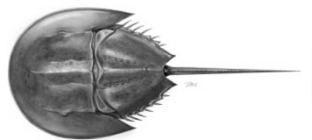




# Horseshoe Crab Technical Committee Report

Presented to Horseshoe Crab  
Management Board  
October 30 , 2014





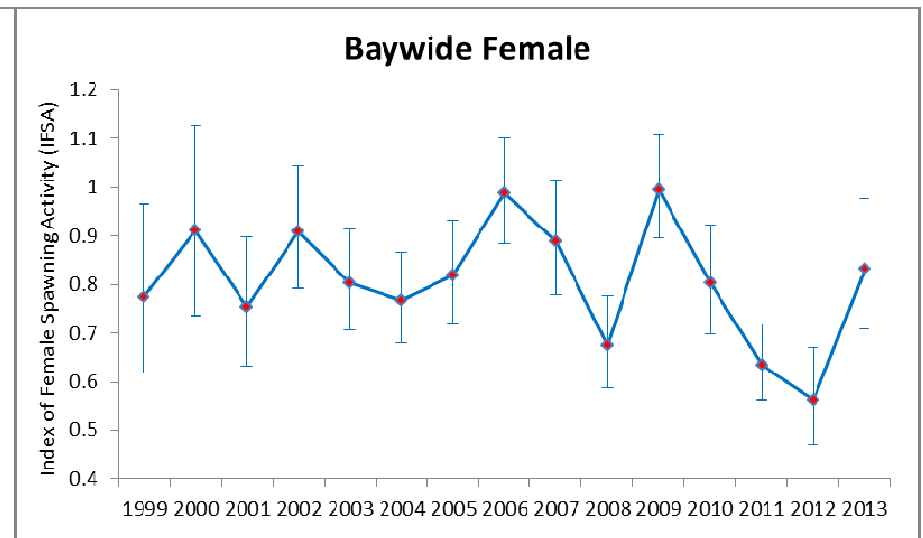
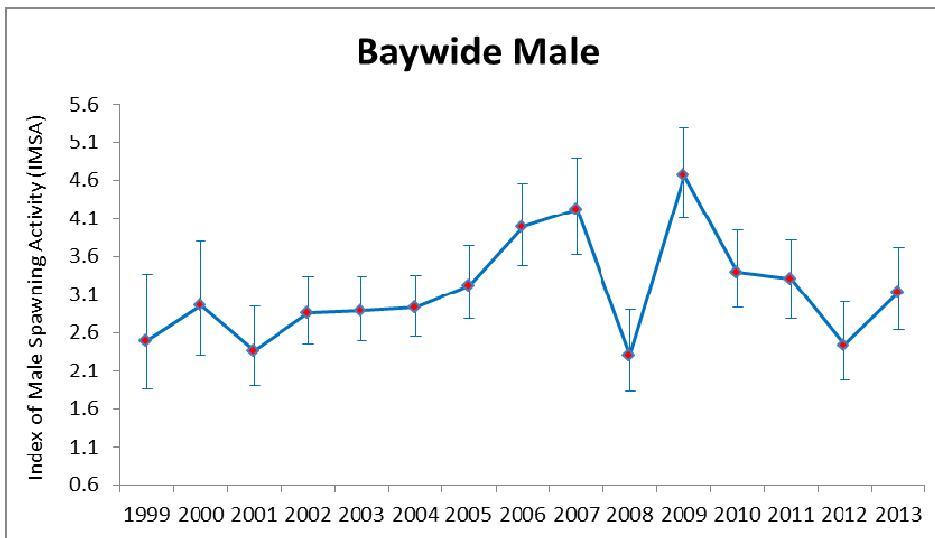
**2013 Delaware Bay Horseshoe  
Crab Spawning Survey**

# DELAWARE BAY SPAWNING SURVEY



Year	Beaches Surveyed	Male				Female				Annual Sex Ratio (M:F)
		ISA	90% CI	SD	CV (%)	ISA	90% CI	SD	CV (%)	
1999	17	<b>2.50</b>	1.86, 3.37	0.45	18	<b>0.77</b>	0.62, 0.97	0.10	13	3.2
2000	22	<b>2.96</b>	2.31, 3.80	0.45	15	<b>0.91</b>	0.74, 1.13	0.12	13	3.2
2001	22	<b>2.37</b>	1.91, 2.95	0.31	13	<b>0.75</b>	0.63, 0.90	0.08	10	3.1
2002	23	<b>2.86</b>	2.45, 3.34	0.27	9	<b>0.91</b>	0.79, 1.04	0.07	8	3.1
2003	23	<b>2.89</b>	2.50, 3.33	0.25	9	<b>0.80</b>	0.71, 0.91	0.06	8	3.6
2004	24	<b>2.93</b>	2.55, 3.36	0.24	8	<b>0.77</b>	0.68, 0.87	0.06	7	3.8
2005	23	<b>3.23</b>	2.79, 3.74	0.29	9	<b>0.82</b>	0.72, 0.93	0.07	9	3.9
2006	24	<b>3.99</b>	3.49, 4.56	0.33	8	<b>0.99</b>	0.89, 1.10	0.07	7	4.0
2007	24	<b>4.22</b>	3.63, 4.90	0.38	9	<b>0.89</b>	0.78, 1.01	0.07	8	4.7
2008	25	<b>2.30</b>	1.83, 2.90	0.32	14	<b>0.68</b>	0.59, 0.78	0.06	9	3.4
2009	26	<b>4.67</b>	4.11, 5.29	0.36	8	<b>1.00</b>	0.89, 1.11	0.06	6	4.7
2010	25	<b>3.39</b>	2.93, 3.94	0.31	9	<b>0.80</b>	0.70, 0.92	0.07	8	4.2
2011	25	<b>3.31</b>	2.83, 3.87	0.31	10	<b>0.64</b>	0.57, 0.72	0.05	7	5.2
2012	25	<b>2.44</b>	1.97, 3.01	0.31	13	<b>0.56</b>	0.47, 0.67	0.06	10	4.4
2013	25	<b>3.14</b>	2.65, 3.71	0.32	10	<b>0.83</b>	0.71, 0.98	0.08	10	3.8

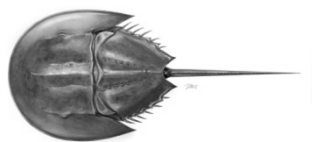
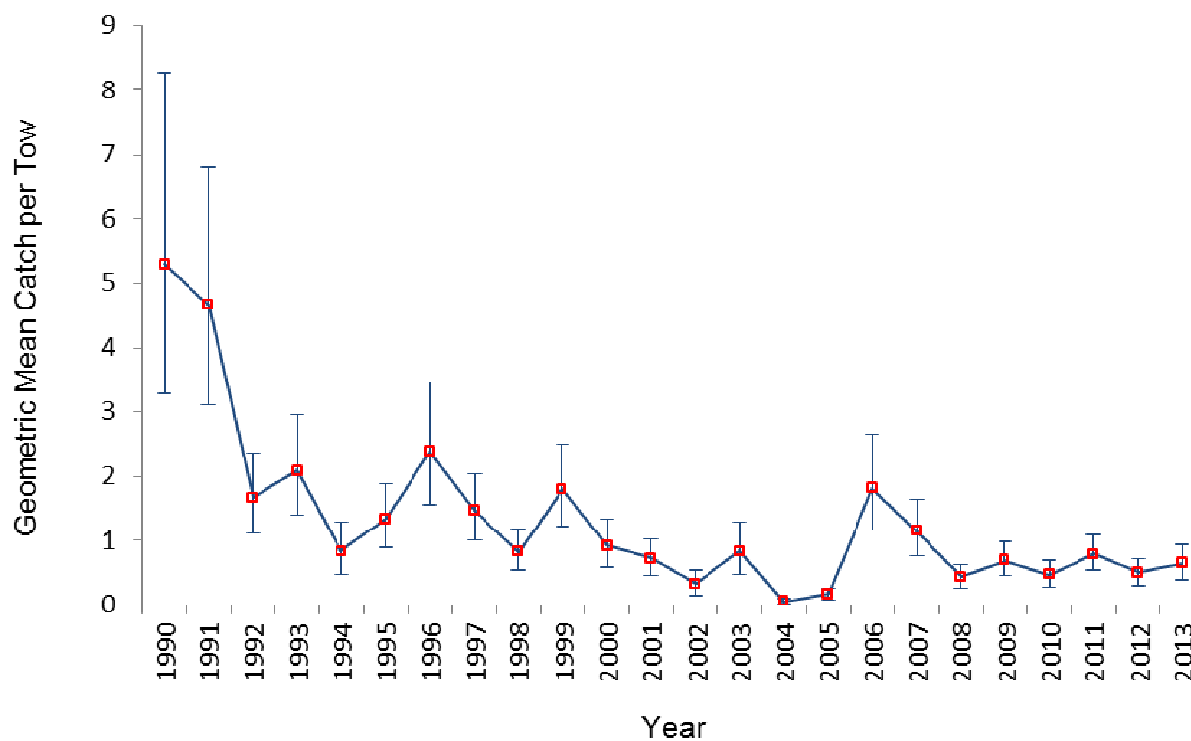
- ♂ • Slight increase, not sig
- ♀ • Slight decrease, not sig



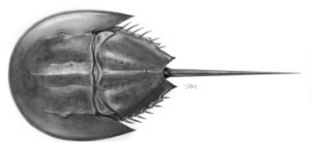
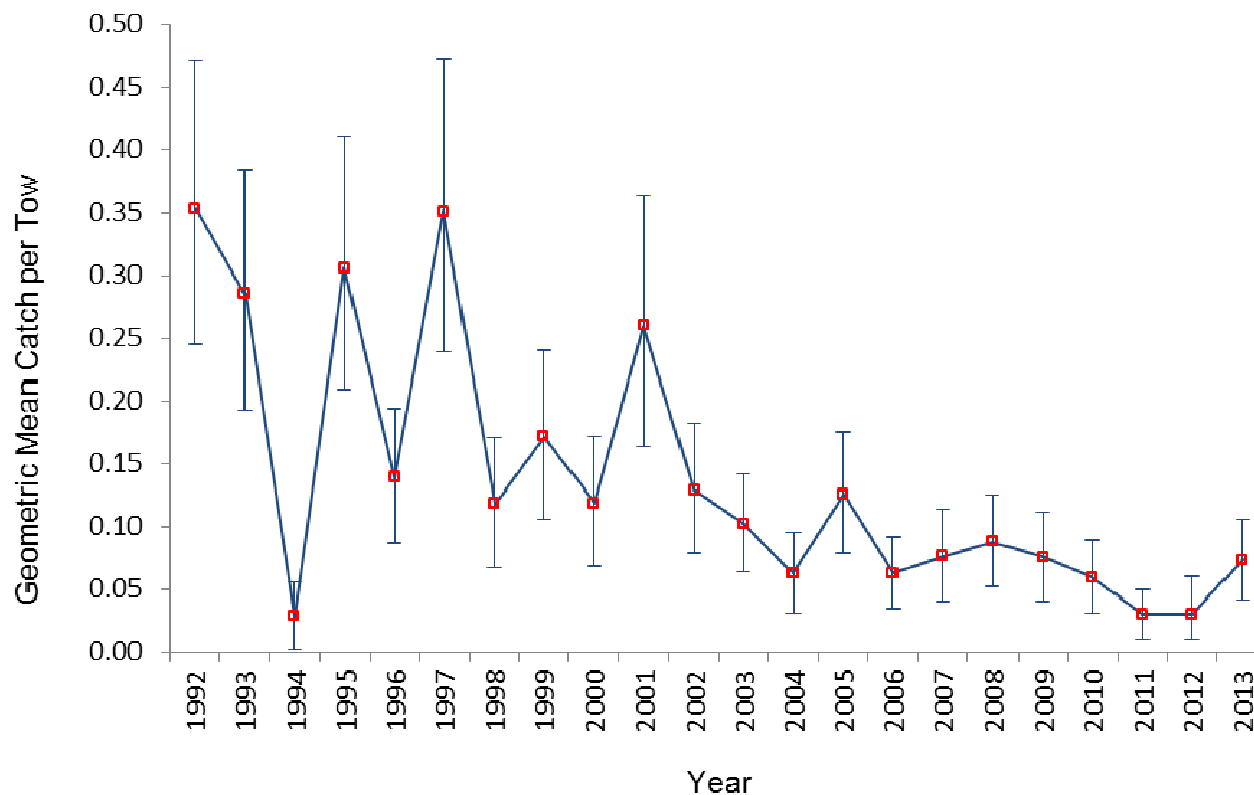


# Delaware Trawl Survey

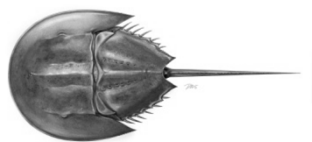
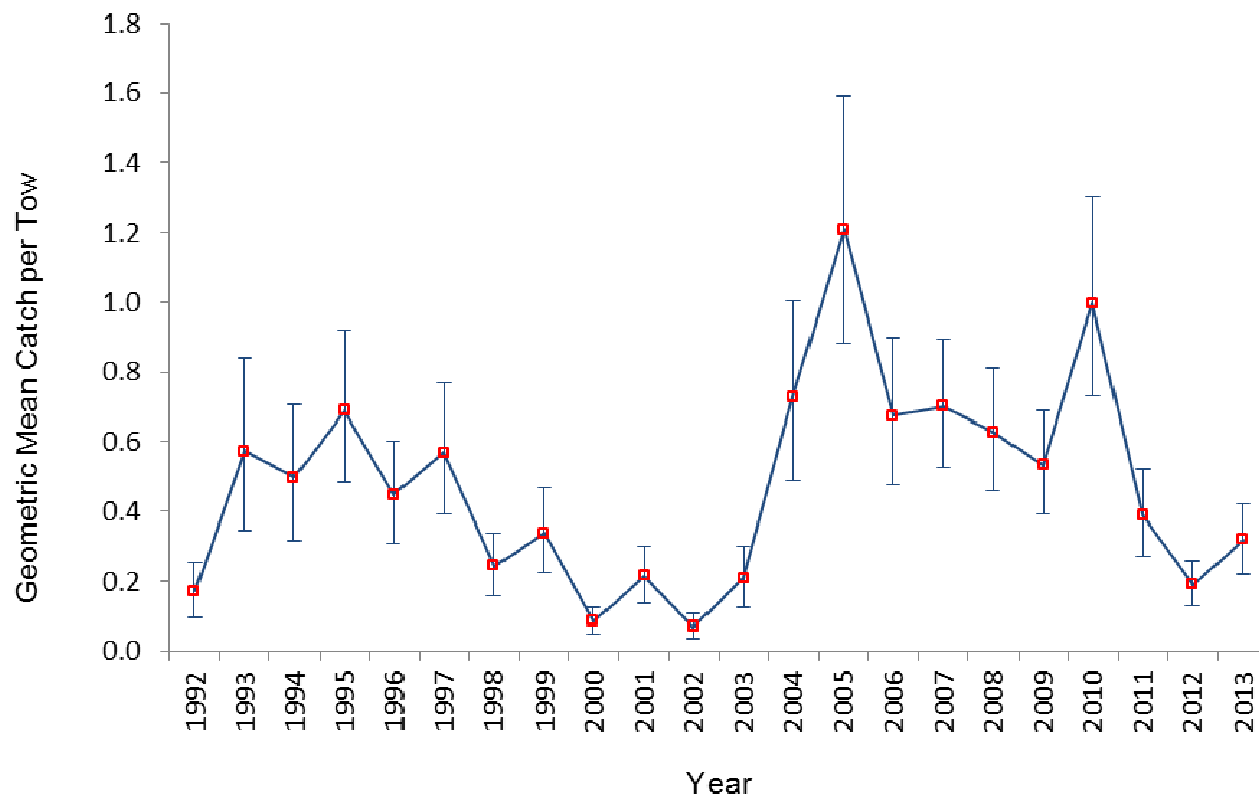
# 30 ft. Trawl Catch -All months



# 16 ft. Trawl Catch- Adult (>160 mm)



# 16ft. Trawl Catch - Juvenile (<160 mm)





# Red Knot Abundance Estimates

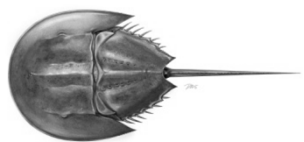
Photo Credit: Larry Flynn, Hartford Audubon





# Annual ARM Procedure

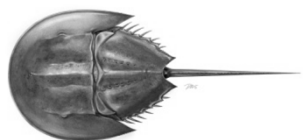
- Estimate abundance for Knots and male and female HSC adults
- Adjust abundance estimate to nearest abundance bin in the ARM state space model
  - Round down to the nearest non-zero value
- Use optimal policy table to identify harvest package





# VT Trawl survey cancelled in 2013

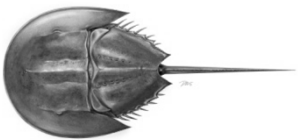
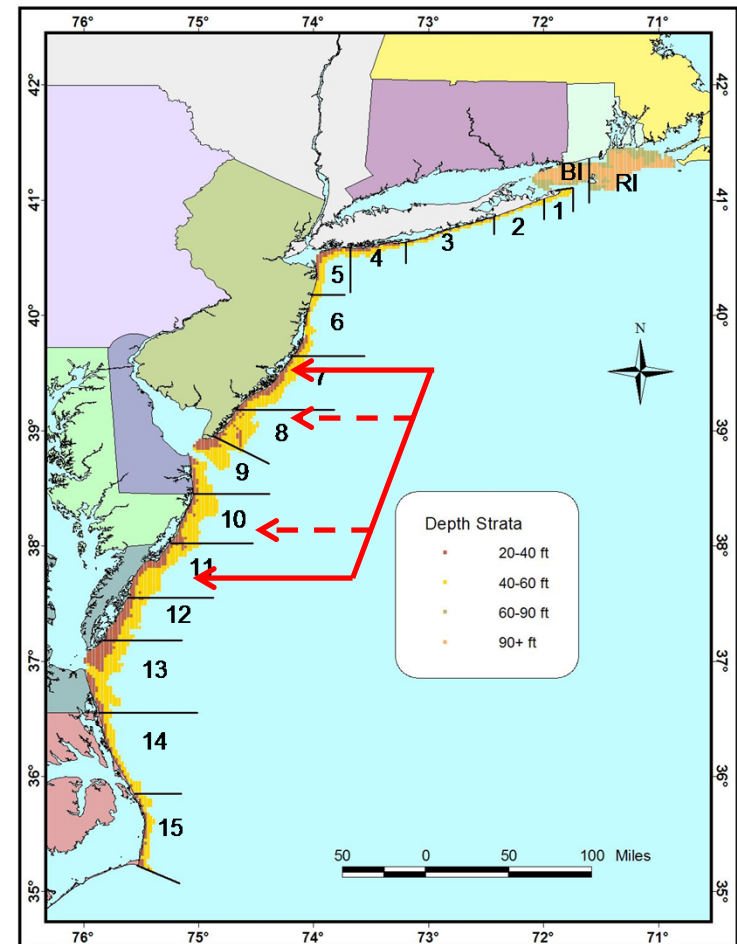
- Due to Funding lapses VT Trawl survey was cancelled
- NOAA's NEMAP survey was identified as a possible alternative data source
  - Similar survey but HSC not targeted (i.e., not designed for HSC)



# Usable Data



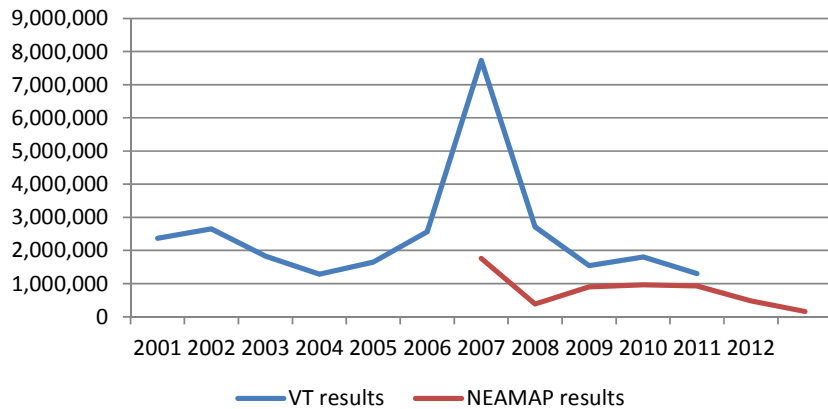
- Subset to Fall cruises only
  - Correspond with VT Trawl timing
- Subset to VT Trawl regions
- 37° 40' to 39° 20'
- Separated into core and peripheral



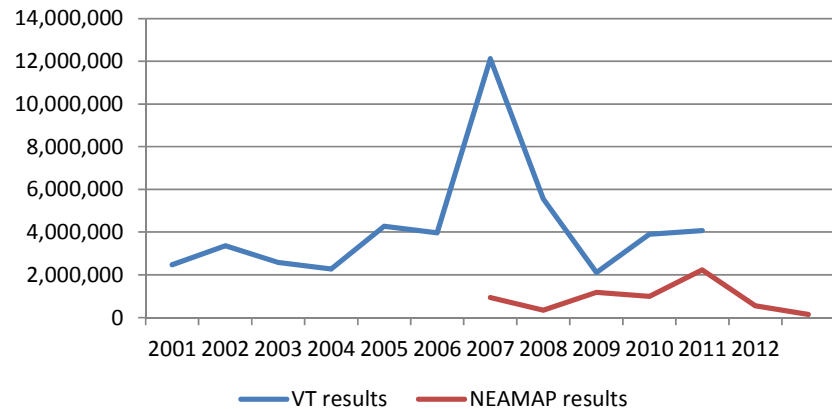
# Results



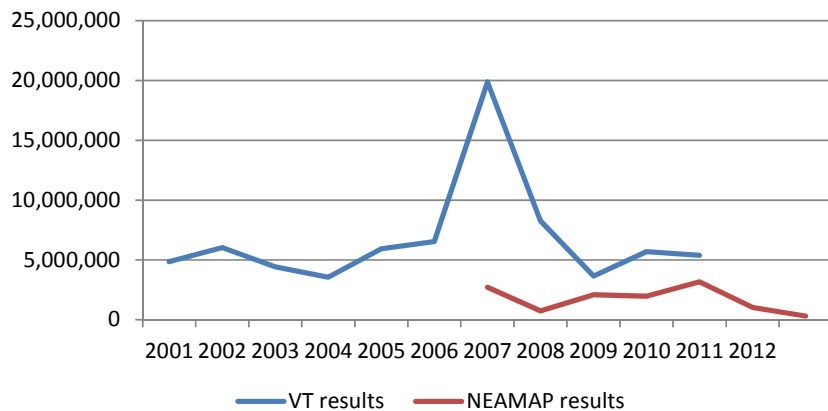
### Estimated female abundance



### Estimated male abundance



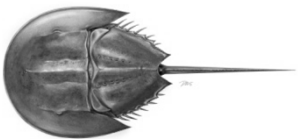
### Estimated male+female abundance



Correlation in female trends is good (0.77)

Male correlation is bad (-0.27)

Difference in scales is substantial and not constant over time



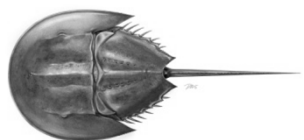


# Harvest Recommendations

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Option Number	Female Abundance (number of crabs)	Male Abundance (number of crabs)	Harvest Package Recommendation
1	3,183,411	5,981,455	3
2	1,091,935	1,930,124	1
3	1,091,935	1,943,939	1
4	3,758,489	4,886,022	2

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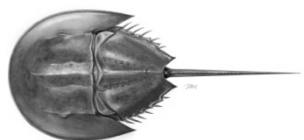




# ARM Framework Recommendations

State	Delaware Bay Origin HSC		Total State Quota	
	Male	Female	Male	Female
Delaware	162,136	0	162,136	0
New Jersey	162,136	0	162,136	0
Maryland	141,112	0	255,980	0
Virginia	34,615	0	81,331	0

\*Virginia quota refers to harvest east of the COLREGS line.



# ARTIFICIAL BAIT TRIALS



Photo credit: MBL, Woods Hole

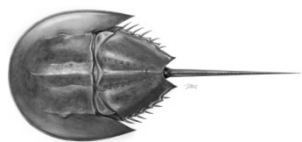


Photo Credit: Paige Herman

# Questions?



Photo Credit: New London Day

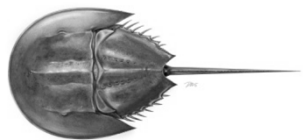






# **HSC Specifications for Delaware Bay Region**

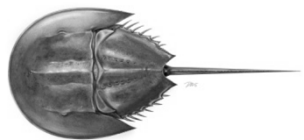
**Presented to Horseshoe Crab  
Management Board  
October 30, 2014**





# ARM Harvest Recommendations

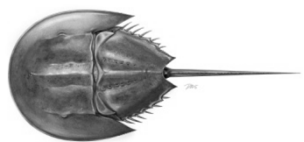
- Model is based on estimates of red knot and horseshoe crab abundance
  - **HSC abundance data from Virginia Tech 2012 Trawl Survey – no data for 2013**
  - Shorebird Abundance from 2013 Mark-Resight Survey
- ARM Model recommends the same harvest package as 2014 for 2015





# ARM Optimum Harvest Packages

Harvest package	Male harvest (×1,000)	Female harvest (×1,000)
1	0	0
2	250	0
<b>3</b>	<b>500</b>	<b>0</b>
4	280	140
5	420	210

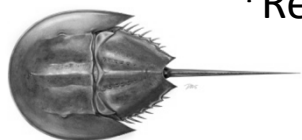




# HSC Quota By State

<i>State</i>	<b>Delaware Bay Origin HSC Quota</b>		<b>Total Quota</b>	
	<i>Male</i>	<i>Female</i>	<i>Male</i>	<i>Female</i>
<b>Delaware</b>	<b>162,136</b>	<b>0</b>	<b>162,136</b>	<b>0</b>
<b>New Jersey</b>	<b>162,136</b>	<b>0</b>	<b>162,136</b>	<b>0</b>
<b>Maryland</b>	<b>141,112</b>	<b>0</b>	<b>255,980</b>	<b>0</b>
<b>Virginia</b>	<b>34,615*</b>	<b>0</b>	<b>81,331*</b>	<b>0</b>

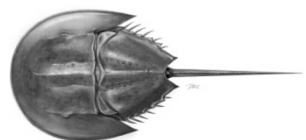
\*Refers to harvest east of the COLREGS line.





## Questions?

State	Total Quota	
	Male	Female
Delaware	162,136	0
New Jersey	162,136	0
Maryland	255,980	0
Virginia	81,331	0

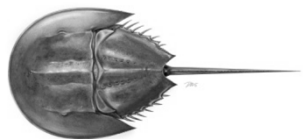




# **2014 Horseshoe Crab FMP Review**

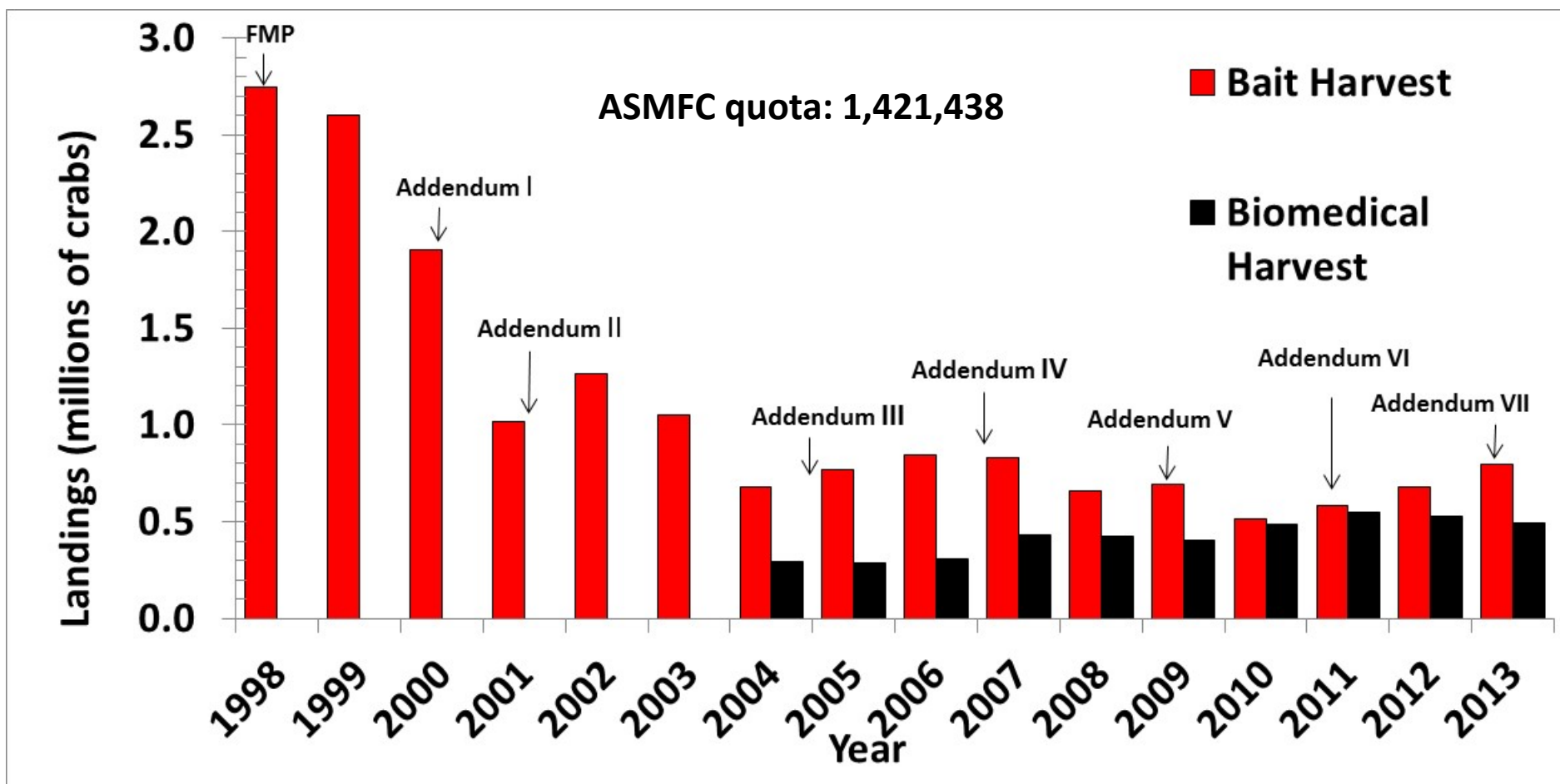
**Presented to the Horseshoe Crab  
Management Board**

**October 30, 2014**





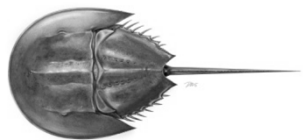
# Annual Total Harvest





# 2013 Bait Fishery

- **Total coastwide harvest of 796,939 crabs**
  - Increase of ~18% from 2012
  - Harvest still well below coastwide quota (1.4 million crabs)

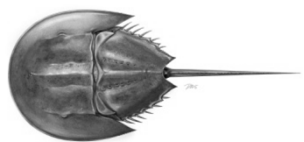






# Biomedical Harvest

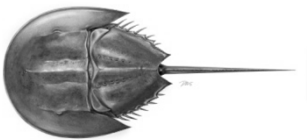
- **Reported number of crabs brought to biomedical facilities: 549,937**
  - **3% decrease from previous 5-year average**
- **Crabs used as bait and bled: 60,622**
  - **33% decrease from past 5-year average**
- **Coastwide mortality estimate: 78,007**





# State Compliance

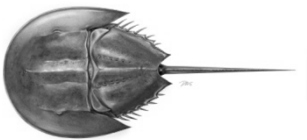
- **PRT found all states management measures to be consistent with the FMP**
- **DC did not submit a report**
  - **PRT recommends that DC, as well as PRFC, take steps to be removed from Board**





# Additional Issues

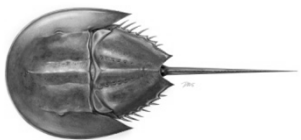
- **PRT and TCs strongly recommends the continuation of the Benthic Trawl Survey**





## Request for *de minimis*

- NH, PRFC, SC, GA, and FL all qualify and request *de minimis* status for 2014
- NJ qualified but did not request
- PRT recommends all requests for *de minimis* status be granted





**Questions?**

