2018 STOCK ASSESSMENT OF ATLANTIC STRIPED BASS

M. Celestino, SAS Chair

April 30, 2019

Assessment Team

- Michael Celestino, New Jersey Division of Fish and Wildlife, Stock Assessment Subcommittee Chair
- Nicole Lengyel, Rhode Island Division of Marine Fisheries, Technical Committee Chair
- Dr. Stuart Welsh, West Virginia University, Tagging Subcommittee Chair
- Gail Wippelhauser, Maine Department of Marine Resources
- Kevin Sullivan, New Hampshire Department of Fish and Game
- Dr. Gary Nelson, Massachusetts Division of Marine Fisheries
- Justin Davis, Connecticut Department of Energy and Environmental Protection, Marine Fisheries
- Kurt Gottschall, Connecticut Department of Energy and Environmental Protection, Marine Fisheries
- Jessica Best, New York Department of Environmental Conservation, Marine Resources
- Carol Hoffman, New York Department of Environmental Conservation, Marine Resources
- Brendon Harrison, New Jersey Division of Fish and Wildlife
- Michael Kaufmann, Pennsylvania Department of Conservation and Natural Resources
- Ian Park, Delaware Division of Fish and Wildlife
- Dr. Hank Liao, Old Dominion University
- Angela Giuliano, Maryland Department of Natural Resources
- Dr. Alexei Sharov, Maryland Department of Natural Resources
- Beth Versak, Maryland Department of Natural Resources
- Ellen Cosby, Potomac River Fisheries Commission
- Alex Aspinwall, Virginia Marine Resources Commission
- Chris Bonzek, Virginia Institute of Marine Science
- Charlton Godwin, North Carolina Department of Natural Resources
- Jeremy McCargo, North Carolina Department of Natural Resources
- Gary Shepherd, National Marine Fisheries Service, Northeast Fisheries Science Center
- Dr. John Sweka, U.S. Fish and Wildlife Service
- Steve Minkkinen, U.S. Fish and Wildlife Service
- Dr. Wilson Laney, U.S. Fish and Wildlife Service
- Josh Newhard, U.S. Fish and Wildlife Service
- Dr. Katie Drew, ASMFC Senior Stock Assessment Scientist
- Max Appelman, ASMFC Fishery Management Plan Coordinator

Data Changes for Benchmark

- Calibrated recreational MRIP data
- Plus group extended from age 13+ to 15+
- Fleets reduced from 3 to 2
- Commercial dead discards: from raw tags to smoothed and adjusted tags (& MRIP releases)
- Index changes:

Composite YOY (MD & VA)	ChesMMAP Trawl (new)
MRIP (age composition)	NEFSC Trawl (eliminated)
CT Trawl (age composition)	VA Pound Net (eliminated)
DE 30' Trawl (new)	

- Updated female maturity ogive
- Scale and otolith ages used
- Terminal year = 2017

Two-stock migration model

- Modified the current SCA to model two biologically distinct stocks that mix in a common "ocean" region
  - the Chesapeake Bay stock that is comprised of a resident population and a migratory population that moves between the Bay and ocean for spawning
  - The Ocean stock which includes the Delaware Bay and Hudson River stocks
- The Review Panel concluded that the two-stock model was not ready to serve as a basis for management advice

Statistical Catch-At-Age Model

- Same model used previously for management, updated with new data

- Forward projecting statistical catch-at-age model

- Data are split into two "Fleets" based on regions
  - Chesapeake Bay & Ocean
  - Improved selectivity fits
  - Provided partial F for each fleet

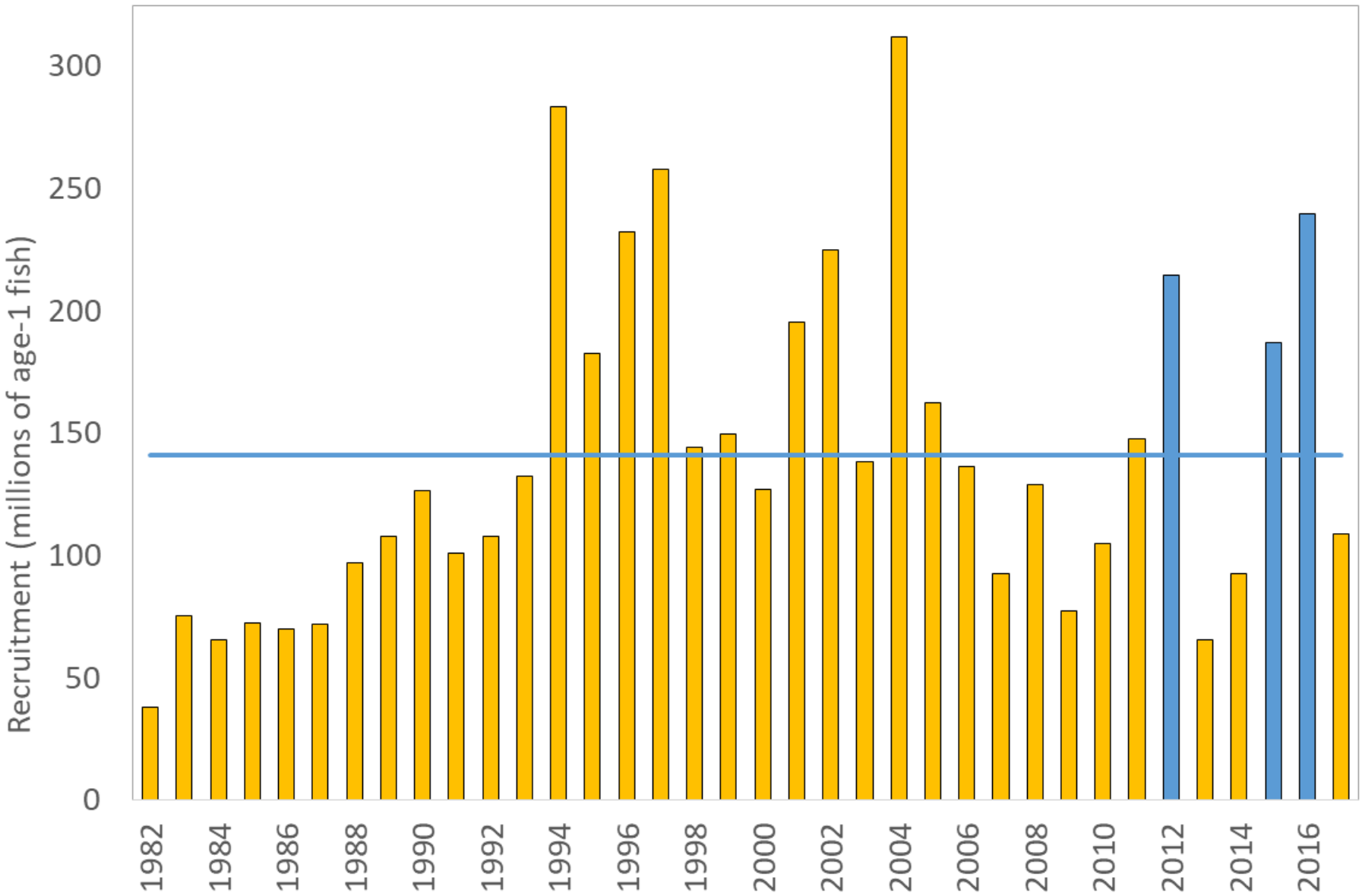
- Provides estimates of recruitment, F, total abundance, and female spawning stock biomass

SAW/SARC 66 Updated Striped Bass BRPs

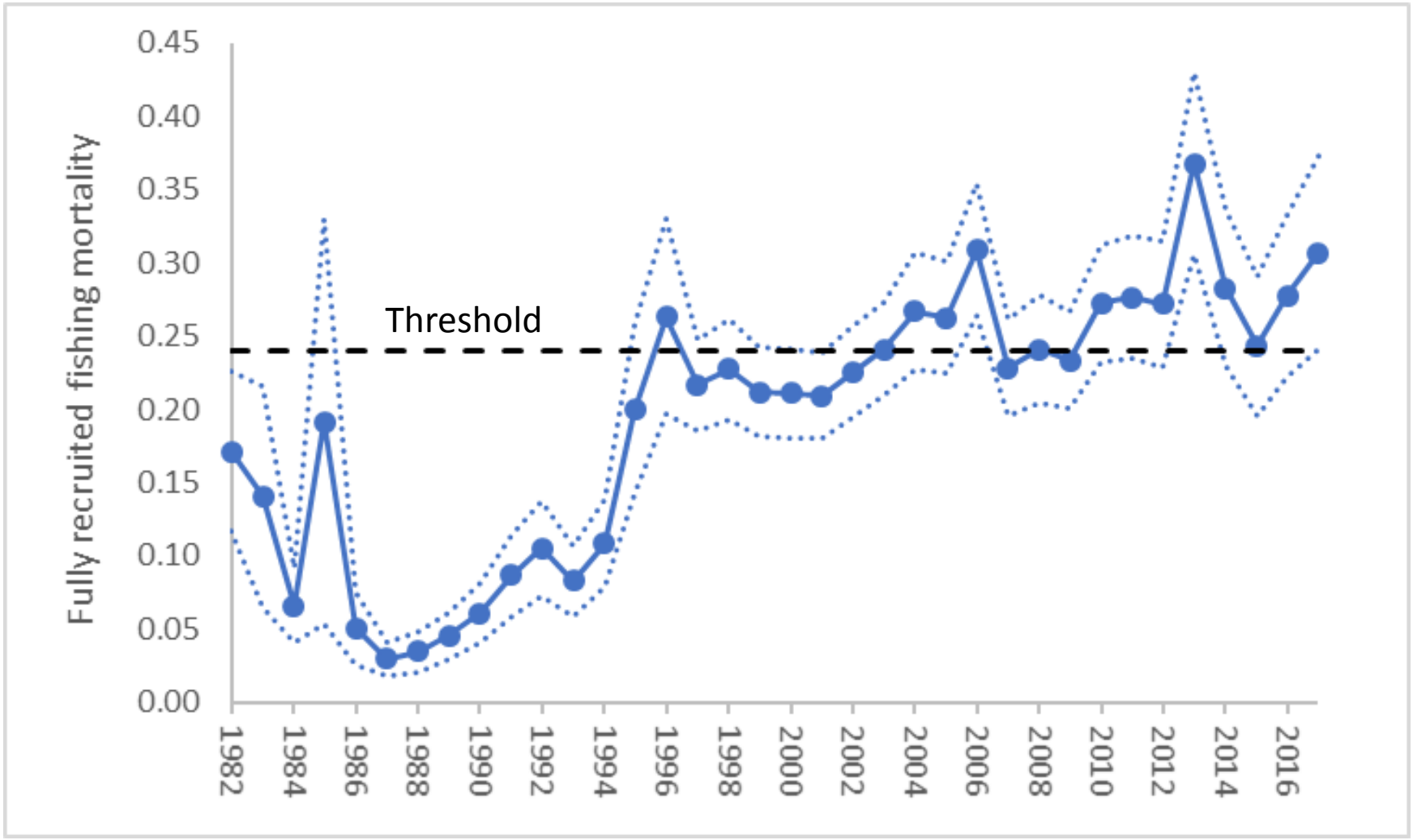
Reference Point Definitions		
	Female SSB (MT)	**F**
Threshold	Estimate of 1995 female SSB	F projected to achieve SSB Threshold
Target	125% SSB Threshold	F projected to achieve SSB target

Reference Point Values		
Reference Point	**Addendum IV, 2014**	**SARC 66, 2018**
$SSB_{Threshold}$	57,626	91,436
SSB_{Target}	72,032	114,295
$F_{Threshold}$	0.22	0.240
F_{target}	0.18	0.197

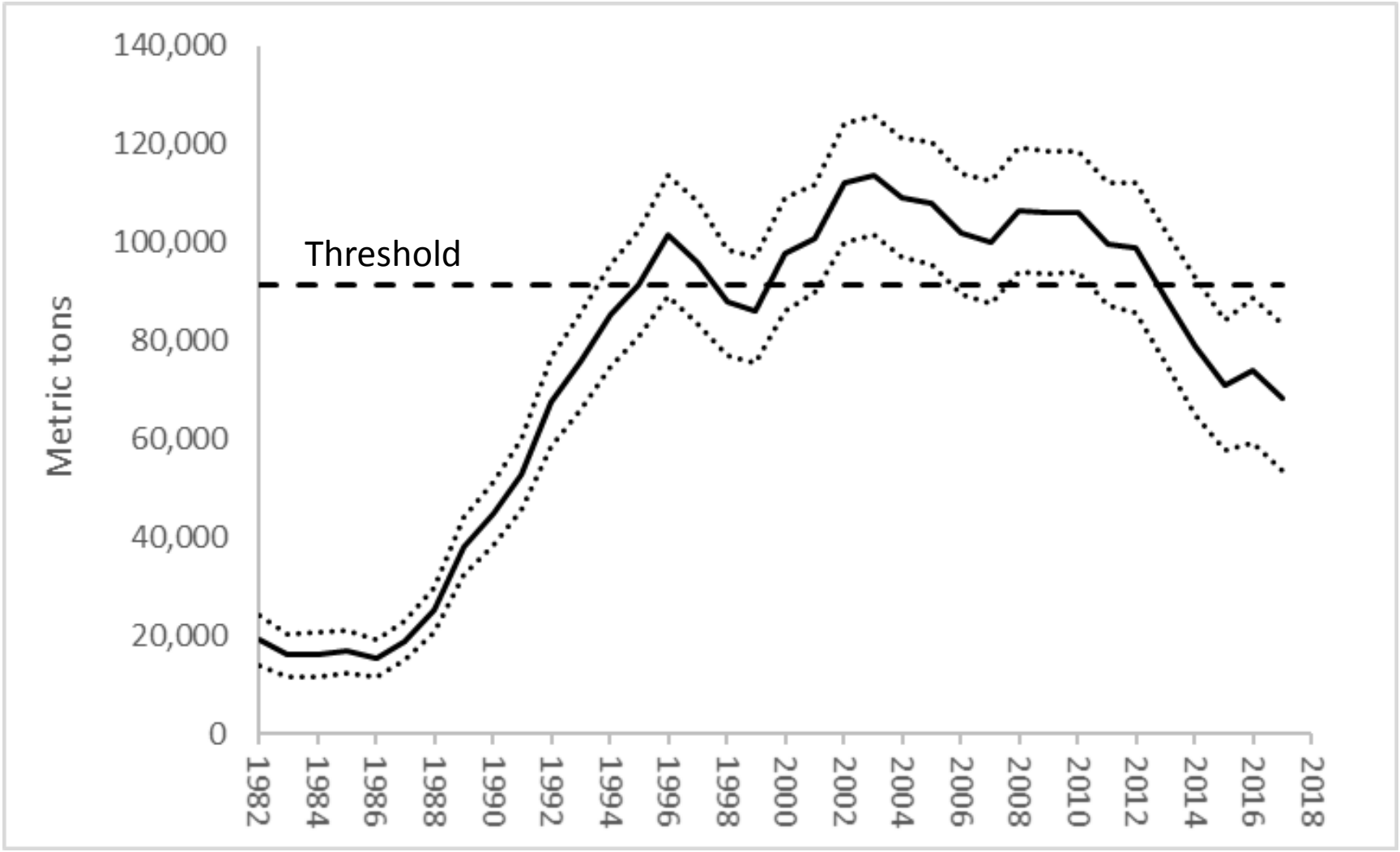
Recruitment (age-1 fish)



Fishing Mortality (±95% CI)



Female Spawning Stock Biomass (±95% CI)

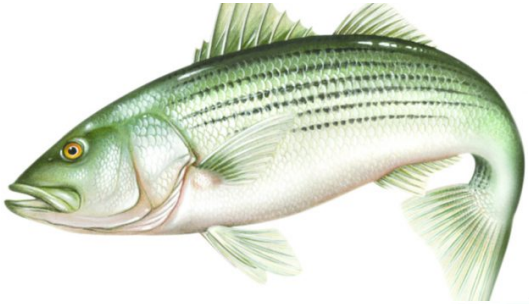


QUESTIONS

Striped Bass
Assessment Peer Review Report

Presented to ASMFC Striped Bass Management Board

April 30, 2019



NEFSC Stock Assessment Review Committee (SARC) Process

1. Striped Bass Stock Assessment Subcommittee, Tagging Subcommittee, and Technical Committee developed assessment

2. External Peer Review Panel: Chair + Center of Independent Experts (CIE)

   - Emphasis on reviewing only the science/assessment

3. SARC Products: Individual Reviewer Reports, Review Panel Consensus Report, and Summary Report

   https://www.nefsc.noaa.gov/saw/ (see SAW/SARC 66)

   https://www.nefsc.noaa.gov/saw/reports.html (see Ref. Docs.)

The 66th Northeast Regional Stock Assessment Review Committee (SARC 66) Northeast Fisheries Science Center, Woods Hole, Massachusetts November 27 - 30, 2018

SARC Chair:

Dr. Robert Latour, VIMS, MAFMC SSC

SARC Panelists from the Center for Independent Experts:

Dr. Robin Cook, University of Strathclyde, Glasgow, Scotland

Dr. John Casey, CEFAS ret., Consultant, United Kingdom

Dr. Yan Jiao, VA Tech, MAMFC SSC

Review Panel Overall Findings

- Two-stock, seasonal (3 periods), spatial (2 regions), catch-at-age model ('2SCA model') – *innovative but <u>not accepted</u>*
  - Ref pts:
    - 2 SSB (Del/Hud stock, ChesBay stock)
    - 3 Fishing Mortality (2 ChesBay stock, 1 Del/Hud stock)

- Single-species, age-structured, catch-at-age model ('SCA model') was updated – SARC 57 model*, <u>accepted</u> for management advice*
  - Much of meeting time devoted to 2SCA model, but SCA model structure, data inputs, diagnostics, some sensitivity runs, results, and stock status information presented

Comments on Regional Reference Points

- Conceptual problem with spatial ref. pts for single stock ($F_{CB, Bay}$, $F_{CB, Ocean}$)
  - Not biologically meaningful
  - Cumulative F should determine status
  - Single, stock-wide F needed to ensure unique mathematical solution (infinite ways to partition F among fleets or areas)

Comments on 2SCA Model

Two-stock, seasonal (3 periods), spatial (2 regions), catch-at-age model ('2SCA model') – *innovative but <u>not accepted</u>*

- More extensive simulation testing
  - Exploration of parameter estimability
  - Testing of the effects of various emigration rate assumptions
  - Alternative methods (e.g., multi-state tagging models) to estimate emigration rates from existing tagging data
  - Development of a method to estimate numbers-at-age for the first year

Comments on 2SCA Model, cont

Two-stock, seasonal (3 periods), spatial (2 regions), catch-at-age model ('2SCA model') – *innovative but not accepted*

- Further examination of tagging data after 1995 (including developing ways of assigning ages to NY data) to examine potential time-varying emigration rates
- Further exploration of appropriate BRPs for a two-stock population with mixing
  - Can the model detect changes in stock status with different emigration rates/exploitation patterns/etc?

Comments on 2SCA Model, cont

Two-stock, seasonal (3 periods), spatial (2 regions), catch-at-age model ('2SCA model') – *innovative but <u>not accepted</u>*

- Evaluation of why model output for the two stocks show such similar patterns over time
- Further exploration of the assumption of constant selectivity across periods within a region & year
- Identify weaknesses in the existing data that can be improved to support the further development of this model
- Develop more robust estimates of stock composition

Assessment TORs - SCA model

ToR1: Investigate all fisheries independent and dependent data sets, including life history, indices of abundance, and tagging data. Discuss strengths and weaknesses of the data sources.

Panel Comments:

- Rich datasets supported estimation of life history parameters and indices
- Wealth of tagging data available to aid scaling and estimation of M
- Overall, SBWG nicely assembled requisite input data

TORs, cont - SCA model

ToR 2: Estimate commercial and recreational landings and discards. Characterize the uncertainty in the data and spatial distribution of the fisheries. Review new MRIP estimates of catch, effort and the calibration method, if available.

Panel Comments:

- Commercial discards separated regionally (CB, ocean) leading to a two-fleet model
- Commercial discard estimation largely based on tagging data
- Recreational harvest (harvested+released) came from new-MRIP; increased by 140% and 160% compared to previous estimates, respectively
- Differences among old- and new-MRIP were primarily in magnitude not trend

TORs, cont - SCA model

ToR 3: Use an age-based model to estimate annual F, recruitment, total abundance and stock biomass (total and spawning stock) for the time series and estimate their uncertainty. Provide retrospective analysis of the model results and historical retrospective. Provide estimates of exploitation by stock component and sex, where possible, and for total stock complex.

Panel Comments:

- 2SCA model not accepted; SCA model accepted
- Bay F generally lower than Ocean F
- Low SSB in 1980s, increased to peak in 2003, declined steadily since 2010
- 2017 SSB estimate similar to that of 1991-1992
- Estimates of uncertainty were fairly low; good precision
- Retrospective pattern: slight overestimation of F and underestimation of SSB

TORs, cont - SCA model

ToR 4: Use tagging data to estimate mortality and abundance, and provide suggestions for further development.

Panel Comments:

- Tagging analyses provided comparisons of mortality and stock sizes
- Recommended exploring tagging data for estimation of stock composition of coastal population and emigration rates (both are need for 2SCA model).

TORs, cont - SCA model

ToR 5: Update or redefine biological reference points (BRPs; point estimates or proxies for B_{MSY}, SSB_{MSY}, F_{MSY}, MSY) for each stock component where possible and for the total stock complex. Make a stock status determination based on BRPs by stock component, where possible, and for the total stock complex.

Panel Comments:

- SCA model: SPR reference points explored but shown to be unrealistic; unclear why, but possibly due to sex-specific dynamics
- Empirical reference points

	Female SSB (MT)	**F**
Threshold	Estimate of 1995 female SSB	F projected to achieve SSB Threshold
Target	125% SSB Threshold	F projected to achieve SSB target

TORs, cont - SCA model

ToR 5: Update or redefine biological reference points (BRPs; point estimates or proxies for B_{MSY}, SSB_{MSY}, F_{MSY}, MSY) for each stock component where possible and for the total stock complex. Make a stock status determination based on BRPs by stock component, where possible, and for the total stock complex.

Panel Comments:

	Female SSB	F
Threshold	91,436 MT	0.240
Target	114,295 MT	0.197
2017 Estimate	68,476 MT	0.307
Status	**Overfished**	**Overfishing**

TORs, cont - SCA model

ToR 6: Provide annual projections of catch and biomass under alternative harvest scenarios. Projections should estimate and report annual probabilities of exceeding threshold BRPs for F and probabilities of falling below threshold BRPs for biomass.

Panel Comments:

- Short-term (2018-2023) projections were run under 4 harvest scenarios
- Very high probabilities of remaining overfished (>0.95) for all scenarios
- Variable but modestly high probabilities of maintaining overfishing (>0.4 versus 0.6, depending on recruitment assumption)

TORs, cont - SCA model

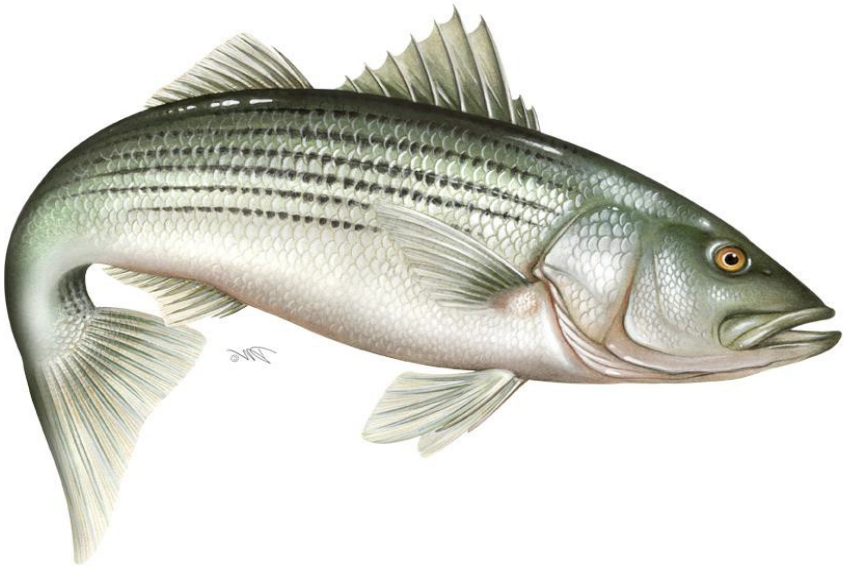
ToR 7: Review and evaluate the status of the Technical Committee research recommendations listed in the most recent SARC report. Identify new research recommendations. Recommend timing and frequency of future assessment updates and benchmark assessments.

- <u>Panel Comments:</u>
  - Good progress made on SCA model since SARC 57 (2013)
  - High priority recommended to list of research topics associated with 2SCA model

Review Panel Overall Findings

- 2SCA model *not accepted;* SCA model *accepted*
- Stock is *overfished* and *overfishing is occurring* in 2017
- Good progress made by SB SAS on SCA model relative to SARC 57
- Recreational harvest (MRIP) substantially larger than in past
- Panel developed list of areas for future research for 2SCA model, but noted additional work investigating failure of SPR reference points (e.g., sexual dimorphism?)

Technical Committee Report on Striped Bass Management Board Tasks



Atlantic Striped Bass Management Board

April 30, 2019

Overview

- Background
- Task 1: Projections
  - Methods
  - Results
  - TC Comments
- Task 2: Example Size Limit Analysis
  - Methods
  - Results
  - TC Comments

Background

- February 2019 Board Meeting
  - 2018 Benchmark Stock Assessment
    - Stock is Overfished
      - SSB_{2017} = 151 million pounds
      - $SSB_{threshold}$ = 202 million pounds
    - Stock Experiencing Overfishing
      - F_{2017} = 0.31
      - $F_{threshold}$ = 0.24

Background

- Motion from the Board:

"Move to task the TC with providing the Board with a report that shows the reductions in harvest needed to reduce F to F threshold (0.24) and F target (0.197) and also providing one example of recreational bag and size limit combination (if necessary, seasonal restrictions) needed to achieve these conditions a) on the coast and b) in the Chesapeake Bay and report back to the Board in May."

TASK 1: PROJECTIONS

METHODS

- Assumptions:
  - Management implemented in 2020
  - Comm. Removal estimates for 2018-2020:
    - Avg. ratio of Commercial to Total removals for 2015-2017 (landings + discards)
  - Rec. Removal estimates for 2018-2020:

    Rec removals = harvest + 9% of live releases
    - 2018 = 2018 MRIP Preliminary
    - 2019 = 1) 2018 MRIP Preliminary

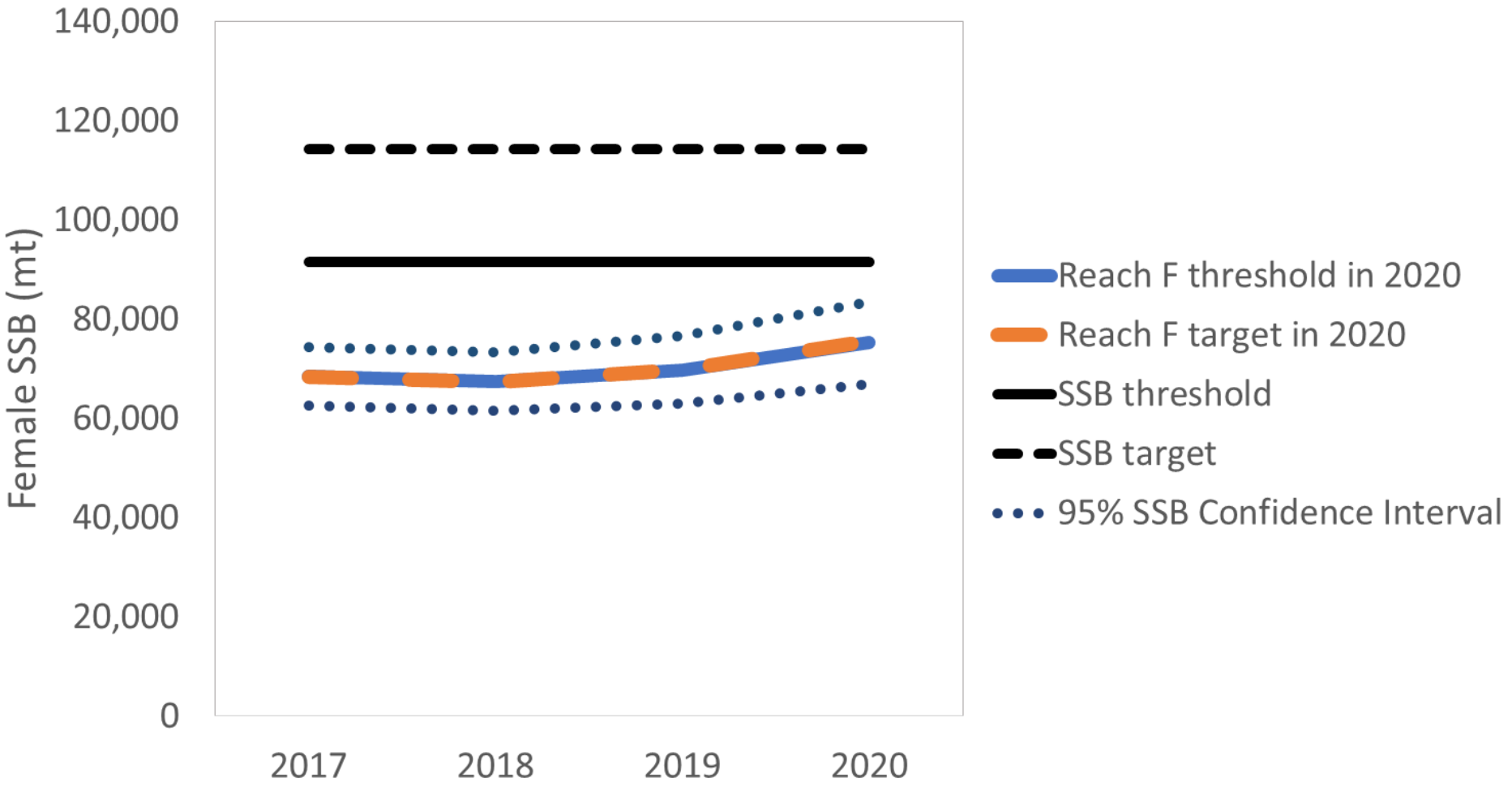
      2) Avg. removals from 2016 – 2018

Results

	Total Removals	% Reduction from 2017
Achieve F threshold in 2020	7.1 million fish	0%
Achieve F target in 2020	5.9 million fish	17%

TC Comments

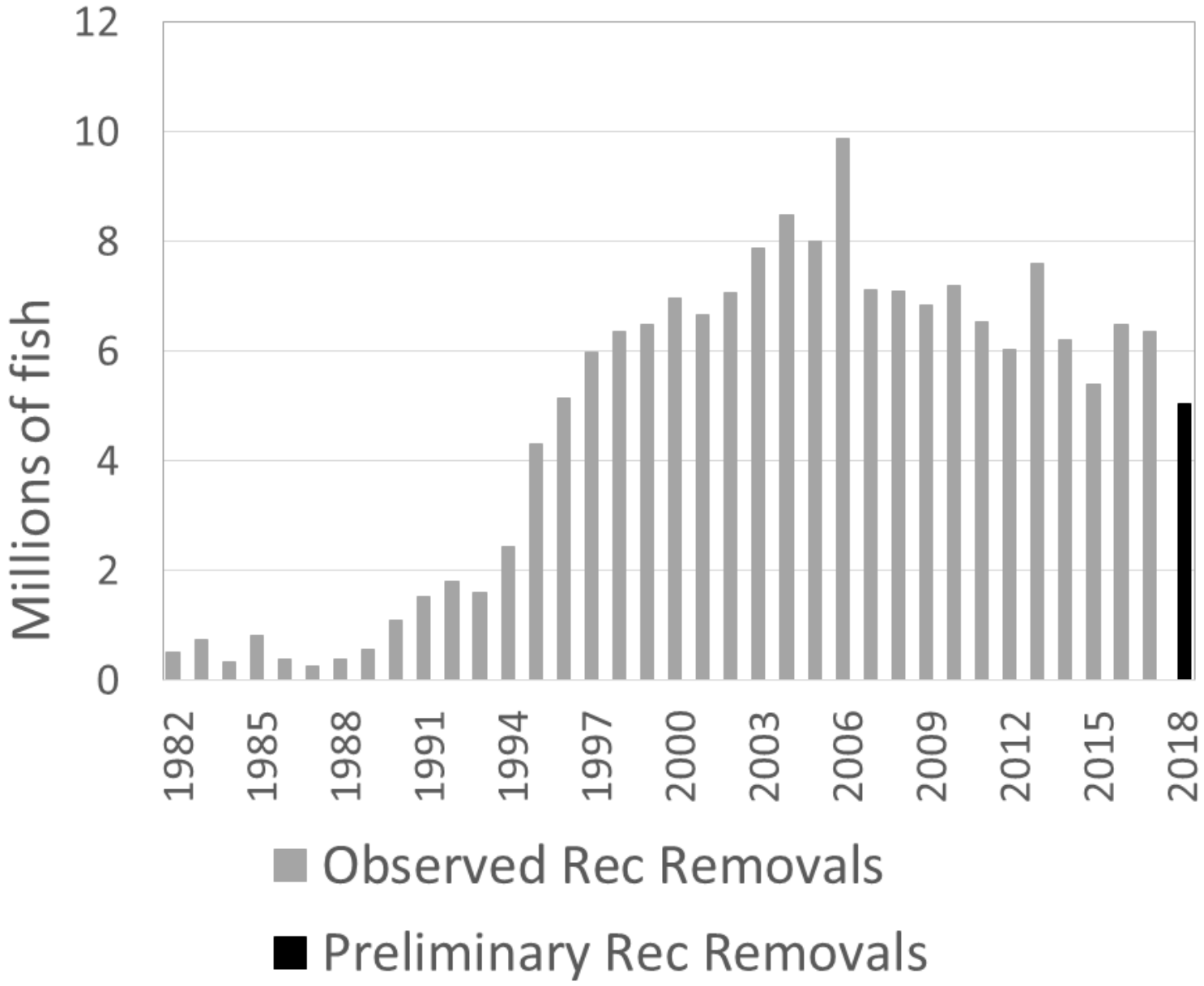
- For all scenarios, SSB projected to be below the target and threshold in 2020



TC Comments

- Uncertainties:
  - 2018 recreational data are still preliminary
  - Assumptions made about 2019 rec. removals
  - Comm. landings and discards estimated for 2018 & 2019
  - 2018 preliminary landings decreased 25% compared to 2017 w/ no management changes

2018 Rec Removals



TASK 2: EXAMPLE SIZE LIMIT ANALYSIS

METHODS

- 1 example for Ocean and CB to achieve 17% reduction in total removals relative to 2017 (i.e., to achieve F target)
  - Coast
    - Current 1-fish bag
    - Seasons vary along coast
    - Only size limit analysis conducted
  - Chesapeake Bay
    - Bag limit reduction > 17%
    - Season analysis had many options
    - Only size limit analysis presented

METHODS

- LF data from 2016 – 2017
  - Most representative of pop. size structure in 2020
- MD & VA have different size limits so separate analyses conducted for each state
- MD @ 20” for 2016 – 2017, decreased to 19” in 2018
  - Prop. of 19” estimated as avg. prop. from 2000 – 2014, when min. size was 18”

RESULTS

EXAMPLE MEASURES		
Region/State	Status Quo Minimum Size	Minimum size to achieve 17% reduction
Ocean	28”	35”
MD	19”	21”
VA	20”	22”

RESULTS

- Increasing the minimum size will increase dead discards 3-4%, but the reduction in harvest offsets this

- The proportion of total removals made up of dead discards also increases, due to the small increase in dead discards and the larger reduction in harvest

TC Comments

- Assumptions in size limit analysis:
  - Availability of different size classes will be the same
  - No changes in effort and angler behavior
- Realized reductions could be very different from what was estimated (e.g. Addendum IV)
- F and removals have varied under constant regulations (e.g., 2015-2018)

TC Comments

- Season changes would reduce harvest but dead discards are likely to increase
  - Anglers target other sportfish but encounter striped bass
  - Anglers switch to catch-and-release

Questions???

RESULTS

Removals to get to F threshold (F=0.240) in 2020				
Year	Probability SSB < SSB threshold	Probability F > F threshold	Removals (Numbers of fish; 2019 = 2018)	Removals (Numbers of fish; 2019 = 3 yr avg)
2017	1	1	7,058,838	7,058,838
2018	1	0.11	5,631,901	5,631,901
2019	1	0.03	5,631,901	6,631,882
2020	**0.99**	**0.5**	**7,092,400**	**6,986,000**
% Change Relative to 2017			0%	-1%
% Change Relative to 2018			26%	24%

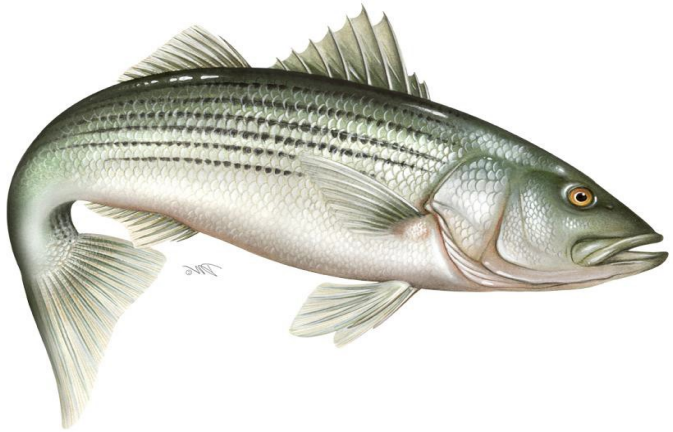
Removals to get to F target (F=0.197) in 2020				
Year	Probability SSB < SSB target	Probability F > F target	Removals (Numbers of fish; 2019 = 2018)	Removals (Numbers of fish; 2019 = 3 yr avg)
2017	1	1	7,058,838	7,058,838
2018	1	0.75	5,631,901	5,631,901
2019	1	0.45	5,631,901	6,631,882
2020	**1**	**0.5**	**5,894,000**	**5,796,000**
% Change Relative to 2017			-17%	-18%
% Change Relative to 2018			5%	3%

RESULTS

Ocean Size Limit		
	28" Size limit (current)	35" Size limit
Harvest	1,732,344	898,552
Dead releases	2,609,528	2,684,569
Total recreational removals	4,341,872	3,583,122
% Reduction	--	-17.50%

Chesapeake Bay Size Limit				
	Maryland 19" Size limit (current)	Maryland 21" Size limit	Virginia 20" Size limit (current)	Virginia 22" Size limit
Harvest	1,003,700	693,707	110,304	66,361
Dead releases	654,761	682,660	113,081	117,036
Total recreational removals	1,658,461	1,376,368	223,385	183,397
% Reduction	--	-17.00%	--	-17.90%

Atlantic Striped Bass Management Action Timelines



Atlantic Striped Bass Management Board
April 30, 2019

Amendment 6 – Management Triggers

- Triggers in Amd 6 have been tripped

- The Board must adjust the management program to:
  - reduce F to the target within one year, and
  - rebuild the biomass to the target; rebuilding schedule not to exceed 10-years

Issues to Consider

- Direct PDT on which issues to consider, and how issues should be approached
- Regulatory Program
  - Consider sector allocation of reduction
  - Consider regional allocation of F for Bay and ocean

	Recreational	Commercial
Bag limit	✓	-
Size limit	✓	✓
Quota	-	✓
Seasons	-	-

Issues to Consider, cont.

- Reference points
- Management triggers
- Monitoring requirements
- FMP goals & objectives
  - Requires amendment

Possible Action Timelines

1. Initiate **addendum** at this meeting:
   - August 2019; review Draft for Public Comment
     - Conduct public hearings during fall
   - October 2019; final action
2. Initiate **amendment**:
   - August 2019; Draft PID for Public Comment
     - Conduct public hearings during the fall
   - October 2019; Board tasks PDT to develop Draft Amend.
   - February 2020; Draft for Public Comment
     - Conduct public hearings during fall 2020
   - May 2020; Final Action

- Questions??