Evaluating the Recreational Blue Crab Fishery in Maryland using Mark-Recapture Methods

Matthew B. Ogburn, Robert F. Semmler, Rob Aguilar, Anson H. Hines

Smithsonian Environmental Research Center

Acknowledgements

- Maryland watermen and recreational crabbers
- Maryland Sea Grant
- Marjorie Reaka (UM College Park) and Elizabeth North (UMCES)
- Eric Johnson (University of North Florida)
- SERC technicians and interns

Recreational creel surveys

Year	Crabs (M)	Male hard crabs	All males	% Total
2001	5.0	16.0%	13.6%	7.0%
2002	3.2	9.9%	9.6%	4.8%
2005	5.6	13.2%	12.6%	6.5%
2011	5.1	7.1%	8.4%	5.1%

Ashford and Jones 2001, 2002, 2005, 2011

Estimating statewide recreational harvest

Commercial Harvest

X

Rec

Comm

=

Recreational Harvest

Estimating statewide recreational harvest

Commercial Harvest

x

Rec

Comm

=

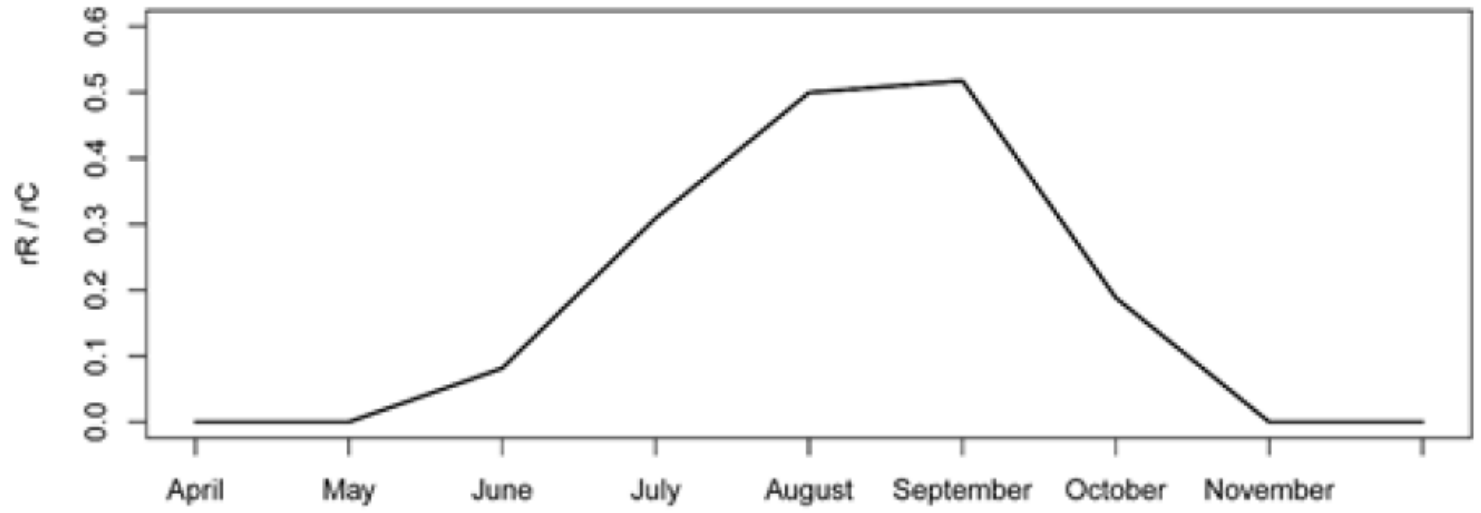
Recreational Harvest

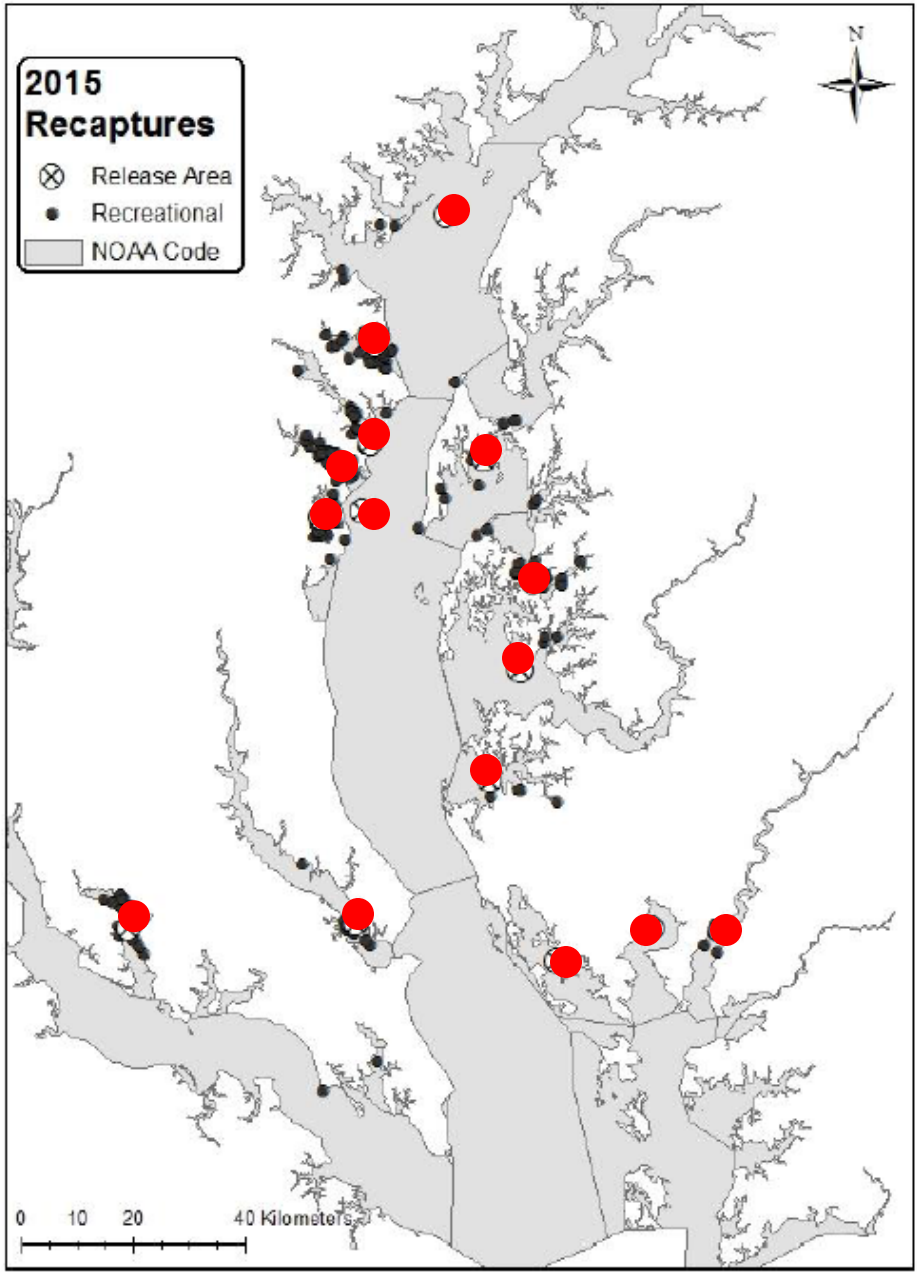
1. Estimate (Rec / Comm) for month of release at each site (commercial data are monthly)
2. Estimate (Rec / Comm) for sites without tagged crabs
3. Use seasonal relationship to determine (uR / uC) in other months

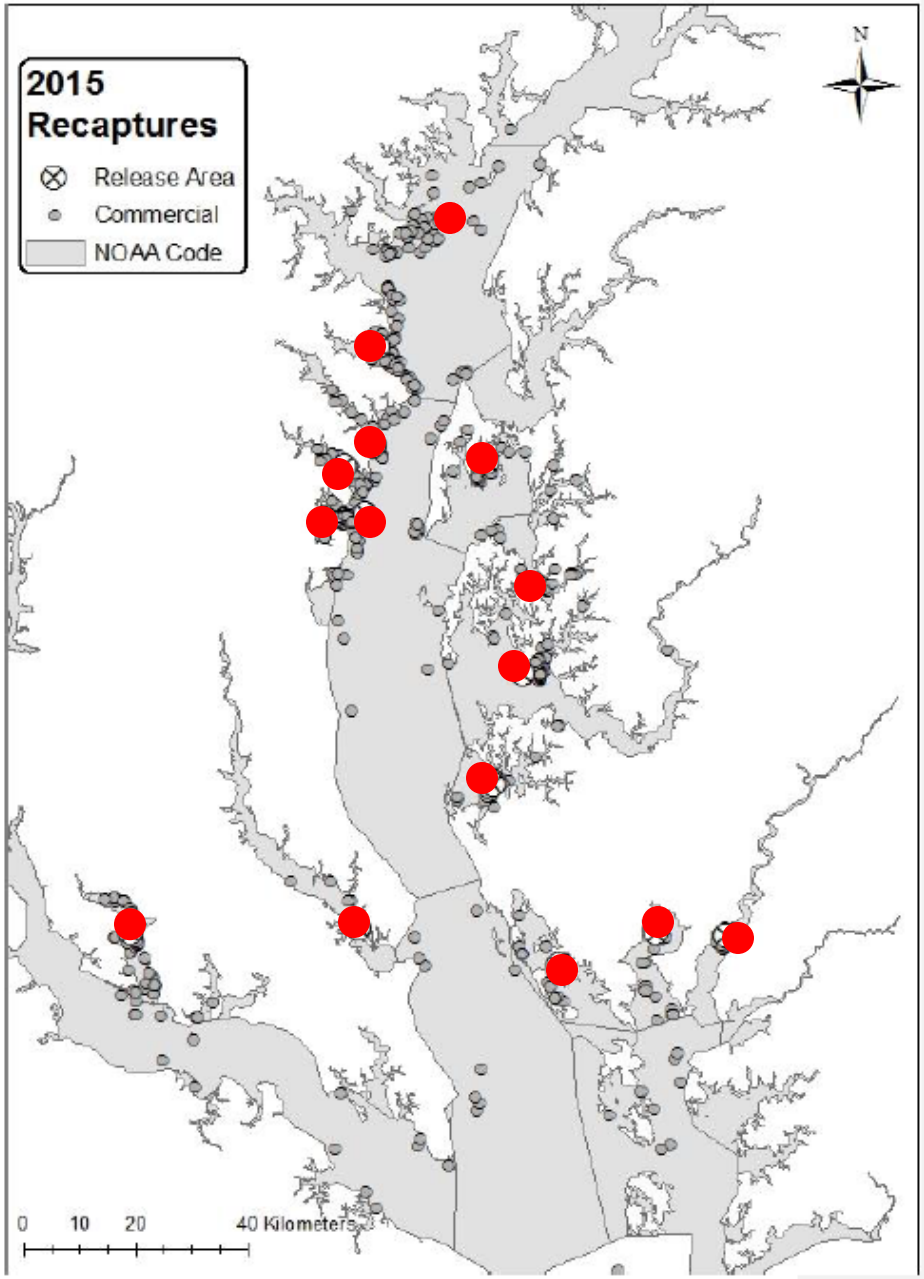
Crab tagging, recaptures and gear type

1. Of 8,741 crabs tagged at 15 sites, 35% of males and 11% of females were caught
2. 1,552 commercial (75% trotline, 25% pot)
3. 444 recreational (62% trotline, 18% pot, 12% trap)

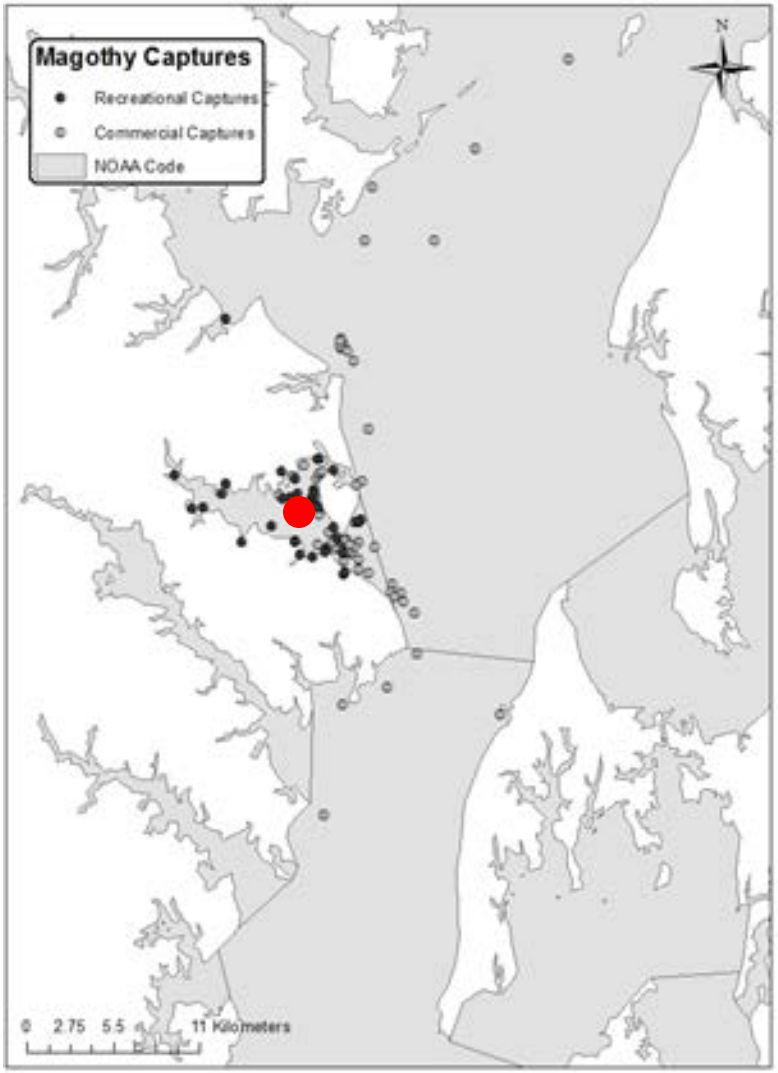
Seasonal variation (in 2014)

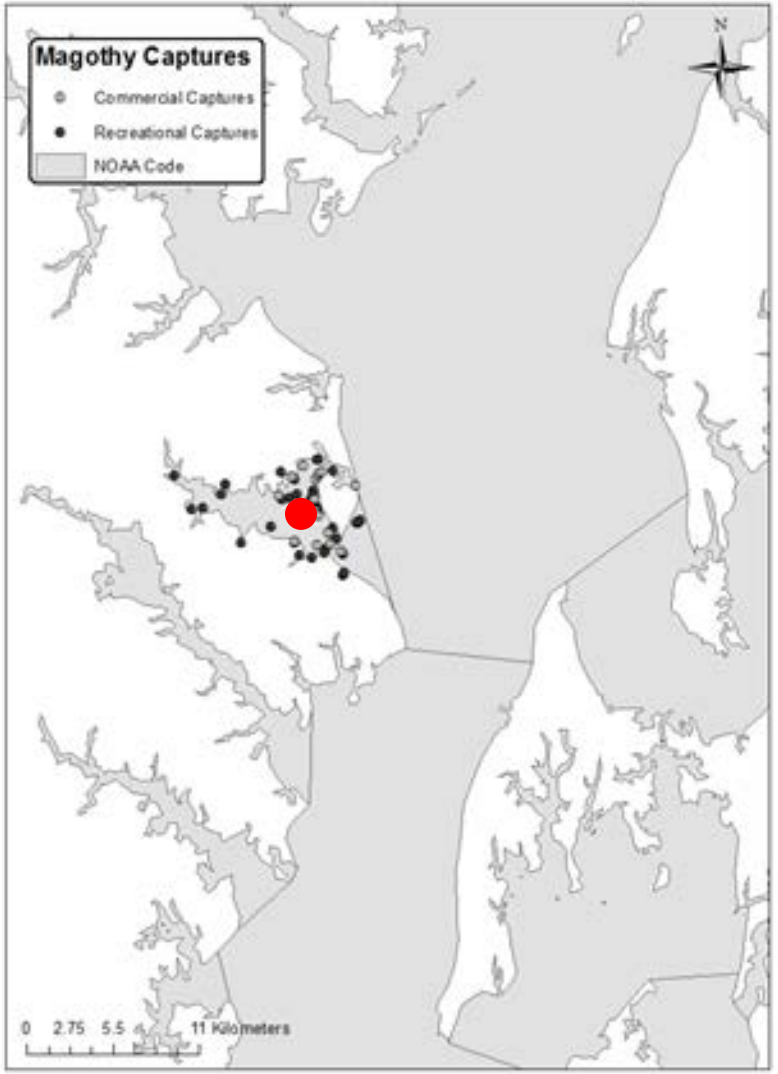



2015
Recaptures
Release Area
Recreational
NOAA Code
N
0 10 20 40 Kilometers

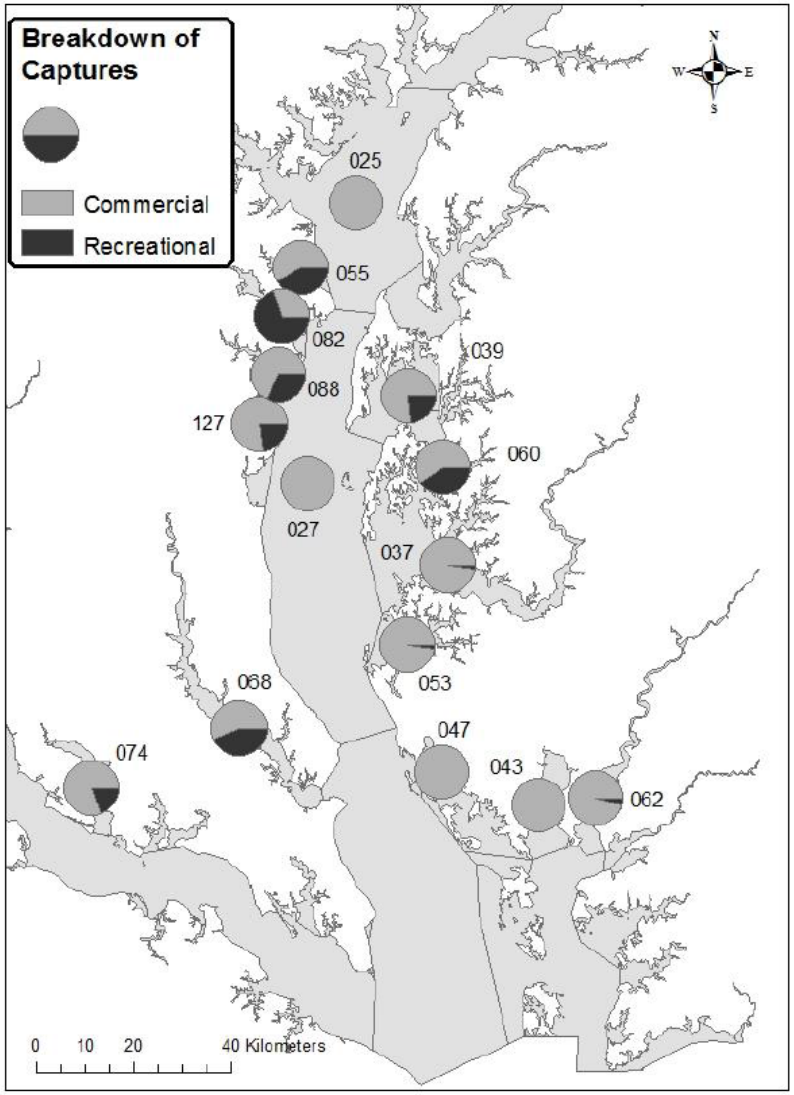

2015
Recaptures
Release Area
Commercial
NOAA Code
N
0 10 20 40 Kilometers

Calculating recaptures



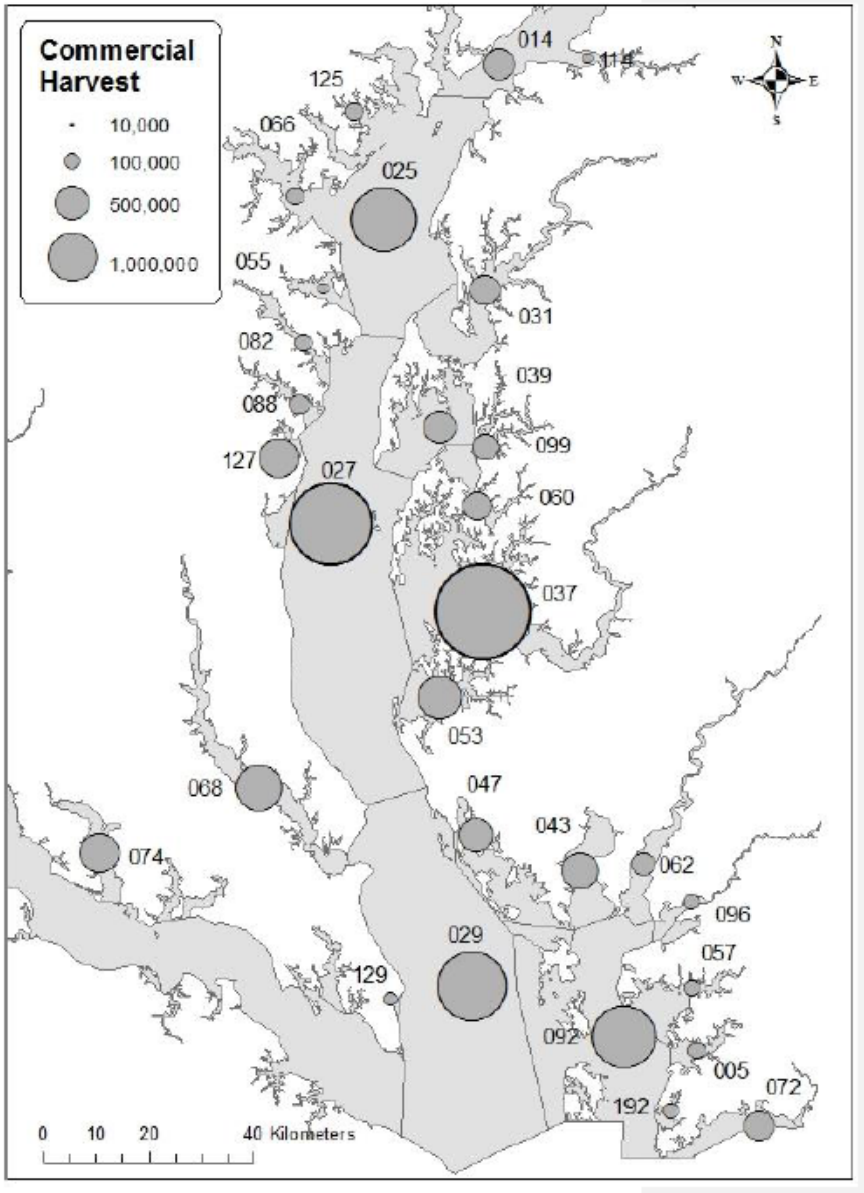


Spatial variation



Site Code	Original Site	Estimated As
(005)	**Big Ammenesex**	**Nanticoke River**
(014)	**Mainstem NN**	**Mainstem N**
(114)	**Tribs NN**	**Magothy River**
(025)	Mainstem N	-----
(125)	**Tribs N**	**Magothy River**
(027)	Mainstem S	-----
(127)	Tribs S	-----
(029)	**Mainstem SS**	**Mainstem S**
(129)	**Tribs SS**	**Patuxent River**
(031)	**Chester River**	**Eastern Bay**
(037)	Choptank River	-----
(039)	Eastern Bay	-----
(043)	Fishing Bay	-----
(047)	Honga River	-----
(053)	Little Choptank River	-----
(055)	Magothy River	-----
(057)	**Manokin River**	**Nanticoke River**
(060)	Miles River	-----
(062)	Nanticoke River	-----
(066)	**Patapsco River**	**Magothy River**
(068)	Patuxent River	-----
(072)	**Pocomoke Sound**	**Nanticoke River**
(074)	Potomac (MD Tribs)	-----
(082)	Severn River	-----
(088)	South River	-----
(092)	**Tangier Sound**	**Nanticoke River**
(192)	**Tangier Sound Tribs**	**Nanticoke River**
(096)	**Wicomico River**	**Nanticoke River**
(099)	**Wye River**	**Miles River**

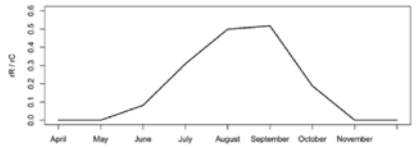
Reported commercial harvest



Calculating harvest for each area

Rec/Comm ratio from 2015 tagging: Aug

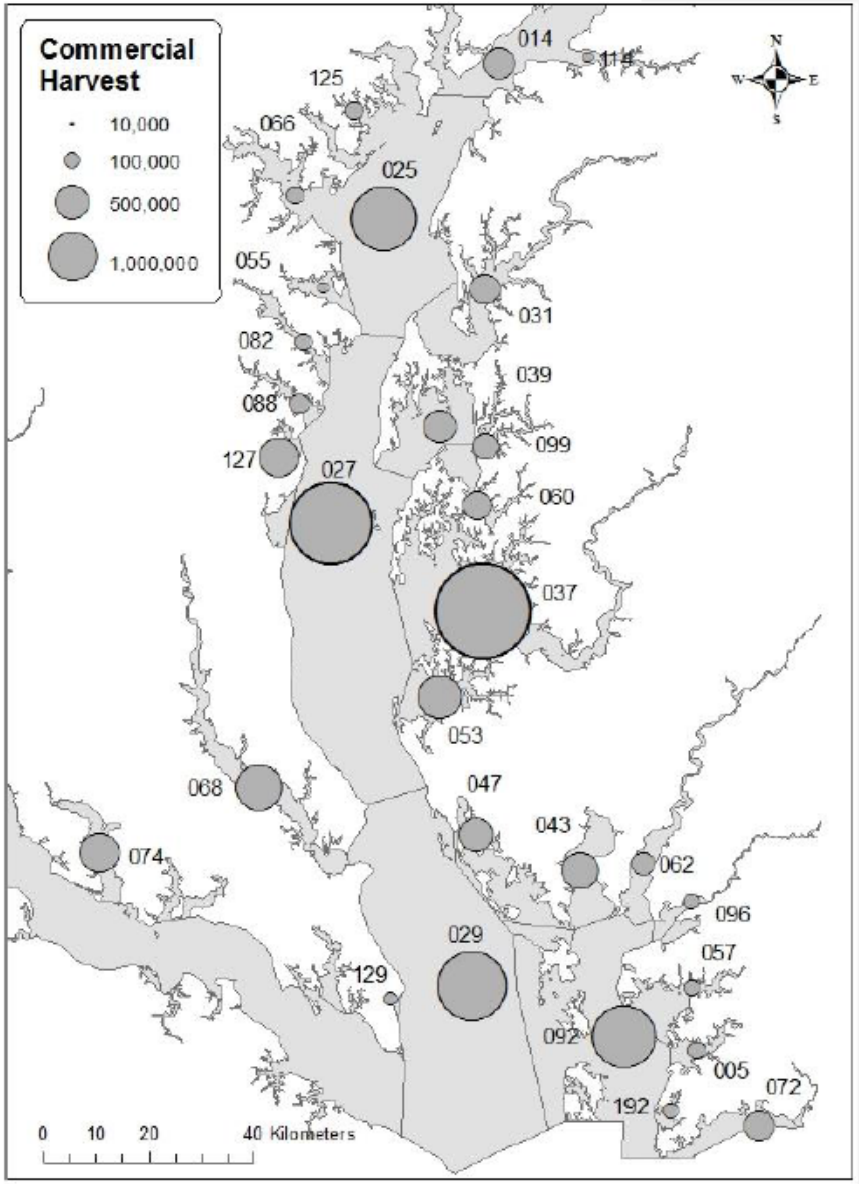
Seasonal variation:

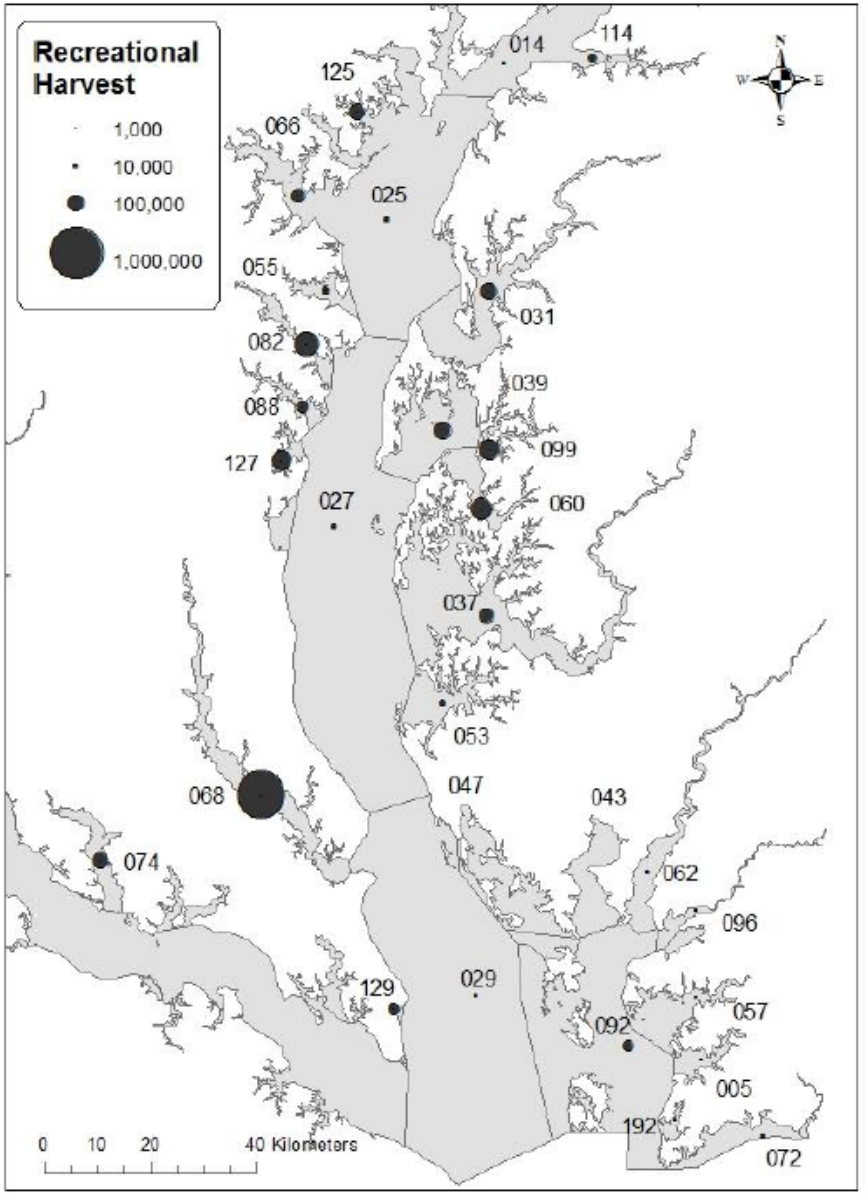


Monthly Rec/Comm: Apr May Jun Jul Aug Sep Oct Nov Dec

Commercial harvest: Apr May Jun Jul Aug Sep Oct Nov Dec

Recreational harvest: Apr May Jun Jul Aug Sep Oct Nov Dec


Commercial Harvest
10,000
100,000
500,000
1,000,000
N
W
E
S
014
114
125
066
025
055
031
082
039
088
099
127
027
060
037
053
068
047
043
074
062
096
029
057
129
092
005
072
192
0 10 20 40 Kilometers


Recreational Harvest
1,000
10,000
100,000
1,000,000
N
W
E
S
014
114
125
066
025
055
031
082
039
088
099
127
027
060
037
053
068
047
043
074
062
096
029
057
129
092
005
072
192
0 10 20 40 Kilometers

Recreational creel surveys

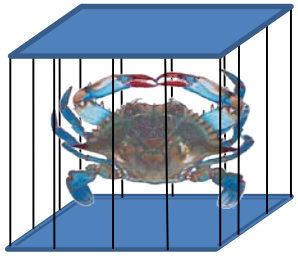
Year	Crabs (M)	Male hard crabs	All males	% Total
2001	5.0	16.0%	13.6%	7.0%
2002	3.2	9.9%	9.6%	4.8%
2005	5.6	13.2%	12.6%	6.5%
2011	5.1	7.1%	8.4%	5.1%
2015	5.3	11.2%	10.4%	6.5%

Recommend a shift back to using 8% of total harvest, not 8% of males to estimate the recreational fishery

Ashford and Jones 2001, 2002, 2005, 2011

Questions?

Exploitation rates

$$U = \frac{\left(\text{  } \right) / \text{ Reporting Rate}}{\left(\text{  } - \left(\text{  } + \text{  } + \text{  } \right) \right)}$$

- The number of captures as a portion of tags left remaining
- We know the number released and recaptured crabs but the other terms must be estimated.
- Exploitation varied from 8% - 70% in 2 months