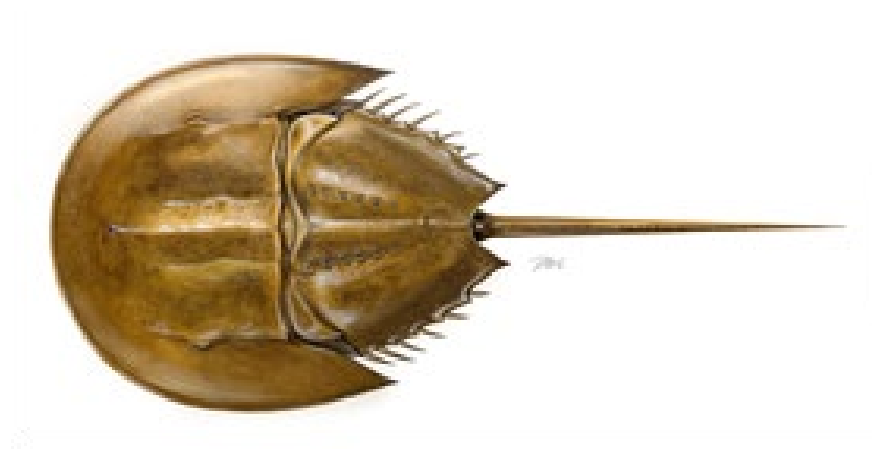


2019 Harvest Specifications for the Delaware Bay



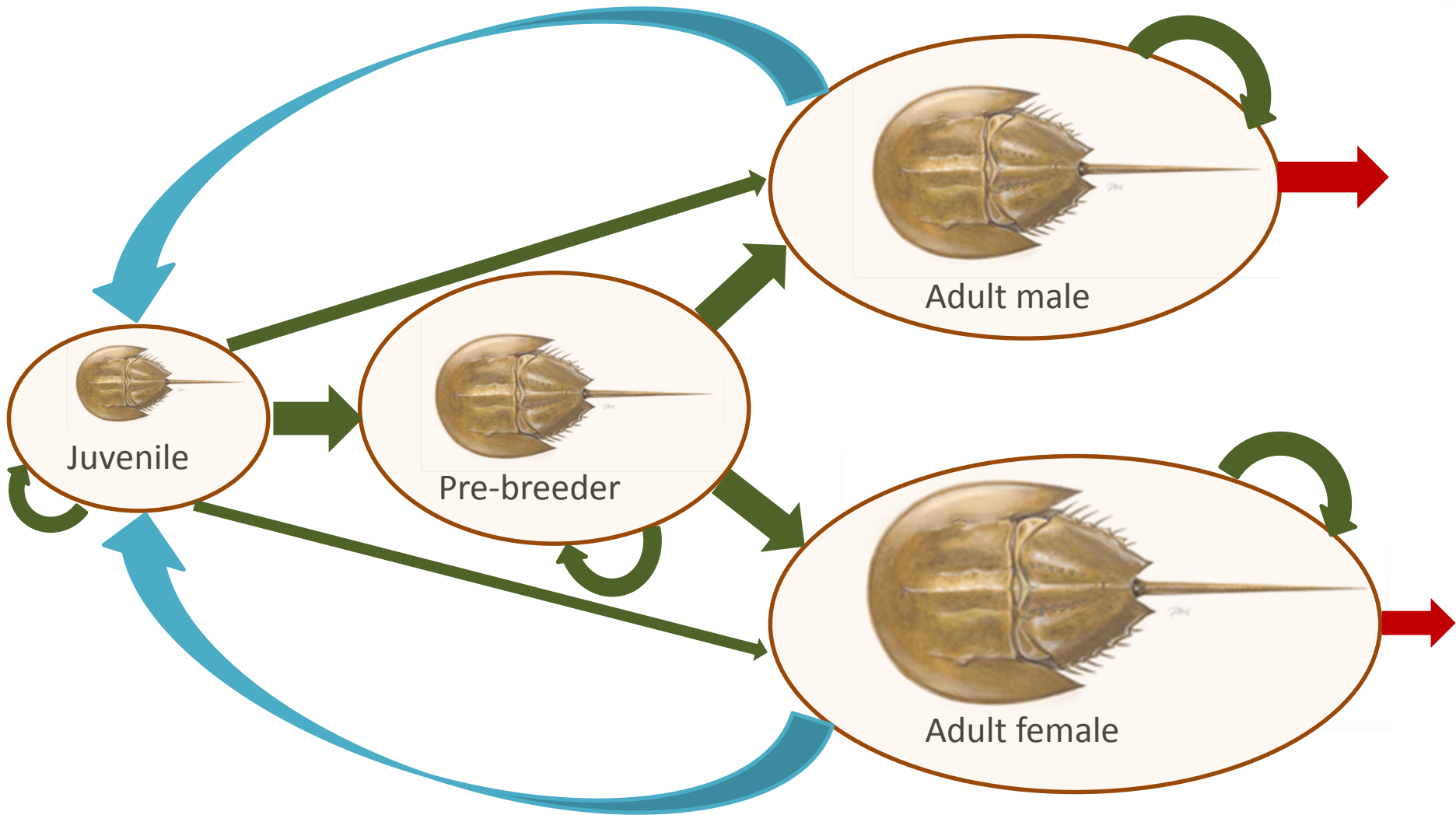
Adaptive Resource Management (ARM)



Manage harvest of horseshoe crabs in the Delaware Bay to maximize harvest but also to maintain ecosystem integrity and provide adequate stopover habitat for migrating shorebirds

- Red knot and HSC population thresholds
- Red knot and HSC abundance estimates
- 5 harvest packages
- Harvest recommendations

ARM Population Dynamics



$$\text{HSC} = \# \text{ juvs to adult} + \# \text{ pre-bdr to adult} + \# \text{ adults} - \# \text{ bait harvest}$$

Harvest Packages



- 5 harvest policies range from full moratorium to a max harvest of 420,000 males and 210,000 females, including two male only harvest options

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

Thresholds in ARM



1. Population thresholds



Female HSC:

80% carrying capacity
(or 11.2 million F crabs)



Red knot:

81,900 birds

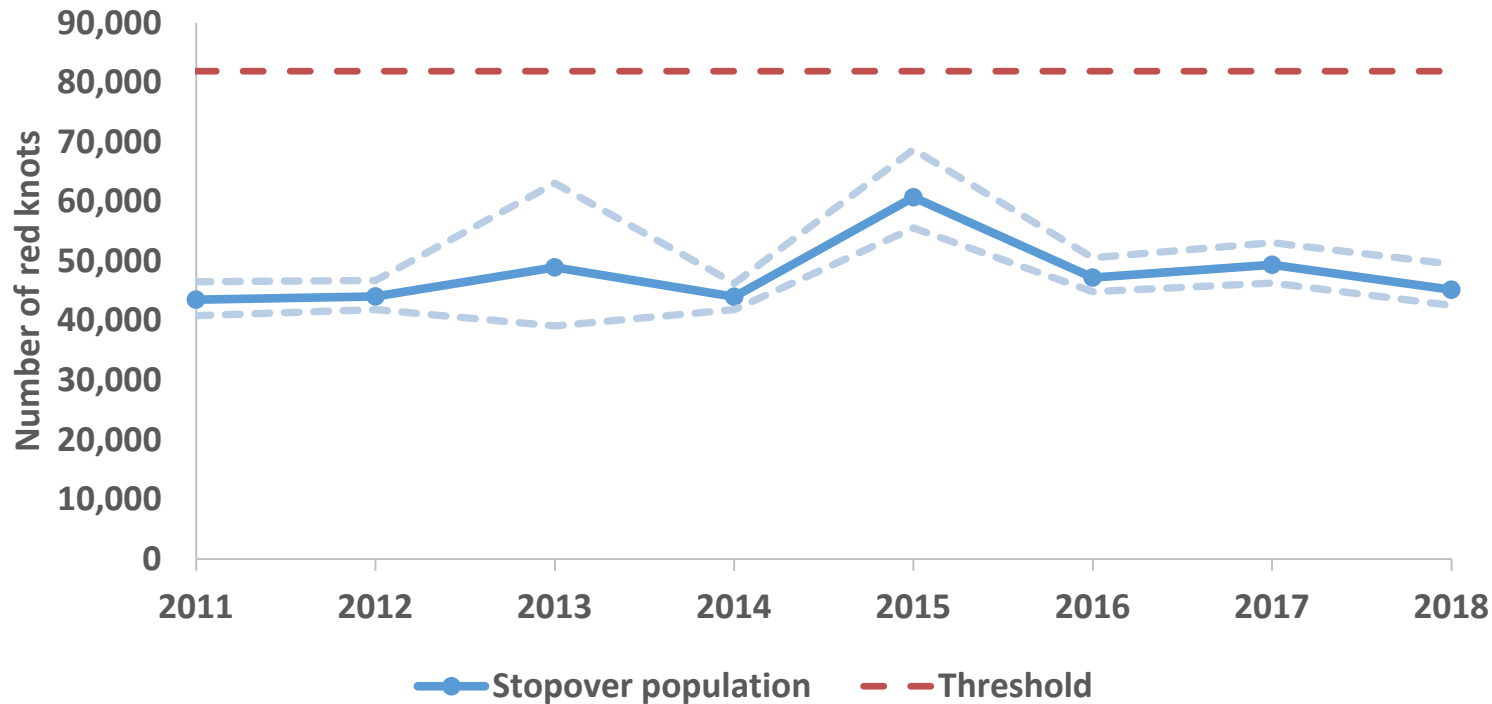
2. Maintain a spawning beach sex ratio of 2M:1F

- If both population estimates are below threshold, *no female HSC harvest*
- If sex ratio falls below 2M:1F, *no male HSC harvest*

Red Knot Abundance



Mark-resight abundance estimates

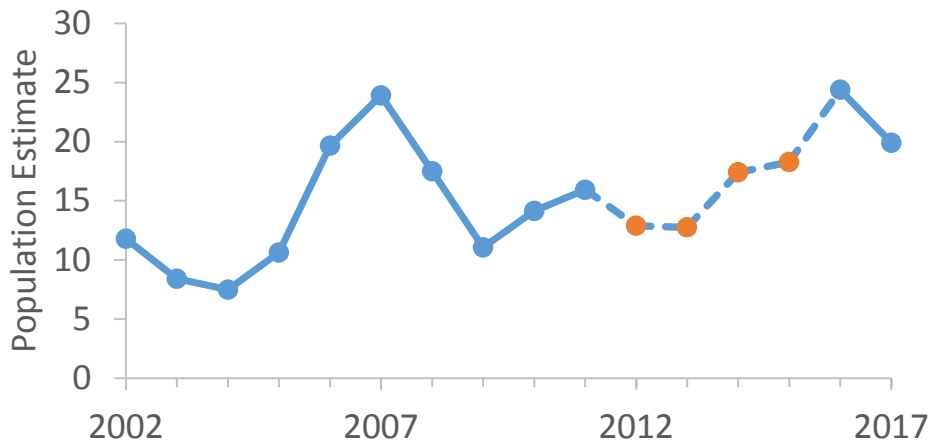


- Red knot abundance from mark-resight investigations
- 2018 estimates are similar to 2016-2017
- 2018 estimated stopover duration was 9.7 days, similar to 2017 estimate of 9.5 days
- 2018 estimate of 45,221 is below threshold of 81,900 birds

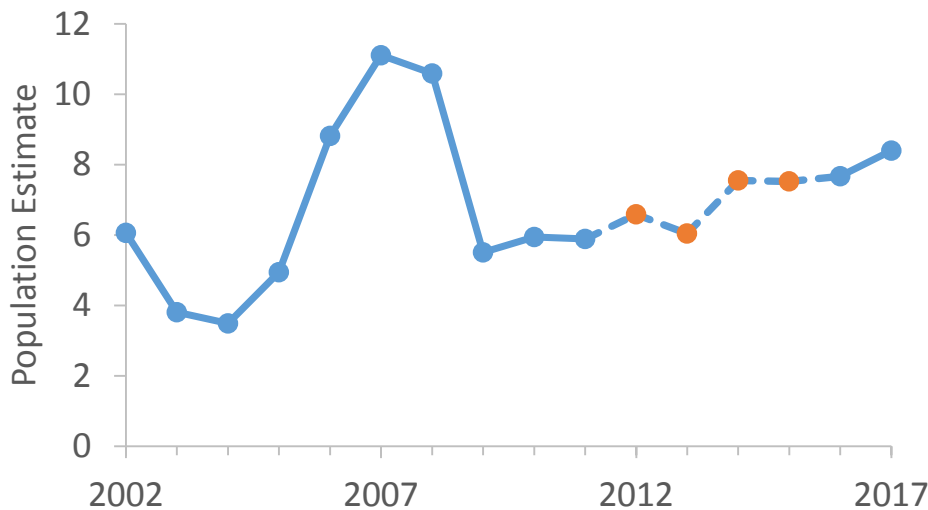
Horseshoe Crab Abundance



Males



Females



• Composite index values

- HSC abundance estimates are based on VT trawl survey
- VT trawl survey not funded every year, so **composite index** was developed
 - Uses DE 30' trawl, NJ DB trawl, and NJ ocean trawl surveys
- 2017 estimate of 8.4 million females is under the 11.2 threshold
- 2017 had 8.4 million females, 19.9 million males

2019 Harvest Recommendation



HSC and red knot abundance estimates:

Horseshoe crab abundance (millions)			Red knot abundance (×1,000)	
Year	Male	Female	Year	Male and female
2017 (Fall)	19.9	8.4	2018 (Spring)	45.22

Harvest package recommendation:

Recommended harvest package	Male harvest (×1,000)	Female harvest (×1,000)
3	500	0

- Both red knots and female HSC are below threshold, therefore no female harvest is recommended

Future ARM



- ARM model underwent a review during 2016
 - Made some improvements
 - Two options for incorporating biomedical data, decision was deferred until benchmark completed

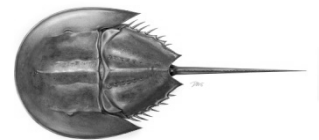
A large, reddish-brown horseshoe crab is shown on a sandy beach. The crab is positioned in the center of the frame, facing towards the right. Its body is a deep, glossy reddish-brown color, and it has a prominent, rounded carapace. The background is a light-colored, textured sand. The word "Questions?" is overlaid in the center of the image in a large, black, sans-serif font.

Questions?



Horseshoe Crab 2018 FMP Review

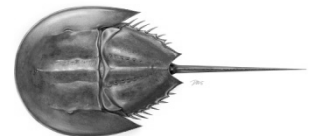
**Presented to Horseshoe Crab
Management Board
October, 2018**



Management History



- **FMP Approved (1998)**
- **Addendum I (2000)** – State bait harvest quotas and *de minimis*
- **Addendum II (2001)** – Quota transfers
- **Addendum III (2004)** – DE Bay state bait quotas and seasonal closures
- **Addendum IV (2006)** – DE Bay state bait quotas and seasons
- **Addendum V (2008)** – Extension of Add IV
- **Addendum VI (2010)** – Extension of Add V
- **Addendum VII (2012)** – DE Bay ARM Framework



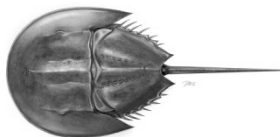
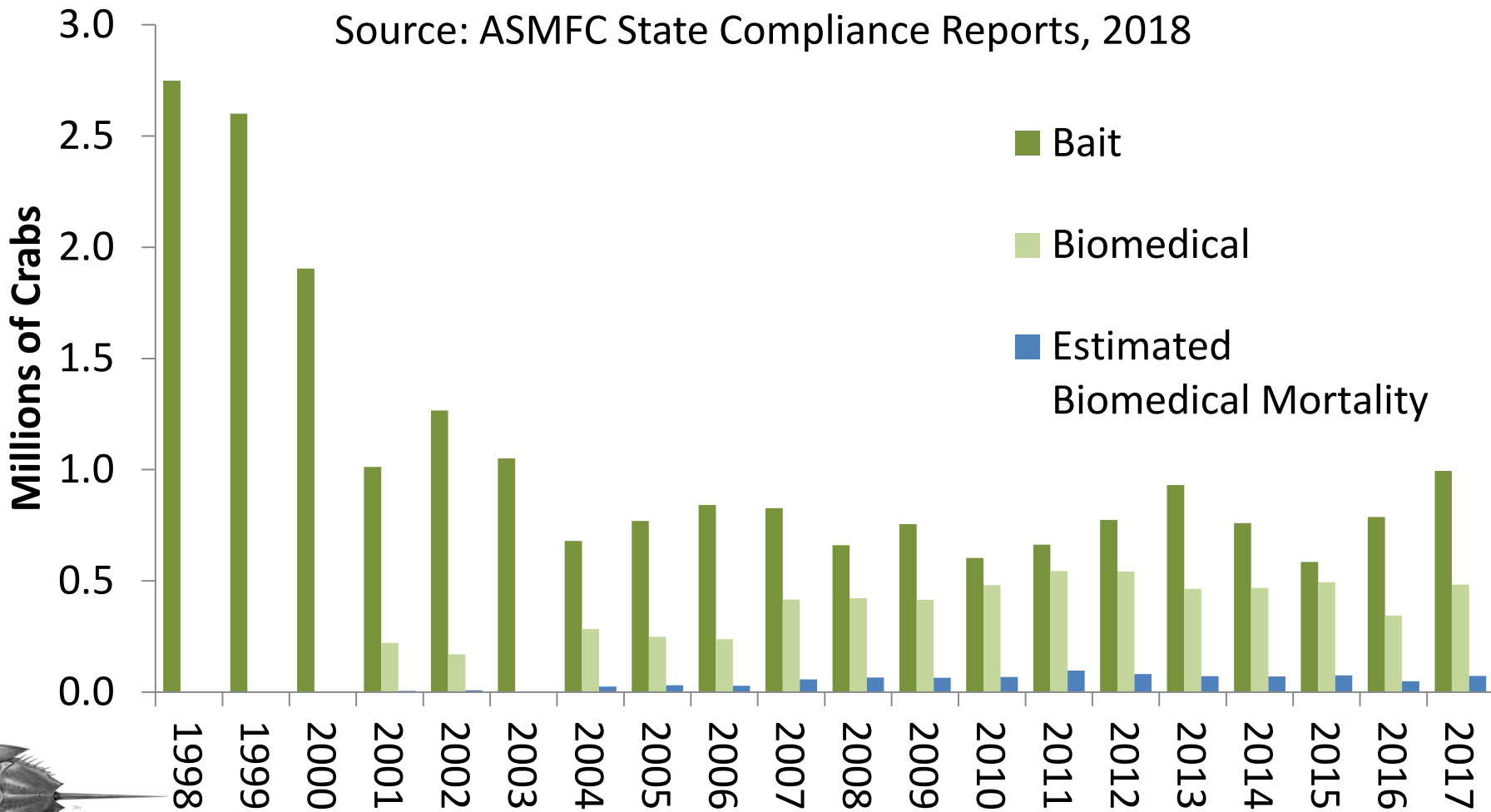
Descriptions in Section I of FMP Review

Annual Total Harvest



Coastwide Horseshoe Crab Bait Landings & Biomedical Harvest

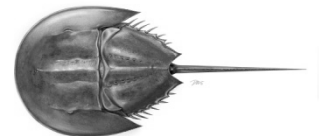
Source: ASMFC State Compliance Reports, 2018



2017 Bait Fishery



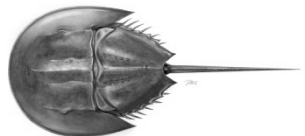
- **Total coastwide harvest was 966,410 crabs**
 - Majority from MD, DE, and NY(combined for 64% of coastwide harvest)
- **23% increase from 2016**
 - Increased landings from 2016 in MA, CT, NY, DE, MD, VA, FL
- **Approximately 61% of the coastwide quota (1.59 million lbs) was landed**
- **DE overage: 38,996 crabs (reduced quota for 2018)**
- **NC received 1,200 crab quota transfer from GA**



Biomedical Use



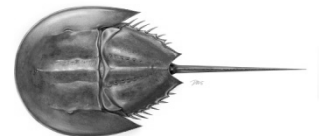
- **Biomedical-only crabs collected: 483,245**
 - 4% increase from 2012-2016 average
- **Bled Bait Crabs: 95,231**
 - 33% increase from 2012-2016 average
- **Biomedical-only mortality estimate: 72,674**
 - Biomed Mortality = Reported # Observed Dead Before Bleeding (6,057 crabs) + 15% x Reported # Biomed-Only Bled (66,617 crabs)
 - 7% of total removals (biomedical mortality + bait harvest)



De Minimis



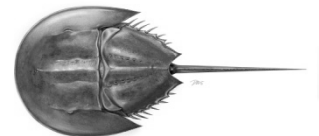
- **Criteria: combined average bait landings (by numbers) for last two years less than 1% of coastwide bait landings for the same two-year period**
- **PRFC, SC, GA, and FL all requested and qualify for *de minimis* status for 2018**
- **NJ qualified but did not request**



PRT Recommendations



- **Recommend continue seeking long-term funding for VT trawl survey**
 - **Funded for 2018-2019**
- **2018 was first year for new biomedical reporting format in compliance reports**
 - **Recommend all states use format for future years; will be included in CR template**
- **PRT recommends that the Board approve the 2018 FMP Review, state compliance reports, and *de minimis* status for PRFC, SC, GA, and FL.**



A large horseshoe crab is shown on a sandy beach. The crab is dark brown and has a prominent, rounded carapace. Its legs are visible, and it is casting a shadow on the sand. The word "Questions?" is overlaid in the center of the image.

Questions?