Working towards healthy, self-sustaining populations for all Atlantic coast fish species or successful restoration well in progress by 2015

Horseshoe Crab
Draft Addendum VII

Horseshoe Crab Management Board
February 2012

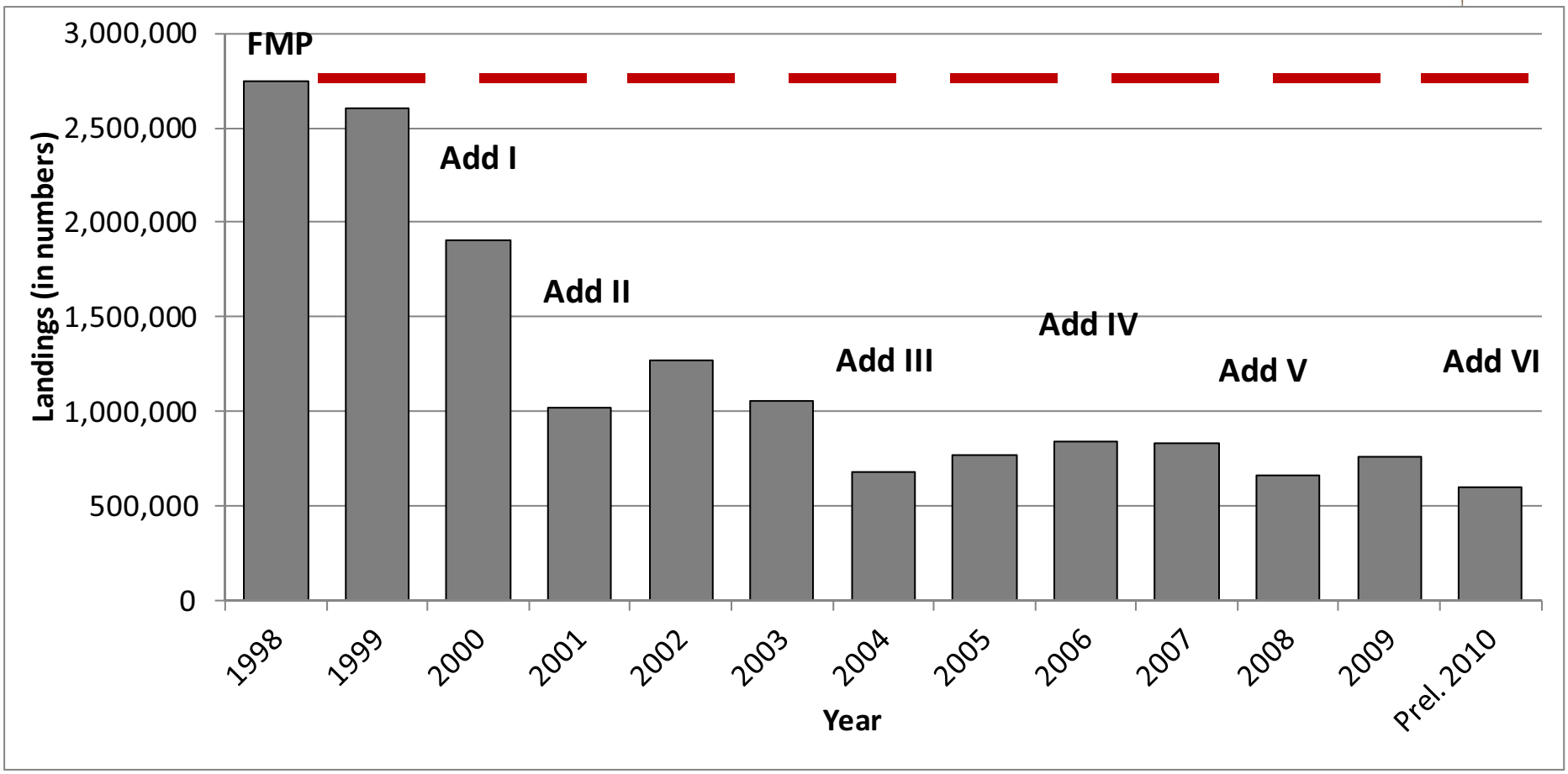
Timeline

Fall 2011	Draft Add VII Developed
November 2011	Board Review
Winter/Spring 2011-2	AP and TC Review/ **Public Comment**
Spring/Summer 2012	Board Review/Final Approval

Summary of the Problem

- Horseshoe crabs play distinct ecological role in the Delaware Bay, supporting fishing, biomedical, and shorebird (red knot) dependents
- Horseshoe crab landings reduced by 4-fold since 1998 but red knots have shown no recovery; not sure how sustainable historical landings were
- Current Add VI expires April 30, 2013

Bait Fishery History



Background

- HSC FMP approved 1998
- Current management under Add VI (2010)
  - Continued extension of Add IV (2006)
- Add VI included an option for ARM implementation
  - Concerns about Trawl Survey funding
- Sunset clause

Management Option 1

- Option 1: No action
  - Add VI expires April 30, 2013, Revert to Add III

	Add. III	Add. VI
Delaware New Jersey	150,000 crabs May 1 – June 7	100,000 males January 1 – June 7
Maryland	170,653 crabs May 1 – June 7	170,653 crabs January 1 – June 7
Virginia	152,495 crabs (None)	60,998 crabs 2:1 male:female Federal waters, January 1 – June 7

Management Option 2

- Option 2: Continue Status quo
  - Continue Add VI provisions
  - Include/Not include Sunset Clause
  - If expires, what is the default?

Potential Sunset Clause
No expiration
One year
Three years
Five years

Management Option 3-ARM

- Option 3: ARM Framework
  - Allocation suboptions

How do we divide up the Optimal Harvest between NJ, DE, MD, and VA?

Management Option 3-ARM

- Suboption 3a, Lambda
- How much of the harvest is Delaware Bay crabs?
  - Will spawn at least once in Delaware Bay
- DE and NJ: assume all are Delaware Bay crabs
- MD and VA: 3 options based on tagging data, genetics data, and a default approach

Lambda

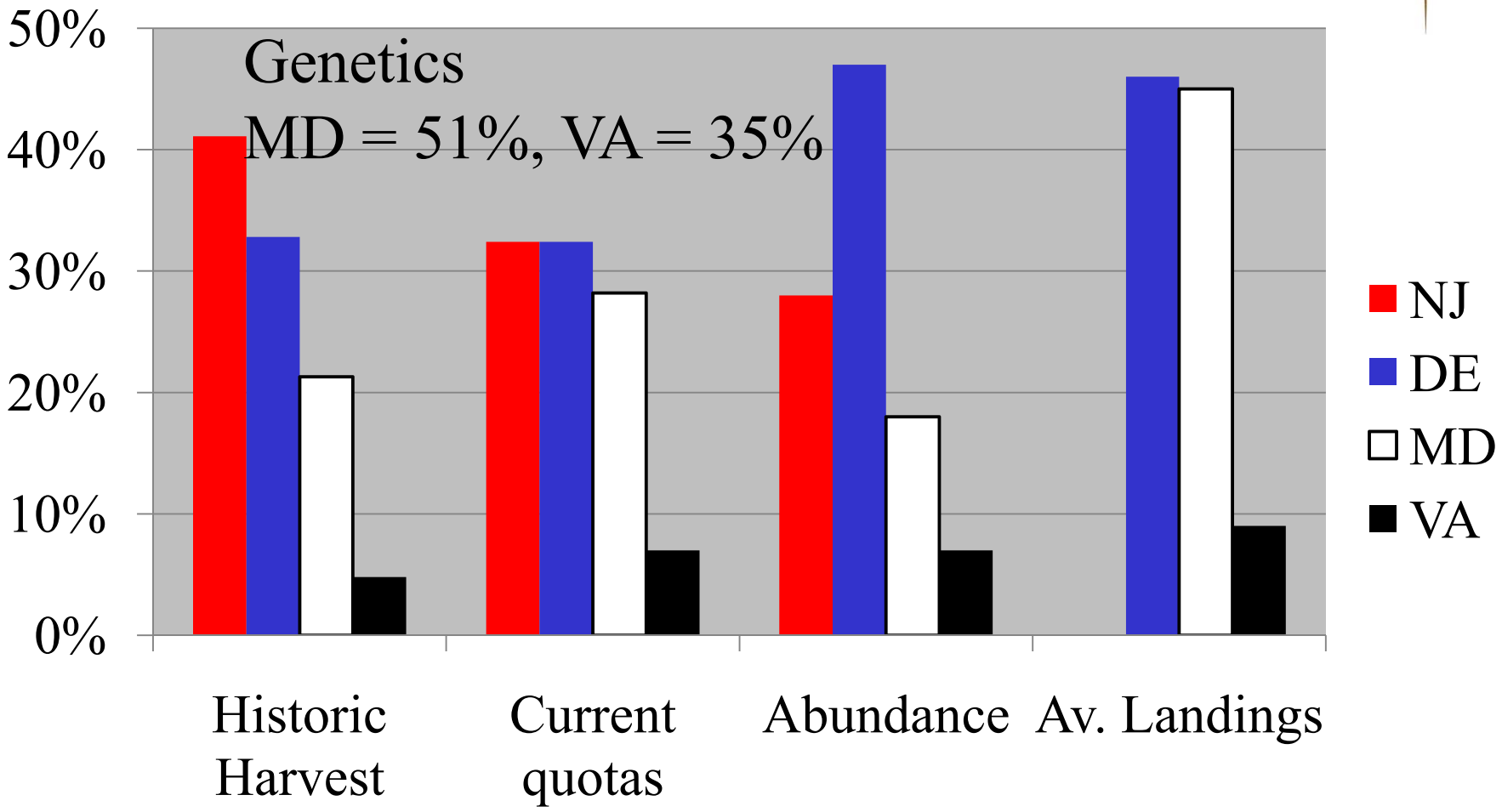
- Tagging data: USFWS
  - MD: 13%
  - VA: 9%
- Conservative: assume all are Delaware Bay crabs
  - MD and VA: 100%
- Genetics data:
  - MD: 51%
  - VA: 35%

Management Option 3-ARM

- Suboption 3b, Weighting
- On what basis should the harvest be divided among the 4 states?
  - Historic harvest
  - Current management quotas
  - Estimated abundance
  - Average landings

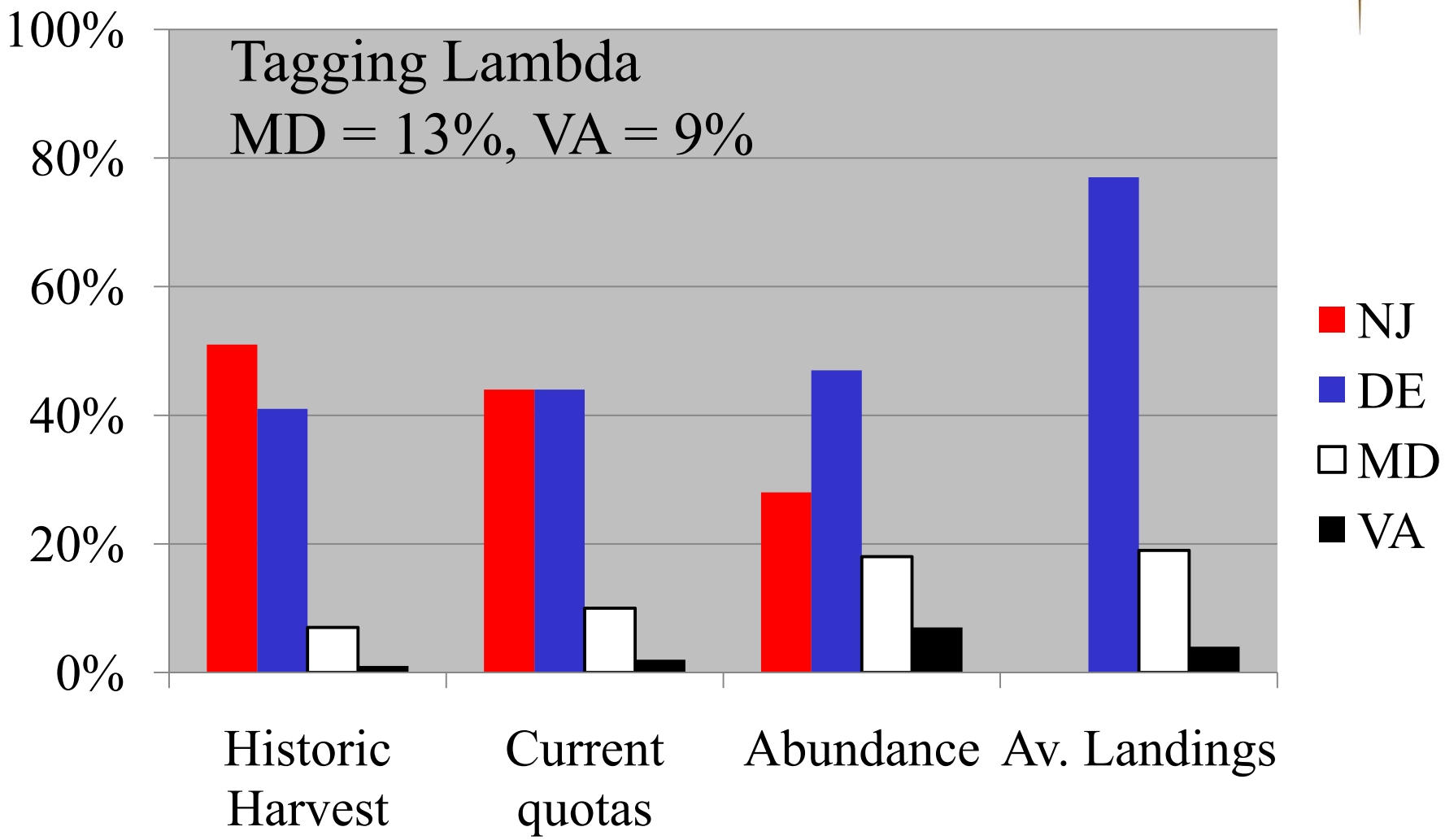
NOTE: Resultant values interact with Lambda

Weighting



See Page 11 in Draft Add. VII

Weighting


Tagging Lambda
MD = 13%, VA = 9%
100%
80%
60%
40%
20%
0%
Historic Harvest
Current quotas
Abundance
Av. Landings
NJ
DE
MD
VA

Management Option 3-ARM

- Suboption 3c, Harvest cap
- Should Maryland and Virginia's harvest be capped to protect non-Delaware Bay crabs?
- Mixed stock fishery
- Yes → what should be used to establish the cap?
  - Historical harvest
  - Past or current management levels
  - Average landings

Harvest Cap

Cap Basis	Current MD quota 170,653	Current VA quota 60,998
	MD Cap	VA Cap
RPLs	613,225	203,326
Add I	459,919	152,495
Add III	170,653	152,495
Add VI	170,653	60,998
2007-2010 Avg Landings	160,746	21,280

Harvest Cap

Assumptions: Lambda based on tagging data, Addendum VI for weight, No Harvest cap

	Current Quota	ARM Quota
MD	170,653	395,600
VA	60,998	141,403

132% increase in harvest without cap

Delaware Bay Stock Allowance

- Suboptions 3d and 3e
  Delaware Bay Stock Allowance
- Should Maryland and Virginia be allowed to still harvest if the ARM recommends a moratorium?
- Mixed stock fishery
- Harvest Package #3 → female moratorium

Delaware Bay Stock Allowance

- If fewer females, fishery would be required to fill quota with males
  - Suboption 3e allows a 2:1 male:female offset
- Percentages refer to coastwide harvest
- Relevant only if assume a mixed stock fishery

See pages 12-14 of Draft Addendum VII

Delaware Bay Stock Allowance

	Maryland, Genetics (51%), W_i = Add. VI	
DBSA level	3d 1:1, male:female	3e 2:1, male:female
0%	**0** (170,653)	**0** (255,890)
1%	**5,318** (165,335)	**5,318** (245,344)
5%	**26,589** (144,064)	**26,589** (202,802)
10%	**53,177** (117,476)	**53,177** (149,626)

Females (Males)

Delaware Bay Stock Allowance

	Virginia, Genetics (35%), W_i = Add. VI	
DBSA level	3d 1:1, male:female	3e 2:1, male:female
0%	**0** (60,998)	**0** (81,331)
1%	**1,901** (59,097)	**1,901** (77,529)
5%	**9,504** (51,494)	**9,504** (62,323)
10%	**19,008** (41,990)	**19,008** (43,315)

Females (Males)

Plan B

- Suboption 3f, "Plan B"
- If the annual model inputs are not available, what are the management measures?
- Board may set management to:
  - Addendum VI measures, or
  - Previous ARM-recommendation
- Via Board Action (vote)

Summary

- Option 1: No action, Add. III
- Option 2: Continue Add. VI measures, how long?
- Option 3: Implement ARM
  - 3a: How much of harvest comes from Delaware Bay?
  - 3b: How to weight each state's stake in the harvest?
  - 3c: Should MD/VA limit harvest to protect non-Delaware Bay Crabs?
  - 3d/e: Should MD/VA harvest crabs under moratorium?
  - 3f: Should there be a Plan B?

Public Hearings

Maryland	December 21, 2011
New Jersey	January 5, 2012
Delaware	January 6, 2012
Virginia	January 10, 2012

Summary

- 4 public hearings
  - 32 public participants
- 49 public comments
  - 41 individual
  - 8 organizations
- Current Add VI expires April 30, 2013

Summary

- Option 1, No action: 2
- Option 2, Status quo: 7 – No preference
  4 – 5-year sunset
- Option 3, Implement ARM: 45+

Some comments favored Option 3 only with certain sub-options

Option 3	No Preference, 2		
3a, Lambda	Genetics	Default	Tagging
	46	36	4
3b, Weighting	RPLs	Add VI	Av Land
	3	10	1 (34 oppose)
3c, Harvest Cap	Add VI	RPLs	No
	47	1	1
3d, DBSA	5%	10%	No
	1	6	41
3e, DBSA 2:1 offset	Yes		No
	2		46
3f, Plan B	Yes, 13		

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Technical Committee recommendations regarding Draft Addendum VII

A report from the Delaware Bay Ecosystem Technical Committee

Horseshoe Crab Management Board
February 2012

Primary Options

- Option 1: No action
  - Less risk averse than ARM framework
- Option 2: Continue status quo
  - No scientific basis for harvest levels
  - Little "new" information from delaying implementation of ARM
  - Does not incorporate feedback loop
  - If selected, should include sunset clause
- Option 3: Implement ARM framework
  - Scientifically derived harvest levels
  - Incorporates feedback loop
  - Considered best available science
  - **TC recommended option**

Option 3a - Lambda

- Could not reach consensus

	Default	Genetics	Tagging
NJ	1.00	1.00	1.00
DE	1.00	1.00	1.00
MD	1.00	0.51	0.13
VA	1.00	0.35	0.09

- Default values
  - Most conservative for Delaware Bay stock
  - Not scientifically derived
- Genetics-based values
  - Scientifically derived, but using indirect data
- Conclusion
  - Majority: Set value no lower than genetics-based values
  - Minority: Actual values could be between genetics-based and tagging-based
  - Consensus: Directed genetics/tagging study would be beneficial

Option 3b - Allocation

- No previous TC recommendation (policy decision)
- Using average landings unfair
  - NJ would receive no quota due to current moratorium
- VA Tech Trawl Survey
  - Best estimates of relative abundance
  - Survey design not intended to develop state-specific estimates
- Recent harvest allocation levels
  - Reflect past policy and management decisions
  - **TC recommended option**
- If states are more conservative than required, should not re-allocate unused crabs to other states

Option 3c – Harvest cap

- Only required for lambda values less than 1.0
- RPL or Addendum 1 landings would be ineffective at limiting harvest
- Average landings penalizes states for past quota underages
- Addendum VI landings
  - Best reflects past management actions
  - Effective cap
  - Protects southern stock
  - **TC recommended option**

Option 3d – DBSA

- No previous TC recommendation
- Only required for lambda values less than 1.0
- Could not reach consensus
- Majority
  - Deviations from ARM model undermine intent of model framework
  - Deviations interfere with utility and evaluation of framework
  - Even small allowable bycatch could turn into targeted quota
  - Recommend against implementation of DBSA
- Minority
  - Even 10% DBSA would not be excessively detrimental to ARM process
  - Would maintain MD/VA fisheries in face of ARM recommended moratorium

Option 3e – 2:1 offset

- No previous TC recommendation
- Allowing offset would further convolute implementation of ARM framework
- **Recommend that 2:1 offset not be allowed**

Option 3f – Backup plan

- Selection of backup plan is premature at this time

- Decision could be affected by many factors
  - State of resources
  - Length of implementation
  - Expected length of data gap

- Recommend alternative strategy
  - Board requests input from DBETC and/or relevant Advisory Panels
  - TC and APs review available data; provide recommendations to Board
  - Board implements appropriate management action

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Horseshoe Crab Advisory Panel Report
29 November 2011
James F Cooper, Chair

Horseshoe Crab Management Board
February 2012

Horseshoe Crab AP Meeting Overview

- Conference call included 6 AP Members, representing 5 states, plus Ms. Chesky.
- The proceedings focused on reviewing Draft Addendum VII
- Agreed that Option 3, ARM Implementation, was the best option to move forward, given some specific allocation options.
- Previous recommendations from May meeting remain as before.
- The AP discussed the additional suboptions of the 2:1 offset and contingency plan option.

Delaware Bay origin of MD and VA crabs

- The AP agreed with DBETC that the default option (lambda = 1) isn't good management.
- The limitations of tagging data were noted.
- The consensus recommendation is that the lambda values fall between tagging & genetic data.
- The AP recommends the two sets of values as the window for future management.

Weighting System for Allocation of Harvest

- The AP considered historical, current quotas and estimated abundance (Trawl data) levels.
- The AP felt it inappropriate to base allocation on estimated abundance or average landings.
- The majority recommendation was basing the proportional allocation of the ARM harvest on Addendum VI quota, while the minority recommended using the Reference Period Landings.

Harvest Cap for MD & VA

- The AP agreed that non-Delaware Bay crabs should be protected until data suggests harvest levels can increase, but a decrease isn't justified.
- The AP recommends a harvest cap based on Addendum VI quota allocations to cap harvest of non-Delaware Bay crabs

Delaware Bay Stock Allowance (DBSA)

- The current AP recommendations allow harvest of some DB HSCs; avoids problems of a moratorium of DB origin crabs.
- AP is aware of HSC improvement of numbers.
- The AP recommends that the Board establish a DBSA that maintains the current quota levels for female crab harvest in VA and MD

Delaware Bay Stock Allowance (DBSA), 2:1 offset

- The AP saw both benefits and disadvantages of allowing a 2:1 offset of males for females.
- Potential economic loss of females (no offset) is estimated at $1.6 million for MD and VA.
- The majority recommends allowing the offset should the DBSA be lower than the current female harvest; the minority felt that the flexibility already existed, if the Board wished to implement an offset in the future.

Plan B

- The AP agreed that the Board should consider the best available scientific information, should the specific data needed for the ARM Framework not be available.
- The AP recommends a contingency plan be included in the plan and the Board use its resources to consider the most appropriate management option.

Summary/Questions

- Lambda: between tagging and genetics
- Weighting: Add VI (majority), RPLs (minority)
- Harvest Cap: Yes, Add VI, but review in future
- DBSA: Yes, to achieve current (Add VI) female harvest levels
- 2:1 offset: Yes (majority), Do not require (minority)
- Plan B: Yes

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Shorebird Advisory Panel

Recommendations on ARM Allocation Scenarios

Sarah Karpanty (VA), Chris Bennett (DE), Jean Woods (DE), Tim Dillingham (NJ), David Mizrahi (NJ)

Horseshoe Crab Management Board
February 2012

Options

1) No Action-Revert to Add. III
   - Less risk-averse; moving backward in management
2) Continue Status Quo- Add. VI
   - Based on past management and policy
   - Unable to adapt to changes
3) Implement ARM
   - Based on scientific modeling
   - Still developing and adaptable to changes

Suboption 3a: lambda λ

- How much of each state's harvest is comprised of Delaware Bay-origin crabs?
  - Genetics: 0.51, Maryland; 0.35, Virginia

- Why?
  - Genetics data are the most reliable at this time
  - Most risk averse

Suboption 3b: Allocation Weights

- On what basis should the total recommended harvest, output by the ARM model, be divided among the states?
  - Addendum VI
- Why?
  - Using the VT Trawl Survey abundance data was attractive, but the survey was not designed to quantify state by state abundance levels.
  - Using average landings would punish NJ for their conservative harvest quotas.
  - Addendum VI levels were recommended as those levels are risk averse in protecting male horseshoe crabs and offset some of the devaluation of male crabs in the ARM model.

Suboption 3c: Harvest cap for MD and VA

- Should there be an overall harvest cap on MD and VA harvest to protect non-Delaware Bay origin horseshoe crabs?
  - Yes-based on Addendum VI levels

- Why?
  - There is no evidence that non-Delaware Bay crabs can sustain higher harvest levels at this time

Suboption 3d: Delaware Bay Stock Allowance

- Should there be an allowable, but minimal, harvest of Delaware Bay origin crabs for MD and VA if the ARM output requires a full or female moratorium?
  - No - maintain near-perfect implementation of ARM
- Why?
  - The MD and VA stocks are mixed, and it is impossible in the field to determine the crab's origin
  - ARM process must be allowed to work; basing female catch on factors other than ARM output will complicate interpretation of ARM management recommendations
  - The AP would reconsider this recommendation if there is additional evidence of sustained increases in crab or shorebird populations

Suboption 3e: 2:1 offset

- Should there be an offset of 2 males per female crab, should the female harvest be restricted below the current Addendum VI levels for MD and VA, if the ARM output requires a full or female moratorium?
  - No - maintain near-perfect implementation of ARM
- Why?
  - Would increase harvest on males in MD and VA. There is no evidence that non-Delaware Bay crabs can sustain higher harvest levels at this time.
  - ARM process must be allowed to work without being convoluted to interpret the impacts.

Suboption 3f: Plan B

- Should there be contingency plan, should the data to annually run the ARM are unavailable?
  - Yes – use the Technical Committees and Advisory Panels to review the available scientific data to make a recommendation to the Board.
  - Do not pre-determine one action
- Why?
  - Using the committees would give the Board a review of the most current information that is available and a review of the older data
  - Process would still allow the Board to react and set management measures in a timely manner

Summary and Questions?

Sub-option	Shorebird Advisory Panel
3a, λ	Option 3 Genetics data, MD (0.51), VA (0.35)
3b, Allocation Weights	Addendum VI quotas
3c, Harvest Cap for MD and VA	Yes- Addendum VI quotas
3d, Delaware Bay Stock Allowance	Maintain the ARM output harvest, including a female moratorium in MD and VA
3e, Delaware Bay Stock Allowance. 2:1 offset	Maintain ARM output harvest without increasing harvest in MD and VA
3f, Plan B	Consult technical committees and advisory panels before making a decision