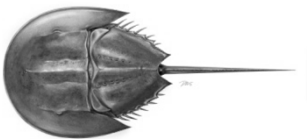




ARM Subcommittee Review of ARM Framework

Horseshoe Crab Management Board

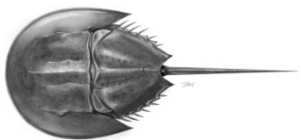
February 3, 2016



Background



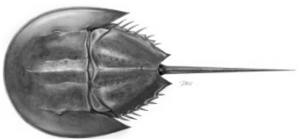
- Fall 2015: ARM Subcommittee, Horseshoe Crab TC, and Delaware Bay TC recommended the ARM go through the double loop review process in 2016
- Nov. 2015: Board considered the recommendation and requested reconsidering the harvest of female horseshoe crabs in the Delaware Bay region through the double-loop review



Background (cont.)



- Jan. 2016: ARM Subcommittee met to discuss the double loop review process, timelines, and products
 - Challenge: there are no examples to draw from for this process as few double loop reviews have been initiated or completed
 - Developed 5 items that could be addressed through the review and identified timelines



Double Loop Review

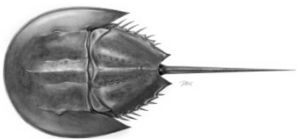


Long Term (18-24 months):

- 1) Model set assessment** (reviewing the model setup, hypotheses, parameters)
- 2) Optimization algorithm update** (changing model software platform)

Short Term (6-8 months):

- 3) Monitoring program** (update and improve monitoring protocols)
- 4) Harvest rates and specifications** (evaluate the harvest of the states relative to the quotas as well as the harvest packages)
- 5) Revisit objective function** (assess structure, revise as needed)

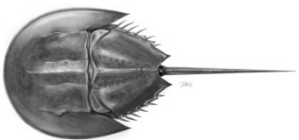


Short Term Review



Benefits:

- Addresses items 3-5 and some model parameters from item 1 could be updated
- No additional personnel needed
- Provide a partial update of ARM model in 2016
- Item 3 has already begun through Jim Lyon's work
- Item 4 could reevaluate DB harvest
 - Currently 2 of the 5 harvest packages never get chosen through the model and could be updated to address possible female harvest

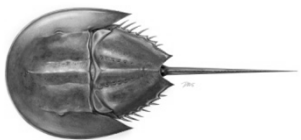


Short Term Review



Challenges:

- Timeline could be extended depending on item 5 because revisiting the objective function could prolong the process
 - members may feel that a revising these objective statement from maximizing horseshoe crab harvest and conserving red knots should put more emphasis on conserving the birds due to the listing of Threatened under the Endangered Species Act (ESA) in 2013



Long Term Review

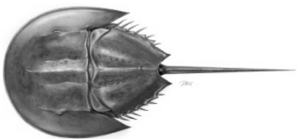


Benefits:

- Provide a thorough review of the ARM model
- Updating the software could make the annual specification process more efficient

Challenges:

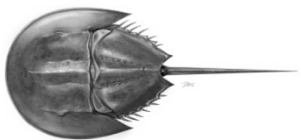
- Would require additional personnel, funding
- Still does not address coastwide population



Next Steps



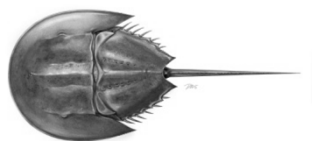
- Committee has assigned tasks for completing the short term review (items 3-5) by the end of 2016
- Subcommittee is looking for guidance from the Board on which time track of work is preferred
 - The short term review may result in new harvest package options, requiring a new addendum
 - The long term review would require additional guidance from the Board on developing scope of work and review of proposals





Review of Alternative Bait Trial Results

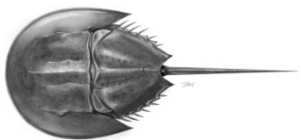
**Horseshoe Crab Management Board
February 3, 2016**



Background



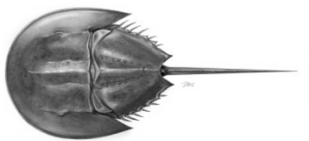
- In 2014 the Board tasked the TC with conducting field trials using artificial bait in the conch and eel fisheries.
 - Goal of the studies was to determine how effective the artificial bait is compared to the presently used horseshoe crab bait.
- An Artificial Bait Trials Working Group was formed to determine methodologies and plans to execute the trials.



Background (cont'd)



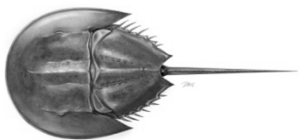
- Massachusetts, Rhode Island, Connecticut, and Delaware all volunteered to participate in the trials.
- Only Connecticut and Rhode Island were successful in obtaining artificial bait and commercial fisherman willing to participate in the trials.



Methods



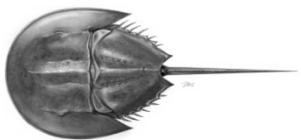
- Artificial Bait was supplied by LaMonica Foods
- Volunteer Fishermen used current fishing methods
 - Soak time, time between trials, operational details up to the discretion of the fisherman
 - Alternated between artificial bait and horseshoe crab
 - Spatial paired traps
 - Target of 50 traps total (25- 25)
 - Repeated for 10 trials
 - Bait pairs were tested using ANOVA for total and legal size conch



Results



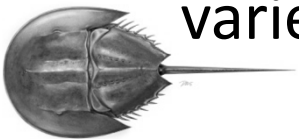
- Connecticut
 - 10 trials from July 3-August 13, 2014
 - 20-25 traps in each trial
 - Total catch of 4,834 conch (3,401 legal size)
- Rhode Island
 - 13 trials from October 27-November 18, 2014
 - 17-54 traps in each trial
 - Total catch of 8,331 conch (4,445 legal size)



Results cont'd



- Both states: Bait pairs were not significantly different for legal size conch
 - all sizes in the Rhode Island trials
- Connecticut: trials resulted in statistically significant increase in sub-legal catch (therefore total catch) of conch, with regular bait compared to artificial bait.
- The summed catch for all traps by date & bait type was similar between bait types for legal & total catch of conch in both states' trials
 - suggesting that bait type does not have a large or consistent effect on catch, especially for legal sizes of conch, under varied seasonal and environmental conditions.



Connecticut



ANOVA – Legal Sizes

Bait Type: Alternate Regular

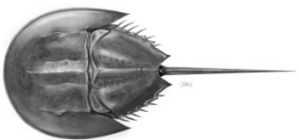
Mean/trap	6.7	7.2
95%CI -L	6.1	6.6
95%CI -U	7.3	7.7
df =489, F=1.19, P=0.27		

ANOVA – All Sizes

Bait Type: Alternate Regular

Mean/trap	8.8	10.9
95%CI -L	8.0	10.0
95%CI -U	9.6	11.9
df =489, F=10.96, P=0.001		

Graph shows mean conch catch per trap (diamond) & 95% confidence intervals (bars).



Rhode Island



ANOVA – Legal Sizes

Bait Type: Alternate Regular

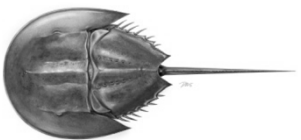
Mean/trap	5.9	5.3
95%CI -L	5.4	4.8
95%CI -U	6.5	5.9
df =787, F=2.23, P=0.14		

ANOVA – All Sizes

Bait Type: Alternate Regular

Mean/trap	10.7	10.5
95%CI -L	9.5	9.5
95%CI -U	11.8	11.5
df =787, F=0.05, P=0.82		

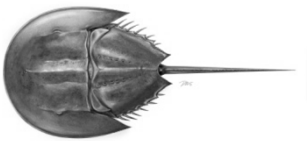
Graph shows mean conch catch per trap (diamond) & 95% confidence intervals (bars).





Review and Populate Advisory Panel Membership

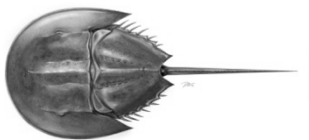
**Horseshoe Crab Management Board
February 3, 2016**



Background



- Massachusetts nominated Brett Hoffmeister to the Horseshoe Crab Advisory Panel
- There are multiple vacancies along the coast
 - Rhode Island 1 vacancy (comm/otter trawl)
 - Delaware 2 vacancies (dealer/processor & conservation/environmental)
 - Maryland 1 vacancy (dealer/processor)



Next steps



- Board consider the AP nomination from Massachusetts and approve their appointment
- States should consider their current representation on the AP and provide any new nominations
 - **Submit by April 1, 2016**

