2015 Blue Crab Advisory Report Preview

Joe Grist (VMRC) – CBSAC Chair

June 2, 2015

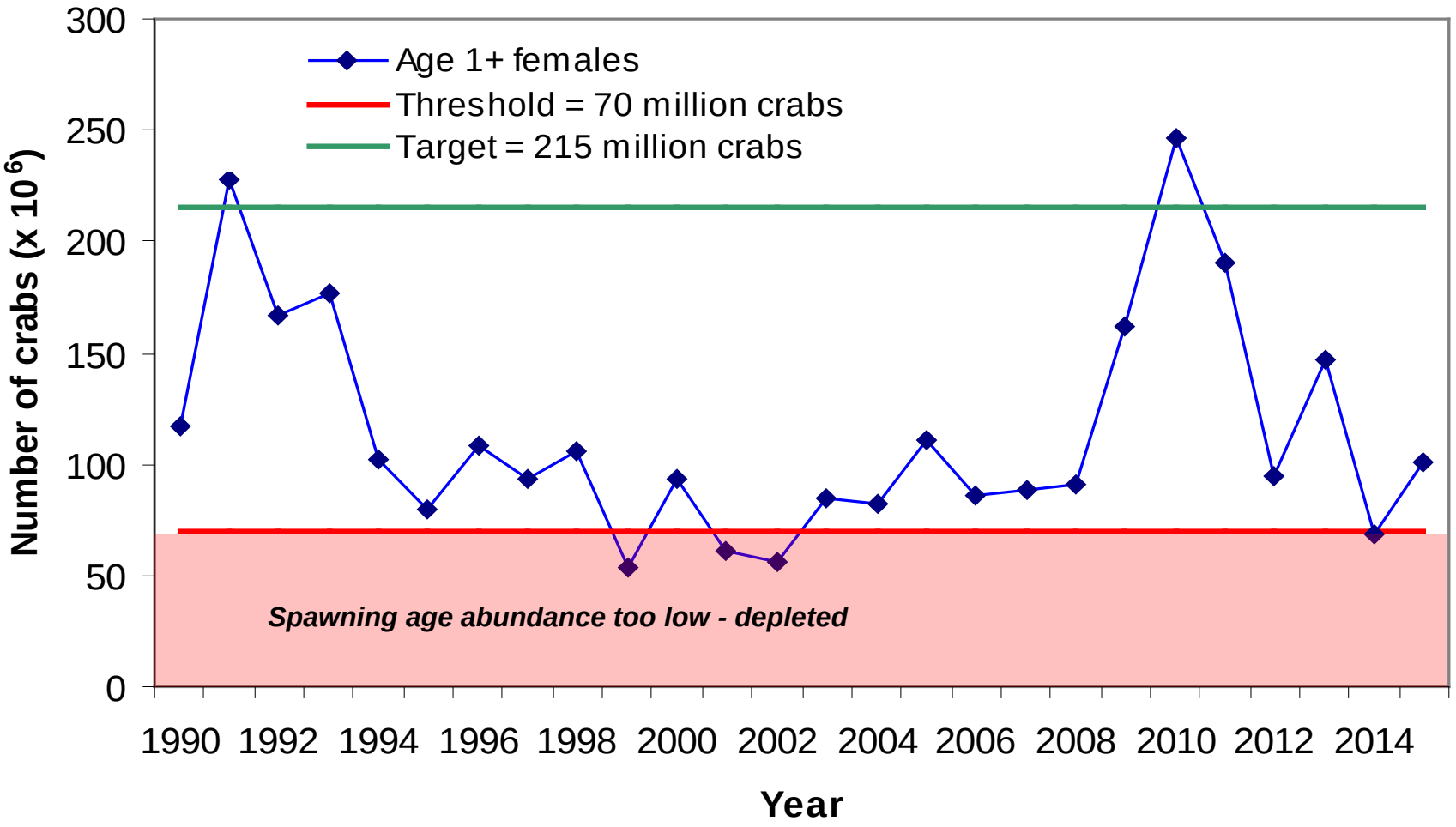
Control Rule	Reference Points			Stock Status				
	Period	Target	Threshold	2011	2012	2013	2014	2015
Exploitation Fraction	Current, Female-specific	25.5%	34% (max)	24%	10%	23%	17%	TBD
Abundance (millions of crabs)	Current, Female-Specific	215	70 (min)	190	97	147	68.5	101

The Chesapeake Bay blue crab stock is currently between the abundance threshold of 70 million age 1+ female crabs and the abundance target of 215 million age 1+ female crabs outlined in the current management framework. The stock is **not depleted and overfishing is not occurring.**

Survey Year (Year Survey Ended)	Total Number of Crabs in Millions (All Ages and Both Sexes)	Number of Juvenile Crabs in Millions (both sexes)	Number of spawning age Female crabs in Millions	Bay-wide Commercial Harvest (Millions of Pounds)	Percentage of Female Crabs Harvested (female exploitation fraction)
1990	791	463	117	96	**44**
1991	828	356	227	90	34
1992	367	105	167	53	**60**
1993	852	503	177	107	**35**
1994	487	295	102	77	28
1995	487	300	80	72	32
1996	661	476	108	69	20
1997	680	512	93	77	22
1998	353	166	106	56	**40**
1999	308	223	**53**	62	**37**
2000	281	135	93	49	**43**
2001	254	156	**61**	47	**42**
2002	315	194	**55**	50	34
2003	334	172	84	47	33
2004	270	143	82	48	**42**
2005	400	243	110	54	24
2006	313	197	85	49	29
2007	251	112	89	43	**35**
2008	293	166	91	49	24
2009	396	171	162	54	23
2010	663	340	246	85	18
2011	452	204	191	67	24
2012	765	581	95	56	10
2013	300	111	147	37	23
2014	297	198	**68.5**	*35*	*17*
2015	411	269	101	*TBD*	*TBD*

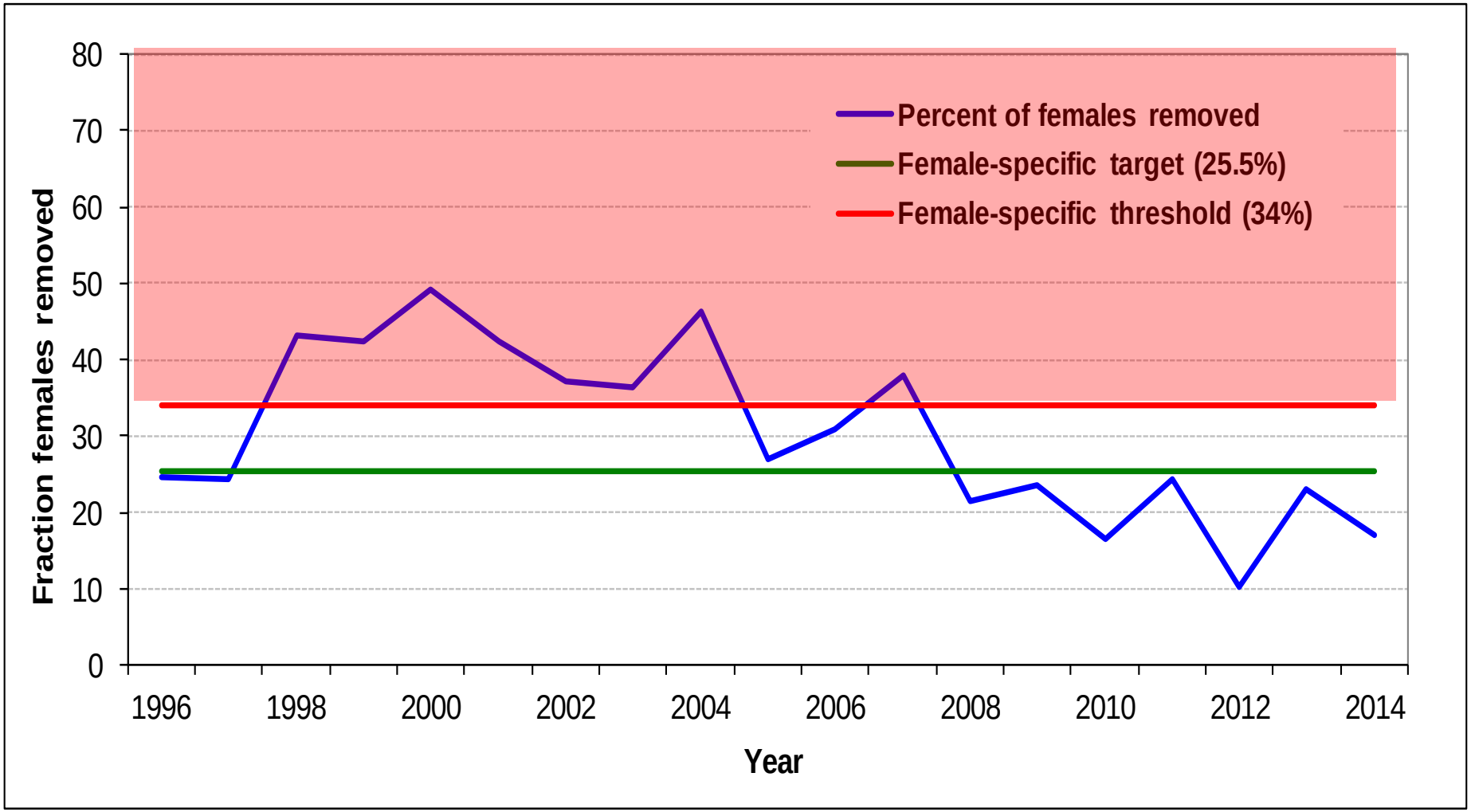
Adult Female Abundance

Winter dredge survey estimate of **abundance of female blue crabs age one year and older** (age 1+) 1990-2015 with female-specific reference points. These are female crabs measuring greater than 60mm across the carapace and are considered the 'exploitable stock' that will spawn within the coming year.



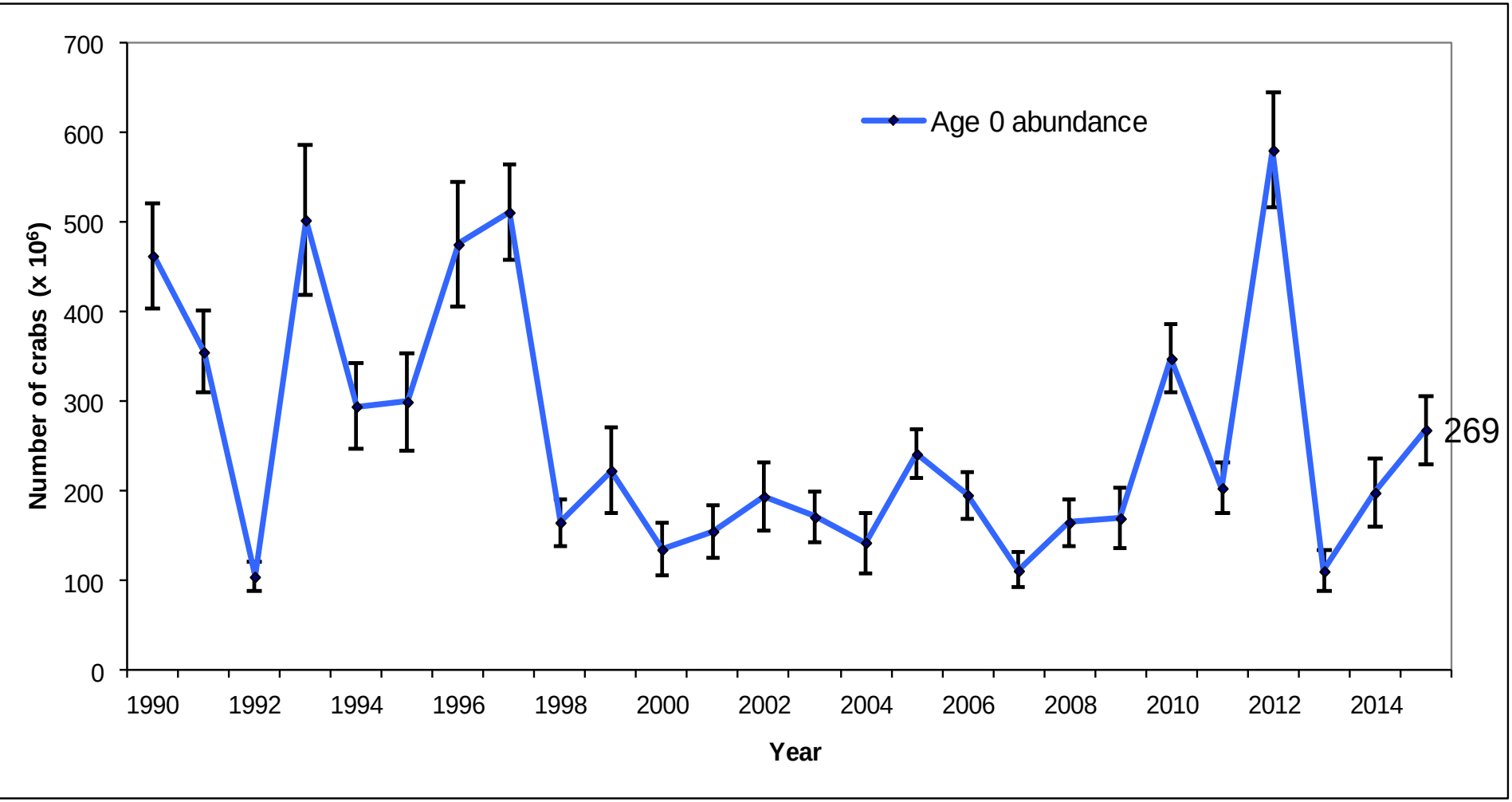
Female Exploitation Rate

The percentage of all female blue crabs removed from the population each year from 1990-2014 by fishing relative to the female-specific reference points. Exploitation rate (% removed) is the number of female crabs harvested within a year divided by the female population (age 0 and age 1+) estimated at the beginning of the year.



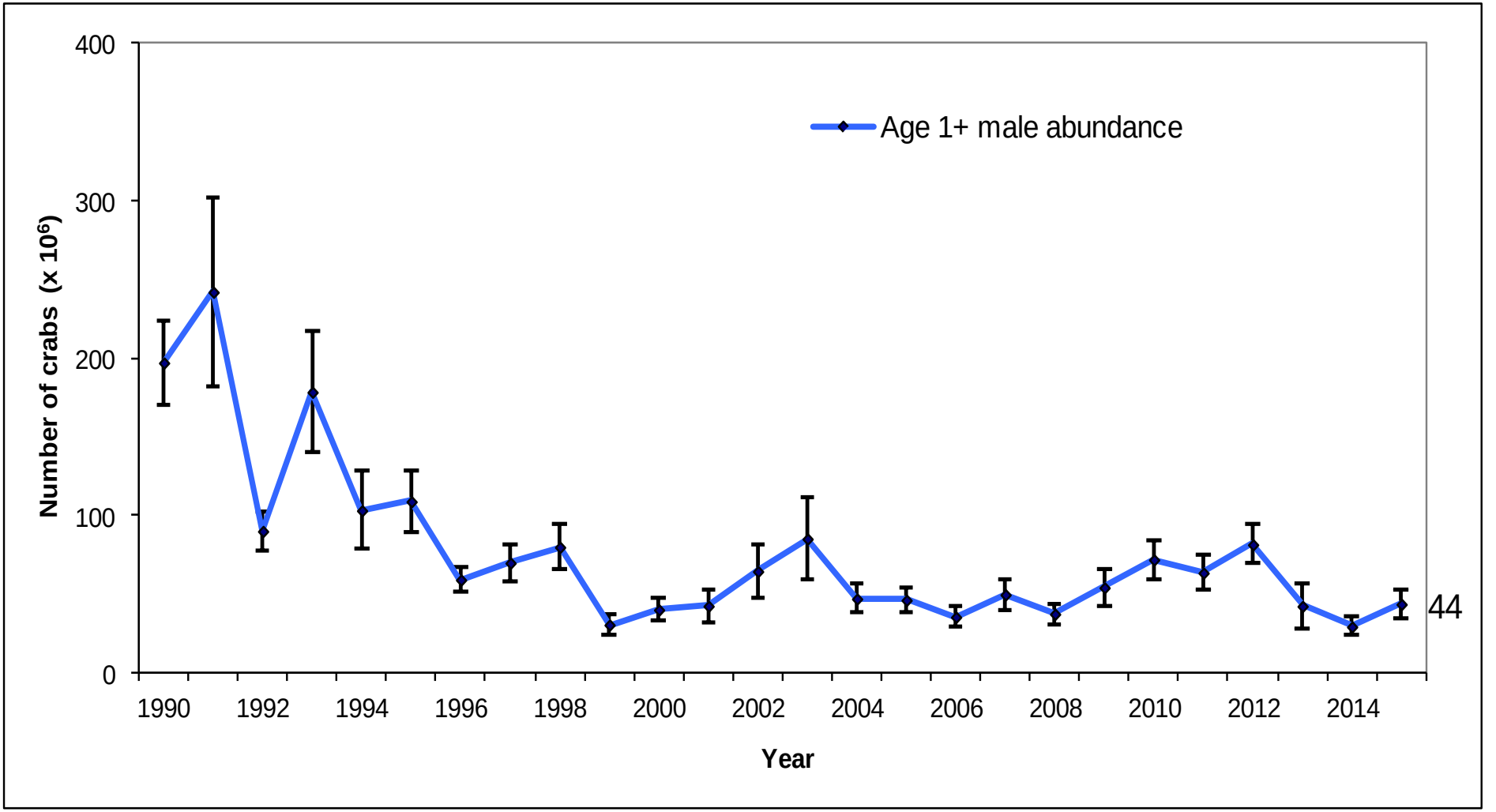
Juvenile Abundance

Winter dredge survey estimate of **abundance of juvenile blue crabs (age 0)**, 1990-2015 calculated without the catchability adjustment for juveniles. These are male and female crabs measuring less than 60mm across the carapace. Error bars represent 95% confidence intervals.



Adult Male Abundance

Winter dredge survey estimate of **abundance of male blue crabs age one year and older (age 1+)** 1990-2015. These are male crabs measuring greater than 60mm across the carapace and are considered the 'exploitable stock' capable of mating within the coming year. Error bars represent 95% confidence intervals.



Male Conservation Triggers

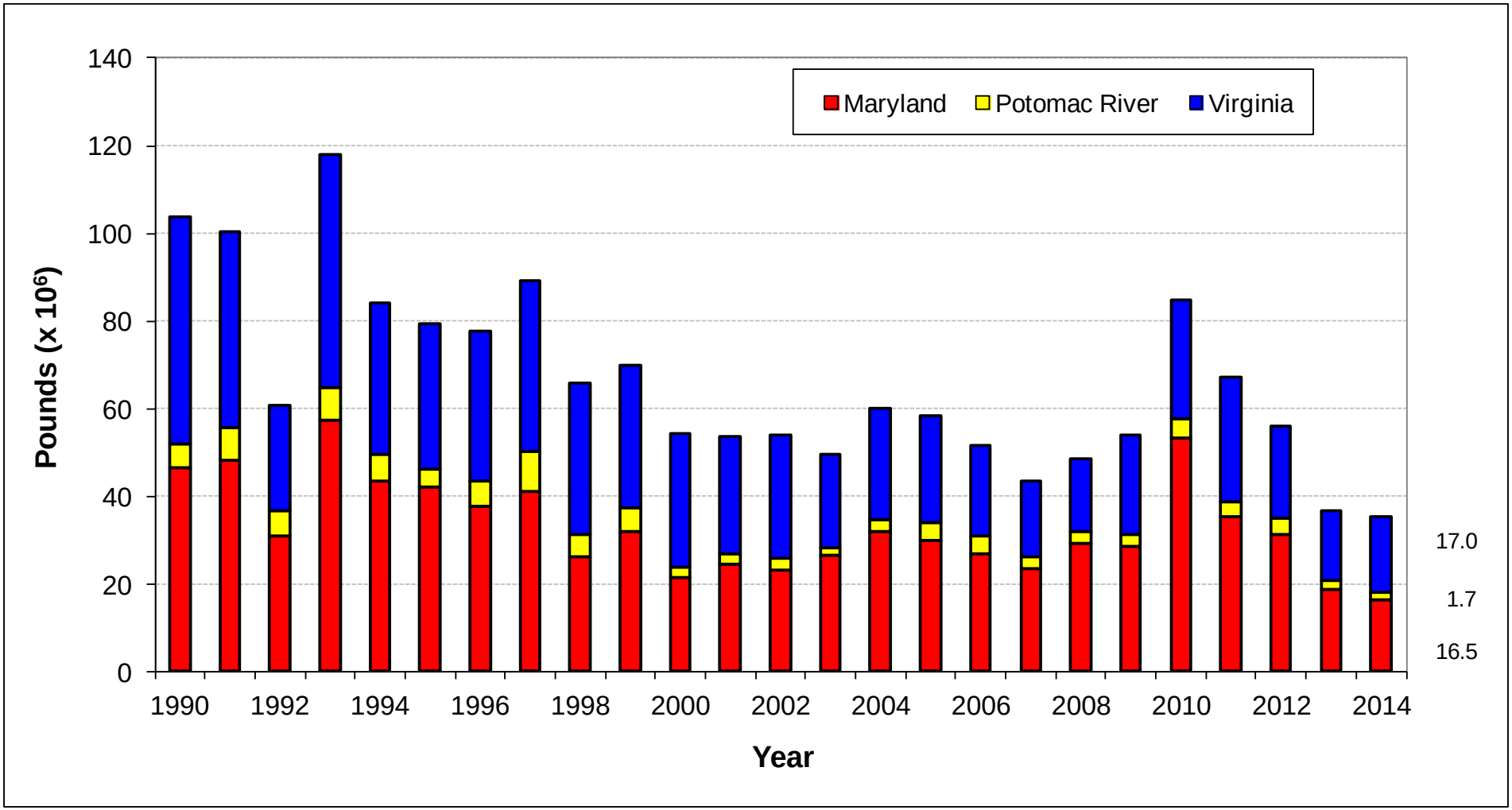
Conservation measures should be considered for males if either of the following occurs:

1. The male exploitation rate exceeds 33%.
2. The female exploitation rate is below the established overfishing threshold of 34% and the total annual exploitation rate of male and female crabs exceeds the 53% threshold of the previous control rule for both sexes combined.

Neither trigger was pulled in 2014. No management action is recommended at this time specific to male blue crabs.

Commercial Harvest

Total commercial blue crab landings (all market categories) in Chesapeake Bay, 1990-2014.



Overwintering Mortality

The 2014 estimates of overwintering mortality of blue crabs in the Bay are some of the highest values in recent history. Overwintering mortality decreased the abundance of all sectors of the blue crab population in 2014.

Percent dead crabs found in late winter dredge samples each year from 2012-2015 and the average for 1996-2011[1].

Bay wide Age/sex group	2015	2014	2013	2012	96-11 avg
All crabs	15.68%	3.79%	4.00%	1.59%	4.78%
Juveniles	10.84%	0.89%	0.00%	0.52%	1.00%
Adult Females	19.25%	7.68%	3.00%	2.69%	9.53%
Adult males	28.11%	13.58%	13.88%	4.90%	9.11%

[1] 1996 was the first year MDNR sampled specifically in mid to late March to assess the level of over-wintering mortality. 1996 – 2010 values are Maryland only. Mortality in random samples from Virginia's portion of the dredge survey were incorporated beginning in 2011 by applying the percent dead crabs according to sampling vessel.

Overwintering Mortality

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Baywide abundance estimates for 2015 before and after overwintering mortality.

Baywide Age/sex group	Abundance estimate in millions before overwintering mortality (millions of crabs)	Final abundance estimate in millions after overwintering mortality (millions of crabs)	% Overwintering mortality
All crabs	487	411	16%
Juveniles	302	269	11%
Adult Females	125	101	19%
Adult Males	61	44	28%

Management Advice Short-Term

1. Monitor fishery performance and stock status relative to recommended reference points and maintain a risk-averse management approach protecting 2015 recruits.

- 2014 female exploitation fraction was below the 25.5% target for the seventh consecutive year.
- Juvenile and adult female blue crabs increased, but the number of recruits remains highly variable year to year.
- Future catches and the ability of the stock to reach abundance target could depend on the survival and successful reproduction of the 2016 exploitable female stock. Conservation of this year's juveniles is expected to maintain or increase the future spawning potential.
- *This is further justification for a continued risk-averse and cautious management approach that ensures harvest is adequately constrained relative to abundance and the target exploitation fraction.*

Management Advice Short-Term

2. Catch Reports: CBSAC again recommends that the jurisdictions implement procedures that provide accurate accountability of all commercial and recreational harvest. If the jurisdictions continue with a sex-specific regulatory strategy, CBSAC again recommends greater efforts to determine the biological characteristics of all catch, both harvested and discarded.

– All three management jurisdictions have current, ongoing efforts to improve the quality of catch and effort information submitted by commercial and recreational harvesters (i.e. pursuing new reporting technologies).

Update on July to July Management

CBSAC agreed to further explore the potential long-term impacts of a July to July management time frame and will report back at a future date.

The July to July timeframe was identified in the 2014 Advisory Report as short-term management advice. The management jurisdictions adopted the timeframe for the 2014-15 season.

Management Advice Long-Term

1. Catch Control: CBSAC supports the commitment of the blue crab management jurisdictions in the 2014 Watershed Agreement to evaluate the establishment of a Baywide allocation-based management framework.

– A management strategy that sets annual catch levels based on estimates of abundance from the WDS and that accounts for sex-specific, spatial, seasonal distribution of crabs could potentially balance annual harvests with highly variable recruitment events.

Management Advice Long-Term

2. Annual sanctuary and complementary management measures.

- CBSAC recommends that the jurisdictions consider establishing a year-round sanctuary for mature females in the lower Bay, and complementary sanctuaries or other management measures in the upper Bay and Potomac River that would promote survival of mature females in their first and subsequent spawning seasons.
- Protection of mature females in multiple spawning seasons should bolster the spawning stock and recruitment, and provide a buffer for the population from the combined effects of environmental disturbance and high fishing pressure.

Management Advice Long-Term

3. Abundance specific exploitation: In the upcoming 2016-17 stock assessment CBSAC recommends the evaluation of variable targets and thresholds based on the fluctuating abundance of all sectors of the female segment of the population.

4. Jurisdictional Management Controls: CBSAC recommends an increased investment in Bay-wide effort monitoring that should include actions in all jurisdictions to implement a pot marking system and a bay wide survey of crab pot effort to estimate the total, spatial, and temporal patterns of the crab pot fishery.

Management Advice Long-Term

5. Latent Effort: CBSAC recommends that the level and possible re-entry of latent effort into the fishery be estimated and monitored.

- In both states, numerous commercial crabbing licenses are unused. An increase in the blue crab population may increase the use of licenses that have, for some time, been inactive.
- In addition to increases in latent effort, CBSAC also recognizes that temporal and seasonal shifts in blue crab abundance may alter existing effort exerted by active licenses.
- The impact of inherent variability of blue crab abundance on both latent and active effort should be investigated as a part of this recommendation.

Critical Data and Analysis Needs

1. Increased accountability and harvest reporting for both commercial and recreational fisheries.
2. Gear efficiency pertaining to selectivity of WDS methods.
3. Improve recruitment estimates through shallow water survey.
4. Investigation of the potential for sperm limitation.

Critical Data and Analysis Needs

5. Other sources of incidental mortality (specifically sponge crab discards, unreported losses after harvest from the peeler fishery, disease, and predation).
6. Gear efficiency pertaining to selectivity of WDS methods.
7. Collaborative Baywide fishery independent study focused on the spring through fall distribution and sex-specific abundance of blue crabs.

CBSAC Participants:

Joe Grist (Chair)	Virginia Marine Resource Commission
Ellen Cosby	Potomac River Fisheries Commission
Glenn Davis	Maryland Department of Natural Resources
Lynn Fegley	Maryland Department of Natural Resources
Daniel Hennen	NMFS, Northeast Fisheries Science Center
John Hoenig	Virginia Institute of Marine Science
Eric Johnson	University of North Florida
Rom Lipcius	Virginia Institute of Marine Science
John McConaugha	Old Dominion University
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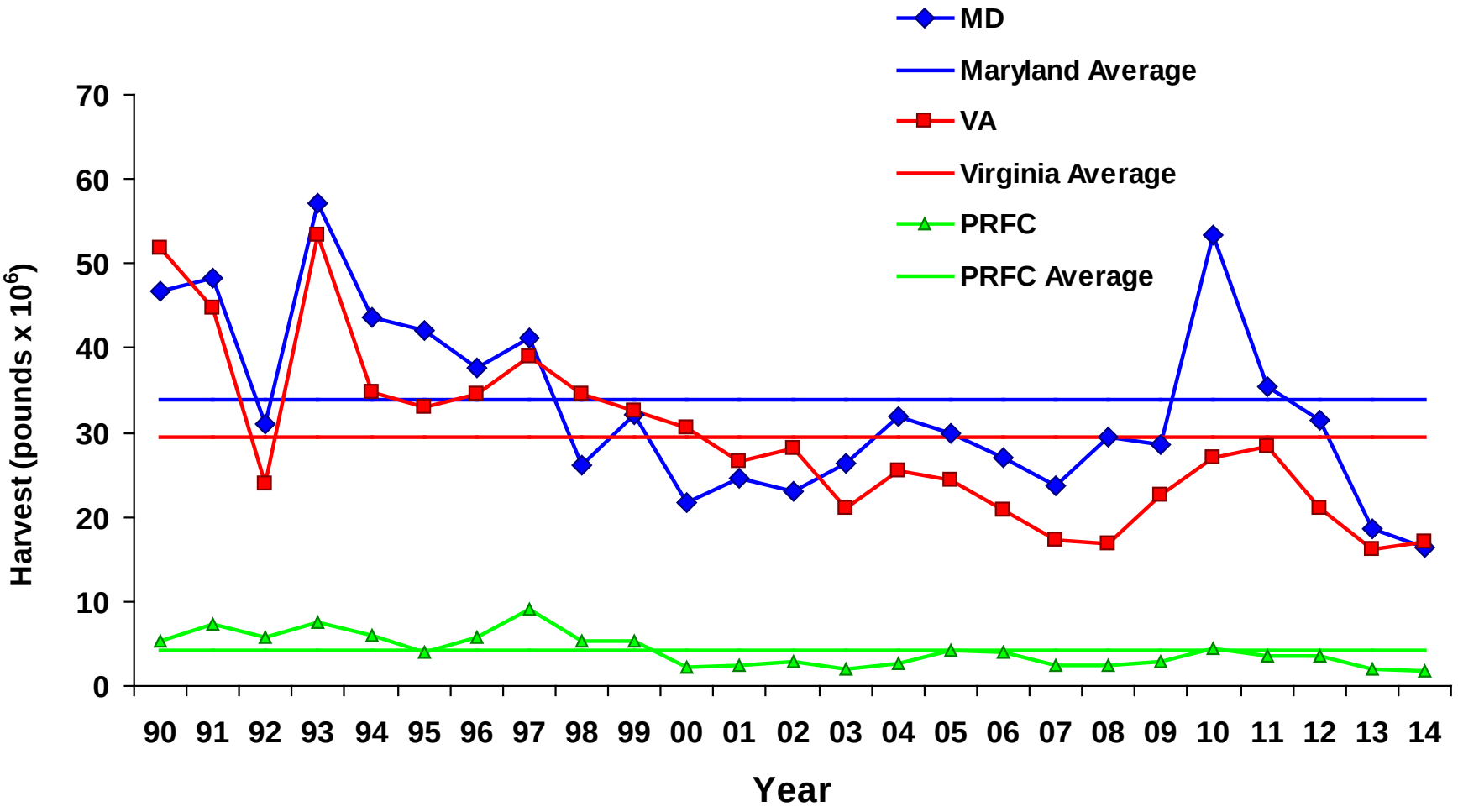
Rob O'Reilly	Virginia Marine Resource Commission
Amy Schueller	NMFS, Southeast Fisheries Science Center
Mike Seebo	Virginia Institute of Marine Science
Alexei Sharov	Maryland Department of Natural Resources
Mike Wilberg	UMCES, Chesapeake Biological Laboratory

Commercial Harvest

Maryland[1], Virginia[1], Potomac River commercial blue crab harvest in millions of pounds, all market categories,1990-2014.



1. Chesapeake Bay harvest only.