COMMONWEALTH of VIRGINIA

Marine Resources Commission
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Stefanie K. Taillon
Secretary of Natural and
Historic Resources

Jamie L. Green
Commissioner

December 1, 2025

MEMORANDUM

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

THROUGH: The Honorable Stefanie K. Taillon
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.

2025

ANNUAL REPORT ON THE

BLUE CRAB FISHERY MANAGEMENT PLAN

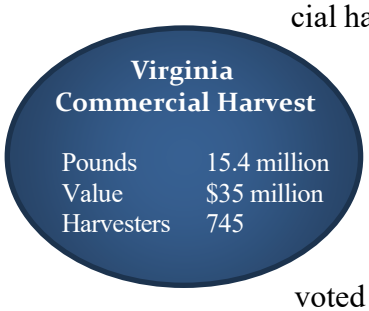
EXECUTIVE SUMMARY

The 36th Bay-wide Winter Dredge Survey was conducted from December 2024 to March 2025 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 2025 was 238 million crabs.

The 2011 Chesapeake Bay blue crab stock assessment recommended reference points be set with respect to the spawning stock, or the female population. The adult female population in 2024 was estimated at 108 million crabs, a decrease of 19% from 2024 and 25% below the geometric mean since actions were taken in 2008 to reduce fishing effort on female crabs. This abundance estimate of spawning-age female crabs is above the depletion threshold of 70 million crabs 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 twelve of the seventeen years since 2008, because closing the winter crab dredge season allows pre-spawn female crabs to be free from 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 Chesapeake Bay, as reported by the Virginia Marine Resources Commission (VMRC), MD DNR, and the Potomac River Fisheries Commission (PRFC), totaled 42.5 million pounds in 2024. This is a 7% decrease from 2023 and 28% below the mean commercial harvest since 1990. Virginia, Maryland, and the Potomac River accounted for 33%, 60%, and 7% of the Bay-wide harvest, respectively. Commercial harvest in Virginia's tidal waters has been reported through the VMRC Mandatory Harvest Reporting Program as 15.4 million pounds with an estimated dockside value of $34.5 million.



Considering the decrease in crab abundance in 2025, the VMRC voted to maintain status quo from last year's measures, keeping the bushel limits and most season dates constant. The only difference was the Commission voted to extend the season by four days to keep the last day of the season on a Saturday. The current crab pot season will close on December 20, 2025, and re-open on March 17, 2026, with low bushel limits in place until May 15. The season for all other commercial crab gears will end October 15, 2025, and re-open April 15, 2026.

Conservation of female spawning-age crabs as well as juvenile crabs is the primary management objective to attempt to lessen interannual fluctuations 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 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 currently underway, following the recommendation of the Chesapeake Bay Stock Assessment Committee (CBSAC). The stock assessment is expected to be complete and available for management consideration in spring 2026.

THE 2025 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 the 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 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 standards. 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 2024-25 Winter Dredge Survey and current biological reference points, the adult female biomass is not overfished and is not 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. In other words, the adult female biomass is not depleted but is not at the levels managers and scientists have strived for. If at any time the Bay-wide Winter Dredge Survey results indicate the abundance of adult female crabs has fallen below the overfished level, management measures would be recommended to protect the biological stability of the blue crab stock.

The abundance and exploitation rate targets and thresholds (biological reference points) used to monitor the status of the blue crab stock in Chesapeake Bay are provided in Table 1. The abundance estimate from the 2024-25 Bay-wide Winter Dredge Survey of adult female crabs (age 1+) was 108 million crabs, 44% below the abundance target of 196 million adult female crabs.

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 2024 female crab exploitation rate estimate was 22%, a decrease from 2023's 25%, and is below both the target and overfishing threshold. Overfishing is not occurring. Bay-wide commercial harvest in 2024 was 42.5 million pounds. Female harvest and abundance both declined in 2024; a greater decline in harvest than in abundance led to the exploitation rate decreasing as well. 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 2025, 43% of the estimated total population were juvenile crabs while adult female crabs made up 45%. 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 in part because 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 4% in 2025. This mortality rate is higher than 2024 but still below the 1996-2025 average of 5.89%. Mortality was highest for adult male crabs (12%), followed by adult females (6%), and then juveniles (0.2%). The recent trend in low overwintering mortality may be linked to warmer winter temperatures observed within the bay.

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 stock assessment team, headed by Dr. Mike Wilberg at the University of Maryland Center for Environmental Science, has been at work throughout 2025 and the expected completion date is in spring of 2026.

Table 2. Bay-Wide Winter Dredge Survey results (winter of 2015-16 through winter of 2024-25).

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
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	**42**	**22%**
2025	**238**	**103**	**138**	**108**	**TBD**	**TBD**

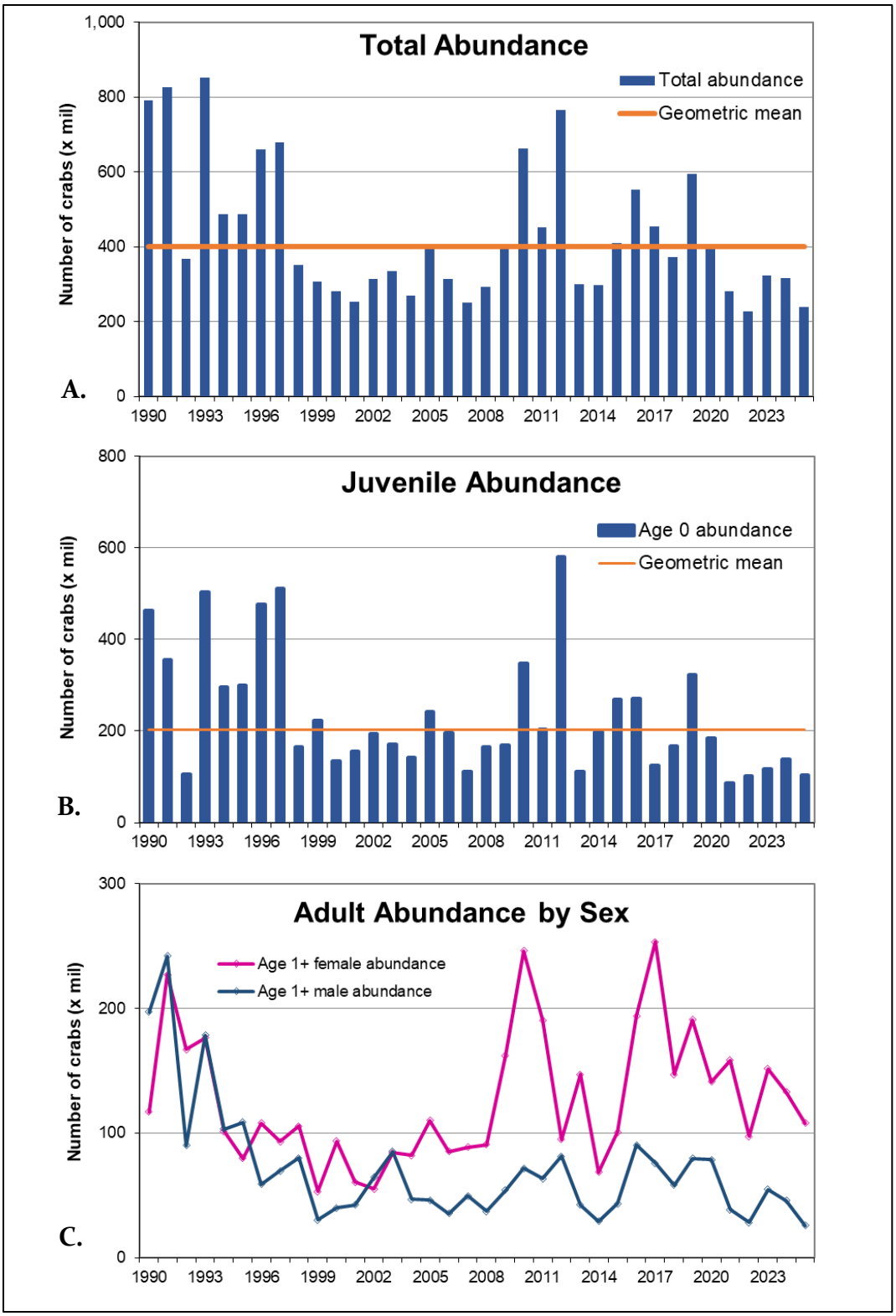


Figure 1A, 1B & 1C. Abundance estimates (in millions of crabs) from the Bay-Wide Winter Dredge Survey for (A) total crab abundance (males and females of all ages); (B) juvenile (age 0) crab abundance (male and female); and (C) spawning-age (age 1+) female and male crab abundance, 1990 through 2025.

Commercial Harvest of Blue Crabs

The total bay-wide commercial harvest in 2024 was approximately 42.5 million pounds (Table 2), which is below both the long-term geometric mean of 59 million pounds from 1990-2023 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, including seasonal environmental conditions, marketability (dockside value), and management measures in effect. Harvest decreased 7% from 2023 while changes within each jurisdiction were more variable. The 2024 commercial bay harvest from Virginia, Maryland, and the Potomac River, respectively, was 14 million pounds, 25 million pounds, and 3 million pounds. This represents an 18% decrease in Virginia, 1% increase in Maryland, and a 14% decrease in the Potomac River.

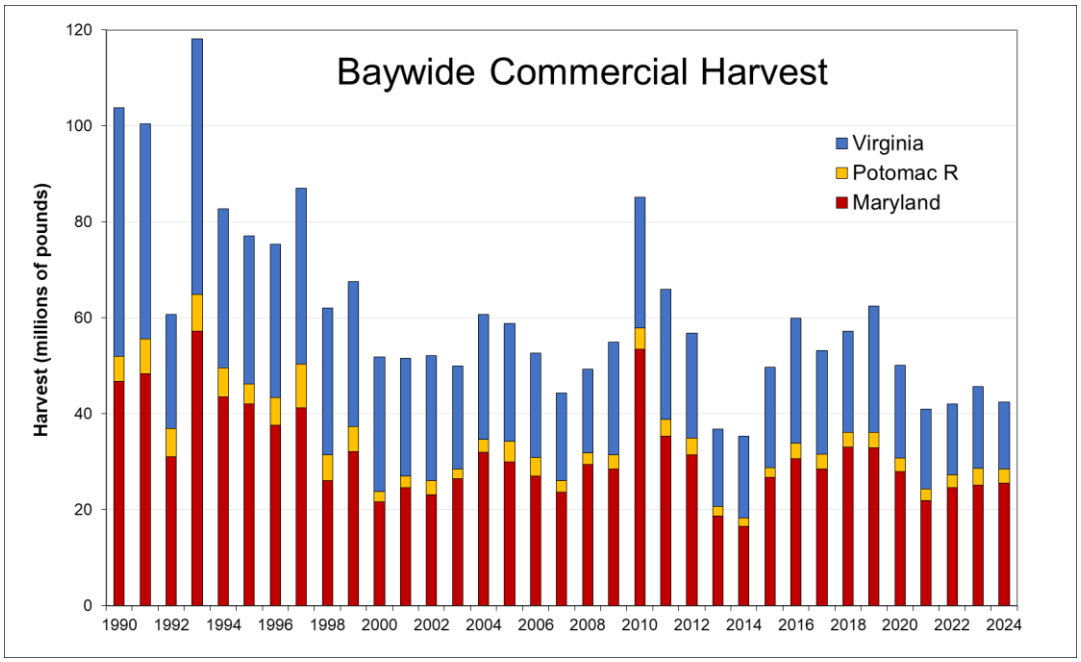


Figure 2. Chesapeake Bay-wide commercial harvest (in millions of pounds), by jurisdiction, 1990-2024.

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. 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 Mandatory Commercial Harvest Reporting Program 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 Mandatory Harvest Reporting Program 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-2024 values have been adjusted to 2024

dollars using the Consumer Price Index to account for inflation. In 2024, Virginia's statewide commercial harvest of blue crabs was 15.4 million pounds, and the dockside value of commercial harvest was estimated at $34.5 million. Harvest in pounds and the economic value of total harvest both decreased by 17% from 2023. 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.

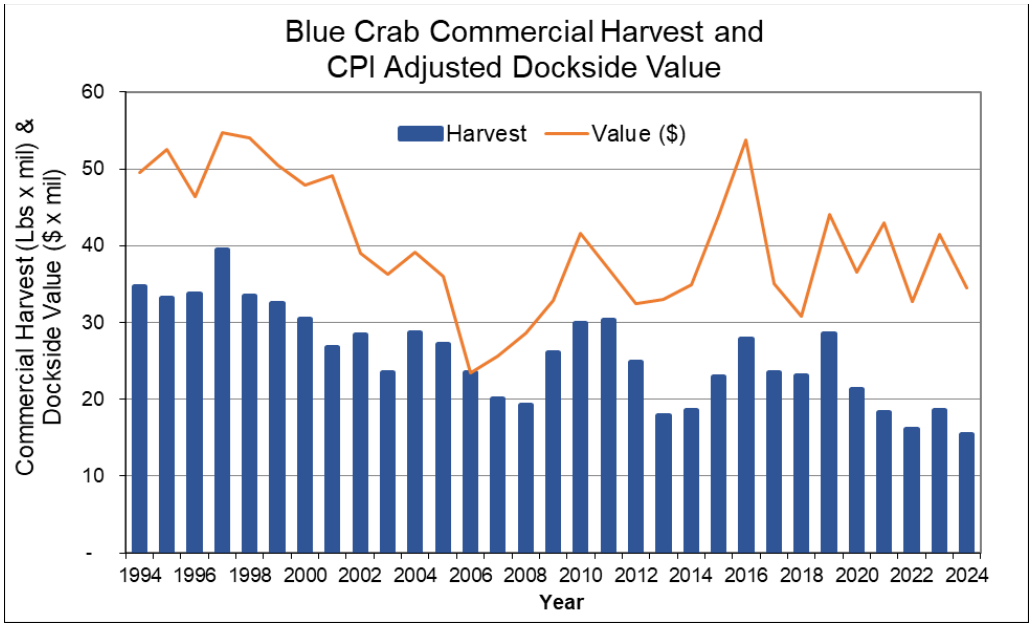


Figure 3. Annual harvest of all market categories of blue crab from Virginia tidal waters in pounds & corresponding dockside value adjusted to 2024 dollars, 1994 – 2024.

Table 3 provides a summary of harvest by crab type. Hard crabs dominate Virginia's harvest, making up 97% of harvest in 2023. Soft and peeler crabs (those which have just shed their shell and are preparing to, respectively) contribute significantly less to the overall harvest in pounds—3% 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 2024 continues a declining trend since 2014, corresponding to a decline in peeler harvester effort. Across the last five 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 2024, the hard crab pot fishery accounted for more than 96% of the total harvest from Virginia waters, and the peeler pot fishery contributed around 3-4%. 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 – 2024).

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	7,857,105	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
2024	14,953,040	97%	441,460	3%	15,394,500

Table 4. Virginia harvest of blue crabs by gear type, in pounds (2008 – 2024).

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	18,040,050	97%	487,942	3%	24,019	0.1%	18,552,011
2024	14,915,194	97%	463,735	3%	15,570	0.1%	15,415,122

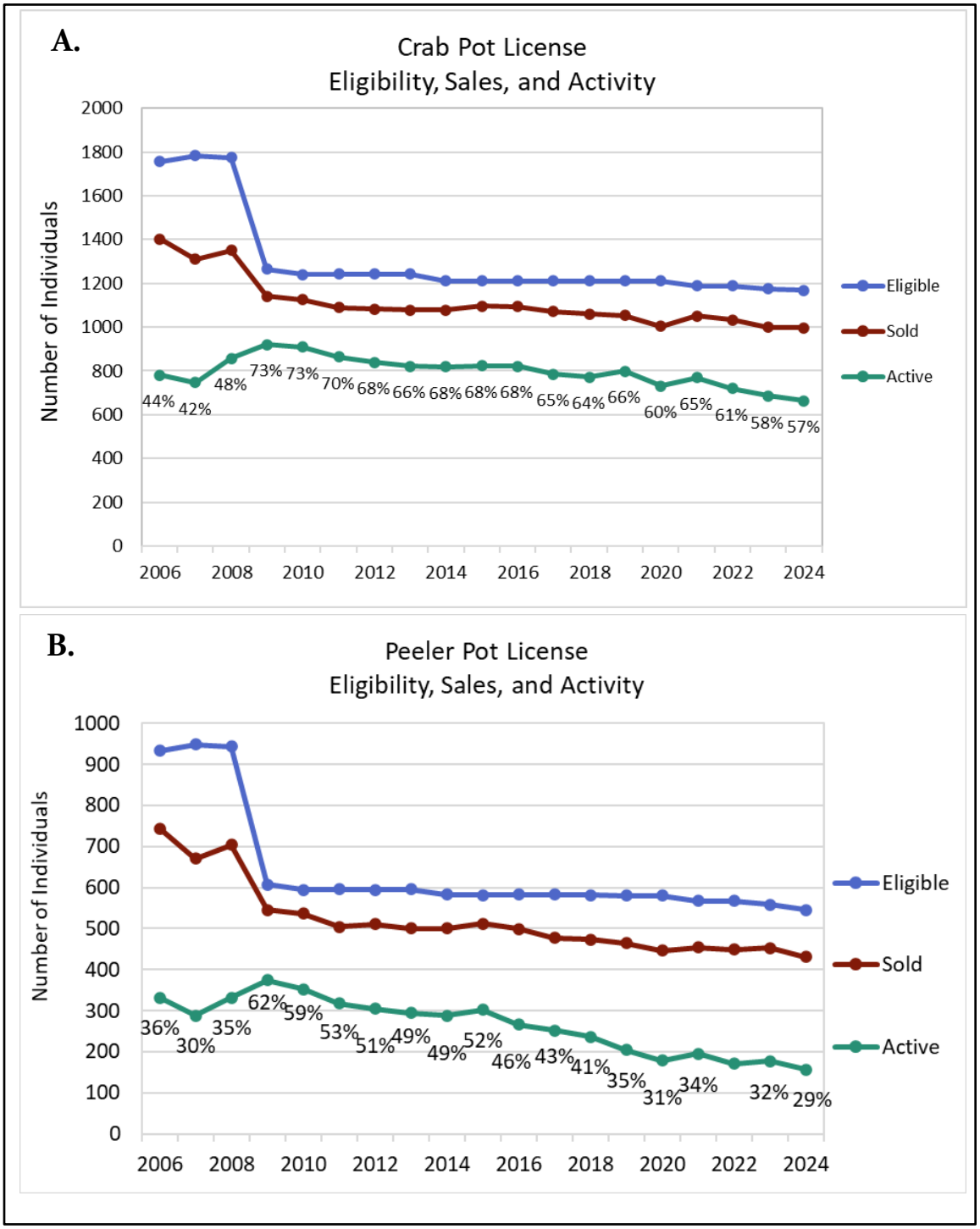


Figure 4A & 4B. Number of eligible crabbers, crabbers who purchased a license, and crabbers who reported crab harvest in the crab pot (A) and peeler pot (B) fisheries (2006 – 2024), with percent of eligible licenses active during the year.

Figures 4A and 4B provide a summary of participation in the crab pot and peeler pot fisheries, respectively, 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 reporting harvest of at least one pound of blue crab. Since 2010, fishermen can maintain their crab license eligibility without purchasing a license so many choose not to purchase a license if they do not intend to use it that year. Those fishermen who do purchase a license may choose whether to use it during the year, as an active harvester. These charts show that the percent of eligible crab pot fishermen actively harvesting declined from 73% to 66% in the years directly after the blue crab fishery disaster and declined again from 65% to 57% over the most recent four years. The number of eligible peeler pot fishermen who are active declined over the same period, from 62% in 2009 to 29% in 2024.

These charts indicate that potential latent effort exists in both fisheries. 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 2025

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 immediately 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 higher adult female abundances in recent years have been tempered by low juvenile abundances and low adult male abundance bringing down the total crab abundance. 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, which is expected to be completed in spring of 2026.

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, the 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.

Two following years of lackluster results and anticipation of the upcoming benchmark stock assessment resulted in similar measures being established for 2024 and 2025, with only slight adjustments made to the end of the crab pot season.

The Commission continued the closure of the winter crab dredge fishery season, which has remained closed since 2008. This action is grounded in the need to protect juvenile abundance that will mature over the coming year, as well as adult female crabs that will support the 2026 juvenile year class.

At the same time, the agency created a regulatory framework that would allow for a future winter dredge fishery should biological and environmental conditions support it. This provides the Commission with a clear, science-aligned pathway for potential reopening without compromising conservation goals.

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 Chesapeake Bay's 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 (HAB TF). Members of the HAB TF have combined efforts to implement an online reporting system for Virginia residents, conduct flyovers 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 HAB TF 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. The issue of variable environmental conditions and changing shoreline conditions will continue to be important as well, as blue crab behavior is linked to water temperature and availability of sufficient habitat.

Water quality in the Chesapeake Bay is improving due to the ongoing efforts of the Commonwealth and the signatories of the Chesapeake Bay Agreement. Additional work is being implemented to meet pollution reduction goals in Chesapeake Bay. A Chesapeake Bay Watershed Agreement was signed in June 2014 by governors from all six watershed states, the mayor of the District of Columbia, the Chesapeake Bay Commission, and the Environmental Protection Agency, containing goals and outcomes to be met by December 2025. The Chesapeake Bay Program is currently planning for the future of the Watershed Agreement through the Beyond 2025 process, including revised outcomes and goals and is on track to approve a revised 2014 Chesapeake Bay Agreement at the December 2, 2025 Chesapeake Bay Executive Council meeting. The revised Agreement will continue to include a Blue Crabs Outcome aimed at achieving a sustainable Bay-wide blue crab fishery through cross-jurisdictional coordination that supports healthy blue crab populations and thriving fish communities.

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 the Chesapeake Bay include:

- Annual bay-wide aerial survey;

- Targeted water quality monitoring and annual ground surveys of key SAV locations in Virginia waters to evaluate the effects of water quality changes, global temperature fluctuations, and variable environmental conditions;
- Water quality assessments (SAV distribution is a criterion for water clarity);
- The influence of environmental variability factors on the health of eelgrass and widgeon grass beds;
- The importance of SAV to the biomass and production of animals using the meadows and differences between eelgrass and widgeon grass habitat provisioning
- 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 continue to increase as a result of environmental variability, losses of eelgrass beds in Virginia may accelerate. VIMS research has demonstrated that increased water clarity can help eelgrass beds persist under higher temperatures (Lefcheck et al. 2017, Patrick et al. 2023). 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 Chesapeake Bay. Since historically low abundances in 1972 and the beginning of annual assessments in 1984, SAV recovery 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 bottoming out in 2006 and followed by a multi-year pattern of variability (Orth et al. 2010). In recent years, 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 due to rapid expansion and dominance of widgeon grass in the medium salty areas (Hensel et al. 2023). However, high turbidity and freshwater inflow in spring of 2019 collapsed the widgeon grass meadows throughout the middle bay. Since that time, widgeon grass in the middle bay has made some recovery but failed to reach previous highs whereas eelgrass meadows in the lower bay have responded positively to increasing water clarity and exhibited year over year increases with the most recent annual survey (2024) documenting the highest coverage of eelgrass that has been observed in the lower bay since the survey began in 1984.

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). These studies indicate that blue crab use of alternative nursery habitats such as widgeon grass, salt marshes, and exotic red algae may offset potential negative impacts of future projected eelgrass declines in association with increasing environmental variability. However, recent work by Alvaro et al. (2025) shows that the overall animal productivity of widgeon grass meadows in Chesapeake Bay is significantly lower per unit area than that of eelgrass meadows and blue crabs in particular exhibit higher densities and larger sizes in eelgrass than widgeon grass. These results indicate that while widgeon grass provides essential habitat, it may be a poor substitute for the eelgrass meadows it is replacing.

Shifting environmental conditions will have variable effects on blue crabs across life stages. 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. Warming waters may also limit eelgrass recovery and increase the severity and duration of hypoxic "dead zones" in the bay. Other aspects of shifting environmental conditions, such as ocean acidification, changes in precipitation altering salinity regimes, increased tropical storms, 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). As wide scale change continues, it will be critical to monitor the potential positive and negative effects on blue crabs.

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 and 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, but VIMS is evaluating the potential role of variable environmental

conditions, specifically increasing water temperatures and salinities in the lower bay, on pathogen prevalence in the future.

VIMS Blue Crab Surveys

VIMS conducts multiple blue crab surveys: the Juvenile Finfish Trawl Survey (established 1955), the Winter Dredge Survey (WDS) (established 1990), 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 established in 2002. Data from the VIMS Juvenile Finfish Trawl Survey are used to develop indices of abundance for annual recruitment to the stock. The JNS is complementary to the VIMS Juvenile Finfish Trawl Survey, 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 2024-25). Commercial harvest and percentage of female crabs removed in 2025 are not yet available.

Survey Year (Year Survey Ended)	Total Number of Crabs in Millions (All Ages)	Number of Juvenile Crabs in Millions (both	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
Cont'd						

Attachment 1

Survey Year (Year Survey Ended)	Total Number of Crabs in Millions (All Ages)	Number of Juvenile Crabs in Millions (both	Number of Mature Crabs in Millions (both sexes)	Number of Mature Female Crabs in Millions	Bay-wide Commer-cial Harvest in Millions of Pounds	Percentage of Female Crabs Harvested
2023	323	116	207	152	46	25
2024	317	138	179	133	**42**	**22**
2025	**238**	**103**	**138**	**108**	**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.) establish 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 1/2-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 2025)

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 current scientific determination that the Chesapeake Bay blue crab abundance of spawning-age female crabs is depleted. The basis for this 10 percent reduction, which equals a potential savings of 1,316,726 pounds of female blue crab, is 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 shall be 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 implement 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.

Attachment 3

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, beginning at 3 AM and ending at 5 PM.
- Repealed Chapter 4VAC20-1140, “Prohibition of Crab Dredging in Virginia Waters”.

October 2024

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

June 2025

- Extended the 2025 crab pot season through December 20, 2025.
- Closed the 2025/26 winter crab dredge fishery season.