Report on the July 2024 Horseshoe Crab Management Objectives Stakeholder Workshop

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Overview

1. Background
2. Workshop Process
   a. Development
   b. Stakeholders
   c. Dialogue Process
3. Key Findings
   a. Areas of Consensus
   b. Areas where Consensus was not reached
4. Recommended Next Steps

Background

- Adaptive Resource Management (ARM) Framework implemented in 2012 for setting bait harvest specifications in Delaware Bay region
  - Zero Delaware Bay-origin female harvest since 2013
- ARM Framework Revision in 2021, adopted for management in 2022
  - Public comments indicated significant public concern over possible female harvest
- Stakeholder survey conducted in 2023
  - Understanding diverging values and perspectives of various user groups

Workshop Development

- Board recognized need for multi-stakeholder dialogue to explore objectives and management approaches for the Delaware Bay horseshoe crab fishery

- Workshop facilitated by neutral third-party

- Workshop design informed by interviews with subset of participants

Stakeholder Groups

- Bait fishery harvesters and dealers, and bait users
- Environmental NGO community
- Biomedical industry
- Horseshoe crab and shorebird biologists
- State resource managers

Workshop Purpose

1. Increase understanding of various stakeholder perspectives and interests.
2. Increase understanding of current horseshoe crab modeling.
3. Identify concerns, alternatives, and areas of common ground for HSC management.

Dialogue Process

- Establish baseline knowledge and understanding
- Consensus testing process
  - 1 = full support
  - 2 = support but with questions and concerns
  - 3 = cannot support given too many questions and concerns
- Public participation

KEY FINDINGS

Consensus Building

Consensus Statements

- *The horseshoe crab population has increased in the Delaware Bay since 2010.*
- *ASMFC should conduct outreach to gather the 'essential concerns' of key stakeholders.*
- *ASMFC should improve science communication about the ARM, including optimizing existing channels for engaging with the public.*

Consensus Statements

- *Using current ASMFC processes, refine the ARM reward and utility functions with stakeholder input.*

- *ASMFC should continue to run the ARM by default with a recommendation to pause female harvest in the meantime (i.e., while the other recommendations listed are implemented and stakeholder input is further considered).*

Consensus Not Reached

- *Female harvest is appropriate under some circumstances.*
- *The ASMFC should use a harvest control rule (and not use adaptive resource management).*
- *Pause running the ARM to focus on modeling for male-only harvest based in science.*
- *Pause the ARM via an ASMFC addendum while stakeholder engagement on reward and utility functions and conflict resolution with environmental NGOs are implemented.*
- *Work on a conflict resolution process with NGOs.*

Participants Affirmed Workshop Purpose

In concluding the Workshop, participants affirmed that its core goals were met:

1. Increased understanding of various stakeholder perspectives and interests.

2. Increased understanding of current horseshoe crab modeling.

3. Identification of concerns, alternatives, and areas of common ground for HSC management.

RECOMMENDATIONS

Potential Next Steps

Potential Next Steps

- Initiate an addendum for interim solution
- Dialogue with key stakeholders to identify ‘essential concerns’
- Initiate process to develop alternative reward and utility functions with stakeholder engagement
- Evaluate Advisory Panel membership
- Efforts to improve science communication about the ARM

Initiate an Addendum

- An addendum would be needed to establish an interim solution for setting specifications (i.e., multi-year specifications with 0 female harvest)
  - Participants agreed ARM should continue to be run while additional recommendations are addressed
  - Set female harvest quota to zero for time needed to address other recommendations
- If initiated today, an addendum could be completed prior to setting specifications for 2026

Dialogue with Stakeholders

- Not all stakeholders could be workshop participants
- Opportunity for building collective understanding of ARM and essential concerns, and exploring alternative methods
- Resources required depends on meeting format
- As an example, ASMFC could hold series of webinar meetings with key stakeholders

Process to Modify ARM Framework

- Reward and utility functions component of the ARM Framework could be evaluated and modified to better address stakeholder concerns and values
- Stakeholder engagement through existing processes (e.g., committee meetings)
- Process will require time and resources
- Management action needed to adopt changes

Advisory Panel Membership

- Various stakeholder groups should be represented on AP
- States can work with ASMFC staff to review/modify current membership
- Can consider adding additional seats to AP for non-traditional stakeholders

Improve Science Communication

- Explaining and understanding science underpinning the ARM Framework is a challenge
- General public may not be aware of existing channels for engagement
- Opportunity to collaborate with environmental NGOs

QUESTIONS?

Results from 2024 ARM Framework

Horseshoe Crab Management Board
October 21, 2024

Adaptive Resource Management

- ARM Framework revised and accepted by the Board for management use in 2022
- Under Addendum VIII (2022), ARM Framework is used annually to produce bait harvest recommendations for the Delaware Bay
- Maximum harvest that can be recommended:
  - 210,000 females
  - 500,000 males
- 175,000 females and 500,000 males recommended for 2024 and the Board elected to implement 0 female harvest

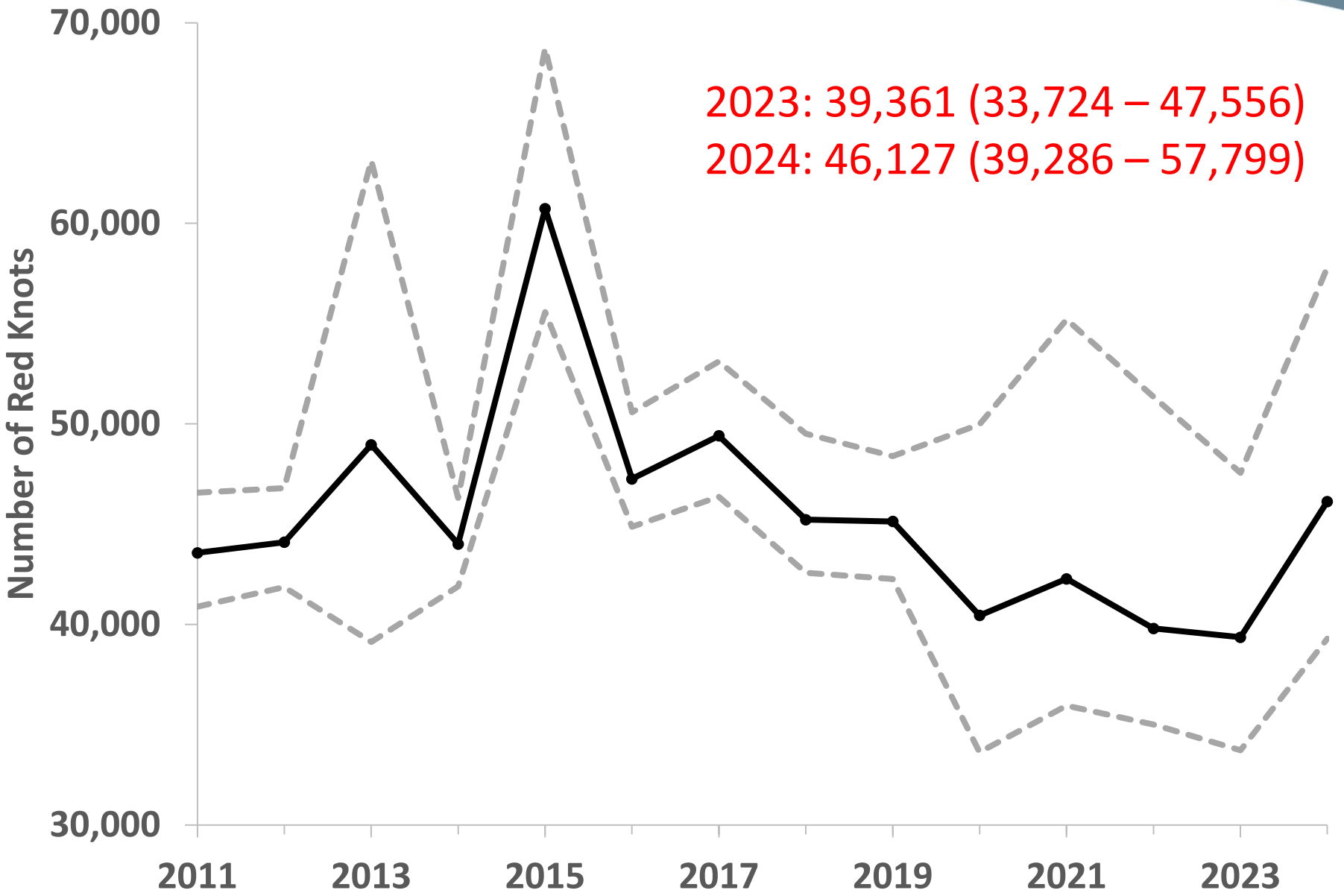
ARM Objective Statement

Manage harvest of horseshoe crabs in the Delaware Bay to maximize harvest but also to maintain ecosystem integrity, provide adequate stopover habitat for migrating shorebirds, and ensure that the abundance of horseshoe crabs is not limiting the red knot stopover population or slowing recovery.

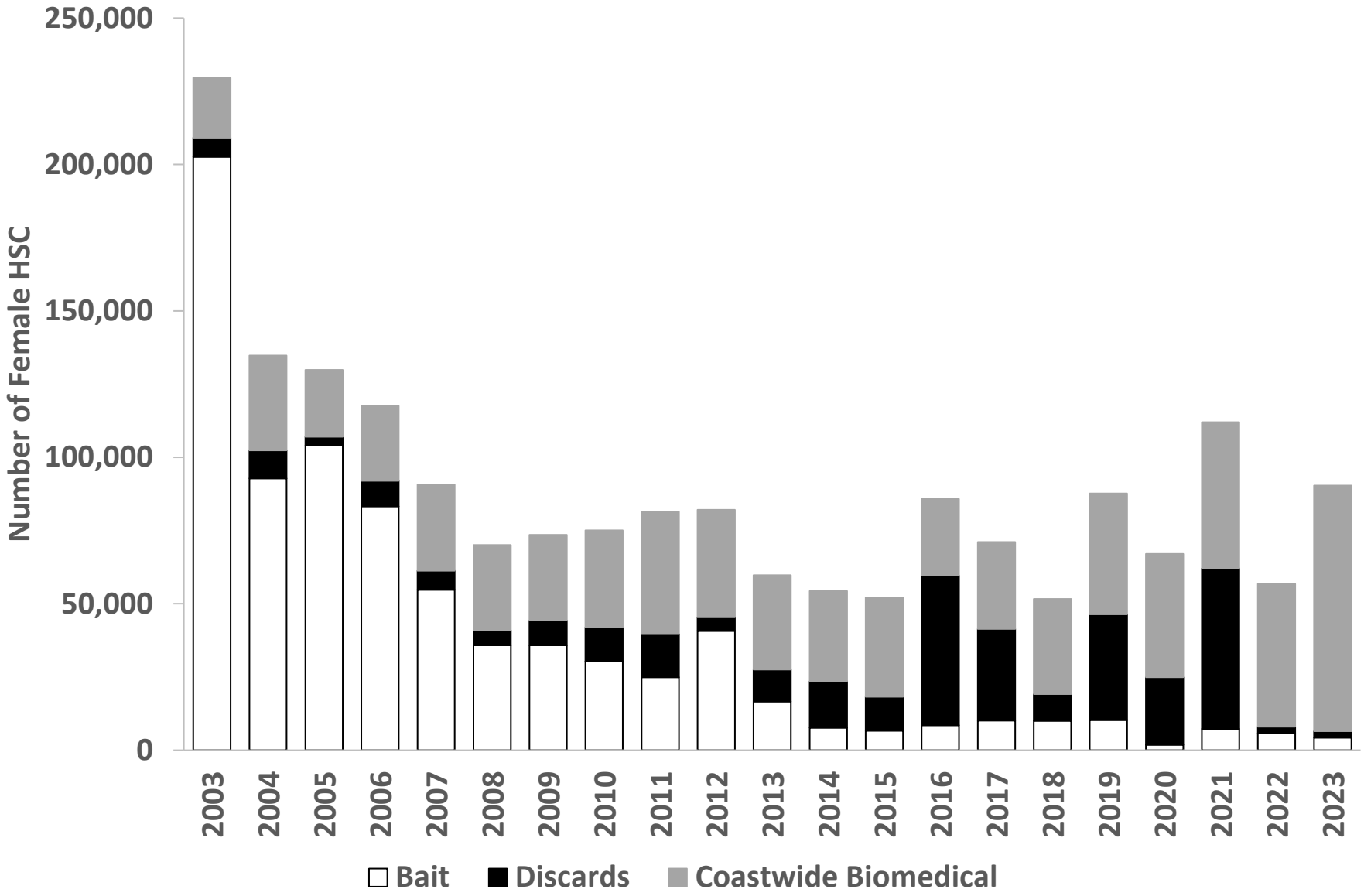
Data Used in ARM Annually

- Red knot population estimates from mark-resight analysis
- Horseshoe crab population estimates from catch survey model
    - Virginia Tech, Delaware Adult, and New Jersey Ocean Trawl Surveys
    - Bait landings, discard estimates, and biomedical mortality

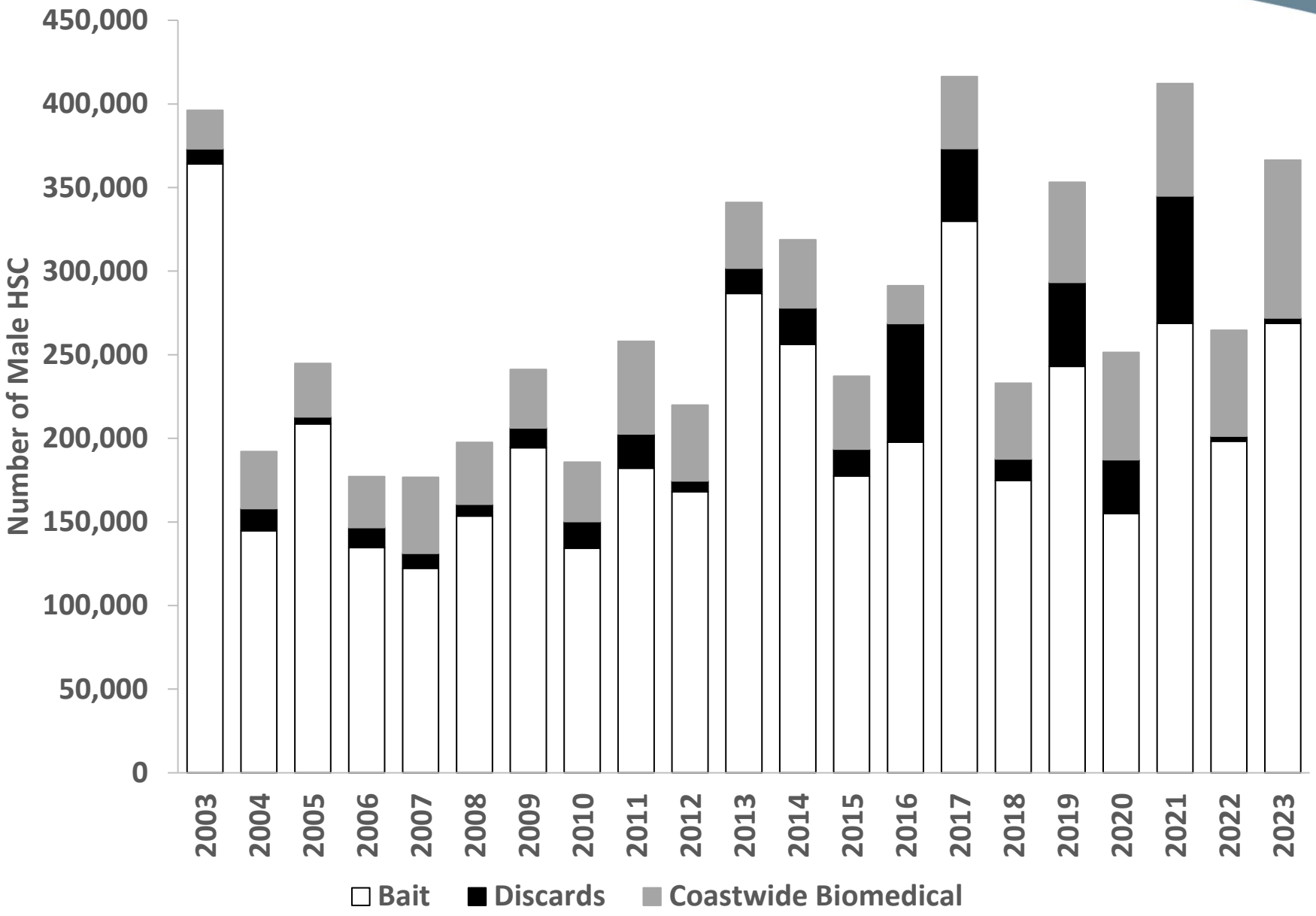
Red Knot Population Estimates



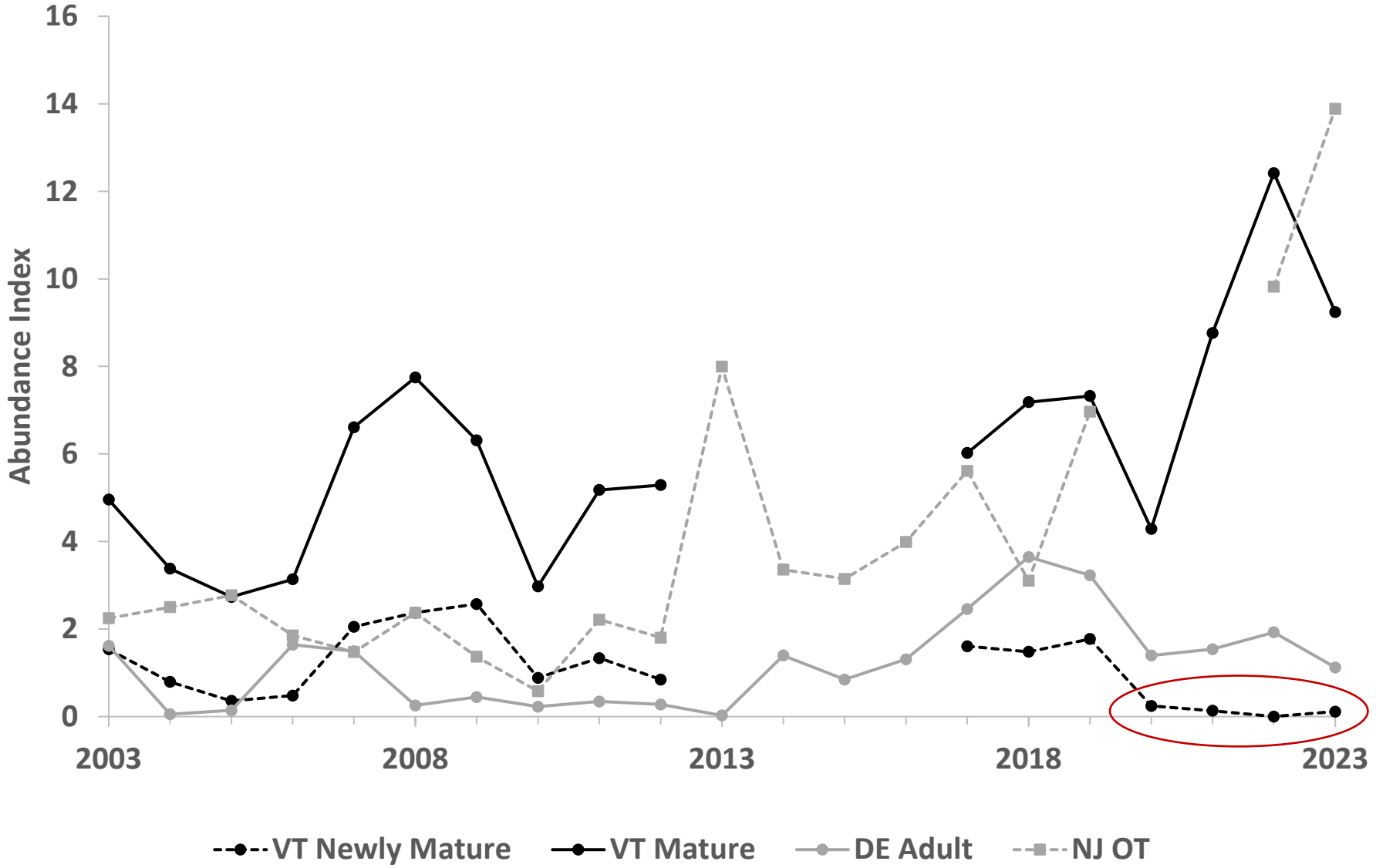
Female Harvest



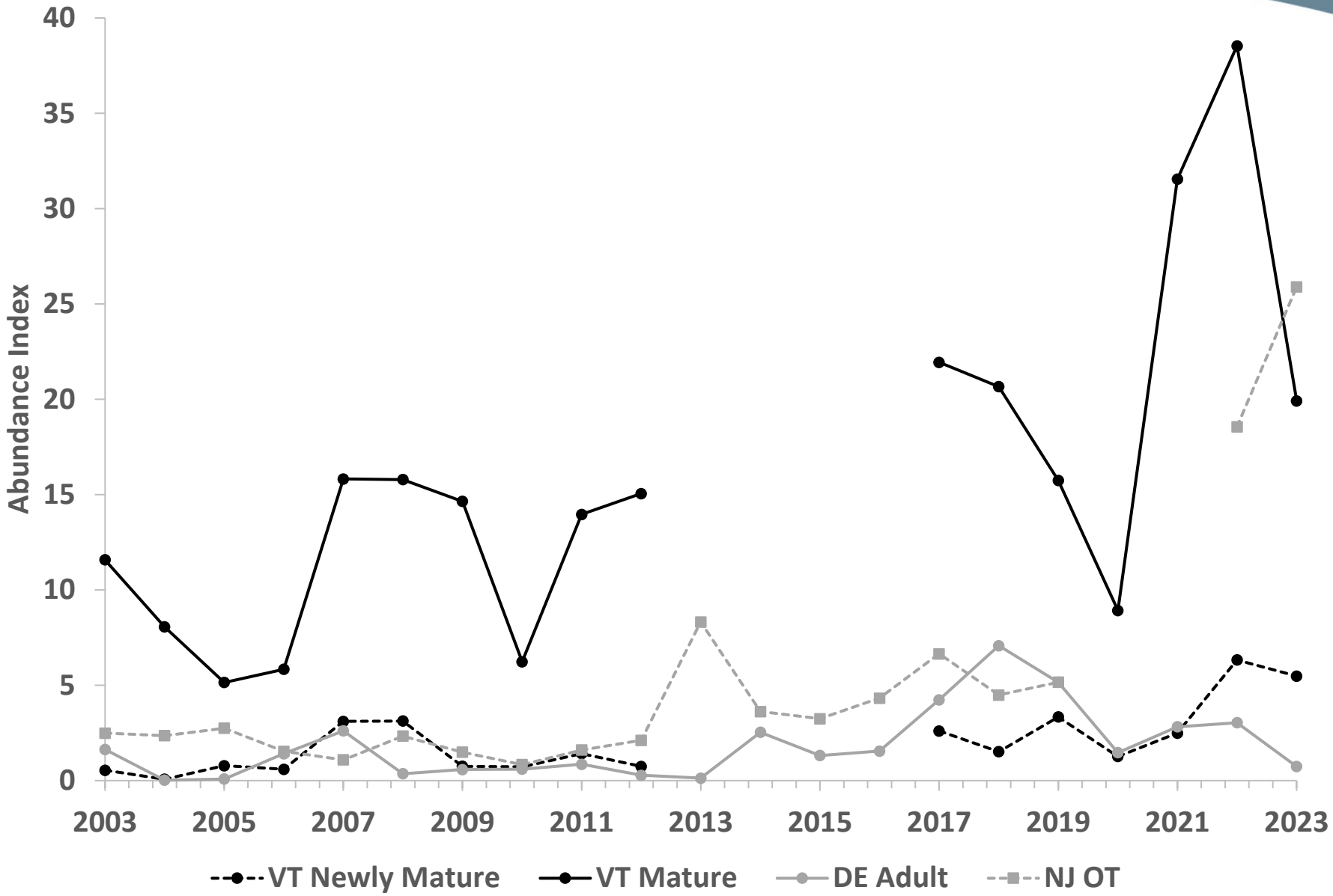
Male Harvest



Female Indices



Male Indices



Newly Mature Problem

- Zero female newly mature HSC in 2022
  - CMSA simple stage-based model that sums NM and mature, subtracts harvest and natural mortality, predicts population next year
  - Will not run with 0 newly mature
- Newly mature females low 2020-2022
  1. Catchability
  2. Recruitment failure
  3. Identification issue

Correction in 2023

- Historical data indicated that newly mature females comprised approximately 20% of the total mature females (newly mature + mature).
- Summed newly mature and mature VA Tech estimates for 2019 – 2021
- Assumed 20% were newly mature and 80% were mature
- Used the adjusted female numbers in the CMSA to estimate the total female population size

Correction for 2024

Through conversations with VA Tech staff and the boat captain, we realized newly mature females were most likely being misclassified as immature **NOT** as mature.

- Increase in abundance of crabs makes processing a representative subsample more difficult.
- Not as many none-mature female crabs were probed for the presence of eggs as should have been.

Our correction method in 2023 was wrong.

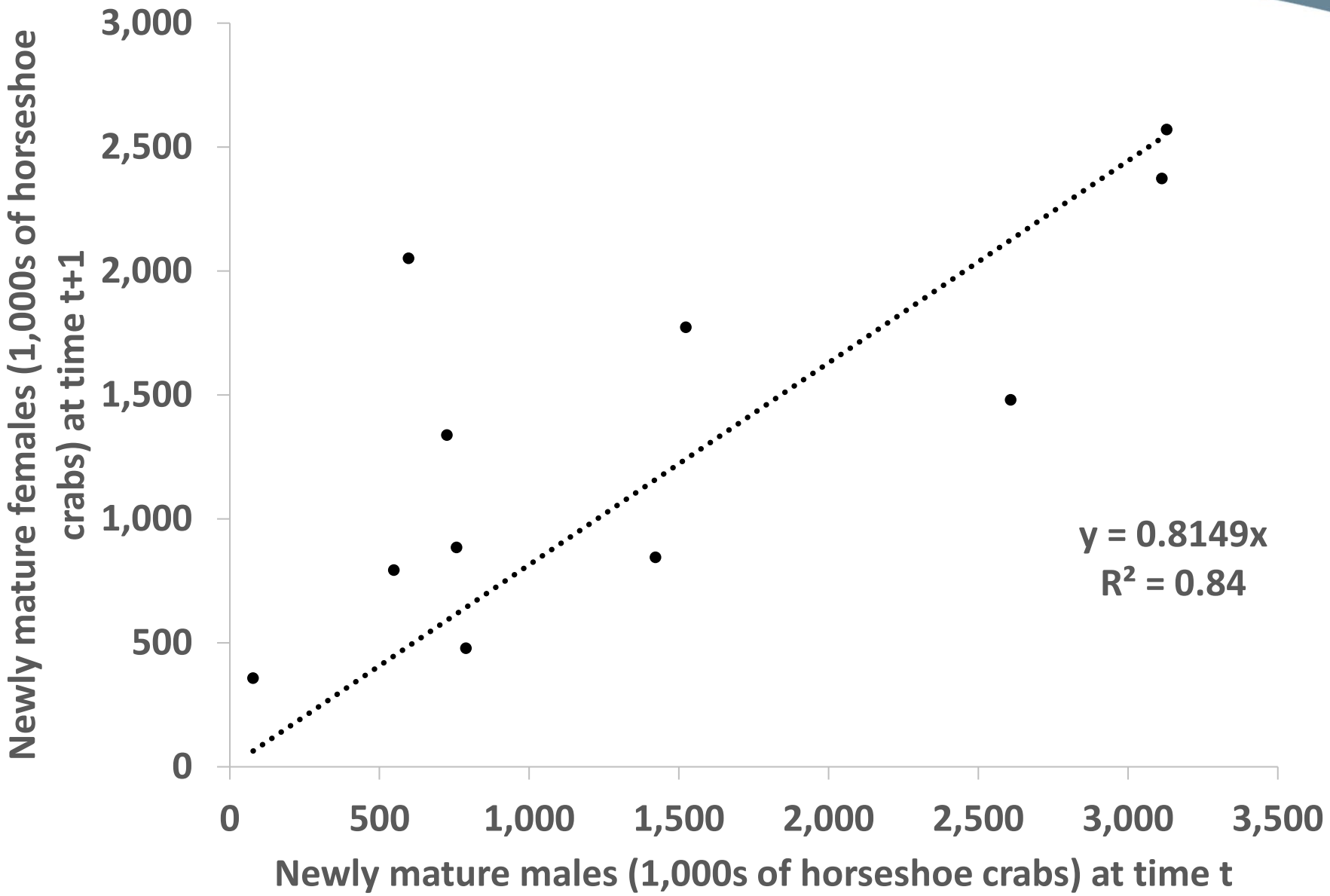
We pulled newly matures out of the mature group when they should have been pulled out of the immature group.

Proposed correction for 2024

Can we infer female newly mature from male newly mature?

- After hatching, there is no reason to believe natural mortality would differ between the sexes during the immature stages.
- Males mature earlier than females and the newly mature stage only lasts for one year.
- Since newly mature males in year *t* and newly mature females in year *t*+1 represent the same cohort, there should be a positive relationship between the two.
- The number of newly mature females in year *t*+1 should be somewhat less than the number of newly mature males in year *t* because of one more year's worth of natural mortality on newly mature females.

Revised Gap Filling Method



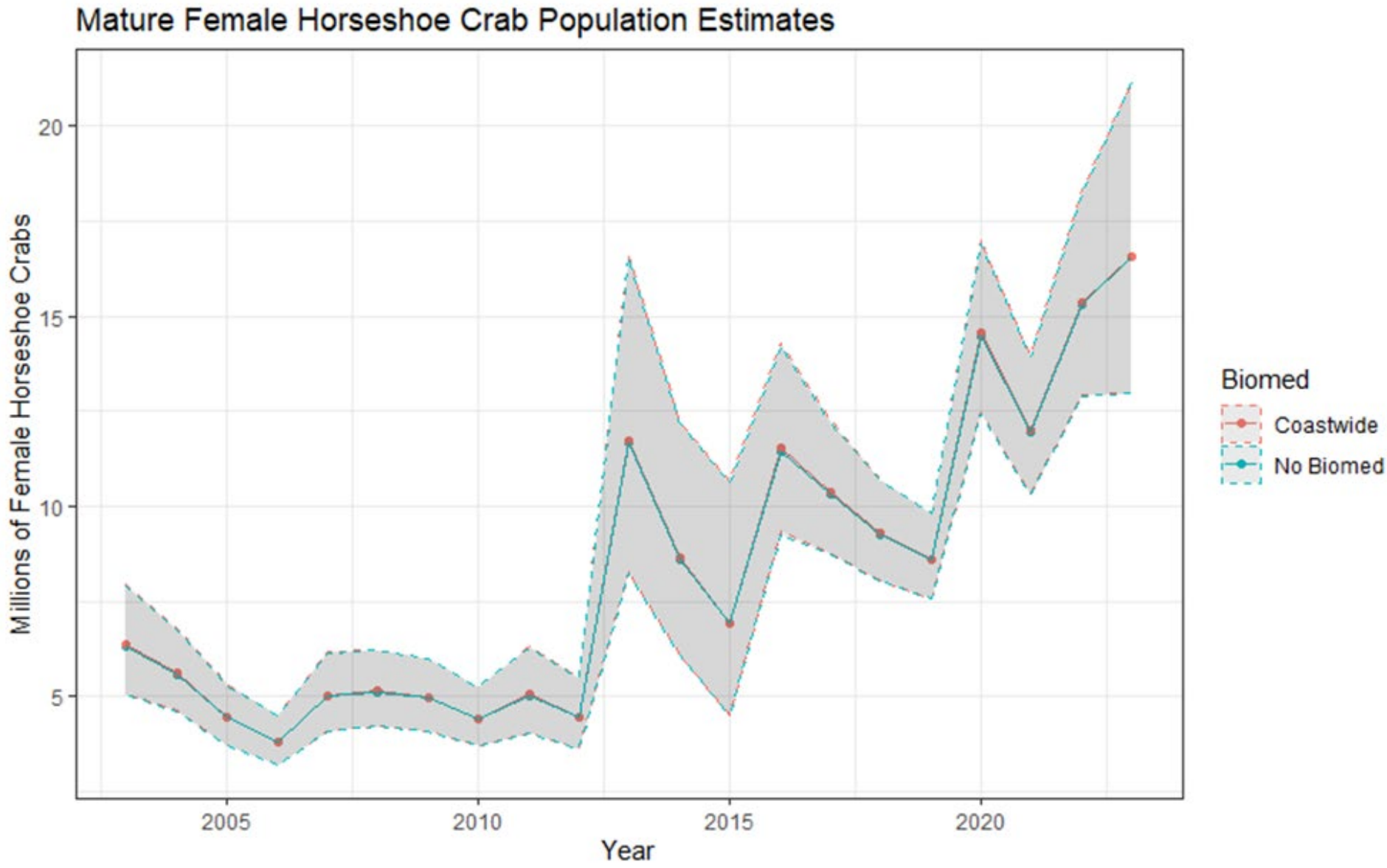
Proposed correction for 2024

	Original Females				Corrected Females		
Year	Newly Mature	Mature	Total Mature		Newly Mature	Mature	Total Mature
2002	1.54	4.96	6.50		1.54	4.96	6.50
2003	0.79	3.38	4.17		0.79	3.38	4.17
2004	0.36	2.74	3.09		0.36	2.74	3.09
2005	0.48	3.14	3.62		0.48	3.14	3.62
2006	2.05	6.61	8.66		2.05	6.61	8.66
2007	2.37	7.75	10.12		2.37	7.75	10.12
2008	2.57	6.31	8.88		2.57	6.31	8.88
2009	0.89	2.98	3.86		0.89	2.98	3.86
2010	1.34	5.18	6.52		1.34	5.18	6.52
2011	0.85	5.29	6.14		0.85	5.29	6.14
2016	1.61	6.02	7.63		1.61	6.02	7.63
2017	1.48	7.19	8.67		1.48	7.19	8.67
2018	1.77	7.33	9.10		1.77	7.33	9.10
2019	0.24	5.11	5.35		**2.72**	5.11	**7.83**
2020	0.13	10.80	10.94		**1.04**	10.80	**11.84**
2021	0.00	15.50	15.50		**2.03**	15.50	**17.53**
2022	0.12	11.42	11.54		**5.16**	11.42	**16.58**

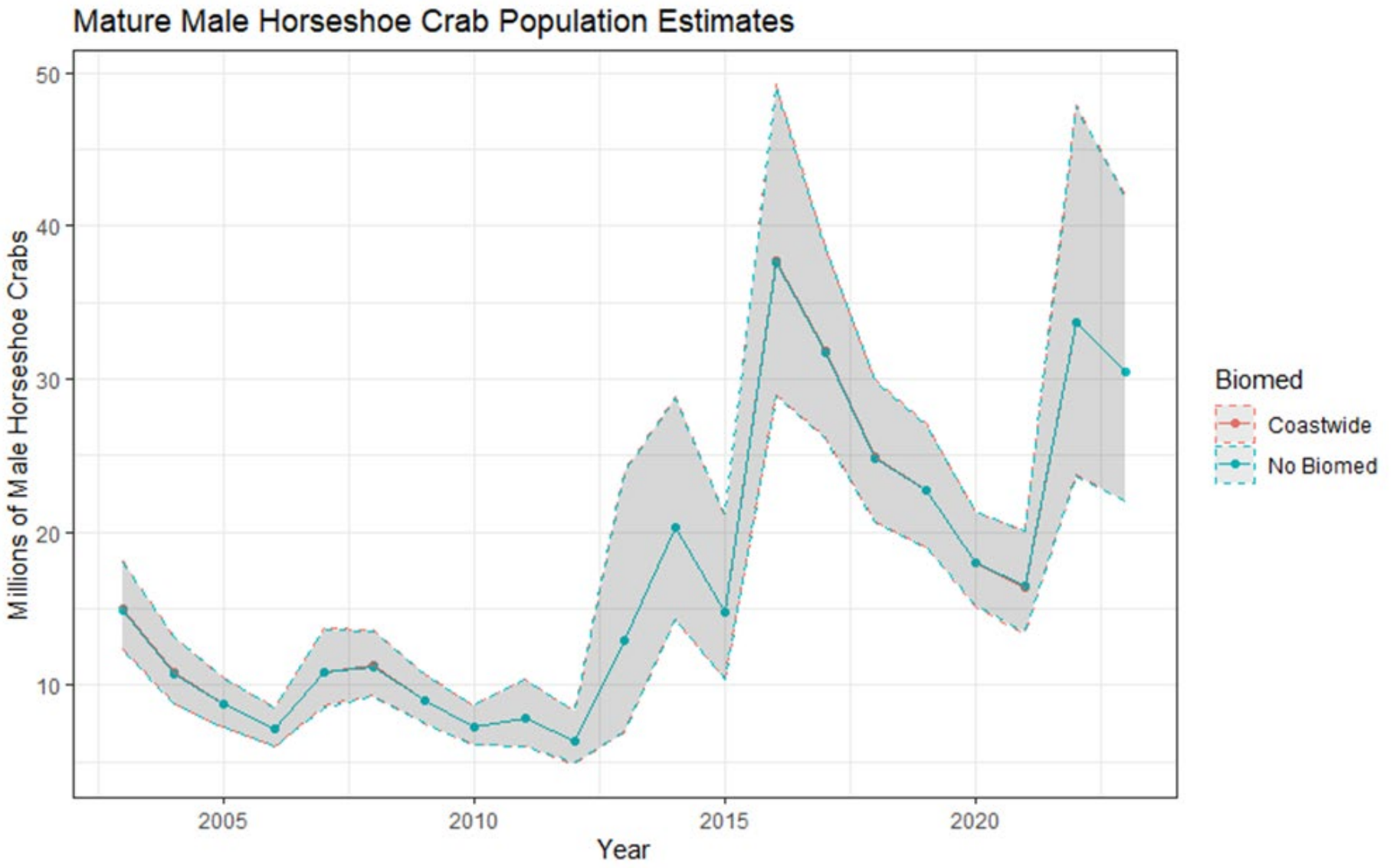
*millions of crabs

- Using the VT estimates as provided is a priority
- A correction will need to be made next year because VT estimated 0 newly mature females in the fall of 2023

Mature Females



Mature Males



2024 Harvest Recommendation

- Harvest recommendation is based on current state of the system and optimal harvest policy function from the 2021 ARM Revision
- As per Addendum VIII, recommended harvest is rounded down to nearest 25,000 crabs
- For 2025, ARM recommended harvest:
  - 500,000 male
  - 175,000 female

2024 Quota Allocation

State	Delaware Bay-Origin Quota		Total Quota	
	Male	Female	Male	Female
Delaware	173,014	60,555	173,014	60,555
New Jersey	173,014	60,555	173,014	60,555
Maryland	132,865	46,503	126,410	44,243
Virginia	21,107	7,387	40,667	20,331
TOTAL	500,000	175,000	513,106	185,684

Board Action

- Set harvest specifications for Delaware-bay region states

2023 Quota Allocation

State	Delaware Bay-Origin Quota		Total Quota	
	Male	Female	Male	Female
Delaware	173,014	0	173,014	0
New Jersey	173,014	0	173,014	0
Maryland	132,865	0	255,980	0
Virginia	21,107	0	81,331*	0
TOTAL	500,000	0	683,339	0

**East of COLREGS*

Questions ?????

Horseshoe Crab FMP Review for the 2023 Fishing Year

Horseshoe Crab Management Board

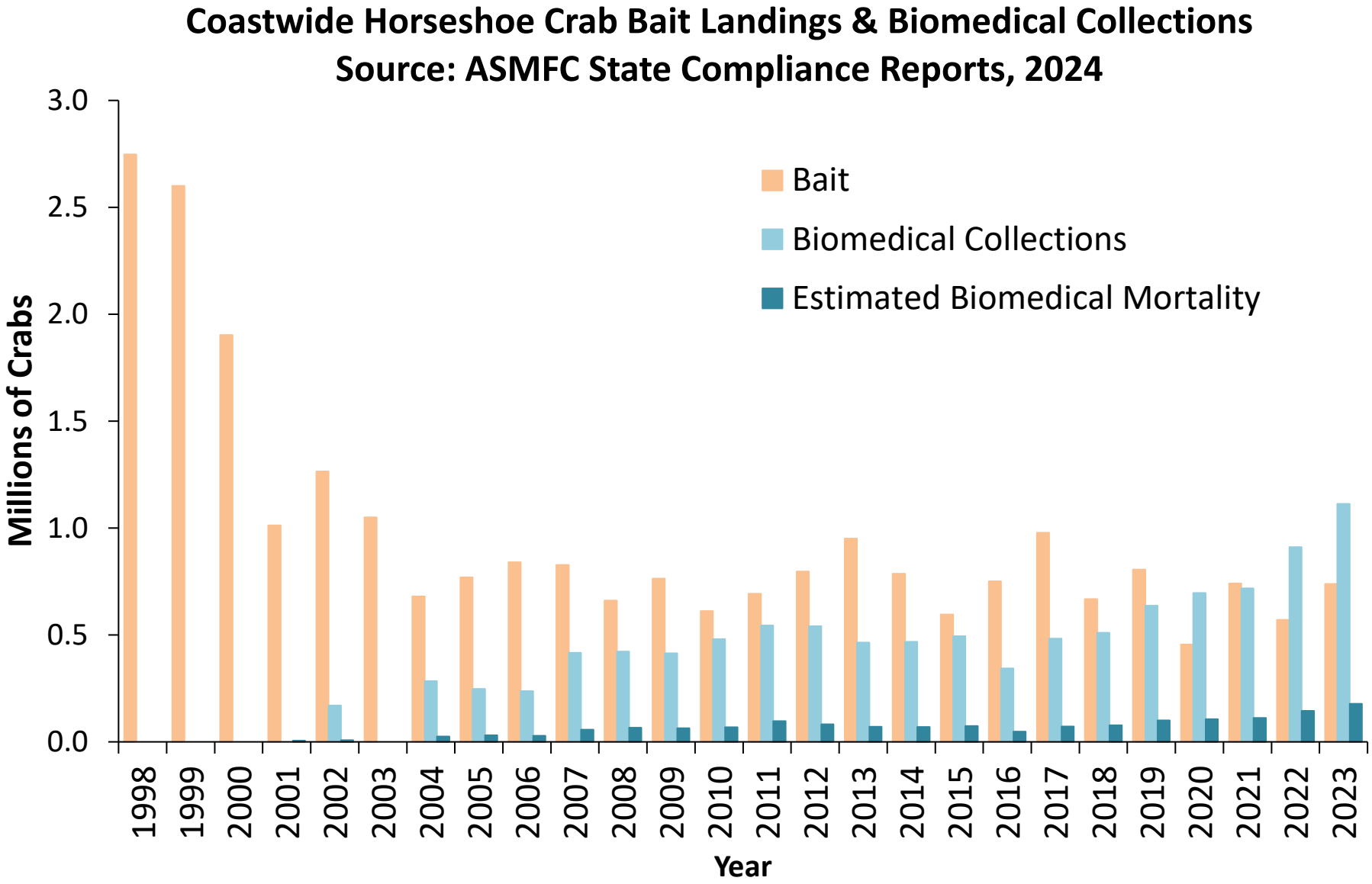
October 2024

Management History

- **FMP Approved (1998)**
- **Addendum I (2000) –** State bait harvest quotas & *de minimis*
- **Addendum II (2001) –** Quota transfers
- **Addendum III (2004) –** DE Bay state bait quotas & seasonal closures
- **Addendum IV (2006) –** DE Bay state bait quotas & seasons
- **Addendum V (2008) –** Extension of Add IV
- **Addendum VI (2010) –** Extension of Add V
- **Addendum VII (2012) –** DE Bay ARM Framework
- **Addendum VIII (2022)** – Adopted ARM Revision

Descriptions in Section I of FMP Review

Annual Total Harvest



2023 Bait Fishery

- Total coastwide harvest was 738,789 crabs
  - *FL landings are confidential*
  - 29% increase from 2022 landings of 570,988, similar to 2021 landings
- Majority from MD (25%), DE (23%), MA (19%), NY (18%), VA (14%)
- 46.4% of coastwide quota of 1.59 million crabs

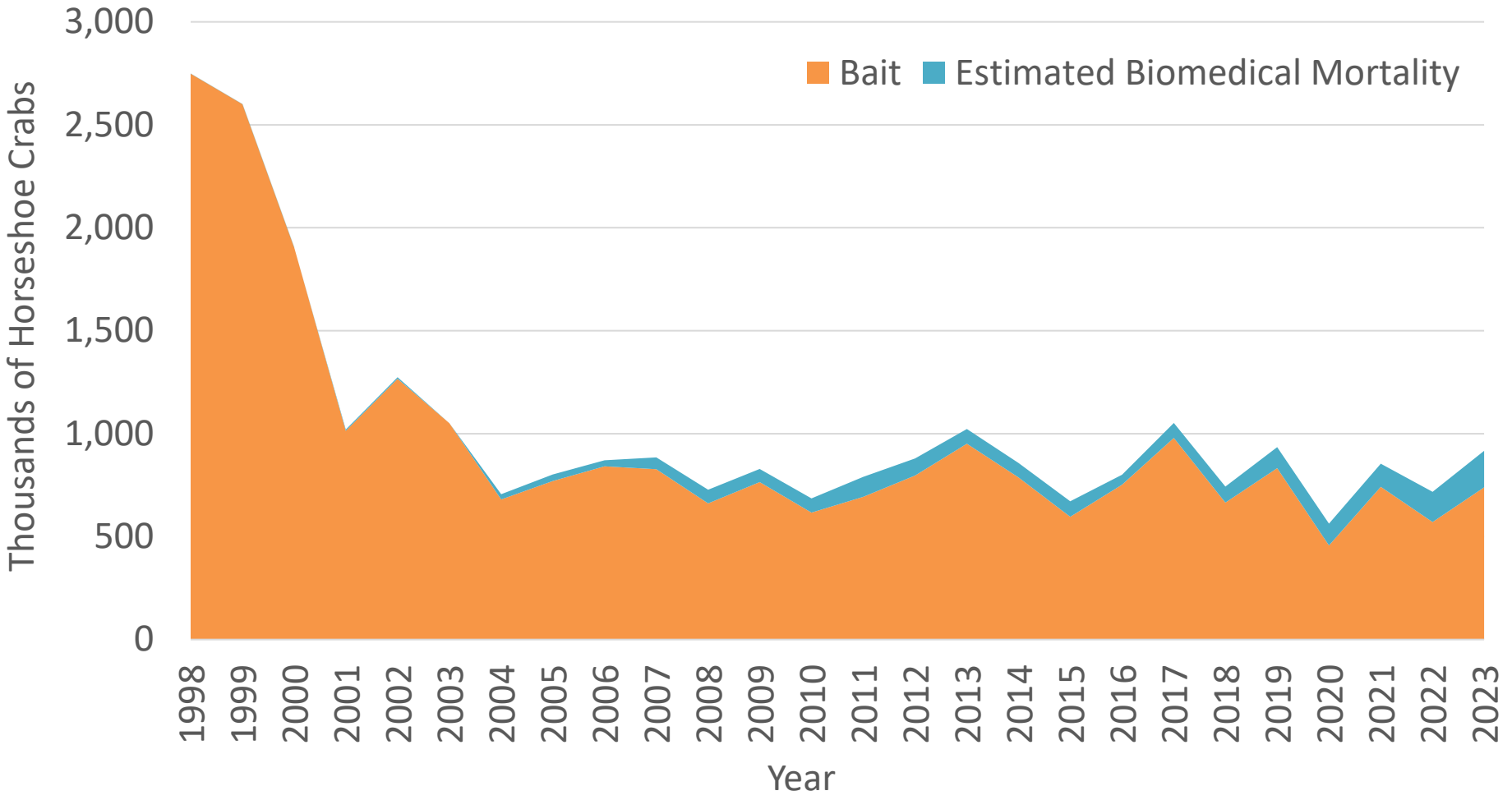
Biomedical Use

- Biomedical-only crabs collected in 2023: 1,113,644 crabs
  - 22% increase from 2022 (911,826 crabs)
- Biomedical-only mortality estimate:

  178,232 crabs
  - Biomed Mortality = # Observed Dead Before Bleeding + 15% x # Biomed-Only Bled
  - 19.4% of total directed removals; biomedical mortality + bait harvest (917,021 crabs)
- Total removals increased from 2022

637,029
637,029
637,029
761,284
761,284

Total Mortality



De Minimis

- Combined average bait landings (by numbers) for last two years < 1% of coastwide bait landings for the same two-year period
- SC, GA, and FL all requested and qualify for *de minimis* status for 2024

PRT Notes

- DE landings exceeded the ASMFC bait quota
  - DE reduced the state quota for 2024
- As of Oct. 1, 2023, hand harvest of horseshoe crab and eggs is prohibited in CT
- NY state legislature is considering a bill to prohibit all commercial and biomedical harvest of horseshoe crabs
- MA reduced state quota to 140,000 crabs

PRT Notes

- MD regulations allow HSC harvest starting May 1
  - Addendum VI included a provision for no harvest from January 1 to June 7 for NJ, DE, & MD, which expired in 2013
  - Subsequent Addenda do not include this provision
- PRT concern about inconsistency in harvest season in DE Bay Region
  - DE and VA have harvest restrictions Jan 1 – June 7

PRT Recommendations

- The Board should clarify intent regarding season closure provisions for DE Bay region
- Continue seeking long-term funding for VT trawl survey
  - Funded through 2024
- Consider annual characterization of discard removals

PRT Recommendations

- All states and jurisdictions appear to be in compliance with FMP provisions
  - MA did not meet compliance report deadline

- ***Board action:***

  Consider approval of the FMP Review and state compliance reports for the 2023 fishing year, and *de minimis* status for SC, GA, and FL.

Questions?