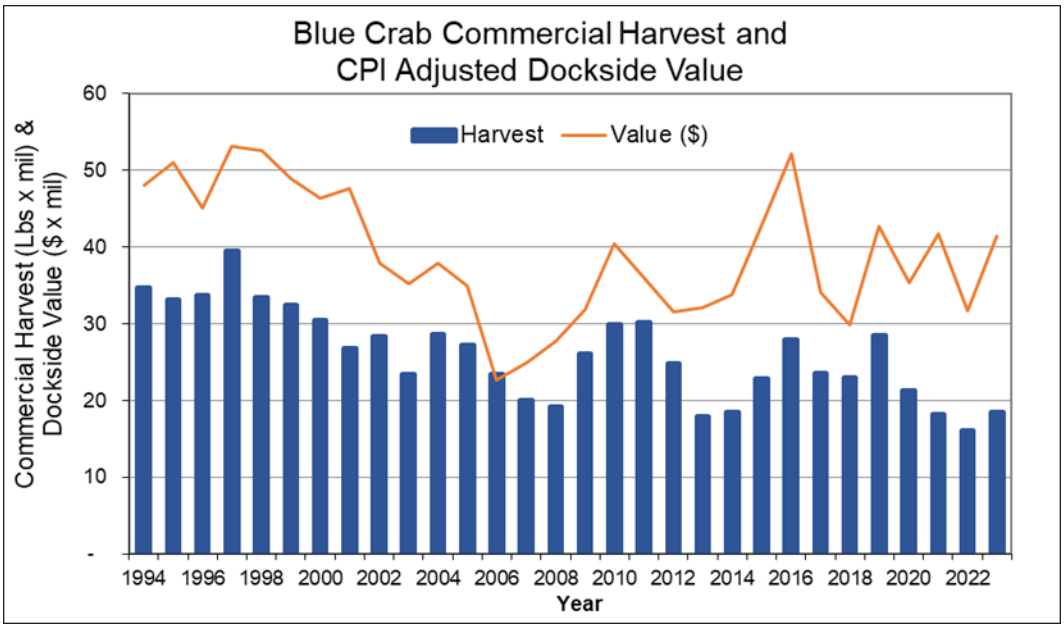


*Figure 3. Annual harvest of all market categories of blue crab from Virginia tidal waters in pounds & corresponding dockside value adjusted to 2022 dollars, 1994 – 2023.*

Table 3 provides a summary of harvest by crab type. Hard crabs (minimum size for hard male and immature female crabs is five inches, no minimum size for hard mature female crabs) dominate Virginia's harvest, making up 98% of harvest in 2023. Peeler and soft crabs (minimum size for soft crabs is 3 ½ inches; minimum size for peelers is 3 ¼ inches through July 15 and 3 ½ inches after July 15) contribute significantly less to the overall harvest in pounds—2% of harvest in recent years. However, because peeler and soft crabs are smaller than hard crabs, they may comprise up to 8% of the harvest in numbers. Harvest of peeler crabs peaked in 1998 at more than 2.5 million pounds but has remained below one million pounds since 2006. The peeler harvest for 2023 continues a declining trend since 2014, corresponding to a decline in peeler harvester effort. Across the last four years, peeler harvest has been approximately 350-400,000 pounds annually.

Table 4 provides harvest data by gear type, which indicates that hard crab pots account for the bulk of the harvest. From 2008 through 2023, the hard crab pot fishery accounted for more than 96% of the total harvest from Virginia waters, and the peeler pot fishery contributed around 4%. Less than 1% of annual harvest is attributed to other gear types such as crab trotlines, traps and pounds, crab scrapes, and dip nets.

*Table 3. Annual Harvest of Blue Crab From Virginia Waters by Market Category (hard crabs and peeler or softshell crabs), in pounds (2008 – 2023).*

| Year | Hard Crabs | Percent of Total Harvest | Peeler & Soft Crabs | Percent of Total Harvest | Total Harvest |
|---|---|---|---|---|---|
| 2008 | 18,278,467 | 95% | 995,014 | 5% | 19,273,481 |
| 2009 | 25,112,135 | 96% | 961,474 | 4% | 26,073,609 |
| 2010 | 29,000,485 | 97% | 969,942 | 3% | 29,970,427 |
| 2011 | 29,534,671 | 97% | 759,031 | 3% | 30,293,702 |
| 2012 | 23,992,153 | 96% | 879,751 | 4% | 24,871,904 |
| 2013 | 17,344,295 | 97% | 599,696 | 3% | 17,943,991 |
| 2014 | 17,561,666 | 95% | 985,254 | 5% | 18,546,920 |
| 2015 | 22,078,912 | 97% | 800,745 | 3% | 22,879,657 |
| 2016 | 27,184,207 | 97% | 735,197 | 3% | 27,919,404 |
| 2017 | 22,881,300 | 97% | 651,244 | 3% | 23,532,544 |
| 2018 | 22,458,417 | 97% | 641,742 | 3% | 23,100,160 |
| 2019 | 27,991,045 | 98% | 635,198 | 2% | 28,626,243 |
| 2020 | 20,894,331 | 98% | 409,037 | 2% | 21,303,368 |
| 2021 | 17,857,105 | 98% | 405,327 | 2% | 18,262,432 |
| 2022 | 15,695,117 | 98% | 387,384 | 2% | 16,082,500 |
| 2023 | 18,193,330 | 98% | 364,349 | 2% | 18,557,678 |

*Table 4. Virginia Harvest of Blue Crabs by Gear Type, in pounds (2008 – 2023).*

| Year | Gear | | | | | | Total Harvest |
|---|---|---|---|---|---|---|---|
| | Hard Pot | | Peeler Pot | | Other Gears | | |
| 2008 | 17,512,157 | 91% | 963,324 | 5% | 798,000 | 4% | 19,273,481 |
| 2009 | 24,914,941 | 96% | 981,319 | 4% | 177,349 | 0.7% | 26,073,609 |
| 2010 | 28,733,411 | 96% | 1,057,239 | 4% | 179,777 | 0.6% | 29,970,427 |
| 2011 | 29,224,573 | 96% | 900,169 | 3% | 168,960 | 0.6% | 30,293,702 |
| 2012 | 23,750,604 | 95% | 917,917 | 4% | 203,384 | 0.8% | 24,871,904 |
| 2013 | 16,981,833 | 95% | 646,156 | 4% | 324,162 | 2% | 17,952,152 |
| 2014 | 17,400,699 | 94% | 1,040,753 | 6% | 110,228 | 0.6% | 18,551,680 |
| 2015 | 21,787,650 | 95% | 1,006,207 | 4% | 108,521 | 0.5% | 22,902,377 |
| 2016 | 26,825,259 | 96% | 982,348 | 4% | 111,796 | 0.4% | 27,919,404 |
| 2017 | 22,597,369 | 96% | 858,690 | 4% | 76,485 | 0.5% | 23,532,544 |
| 2018 | 22,137,274 | 96% | 868,644 | 4% | 94,243 | 0.4% | 23,100,160 |
| 2019 | 27,561,353 | 96% | 931,067 | 3% | 159,744 | 0.6% | 28,600,712 |
| 2020 | 20,743,277 | 97% | 517,858 | 2% | 42,235 | 0.2% | 21,303,369 |
| 2021 | 17,727,990 | 97% | 495,702 | 3% | 38,739 | 0.2% | 18,262,432 |
| 2022 | 15,527,768 | 97% | 518,941 | 3% | 35,792 | 0.2% | 16,082,500 |
| 2023 | 18,045,356 | 97% | 488,303 | 3% | 24,019 | 0.1% | 18,557,678 |

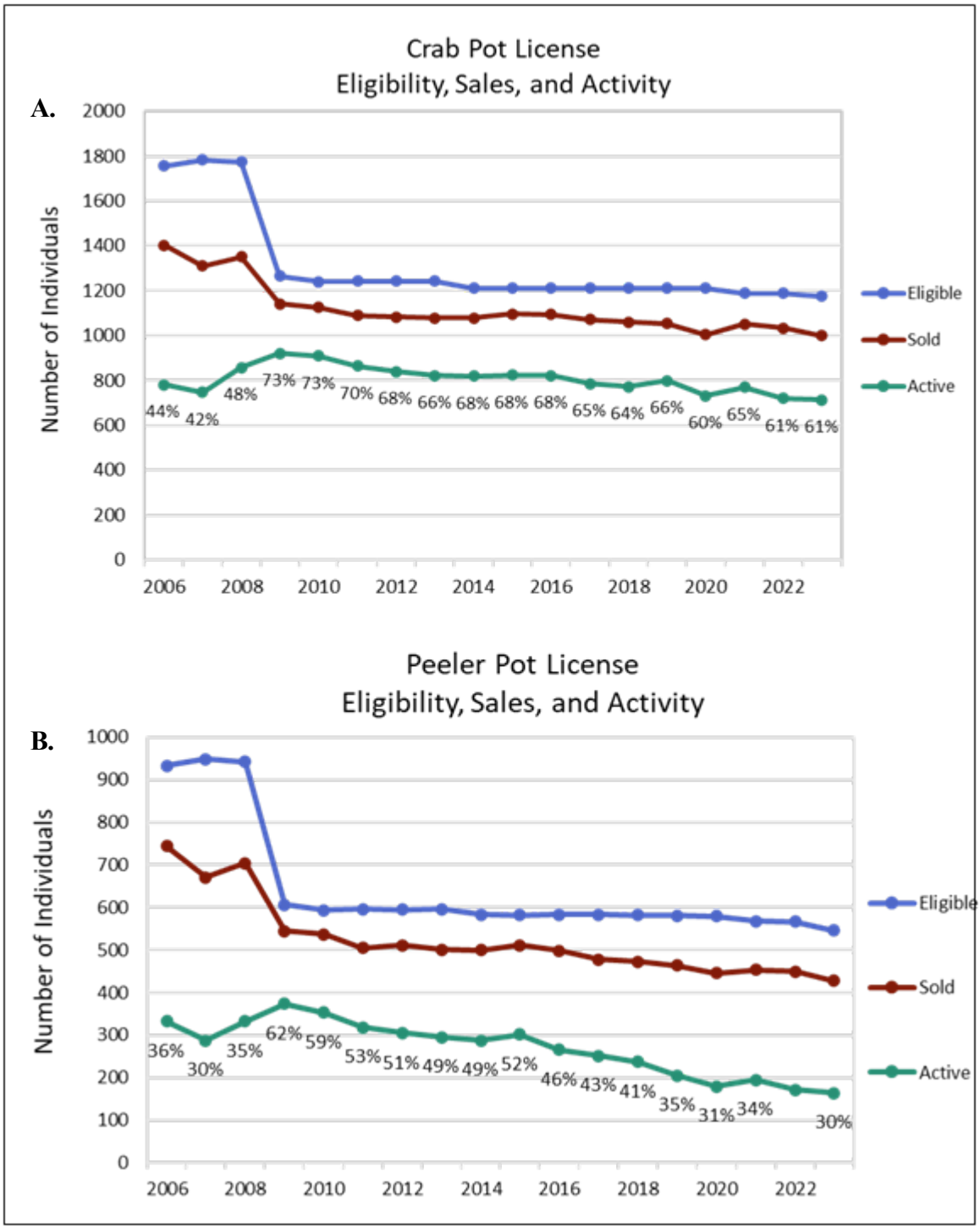


*Figure 4A & 4B. Number of eligible crabbers, crabbers who purchased a license, and active crabbers in the crab pot (A) and peeler pot (B) fisheries (2006 – 2023), with percent of eligible licenses active during the year.*

Figures 4A and 4B provide a summary of participation in the crab pot and peeler pot fisheries since 2006. Each chart indicates the numbers of harvesters who were eligible to purchase a license for the fishery, purchased a license, or were active in a given year by harvesting at least one pound of blue crab. Since 2010, fishermen can maintain their eligibility without purchasing a license. Further, those

fishermen who purchase a license may choose whether to be an active harvester. These charts show that in recent years the percent of eligible crab pot fishermen actively harvesting has remained relatively stable between 65% and 70%. However, the number of harvesters in 2020 and 2022 were closer to 60%. The number of eligible peeler pot fishermen who are active declined over the same period, from 62% in 2009 to 32% in 2023.

These charts also indicate that potential latent effort might exist in either fishery. However, there is no indication that eligible but inactive crab fishermen join either fishery when the blue crab abundance is particularly high in any given year. Since the license moratorium went into effect in 1999, many eligible crabbers are holding onto licenses for family members or for future sale.

**Blue Crab Conservation Actions Through 2024**

Commission actions since 1994 that have attempted to promote sustainability of the blue crab stock and fishery are included in Attachments 2 and 3. Many of these measures were designed to promote spawning potential of blue crabs and have helped in the recovery of the Chesapeake Bay stock. Many measures taken by the Commission were employed before scientists developed stock status indicators, and these indicators demonstrated improved stock status after each analytical stock assessment in 1997, 2005, and 2011. These improvements in science allowed the Commission to better target problem areas in the stock and its fisheries.

The Chesapeake Bay jurisdictions have relied on a management framework enacted in 2014 in which the fishery is regulated annually from July 5 through July 4 of the next year. The benefit of this approach is that reactive management measures or conservation efforts can be applied after survey data becomes available. Since 2014, the VMRC and other Chesapeake Bay jurisdictions have paid close attention to the current year's juvenile abundance, as well as the mature female abundance, as the juveniles in one year are the subsequent year's spawning stock. The current July-to-July regulatory framework for blue crabs allows for the conservation of female crabs for spawning in both the current and following year.

Most abundances increased following the blue crab fishery disaster in 2008, with the 2016-17 Bay-wide Winter Dredge Survey estimating the highest adult female abundance in the survey's history. This may be attributed partly to the conservation measures implemented since 2008. However, high adult female abundances in recent years have been tempered by low juvenile abundances. Juvenile recruitment is known to be highly unpredictable, due to high natural mortality and varying annual catchability. Scientists with CBSAC have raised the possibilities that there are external factors driving low recruitment or decreasing catchability of juvenile crabs in the Winter Dredge Survey. CBSAC hopes to explore these possibilities through the upcoming benchmark stock assessment.

Due to the recent trend of low recruitment and low total abundance estimates, CBSAC recommended jurisdictions take proactive management measures in 2022 and the VMRC, MD DNR, and PRFC responded with management measures designed to reduce harvest by approximately 7-10%. In 2023, CBSAC recommended maintaining the conservative measures set in 2022 and the three jurisdictions agreed. Initial management actions by VMRC in June 2023 were to continue the conservative

2022 measures but with increases in the fall and spring low bushel limits for certain crab pot licenses. The changes in the low bushel limit amounts mean that all license categories take an equitable reduction from the high bushel limits, where previously certain licensees were required to take greater reductions than others. In September 2023, VMRC voted to extend the high bushel limit through October 31 and to extend the crab pot season through December 16, 2023. These measures were enacted to increase seasonal economic opportunities within the fishery and were not projected to increase harvest in any significant proportion.

In 2024, CBSAC recommended maintaining conservative measures set in 2024 and the three jurisdictions agreed to do so. In response to an industry request, VMRC extended the daily crabbing time limit by six hours, shifting from a seasonally variable eight-hour day to a consistent fourteen-hour day, from 3 AM to 5 PM year-round. Crabbers will still be bound by daily harvest limits but will now have greater flexibility, especially on the Eastern Shore, to adjust their schedules based on the tides.

The Commission continued the closure of the winter crab dredge fishery season, which has been closed each year since 2008. The main basis for this continued action is conservation of the juvenile abundance, which would mature over this year and be exploited by a 2024-25 winter crab dredge fishery, and of the adult female abundance, which would spawn the next juvenile year-class in 2024. However, the closure of the winter crab dredge is now in 4VAC20-270, "Pertaining to Blue Crab Fishery". Chapter 4VAC20-1140, "Prohibition of Crab Dredging in Virginia Waters", was repealed in June 2024. After this repeal, VMRC staff worked with the Crab Management Advisory Committee (CMAC) to assess the desire for a winter crab dredge fishery and to create a framework for a winter crab dredge fishery. After two meetings, CMAC recommended not opening a crab dredge fishery until results from the ongoing benchmark stock assessment are ready. Instead, they recommended extending the crab pot season for which more watermen will benefit. The Commission voted to close the winter dredge fishery for 2024-25 and declined to extend the crab pot season.

### Ecosystem Constraints on the Blue Crab Resource

Section 28.2-203.1 of the Code of Virginia provides that the blue crab fishery management plan shall be designed to reverse any fishing practices, environmental stressors, and habitat deterioration negatively impacting the short- and long-term viability and sustainability of the crab stock in Virginia waters. In recent years, the Commission has adopted effective conservation measures to reverse fishing practices that have negatively impacted the stock. The Commission relies on the efforts of its sister agencies to promote and sponsor improvements of the Chesapeake Bay water quality to meet the requirements of §28.2-203.1 of the Code of Virginia dealing with environmental stress and habitat deterioration.

Algal blooms can result in hypoxic and anoxic conditions (low dissolved oxygen levels) in the Chesapeake Bay that cause blue crabs to be displaced from habitats or, in the case of prolonged exposure, die. These mortality events are uncommon and generally limited to situations where crabs cannot move into more favorable conditions, such as when they are in crab pots in low dissolved oxygen zones. Although such mortality events are unlikely to affect the population significantly, the Commission is working to minimize these events as a member of the Virginia Department of Health's Harmful Algal

Bloom Task Force (HABTF). Members of the HABTF have combined efforts to implement an online reporting system for Virginia residents, conduct fly-overs to visually determine the extent of bloom conditions, collect and analyze samples from areas with active HABs, and update the public about HABs. VMRC staff collaborated with the HABTF to provide links to VDH Harmful Algal Bloom notices on the VMRC website.

The Commission and Virginia's crab industry recognize that improvements in blue crab habitat and water quality could increase the probability for stronger recruitment to the stock and fisheries; however, many water quality and habitat impacts to the stock are not fully quantified or understood. Chesapeake Bay scientists are exploring the relationships between blue crabs and other components of the ecosystem. Many natural and anthropogenic stressors continue to challenge the stability of the blue crab stock, including hypoxia, shoreline development, and pollution.

Water quality in Chesapeake Bay is improving due to the ongoing efforts of the Commonwealth and the signatories of the Chesapeake Bay Watershed Agreement (Agreement). Additional work is being implemented to meet pollution reduction goals in the Chesapeake Bay. Each of the Bay jurisdictions has developed a Watershed Implementation Plan (WIP) to guide restoration plans through 2025. The federal government developed Executive Order 13508, which guides the federal agencies' plan to meet pollution reduction goals and established the Federal Leadership Committee that will publish an annual Chesapeake Bay Action Plan. The Agreement was signed in June 2014 by governors from all seven watershed states, the Chesapeake Bay Commission, and the Environmental Protection Agency. The Agreement contains 10 goals and 29 measurable outcomes to improve the health of Chesapeake Bay, including sustaining blue crabs. A new 2-year workplan for the Blue Crab Abundance Outcome was finalized in 2020, prioritizing research needs identified by CBSAC and the jurisdictions.

Nursery habitats, those areas that improve survival and growth of juvenile blue crabs, are key to juvenile survival (Lipcius et al. 2007). Seagrass beds are a favorable nursery habitat for newly settled, young juvenile, and molting blue crabs. The historically dominant submerged aquatic vegetation (SAV) in Virginia waters is eelgrass (Orth et al. 2017). The importance of eelgrass habitat functions in Chesapeake Bay was first demonstrated by VIMS in a 1961 report to the National Science Foundation. Subsequent studies by VIMS have led to a greater understanding of SAV Bay-wide distribution, abundance, and health. VIMS established the first broad-scale aerial monitoring of SAV in 1974 and expanded the survey in 1978 to cover all of Virginia's tidal waters. VIMS maintains a research and monitoring program that has significantly expanded our understanding of SAV, its role in the greater Bay ecosystem, and its linkages with the health of the blue crab stock. Ongoing research and monitoring programs of SAV and other critical habitats in Chesapeake Bay include:

- Annual Bay-wide aerial survey;
- Targeted water quality monitoring and study of key SAV locations in Virginia waters for effects from water quality changes.
- Water quality assessments (SAV distribution is a criterion for water clarity);
- Habitat suitability of exotic algae versus native seagrass as an alternative nursery habitat for juvenile blue crabs;
- Importance of salt marshes as nursery habitats for the blue crab;

- The distribution of age-0 blue crabs in shallow water habitats including seagrass, algal patches, salt marshes, restoration oyster reefs, and shallow-water soft bottom (e.g., muddy coves); and
- The functional relationships between habitat characteristics and juvenile blue crabs.

Eelgrass is near its southern limits along the Atlantic coast in Virginia, so high summertime water temperatures can be especially harmful to eelgrass beds. If water temperatures increase, losses of eelgrass beds in Virginia may accelerate. VIMS research has demonstrated that increased water clarity can help eelgrass beds persist under higher temperatures. Therefore, VIMS is working with Virginia regulatory agencies, MD DNR, and the Environmental Protection Agency to assess the current water clarity goals for Chesapeake Bay to determine if changes are appropriate and needed.

VIMS annual Bay-wide aerial survey serves as a significant indicator of Bay health and as a tool for determining compliance with Virginia water quality standards. Virginia tidal waters are home to 12 species of SAV, with eelgrass (*Zostera marina*), widgeon grass (*Ruppia maritima*), and exotic red macroalgae (as well as salt marshes) having the greatest overlap with the distribution of juvenile blue crabs in the Chesapeake Bay. Since historically low abundances in 1984, SAV restoration has varied between tidal waters with different salinities. Seagrass beds have continually increased in lower salinity tidal waters, increased initially in areas of medium-salinity followed by variable annual abundance levels, and increased initially in the high-salinity region followed by a general decline in abundance (Orth et al. 2010). In the years since, low salinity areas have continued to increase and have recently plateaued, whereas medium and high salinity areas show a year-over-year increase through 2018 after which there was a marked decline in 2019. The latest results of the aerial survey showed that SAV coverage bay-wide declined through 2019 and 2020 after the peak in 2018 but began recovering in 2021 through 2022. In Virginia, coverage increased through 2020 to 2022 after the 2019 low and eelgrass meadows have experienced 4 consecutive years of expansion with 2023 numbers approaching the peak coverage observed in the early 1990's.

A VIMS study showed that juvenile blue crabs prefer denser SAV beds (Ralph et al. 2013), demonstrating the positive influence that the quality of seagrass beds has on blue crab population dynamics. Recent VIMS studies have also demonstrated the high value to juvenile blue crabs of salt marshes and shallow unvegetated areas both adjacent to salt marshes in upriver areas of Bay tributaries and areas that contain an abundance of food such as clams and polychaetes (marine worms), and within areas of abundant macroalgae and salt marshes where native SAV nursery habitat has experienced reductions in aerial coverage (Seitz et al. 2003, Seitz et al. 2005, Johnston and Lipcius 2012). The recent studies indicate that the blue crab stock will be resilient to loss of eelgrass due to its ability to use alternative nursery habitats such as widgeon grass, salt marshes, and exotic red macroalgae.

Increasing temperatures are expected to increase the overwintering survival of adult and juvenile blue crabs (Glandon et al. 2019) and may also extend the spawning and growing season of blue crabs in Chesapeake Bay (Hines et al. 2011). These effects may increase productivity of the population. However, increased temperatures may also decrease the average size of blue crabs (Kuhn & Darnell 2019) and bring a suite of new predators that are expanding their range northward into Virginia waters, such as red drum. Increased temperatures may also limit eelgrass recovery and increase the severity and

duration of hypoxic "dead zones" in the Bay. Other factors, such as ocean acidification, changes in precipitation altering salinity regimes, sea level rise, and pathogen prevalence may also affect blue crabs (Etherington & Eggleston 2000, Rome et al. 2005, Bauer & Miller 2010, Tomasetti et al. 2018, Glaspie et al. 2017).

Many pathogens are present in the tidal waters of Virginia, but only a few have the potential to damage the blue crab stock or fisheries (Shields & Overstreet 2007, Shields 2012). Two agents in particular occur at high prevalence levels and show signs of high pathogenicity: *Hematodinium perezi* and a recently identified reo-like virus. *H. perezi* is a parasitic dinoflagellate found primarily in the higher salinity waters of the Bay, particularly in the seaside bays of the Eastern Shore and along the eastern portions of lower Chesapeake Bay (Messick & Shields 2000). Prevalence levels of *Hematodinium* have a small peak in early summer and a large peak in autumn followed by a rapid decline with the onset of winter temperatures. Prevalence levels are associated with molting in juvenile blue crabs, which explains the bimodal peak occurrence of the parasite. Mortality levels of 87% have been observed in laboratory experiments (Shields and Squyars 2000). The reo-like virus was initially described based on infected juvenile crabs held in the laboratory (Johnson & Bodammer 1975). It has been implicated as a source of mortality in the production of soft-shell crabs based on infection trials and sampling of crabs from shedding facilities (Bowers et al. 2010). At present, these pathogens do not pose a significant risk to the Chesapeake Bay stock.

**VIMS Blue Crab Surveys**

VIMS conducts multiple blue crab surveys: the Juvenile Fish and Blue Crab Trawl Survey (BCTS), the Winter Dredge Survey (WDS), and two surveys associated with the WDS, the Main-stem Prey and Bycatch Survey (MPBS) and the Juvenile Nursery Habitat Survey (JNS). In addition, blue crab data is also gathered by the Chesapeake Bay Multispecies Monitoring and Assessment Program (ChesMMAP), a Bay-wide main-stem trawl survey of mostly adult fishes and mature female crabs. Data from the VIMS Juvenile Fish and BCTS are used to develop indices of abundance for annual recruitment to the stock. The JNS is complementary to the VIMS Juvenile Fish and BCTS, in that it gathers data on juvenile blue crabs and habitat quality in shallow-water habitats where the other surveys are unable to sample. Samples and data from the WDS and MPBS are processed during the course of the winter and spring as they are collected. Samples from the JNS require lengthy laboratory processing, so they are frozen and then processed later in the year from August through October.

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## Attachment 1

**Bay-wide Winter Dredge Survey Results (Winter of 1989-90 Through Winter of 2022-23). *Commercial harvest and percentage of female crabs removed in 2024 are not yet available.**

| Survey Year (Year Survey Ended) | Total Number of Crabs in Millions (All Ages) | Number of Juvenile Crabs in Millions (both sexes) | Number of Mature Crabs in Millions (both sexes) | Number of Mature Female Crabs in Millions | Bay-wide Commercial Harvest in Millions of Pounds | Percentage of Female Crabs Harvested |
|---|---|---|---|---|---|---|
| 1990 | 791 | 463 | 276 | 117 | 104 | 43 |
| 1991 | 828 | 356 | 457 | 227 | 100 | 40 |
| 1992 | 367 | 105 | 251 | 167 | 61 | 63 |
| 1993 | 852 | 503 | 347 | 177 | 118 | 28 |
| 1994 | 487 | 295 | 190 | 102 | 84 | 36 |
| 1995 | 487 | 300 | 183 | 80 | 79 | 36 |
| 1996 | 661 | 476 | 146 | 108 | 78 | 25 |
| 1997 | 680 | 512 | 165 | 93 | 89 | 24 |
| 1998 | 353 | 166 | 187 | 106 | 66 | 43 |
| 1999 | 308 | 223 | 86 | 53 | 70 | 42 |
| 2000 | 281 | 135 | 146 | 93 | 54 | 49 |
| 2001 | 254 | 156 | 101 | 61 | 54 | 42 |
| 2002 | 315 | 194 | 121 | 55 | 54 | 37 |
| 2003 | 334 | 172 | 171 | 84 | 50 | 36 |
| 2004 | 270 | 143 | 122 | 82 | 60 | 46 |
| 2005 | 400 | 243 | 156 | 110 | 60 | 27 |
| 2006 | 313 | 197 | 120 | 85 | 52 | 31 |
| 2007 | 251 | 112 | 139 | 89 | 43 | 38 |
| 2008 | 293 | 166 | 128 | 91 | 49 | 21 |
| 2009 | 396 | 171 | 220 | 162 | 54 | 24 |
| 2010 | 663 | 340 | 310 | 246 | 85 | 16 |
| 2011 | 452 | 204 | 255 | 191 | 67 | 24 |
| 2012 | 765 | 581 | 175 | 95 | 56 | 10 |
| 2013 | 300 | 111 | 180 | 147 | 37 | 23 |
| 2014 | 297 | 198 | 99 | 68.5 | 35 | 17 |
| 2015 | 411 | 269 | 143 | 101 | 50 | 15 |
| 2016 | 553 | 271 | 284 | 194 | 60 | 16 |
| 2017 | 455 | 125 | 330 | 254 | 53 | 21 |
| 2018 | 371 | 168 | 206 | 147 | 57 | 27 |
| 2019 | 594 | 323 | 271 | 191 | 62 | 14 |
| 2020 | 405 | 185 | 220 | 141 | 50 | 19 |
| 2021 | 282 | 86 | 196 | 158 | 41 | 29 |
| 2022 | 227 | 101 | 125 | 97 | 42 | 31 |
| 2023 | 323 | 116 | 207 | 152 | 46 | 25 |
| **2024** | **317** | **138** | **179** | **133** | **TBD*** | **TBD*** |

# VIRGINIA'S 21-POINT BLUE CRAB MANAGEMENT PLAN

**October 1994, the Commission established the following 7-point blue crab management plan:**

- Expanded the spawning sanctuary (146 sq. mi.) established in 1942 by 75 sq. mi., with no crab harvest allowed from June 1 through September 15.
- Established a 14,500-acre winter-dredge sanctuary in Hampton Roads.
- Shortened the crab pot season to April 1 through November 30.
- Required two cull (escape) rings in each commercial and recreational crab pot.
- Required four cull rings in each peeler pound that allows escapement of small peeler crabs.
- Capped the number of peeler pots per license to prevent expansion of the fishery.
- Limited the crab dredge size to 8 feet to prevent increases in effort.

**The Commission reinforced the 7-point management plan in January 1996.**

- Prohibited the possession of dark-colored (brown through black) sponge crabs (adult female hard crab which had extruded her eggs on her abdomen), with a 10-sponge crab per bushel tolerance.
- Limited license sales of hard crab licenses, based on previous eligibility or exemption requirements.
- 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.
- Established a 3 ½ -inch minimum possession size limit for all soft shell crabs.

**Concerns over excess effort in the fisheries and a persistent trend of low spawning stock biomass during most of the 1990's led to additional crab conservation measures in 1999 and 2000.**

- Lowered the maximum limit on peeler pots from 400 to 300 pots in 1999. Harvest by this gear type increased by 90%, from 1994 through 1998, while the overall harvest remained relatively static.
- Initiated a moratorium on additional commercial licenses for all commercial crabbing gear. This moratorium became effective May 26, 1999 and continued until May 26, 2004.
- Established (in 2000) a Virginia Bay-wide Blue Crab Spawning Sanctuary, in effect June 1 through September 15. This additional sanctuary (435 sq. mil) allows for increased spawning potential.

**A cooperative Bay-wide agreement (October 2000) to reduce harvest 15% by 2003 led to new measures.**

- Enacted an 8-hour workday for commercial crabbers (2002) that replaced Wednesday closures of 2001.
- Established a 3-inch minimum size limit for peeler crabs (2002).
- Reduced peeler pot limits from 400 to 300 pots (for 2001).
- Reduced the winter crab dredge fishery limit from 20 to 17 barrels (2001).
- Augmented (2002) the Virginia Blue Crab Sanctuary by 272 sq. mi. (total sanctuary area = 928 sq. mi.).
- Reduced unlicensed recreational harvester limits to 1 bushel of hard crabs, 2 dozen peelers (2002).
- Reduced licensed recreational harvester limits to 1 bushel of hard crabs, 2 dozen peelers, with vessel limit equal to number of crabbers on board multiplied by personal limits (2001).

**Attachment 3**

## ACTIONS TO PROMOTE REBUILDING OF CHESAPEAKE BAY BLUE CRAB STOCK (2008 through 2024)

**February 2008**

- Larger cull ring (2-5/16") required to be open at all times in all tidal VA waters to promote additional increases in escapement.
- Peeler crab minimum size limit increased from 3" to 3 ¼" (through July 15) and to 3 ½" (as of July 16).
- Use of agents modified to prevent license "stacking" and to curtail use of agents.
- Winter crab dredge fishery capped at 53 licensees (from previous 225 licensees), all being active harvesters in previous two winter seasons.

**March 2008**

- Adopted an extended closure (May 1 - September 15) of blue crab spawning sanctuary, to protect spawning females, except for the historical sanctuary (146 square miles) managed by law.

**April 2008**

- Established a fall closure for female harvest (October 27 – November 30).
- Implemented a 15% reduction in pots per individual for 2008 crab pot fishery and a 30% reduction for 2009 crab pot and peeler pot fishery.
- Closed the 2008-09 winter crab dredge fishery season.
- Required use of two 3/8" cull rings effective July 1 (except Seaside Eastern Shore).
- Eliminated 5-crab pot recreational license.
- Revamped revocation procedures to allow a hearing after just two crab violations in a 12-month period.

**November 2008**

- To address the latent effort, the Commission placed crab pot and peeler pot fishermen who had been inactive (no harvest) for a 4-year period (2004-2007) on a waiting list until the abundance determined from the Bay-wide Winter Dredge Survey of age-1+ crabs exceeds the interim target of 200 million.

**May 2009**

- Shortened closed season for female crabs to November 21 - November 30.
- Closed the 2009/10 winter crab dredge fishery season.
- Lowered percentage reduction of crab pots from 30% (2008) to 15% (2009).
- Reestablished 5-pot recreational crab pot license but prohibited harvest on Sunday and from Sept 16 - May 31.
- Right to hold revocation hearing for crab licensee after two crab violations by authorized agent (agents cannot be licensed for any crab fishing gear).

**May 2010**

- Made it unlawful (from March 17 - June 30) to possess dark sponge crabs exceeding regulation tolerance of 10 per bushel (previously March 17 – July 15).
- Made it lawful (indefinitely) that commercial licenses (crab/peeler pot, scrape, trap, ordinary/patent trot line, dip net) shall be sold only to commercial fishermen eligible in 2010, except those placed on the waiting list established in November 2007.
- Closed the 2010/11 winter crab dredge fishery season.

**Attachment 3**

**April 2011**

- Changed closed season on harvest from Virginia Blue Crab Sanctuaries from May 16 to May 1.
- Changed boundary line of Blue Crab Sanctuary in upper Bay near Smith Point Light.

**September 2011**

- Closed the 2011/12 winter dredging fishery season.
- Established 5-day maximum tending requirement for crab pots and peeler pots.

**November 2012**

- Closed the 2012/13 winter crab dredge fishery season.
- Funded the Winter Crab Dredge Gear Study using Marine Fishing Improvement Funds.
- Extended the 2012 season until December 15, 2012 for both male and female crabs and applied conservation equivalent bushel limits to the 2013 crab pot season by gear license categories as follows:
    - For up to 85 crab pots a maximum limit of 27 bushels.
    - For up to 127 crab pots a maximum limit of 32 bushels.
    - For up to 170 crab pots a maximum limit of 38 bushels.
    - For up to 255 crab pots a maximum limit of 45 bushels.
    - For up to 425 crab pots a maximum limit of 55 bushels.
- Restricted crabbing in the Virginia portion of the Albemarle and Currituck watersheds to crab pots and peeler pots only.

**February 2013**

- Established a vessel harvest and possession limit equal to only one of the largest legal bushel limits on board any vessel.
- Limited the use of agents in the hard pot fishery to 168, with priority going to those licensees who received approval for agent use in 2012.

**June 2013**

- Established daily individual and vessel harvest and possession limits for the 2013 season.

**October 2013**

- Closed the 2013/14 winter crab dredge fishery season.
- Results of the Winter Crab Dredge Mortality Project were presented.
- Extended the 2013 season until December 15, 2013 for both male and female crabs and applied conservation equivalent bushel limits to the 2013 season extension and the 2014 crab pot season by gear license categories as follows:
    - For up to 85 crab pots a maximum limit of 16 bushels.
    - For up to 127 crab pots a maximum limit of 21 bushels.
    - For up to 170 crab pots a maximum limit of 27 bushels.
    - For up to 255 crab pots a maximum limit of 43 bushels.
    - For up to 425 crab pots a maximum limit of 55 bushels.
- Established the 2014 crab pot season as March 17 through November 30, 2014 for both male and female blue crabs.
- Established a declaration date for agent use requirements in the crab pot fishery for the 2014 season.

**Attachment 3**

**June 2014**

- Closed the 2014/15 winter crab dredge fishery season.
- Enacted management reductions in response to the scientific determination that the Chesapeake Bay blue crab abundance of spawning-age female crabs was depleted. The basis for this 10 percent reduction, which equals a potential savings of 1,316,726 pounds of female blue crab, was to augment spawning in summer 2014 and spring 2015 and help reverse the depleted stock condition of blue crab.
- Established the following bushel limits from July 5, 2014 through November 15, 2014 and April 1, 2015 through July 4, 2015:
    - 10 bushels, or 3 barrels and 1 bushel, of crabs, if licensed for up to 85 crab pots.
    - 14 bushels, or 4 barrels and 2 bushels, of crabs, if licensed for up to 127 crab pots.
    - 18 bushels, or 6 barrels, of crabs, if licensed for up to 170 crab pots.
    - 29 bushels, or 9 barrels and 2 bushels, of crabs, if licensed for up to 255 crab pots.
    - 47 bushels, or 15 barrels and 2 bushels, of crabs, if licensed for up to 425 crab pots
- Established the following bushel limits from November 16, 2014 through November 30, 2014 and March 17, 2015 through March 31, 2015:
    - 8 bushels, or 2 barrels and 2 bushels, of crabs, if licensed for up to 85 crab pots.
    - 10 bushels, or 3 barrels and 1 bushel, of crabs, if licensed for up to 127 crab pots.
    - 13 bushels, or 4 barrels and 1 bushel, of crabs, if licensed for up to 170 crab pots.
    - 21 bushels, or 7 barrels of crabs, if licensed for up to 255 crab pots.
    - 27 bushels, or 9 barrels of crabs, if licensed for up to 425 crab pots.
- The lawful season for the commercial harvest of blue crabs by all other commercial gears was made March 17, 2014 through September 15, 2014 and May 1, 2015 through November 30, 2015.

**May 2015**

- Adjusted season dates for non-crab pot gear, closing September 26 and reopening April 21.
- Made it unlawful for any vessel to act as both a crab harvester and a crab buyer on the same trip.
- Made it unlawful for any person to possess dark sponge crabs from March 17 through June 15.
- Redefined the Virginia Blue Crab Sanctuary Area 1 as Virginia Blue Crab Sanctuary Area 1A and Blue Crab Sanctuary Area 1B and implemented separate closure dates for Blue Crab Sanctuary Areas 1A, 1B and Areas 2 through 4.

**October 2015**

- Closed the 2015/16 winter crab dredge fishery season.

**June 2016**

- Closed the 2016/17 winter crab dredge fishery season.
- Extended the crab pot season to close December 20, 2016 and open March 1, 2017.

**June 2017**

- Closed the 2017/18 winter crab dredge fishery season.
- Extended the fall bushel limit decrease to begin November 1, 2017.
- Shortened the crab pot season to end November 30, 2017 and open March 17, 2018, in order to conserve part of the 2018 spawning stock in late 2017 and early 2018.

**June 2018**

- Closed the 2018/19 winter crab dredge fishery season.

**June 2019**

- Closed the 2019/20 winter crab dredge fishery season.
- Removed the fall bushel limit decrease.

**June 2020**

- Closed the 2020/21 winter crab dredge fishery season.

**October 2020**

- Extended the 2020 crab pot season through December 19, 2020 to offset economic effects of the COVID-19 pandemic.

**June 2021**

- Closed the 2021/22 winter crab dredge fishery season.
- Mandated online commercial blue crab harvest reporting starting January 1, 2022.

**June 2022**

- Closed the 2022/23 winter crab dredge fishery season.
- Re-established the fall bushel limit decrease to start October 1, 2022 and to extend the spring fall bushel limit decrease through May 15, 2023.
- Shortened the season for all other crab gears to end October 15, 2022 and open on April 16, 2023.

**June 2023**

- Closed the 2023/24 winter crab dredge fishery season.
- Adjusted low bushel limits to increase equity across hard crab pot license categories.

**September 2023**

- Extended the 2023 crab pot season through December 16, 2023.
- Postponed the fall bushel limit decrease from October 1, 2023 to November 1, 2023.

**June 2024**

- Extended daily harvest time limits to 3 AM to 5 PM.
- Repealed 4VAC20-1140, “Prohibition of Crab Dredging in Virginia Waters”.

**October 2024**

- Closed the 2024/25 winter crab dredge fishery season.