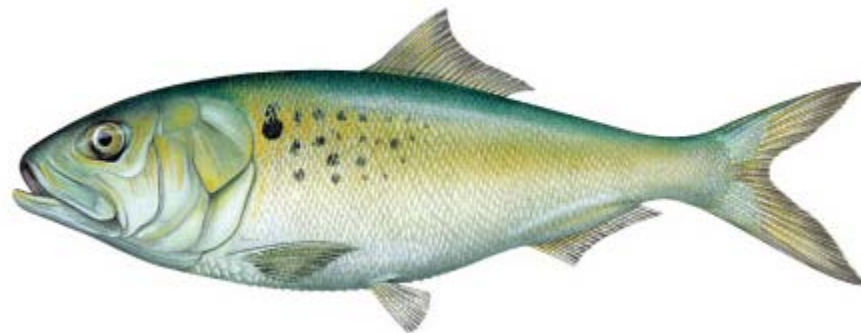




Atlantic Menhaden Draft Amendment 3



November 2017

Overview



- Management Options & Public Comment Summary (*M. Ware*)
- AP Report (*J. Kaelin*)
- LEC Report (*M. Ware*)
- Consider Final Approval of Draft Amendment 3



Public Comment Overview



Public Hearings

- Conducted 15 hearings in 13 jurisdictions
- ME, NH, MA (x2), RI, CT, NY, NJ, DE, MD, PRFC, VA (x2), NC, FL
- 602 individuals attended the hearings

Written Comment

- A total of 158,106 comments received
- 157,560 comments received through form letters
- 99 organizations submitted comments
- Remaining (448) generally came from individual stakeholders, including comm. fishermen, rec fishermen, and concerned citizens



Reference Point Options



Option A: Single Species

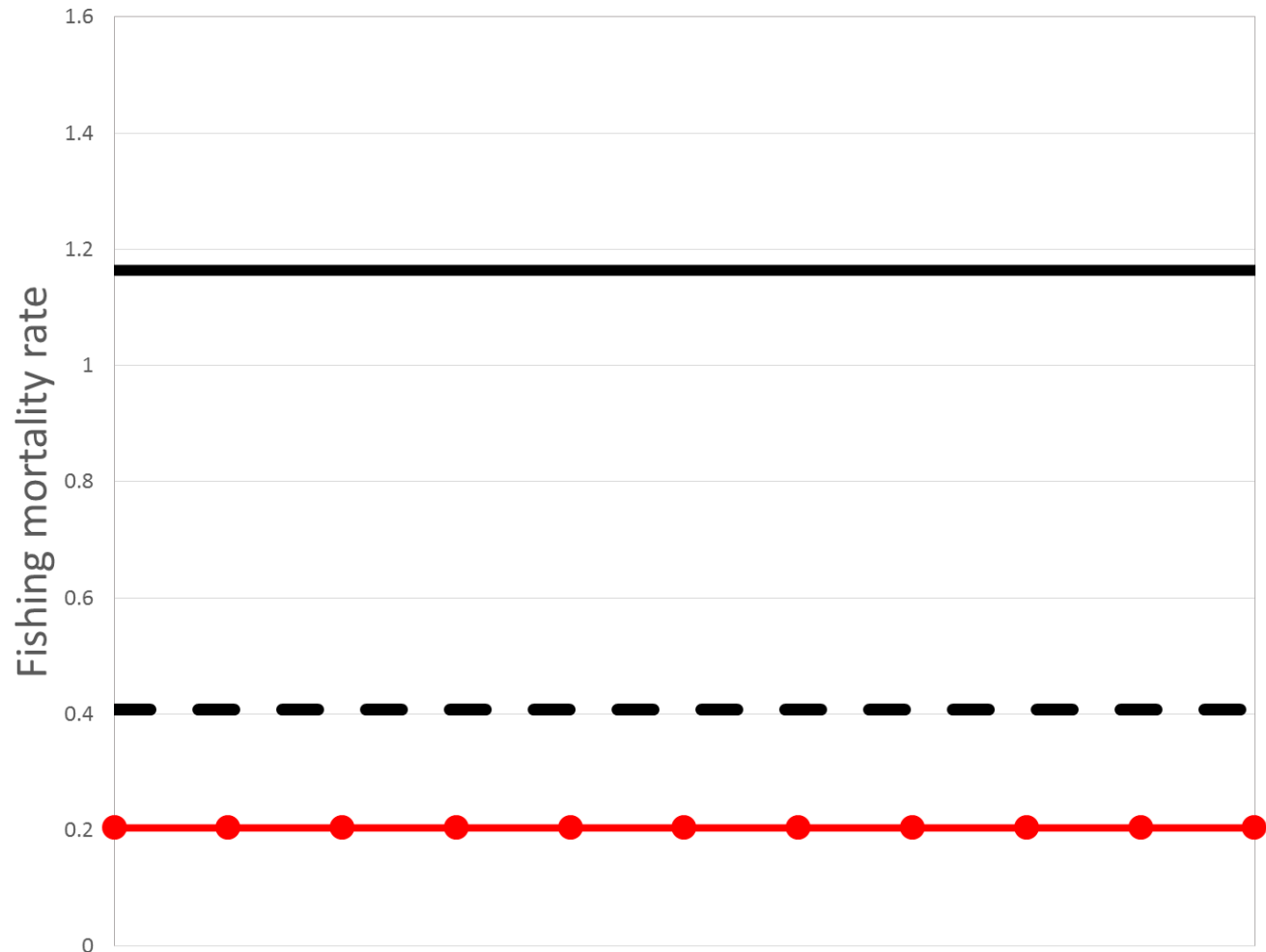
Option B: Single Species w/ BERP

Option C: Hockey Stick Control Rule w/ BERP

Option D: 75% Rule of Thumb w/ BERP

Option E: 75% Target/40% Threshold w/ BERP

Use single species reference points and do not pursue ERPs for menhaden



Reference Point Options



Option A: Single Species

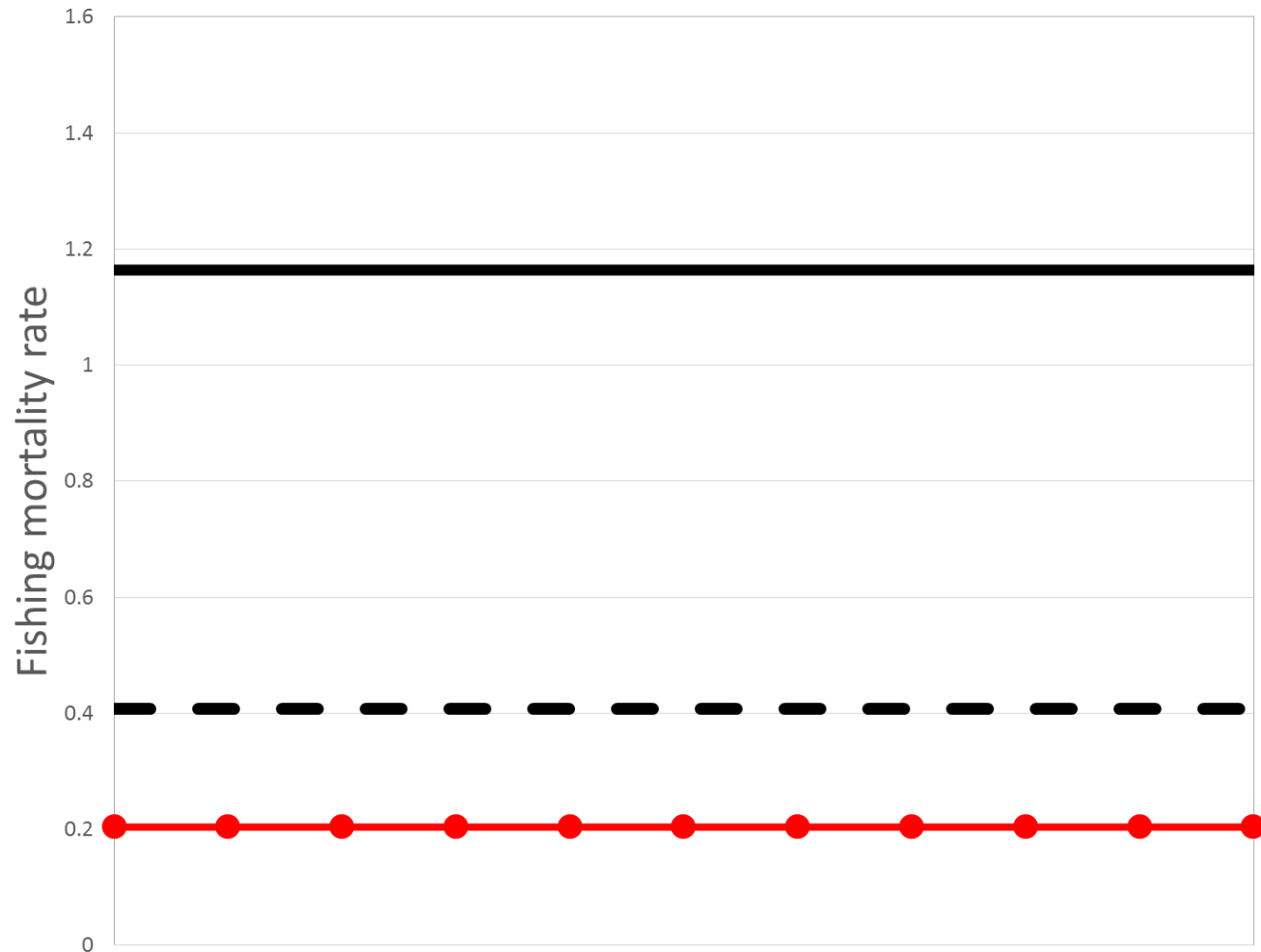
Option B: Single Species w/ BERP

Option C: Hockey Stick Control Rule w/ BERP

Option D: 75% Rule of Thumb w/ BERP

Option E: 75% Target/40% Threshold w/ BERP

Continue to develop menhaden-specific ERPs and, in interim, use single species reference points



Reference Point Options



Option A: Single Species

Option B: Single Species w/ BERP

**Option C:
Hockey Stick
Control Rule w/
BERP**

Option D: 75% Rule of Thumb w/ BERP

Option E: 75% Target/40% Threshold w/ BERP

Continue to develop menhaden-specific ERPs and, in interim, use hockey stick control rule



Reference Point Options



Option A: Single Species

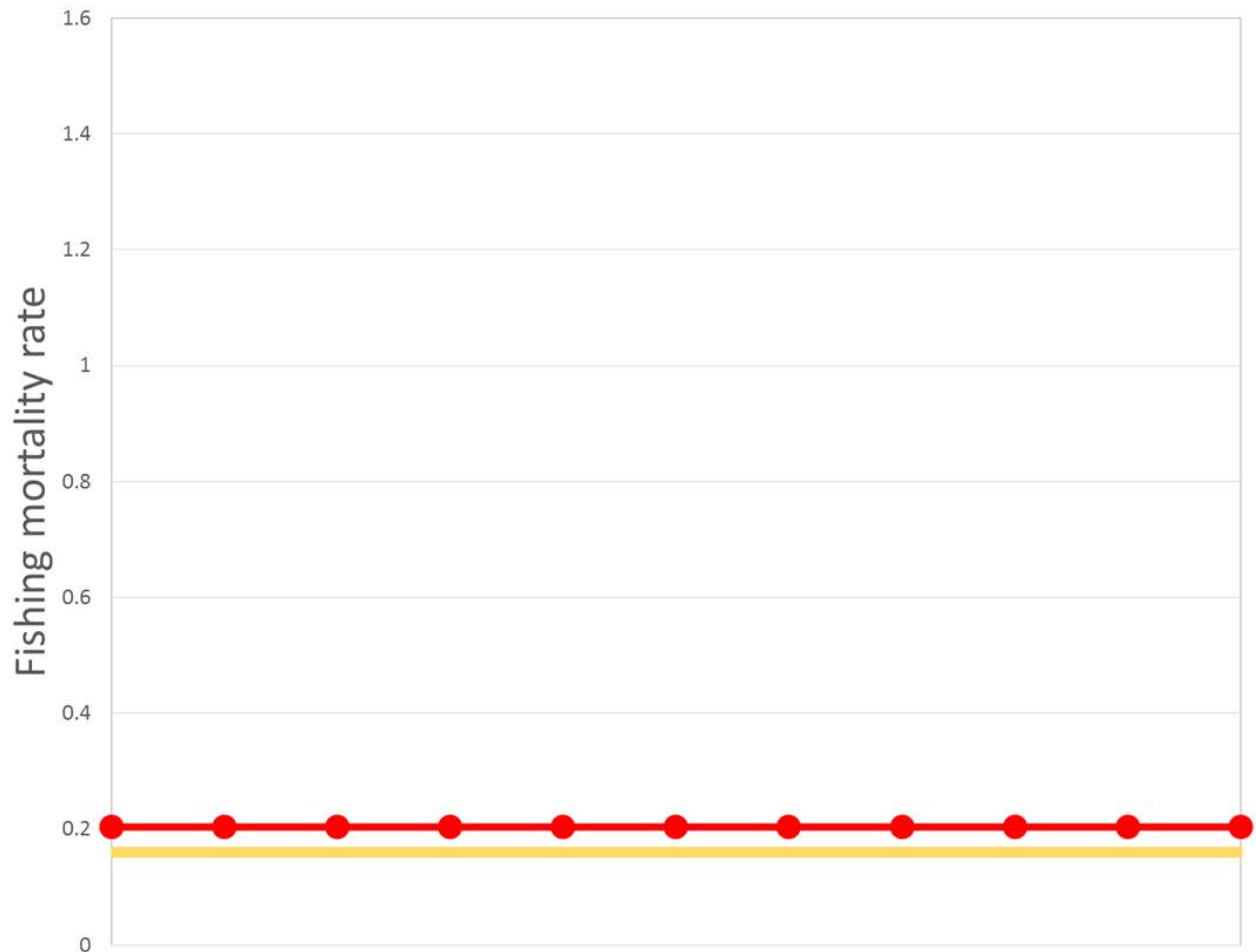
Option B: Single Species w/ BERP

Option C: Hockey Stick Control Rule w/ BERP

Option D: 75% Rule of Thumb w/ BERP

Option E: 75% Target/40% Threshold w/ BERP

Continue to develop menhaden-specific ERPs and, in interim, use 75% rule-of-thumb



Reference Point Options



Option A: Single Species

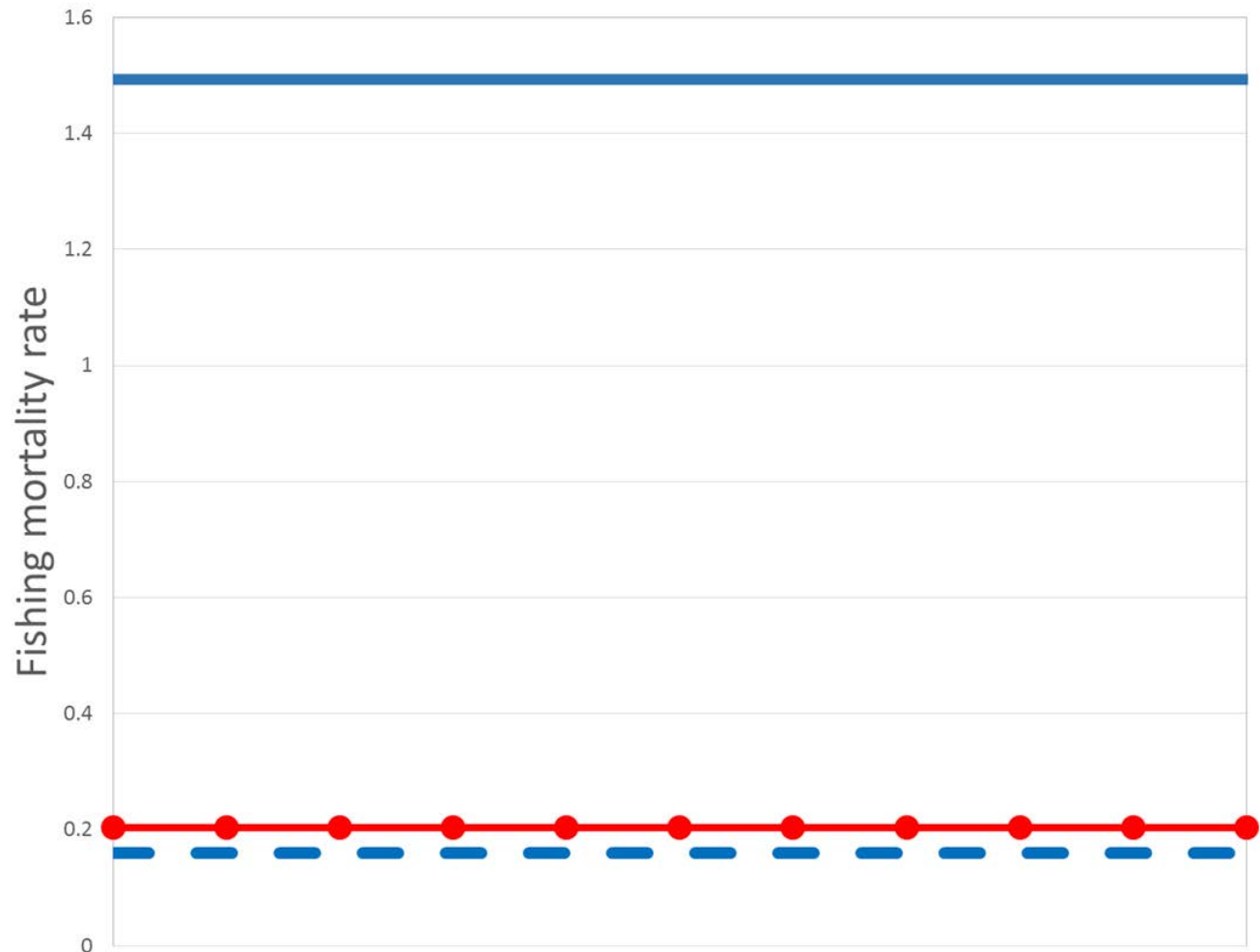
Option B: Single Species w/ BERP

Option C: Hockey Stick Control Rule w/ BERP

Option D: 75% Rule of Thumb w/ BERP

Option E: 75% Target/40% Threshold w/ BERP

Continue to develop menhaden-specific ERPs and, in interim, use 75% target w/ 40% threshold



Question About Threshold/Target



“If the current F exceeds the threshold level, the Board will take steps to reduce F to the target level. If current F exceeds the target, but is below the threshold, the Board may consider steps to reduce F to the target level. If current F is below the target F , then no action is necessary to reduce F .”



Public Comment – Reference Points



	Single Species	BERP/Single Species	BERP/Hockey Stick Control Rule	BERP/75% Rule of Thumb	BERP/75% Target – 40% Threshold
Individual	1	2	19	5	300
Organization	1	4	9	1	62
Form Letter		692	118		156,858
Hearings					
ME					3
NH					9
MA				1	14
RI		1			23
CT					13
NY	1	1	13		16
NJ			1		3
DE	3			2	14
MD		2	1	2	38
PRFC	1	16			4
VA		227		4	28
NC		2		1	6
FL			1	4	24
TOTAL	7	947	162	20	157,417

Quota Allocation



A. Coastwide

B. Jurisdictional

C. Fixed
Minimum

D. Regional Fleet
Capacity

E. Disposition

F. Allocation
Based on TAC
Level

No
division
of TAC



Quota Allocation



Divide TAC Between the Jurisdictions

- A. Coastwide
- B. Jurisdictional**
- C. Fixed Minimum
- D. Regional Fleet Capacity
- E. Disposition
- F. Allocation Based on TAC Level

	2009-2011 TAC %	2012-2016 TAC %	1985-2016 TAC %	1985-1995 TAC %	Weighted
ME	0.02%	0.22%	0.06%	0.02%	0.10%
NH	0.00%	0.00%	0.00%	0.01%	0.00%
MA	0.84%	0.59%	0.60%	0.70%	0.66%
RI	0.02%	0.15%	0.65%	1.46%	0.95%
CT	0.02%	0.01%	0.03%	0.02%	0.02%
NY	0.21%	0.27%	0.30%	0.33%	0.31%
NJ	11.27%	12.62%	5.76%	2.37%	6.36%
PA	0.00%	0.00%	0.00%	0.00%	0.00%
DE	0.01%	0.03%	0.02%	0.02%	0.02%
MD	1.51%	1.99%	1.08%	0.63%	1.16%
PRFC	0.62%	0.85%	1.10%	1.39%	1.18%
VA	84.96%	83.05%	89.80%	92.21%	88.64%
NC	0.50%	0.16%	0.47%	0.60%	0.43%
SC	0.00%	0.00%	0.00%	0.00%	0.00%
GA	0.00%	0.00%	0.00%	0.00%	0.00%
FL	0.02%	0.06%	0.13%	0.25%	0.17%

Quota Allocation



- A. Coastwide
- B. Jurisdictional
- C. Fixed Minimum**
- D. Regional Fleet Capacity
- E. Disposition
- F. Allocation Based on TAC Level

Sub-option 1: 0.5% minimum

Sub-option 2: 1% minimum

Sub-option 3: 2% minimum

	2009-2011 TAC %	2012-2016 TAC %	1985-2016 TAC %	1985-1995 TAC %	Weighted
ME	1.02%	1.19%	1.05%	1.02%	1.08%
NH	1.00%	1.00%	1.00%	1.01%	1.00%
MA	1.71%	1.50%	1.50%	1.59%	1.55%
RI	1.02%	1.13%	1.54%	2.22%	1.80%
CT	1.01%	1.01%	1.03%	1.02%	1.02%
NY	1.17%	1.23%	1.25%	1.27%	1.26%
NJ	10.47%	11.60%	5.84%	2.99%	6.34%
PA	1.00%	1.00%	1.00%	1.00%	1.00%
DE	1.01%	1.03%	1.02%	1.02%	1.02%
MD	2.27%	2.67%	1.91%	1.53%	1.98%
PRFC	1.52%	1.72%	1.92%	2.17%	1.99%
VA	72.37%	70.76%	76.43%	78.46%	75.46%
NC	1.42%	1.13%	1.39%	1.50%	1.36%
SC	1.00%	1.00%	1.00%	1.00%	1.00%
GA	1.00%	1.00%	1.00%	1.00%	1.00%
FL	1.02%	1.05%	1.11%	1.21%	1.15%

Quota Allocation



- A. Coastwide
- B. Jurisdictional
- C. Fixed Minimum
- D. Regional Fleet Capacity**
- E. Disposition
- F. Allocation Based on TAC Level

Sub-option 1: No soft cap

Sub-option 2: Soft cap for small-capacity fleet with a 25,000 pound trip limit per day

Large Fleet					
	2009-2011 TAC %	2012-2016 TAC %	1985-2016 TAC %	1985-1995 TAC %	Weighted
ME, NH, MA, RI, CT	96.08%	94.16%	1.22%	95.32%	94.87%
NY, NJ, PA, DE			5.48%		
MD, PRFC, VA, NC, SC, GA, FL			88.96%		
Small Fleet					
	2009-2011 TAC %	2012-2016 TAC %	1985-2016 TAC %	1985-1995 TAC %	Weighted
ME, NH, MA, RI, CT	0.05%	0.08%	0.08%	0.10%	0.09%
NY, NJ, PA, DE	0.34%	1.17%	0.60%	0.58%	0.81%
MD, PRFC, VA, NC, SC, GA, FL	3.53%	4.59%	3.66%	4.00%	4.23%

Quota Allocation



- A. Coastwide
- B. Jurisdictional
- C. Fixed Minimum
- D. Regional Fleet Capacity
- E. Disposition**
- F. Allocation Based on TAC Level

	Reduction	Bait/Other
Sub-option 1	75%	25%
Sub-option 2	70%	30%

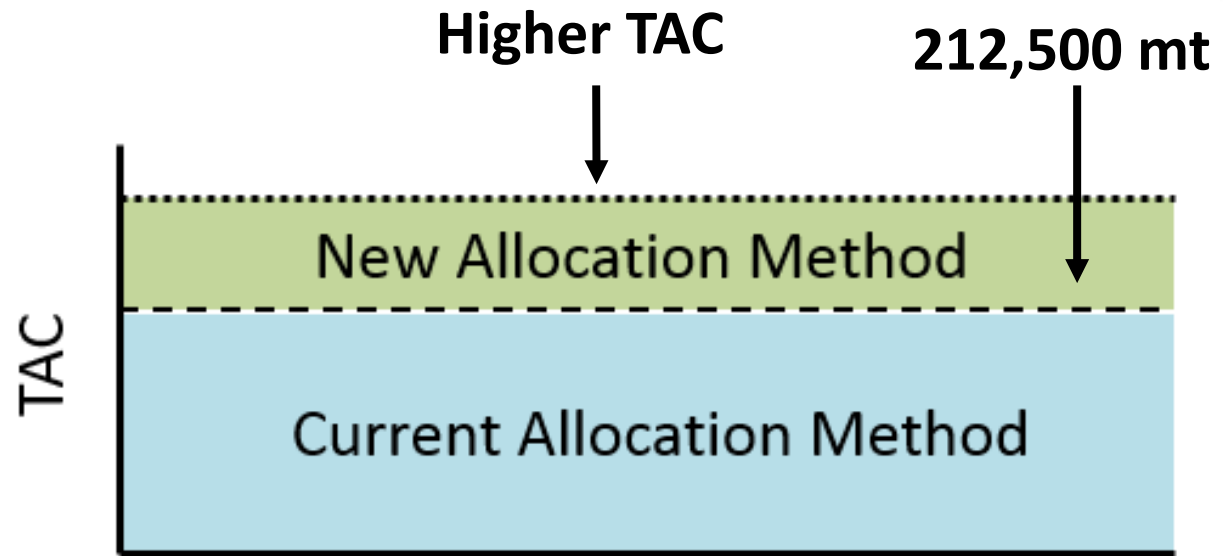
*Bait allocation can be further divided by jurisdiction, gear type, region, or through a fixed min approach



Quota Allocation



- A. Coastwide
- B. Jurisdictional
- C. Fixed Minimum
- D. Regional Fleet Capacity
- E. Disposition
- F. Allocation Based on TAC Level**



Sub-Option 1: TAC above 212,500 mt is allocated such that the reduction fishery gets 50% and the other 50% is distributed to state bait fisheries

Sub-Option 2: TAC above 212,500 mt is allocated such that the reduction fishery gets 30% and the other 70% is distributed to state bait fisheries

Public Comment - Allocation



Fixed Min



Allocation Based on TAC



	Coast-wide	State-by-State	0.5% Fixed Min	1% Fixed Min	2% Fixed Min	Regional Fleet Capacity-Hard Cap	Regional Fleet Capacity-Soft Cap	Disposition (75/25)	Disposition (70/30)	Allocation Based on TAC Level (50/50)	Allocation Based on TAC Level (30/70)
Individual	1			4	13				3	13	
Organization				1	20				5	4	3
Form Letter					336					692	463
Hearings											
ME	2				4						
NH					5		2				
MA		1			9						
RI	2				9						
CT					1						
NY				5	5						
NJ					2				1		
DE		4	2	11		2		2			
MD	1				1		1			1	
PRFC					2						
VA		2		1	13					225	
NC		1								1	
FL											
TOTAL	6	8	2	22	431	2	5	2	11	936	706

Public Comment - Allocation



	Disposition (75/25)	Disposition (70/30)	Allocation Based on TAC Level (50/50)	Allocation Based on TAC Level (30/70)
Individual		3	13	
Organization		5	4	3
Form Letter			692	463
Hearings				
ME				
NH				
MA				
RI				
CT				
NY				
NJ		1		
DE	2			
MD				1
PRFC				
VA			225	
NC			1	
FL				
TOTAL	2	11	936	706

Public Comment - Allocation



	Coast-wide	State-by-State	0.5% Fixed Min	1% Fixed Min	2% Fixed Min	Regional Fleet Capacity-Hard Cap	Regional Fleet Capacity –Soft Cap
Individual	1			4	13		
Organization				1	20		
Form Letter					336		
Hearings							
ME	2				4		
NH					5		2
MA		1			9		
RI	2				9		
CT					1		
NY				5	5		
NJ					2		
DE		4	2		11		2
MD	1				1		1
PRFC					2		
VA		2		1	13		
NC		1					
FL							
TOTAL	6	8	2	22	431	2	5

Allocation Timeframes



- **Option A: 2009-2011**
 - Current timeframe/ status quo
- **Option B: 2012-2016**
 - Most recent timeframe
- **Option C: 1985-2016**
 - Longest timeframe
- **Option D: 1985-1995**
 - Most historic timeframe
- **Option E: Weighted Allocation**
 - 50% weighting between 2012-2016 and 1985-1995



Public Comment –Timeframe



	2009-2011	2012-2016	1985-2016	1985-1995	Weighted
Individual		1		1	1
Organization	2	2	4		1
Form Letter			56		
Hearings					
ME		2	1		1
NH		1	2	1	1
MA					
RI				3	2
CT					
NY		3			
NJ	1	1			
DE					
MD		1			
PRFC		12	4		
VA	2	15	2		
NC			1	1	1
FL					
TOTAL	5	38	70	6	7

Quota Transfers



Option A: Quota Transfers Permitted (Status quo)

- Two or more states can transfer menhaden quota

Option B: Quota Transfers w/ Accountability Measures

- If state/region exceeds its quota by more than 5% in two consecutive years, it cannot receive a quota transfer in the third year

Option C: Quota Reconciliation

- If TAC is not exceeded, state/regional quota overages are automatically forgiven
- If TAC is exceeded, any unused quota is automatically pooled and equally distributed to states/regions with an overage. Any remaining overage is then deducted from the subsequent year



Public Comment - Transfers



	Status Quo	Accountability Measures	Quota Reconciliation
Individual	3		1
Organization	1	7	
Form Letter			
Hearings			
ME	1	1	
NH			1
MA			
RI	2		
CT	1		
NY			1
NJ			2
DE	2		
MD		1	
PRFC			
VA	225	1	
NC			
FL		1	
TOTAL	235	11	5

Note:
Greatest support for no quota transfers

Quota Rollovers



Option A: No Quota Rollovers

Option B: 10% Total Quota Rollover

- Example: If quota is 1 million pounds, can roll over up to 100,000 pounds of unused quota

Option C: 5% Total Quota Rollover

- Example: If quota is 1 million pounds, can roll over up to 50,000 pounds of unused quota

Option D: 50% Unused Quota Rollover

- Example: If quota is 1 million pounds and 400,000 pounds are unused, up to 200,000 pounds can be rolled over



Public Comment - Rollovers



	No Rollover	10% Rollover	5% Rollover	50% Unused Rollover
Individual	37	2		1
Organization	19	2	1	1
Form Letter	15,060			
Hearings				
ME				
NH	7		1	
MA	23			
RI	21			
CT	15			
NY	24			
NJ	4			
DE	1			
MD	23			
PRFC	6			9
VA	27			225
NC		1		
FL	26			
TOTAL	15,293	5	2	236

Incidental Catch



In Below Options, Incidental Catch Not Included in TAC

Option A: Trip Limit for Non-Directed Gears

- 6,000/12,000 lb per trip

Option B: Trip Limit for Non-Directed & Small Scale Gears

- 6,000/12,000 lb per trip

Option C: Catch Cap and Trigger

- Maintain 6,000/12,000 lb trip limit
- Cap set at 2% of TAC (not a set aside)
- If exceed cap by more than 10% in a single year or by any amount two years in a row, Board is triggered to take action



Incidental Catch



In Below Options, Incidental Catch Is Included in TAC

Option D: 2% Set Aside

- Set aside 2% of TAC for incidental catch after quota is met
- If exceeded, the overage is deducted from next year

Option E: 1% Set Aside for Small Scale Gears

- Set aside 1% of TAC for harvest by small-scale gears throughout the year
- If exceeded, the overage is deducted from next year

Option F: All Catch Included in TAC

- Once the directed quota is met, the fishery closes



Public Comment – Incidental Catch



	Trip Limit Non-Directed Gears	Trip Limit Non-Directed and Small- Scale	Catch Cap and Trigger	2% Set Aside	1% Set Aside for Small-Scale	No Incidental Catch Fishery
Individual		3		1	2	30
Organization		3		1	1	19
Form Letter						15,060
Hearings						
ME						
NH				2		1
MA						22
RI				1		20
CT					3	12
NY		1		1	1	1
NJ		3		1	1	1
DE	1					
MD	8	1				11
PRFC		15				2
VA						14
NC				1	1	
FL						27
TOTAL	9	26	0	8	9	15,220

Episodic Events Program



Set Aside Amount

- **Option A (status quo):** 1% of TAC is set aside
- **Option B:** 3% of TAC is set aside
- **Option C:** 0% of TAC is set aside



Public Comment – Episodic Events



	1% Set Aside	3% Set Aside	0% Set Aside
Individual	1	3	25
Organization	3	4	16
Form Letter	16		320
Hearings			
ME		3	
NH		2	1
MA			22
RI		3	1
CT			
NY	2		1
NJ			2
DE			2
MD	1	1	13
PRFC	1		7
VA		4	15
NC			
FL			24
TOTAL	24	20	449

Ches. Bay Reduction Fishery Cap



- **Option A: Cap Set at 87,216 mt (Status Quo)**
 - Sub-Option A: Max rollover of 10,976 mt of unused Cap
 - Sub-Option B: No rollover
- **Option B: Cap Set at 51,000 mt**
 - Sub-Option A: Max rollover of 6,418 mt of unused Cap
 - Sub-Option B: No rollover
- **Option C: Remove Cap**



Public Comment – Bay Cap



	87,216 mt w/ Rollover	87,216 mt w/ No Rollovers	51,000 mt w/ Rollovers	51,000 mt w/ No Rollovers	No Cap
Individual		1	1	38	
Organization	1		7	31	
Form Letter				84,791	
Hearings					
ME				1	
NH				6	
MA				21	
RI				23	
CT				18	
NY				24	
NJ				5	
DE				2	
MD	1			28	
PRFC				13	
VA	225		24		225
NC	1		1	2	
FL				29	
TOTAL	228	1	33	85,056	225

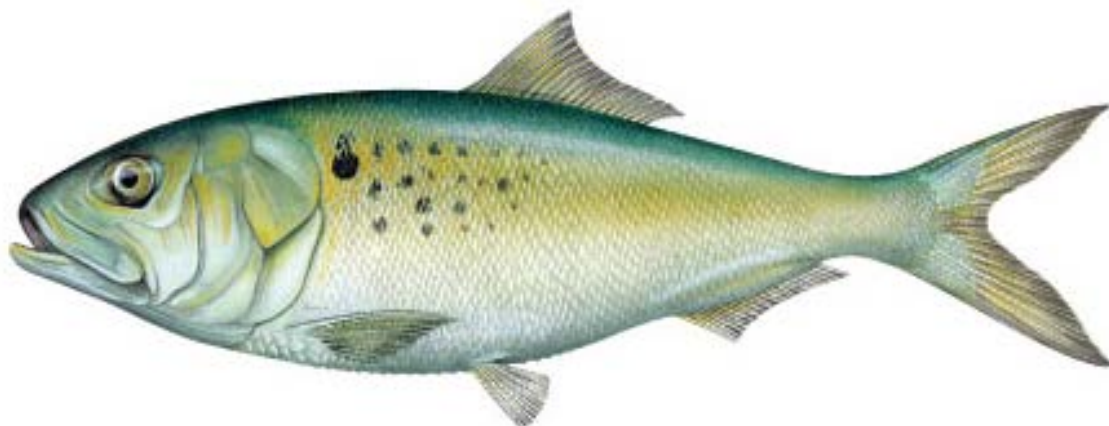
LEC Comments



- LEC met to discuss Draft Amendment 3 at Annual Meeting
- No major enforcement concerns brought up by LEC
- Of particular interest to the LEC, was the incidental catch provision
 - No unusual enforcement challenges with a 6,000 lb trip limit
 - However, simple closure of the directed fishery when quotas are met is less of a drain on enforcement resources

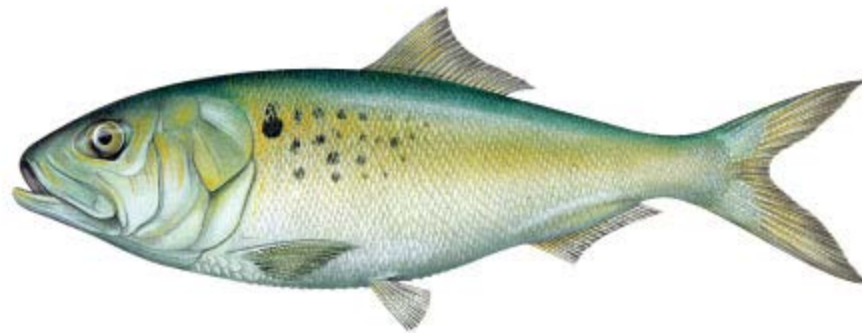


Questions?





Atlantic Menhaden Advisory Panel Report



AP Report-Reference Points



- **6 AP Members Supported Option B**

- Menhaden stock is in good condition so don't need to alter course
- Fishing below the F-target for years and well below historic levels; the Board is already precautionary in its management of menhaden
- Concerns about applying generalized forage fish rules to menhaden due to lack of stock-recruit relationship and fishery selectivity
- Other reference points do not represent the best available science
- Confidence in BERP process; ERPs would be appropriate when there is more confidence in the science specific to the menhaden resource
- Option B supports industry and provides stability; concerns that the goal-posts by which menhaden are managed keep changing
- Comment that increased menhaden abundance in recent years is due to favorable environmental conditions and not the implementation of 2013 TAC



AP Report-Reference Points



- **4 AP Members Supported Option E**

- Generalized rules for forage fish are more appropriate for menhaden given their ecosystem role
- Need to leave fish in water for ecological purposes
- Option E allows the Board to fulfill the needs of the bait states while keeping the stock moving in the right direction
- Important to implement ERPs now; concern with BERP completing menhaden-specific ERPs by 2019
- Option E does not prescribe how quickly the Board needs to get to the F-target so Board can phase-in management to 75% unfished biomass
- Comment that after 2013 TAC, stock abundance increased so need to err on the side of caution and control catch



AP Report-Allocation



- **2 AP Members Supported a Fixed Minimum Approach**
 - Support a 2% fixed minimum given states that don't want quota can give it back; recommendation that unused quota on Nov. 1st be given to other states
 - Current allocation method prevents some states from having a fishery, including those that have fishery infrastructure
- **3 AP Members Did Not Support a Fixed Minimum Approach**
 - Moves Commission away from a history based allocation
 - Method doesn't recognize states which made an investment in the fishery
 - Clear losers with fixed minimum approach, including NJ and VA
- **2 AP Members Supported Allocation Based on TAC Level**
 - Makes states whole again prior to implementation of TAC in 2013 and then a greater percentage can be allocated to the bait fishery
 - Recommendation that the Board use 2012-2016 timeframe for quota above 212,500 mt



AP Report-Allocation



- **1 AP Member Supported 70/30 Split Between Reduction and Bait (Option E)**
 - All states have joined the Commission's compact and everyone should get a share of the resource
 - Gives bait fisheries more without increasing the TAC
- **3 AP Members Did Not Support 70/30 Split Between Reduction and Bait**
 - Allocation option is arbitrary and not based on historic landings
 - Can't transfer quota between the bait and reduction sectors
- **2 AP Members Supported 2009-2011 Timeframe**
 - Does not include years when harvest was capped under TAC
- **General Comment: 1 AP member recommended trawls not be included in the small-scale fleet**



AP Report-Transfers and Rollovers



- **4 AP Members Supported Quota Reconciliation With Accountability Rules (Options B and C)**
 - Prevents a states from continually exceeding its quota
- **6 AP Members Supported Quota Rollovers**
 - 2 supported 50% rollover of unused quota (Option D)
 - 3 supported 5% or 10% quota rollover but not higher (Options B and C); there may be extenuating circumstances which make a small quota rollover reasonable; 10% rollover used in federal fisheries mgmt.
 - 1 supported a rollover of 10% or higher



AP Report-Incidental Catch



- **4 AP Members Supported Option F (No Incidental Catch Fishery)**
 - Concern that catch is not counted towards the TAC
 - 6,000 lb trip limit bridged gap between Amendment 2 and 3 but should not be used after
 - Bycatch competes with directed bait fishery
- **1 AP Member Did Support an Incidental Catch Limit**
 - 6,000 lb trip limit provides critical fishing time for bait sector
- **General Comments**
 - Current bycatch allowance is a loophole, particularly for purse seines
 - Trawls should not be included as non-directed gear type
 - Recommendation to clarify definitions of gear types, mainly if purse seines are prohibited to harvest under trip limit



AP Report-Episodic Events



- **3 AP Members Supported Continuation of Set Aside**
 - If there is no re-allocation of quota, NE needs this program
 - Program should remain no matter what allocation NE gets, but should be increased to 3% if NE states don't get more quota
 - Some NE states have capacity to harvest large amounts of menhaden so set aside is needed
 - Set aside is needed to prevent fish kills
- **3 AP Members Did Not Support a Set Aside**
 - NE states are no longer having episodic events; abundances have been higher for several years
 - Set aside should not be needed with allocation and a higher TAC
 - Episodic events program has just created another fishery
 - Not equitable that other states have their quota but no access to episodic events program



AP Report-Ches. Bay Cap



- **2 AP Members Supported Status Quo (Option A, sub-option A)**
 - Studies have shown the possibility for localized depletion is small
- **3 AP Members Supported Reducing Cap to 51,000 mt With No Rollovers (Option B, Sub-Option B)**
 - Studies on localized depletion were inconclusive and could not determine that it wasn't happening
 - Concern of increased red. harvest from Bay if Cap is not reduced
 - Ches. Bay is an important spawning ground for many species and warrants greater protection
 - Concerns about change in ownership of Omega Protein; an international company may not have a vested interest in Bay
- **1 AP Member Supported Removal of Cap (Option C)**
 - Since there is a coastwide TAC, there should be no Bay Cap
 - VA purse seiners are already restricted from going in majority of Bay



AP Report-2018 TAC



- **6 AP Members Supported Increasing the TAC**
 - 2 supported 280,000 mt TAC; comment that one state lost access to 60% of the menhaden fishery due to 2013 TAC
 - 1 supported 250,000 mt TAC; helps industry & not hurting the stock
 - 1 supported 240,000 mt TAC; NEFMC has a risk policy of 50% chance of exceeding the OFL; MAFMC has a risk policy of $P^*40\%$; TC projections show 314,500 mt TAC has a 50% risk of exceeding F-target
 - 1 supported 220,000 mt TAC; to offset bad years in a fishery you need good years and current TAC caps harvest level to mediocre years
- **2 AP Members Supported Maintaining TAC at 200,000 mt**
 - Regardless of reference points chosen, TAC should not increase under Options A/B and does not need to decrease under Option E
 - Increase in TAC could negate progress that has been made in stock abundance since 2012
- **AP did make a series of motions regarding the TAC but none passed**

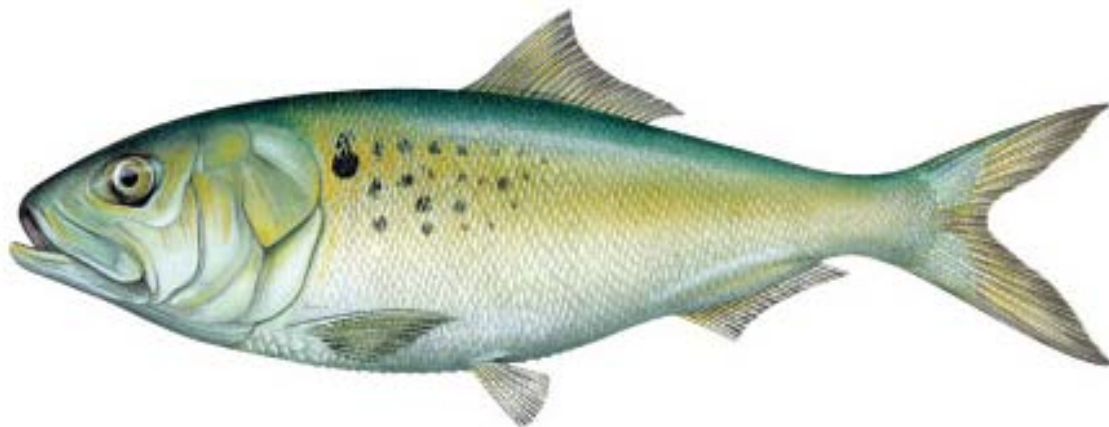
AP General Comments



- AP should be better utilized to provide info on annual changes and trends in fishery; include AP comments in Commission's FMP Review process similar to MAFMC Fishery Performance Report
- AP expressed concern that fishermen harvesting under the 6,000 lb trip limit are selling menhaden from their bunt (purse seines) and not reporting landings; need for greater enforcement at state level
- AP recommends that, in the future, TC complete multi-year projections and the Board set multi-year TACs (2-3 years)



Questions?





Atlantic Menhaden Technical Committee Stock Projection Review

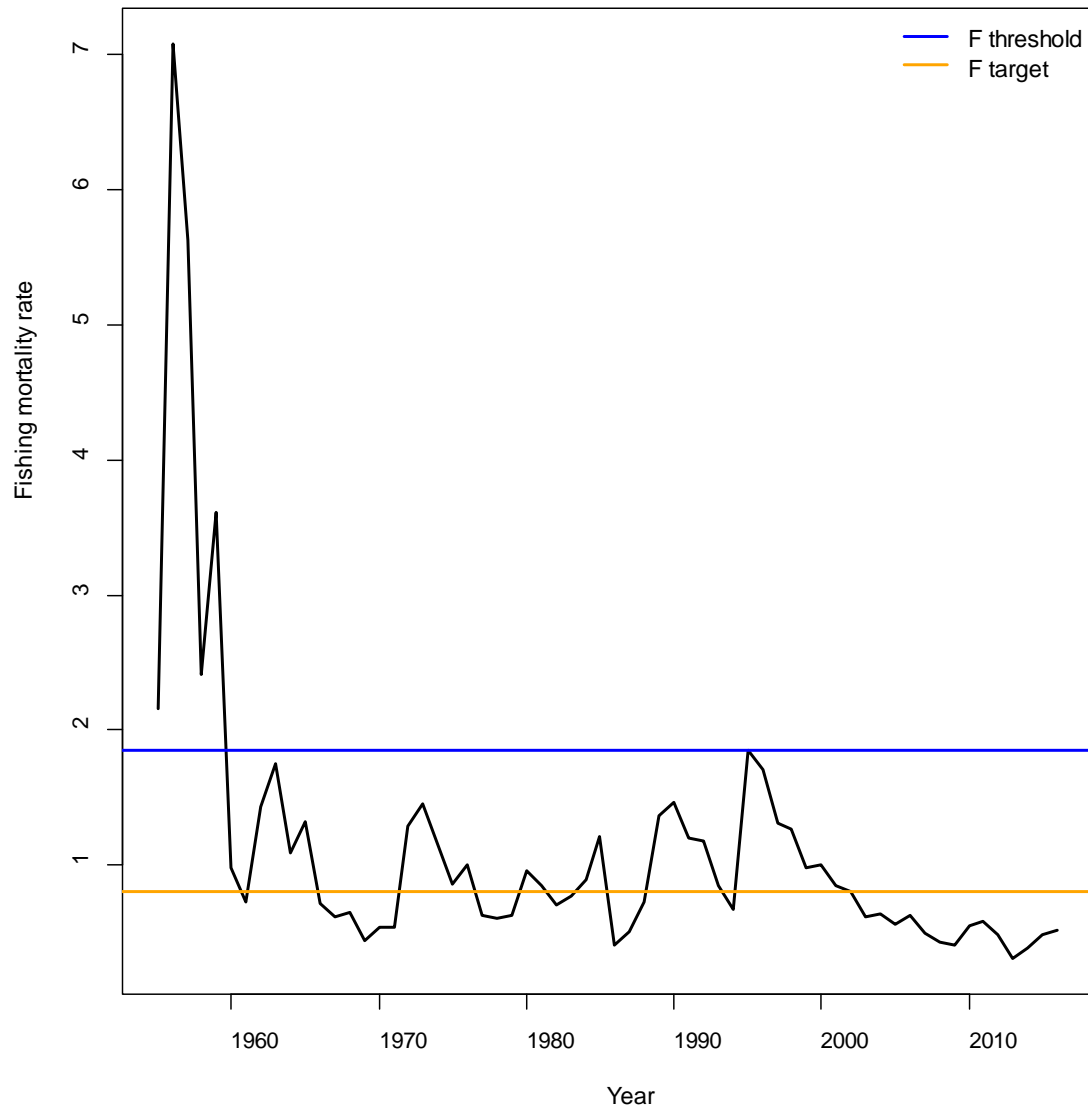
November 2017

Baltimore, MD

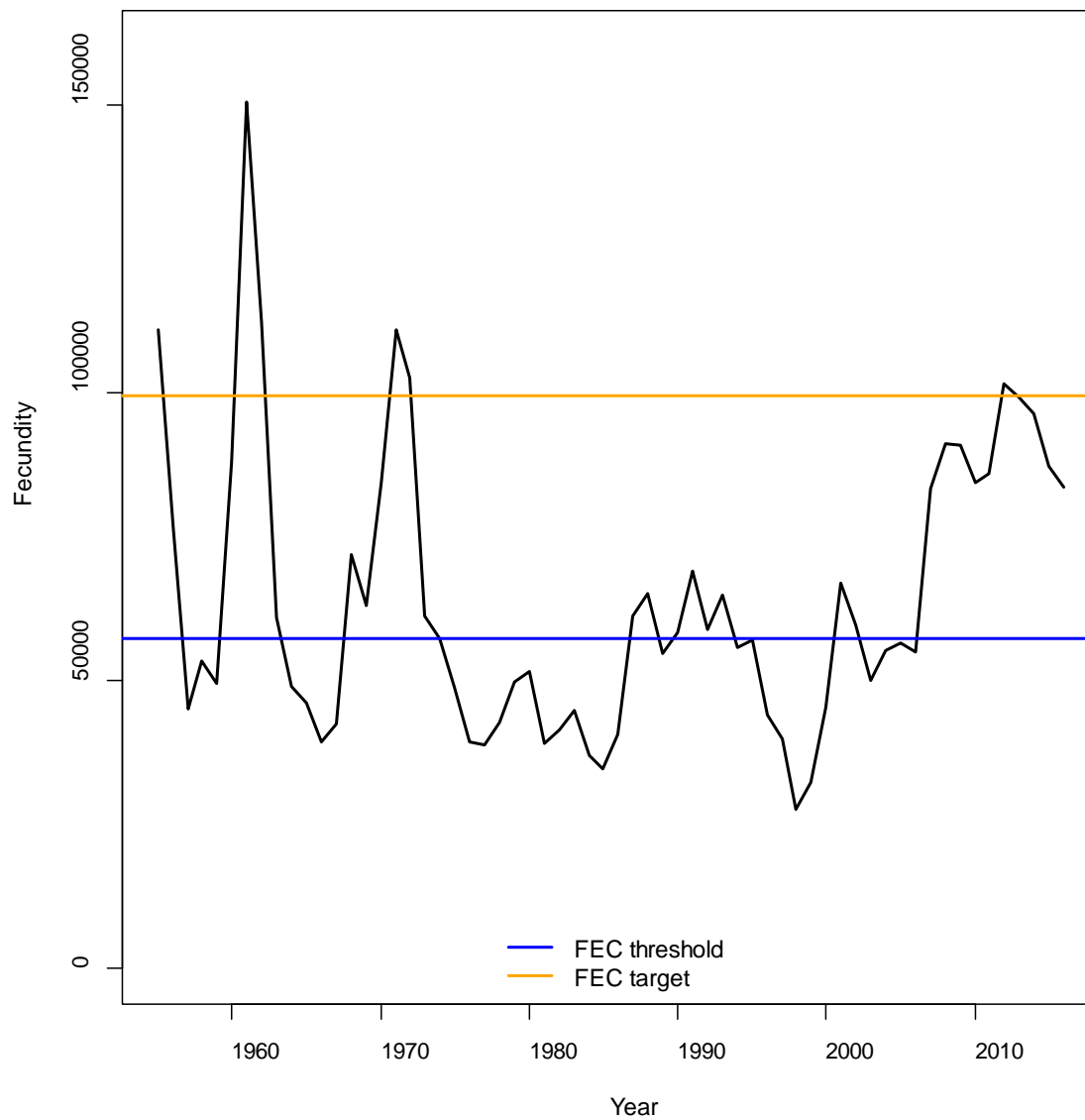


georgiaconservancy.org

Current Stock Status



Current Stock Status



Projection Methods



- Monte Carlo bootstrap runs of 2017 update of the Beaufort Assessment Model (BAM) used as the basis for projections
- Original standard projections run under board requested scenarios for 4 years since terminal year
– 2017 - 2020
- Starting conditions include initial numbers at age, which were the estimated numbers at age for year 2017 from the BAM for each MCB run

Projection Methods



- Numbers at age after the initial year:

$$N_{a+1,y+1} = N_{a,y}e^{-Z_{a,y}}$$

- a = age; y = year
- Z = age and year specific total mortality; equals natural mortality for each age for that year plus fishing mortality times selectivity at age

Projection Methods



- Natural mortality for each projection was the vector from each MCB run
- Selectivity is a vector from each MCB run for each fishery; northern and southern fishery selectivities are values from last time period
- Fishing mortality estimated to match annual landings for the constant TAC projections

Projection Methods



- Annual landings calculated using the Baranov catch equation and weight of landings
- Recruitment projected without underlying stock-recruitment function
 - based on the median recruitment observed in each MCB run
- Recr variability included as a deviation
 - selected randomly with replacement from each MCB run

Projection Methods



- Outputs include fecundity (ova), fishing mortality, recruitment, and landings
 - New outputs include biomass weighted F for ERP calculations
 - This is needed to allow comparisons across ref pts
- Fecundity is number of fish in each age times the reproductive vector at age
 - Specifically, maturity from final year of each MCB run, a 50:50 sex ratio, and a mean fecundity at age were used to produce reproductive vector at age

Projection Caveats



- Did not include structural (model) uncertainty
- Conditional on set of functional forms (e.g., selectivity, recruitment)
- Fisheries were assumed to continue at current proportions of allocation (Bait and Reduction) using current selectivity
 - New mgmt regs that alter the proportions or selectivities would likely affect projection performance
 - Change to reference points will also impact projection performance

Projection Caveats



- If future recruitment is characterized by runs of large or small year classes, possibly due to environmental or ecological conditions, stock trajectories may be affected
- Projections apply the Baranov catch equation
 - Assumes mortality occurs throughout the year
 - If assumption is violated (e.g., seasonal closures), additional, unquantified uncertainty will be introduced, impacting projection performance

Previous Projections Performed



Projection Run	TAC	Risk of exceeding F_{target}		
		2018	2019	2020
1. Current TAC	200,000	9.5%	0.5%	0%
2. 5% increase to current TAC	210,000	12%	1.5%	0%
3. 10% incr to current TAC	220,000	15.5%	3.5%	0%
4. 20% incr to current TAC	240,000	22.5%	9.5%	2.5%
5. 30% incr to current TAC	260,000	29.5%	20.5%	10.5%
6. 40% incr to current TAC	280,000	37.5%	33%	29%

Previous Projections Performed



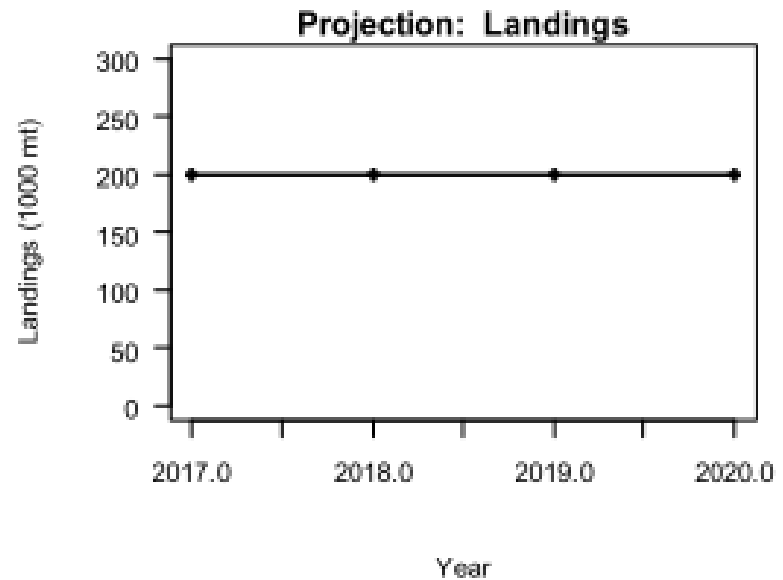
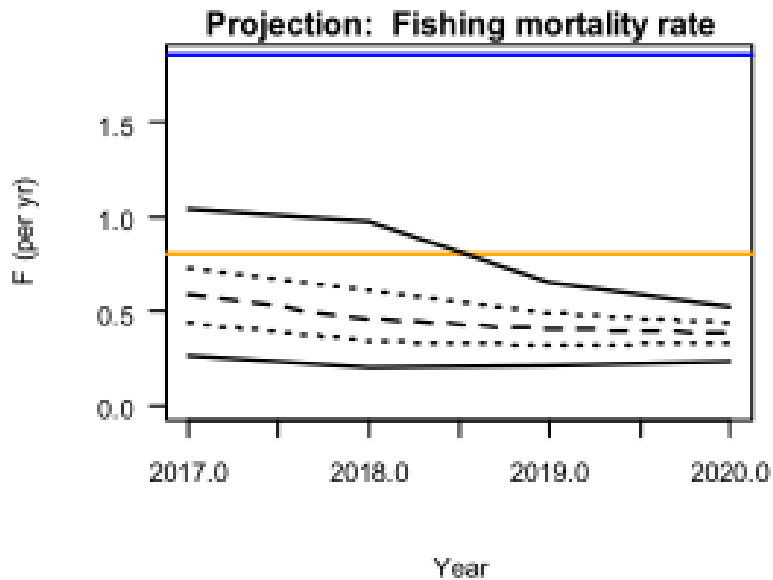
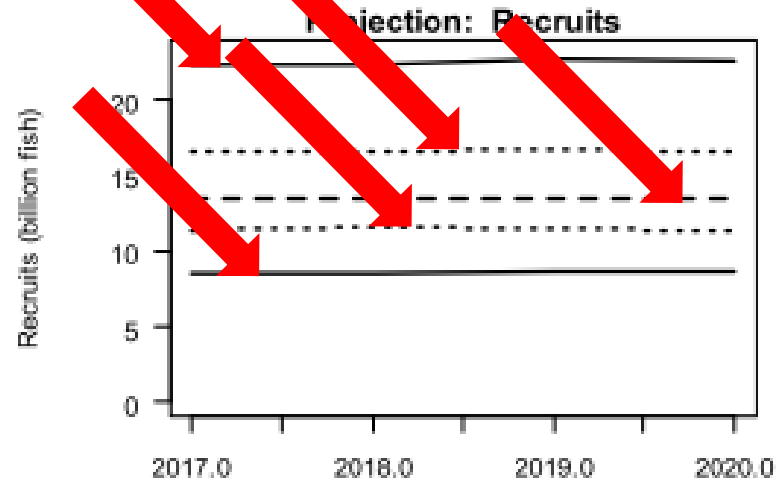
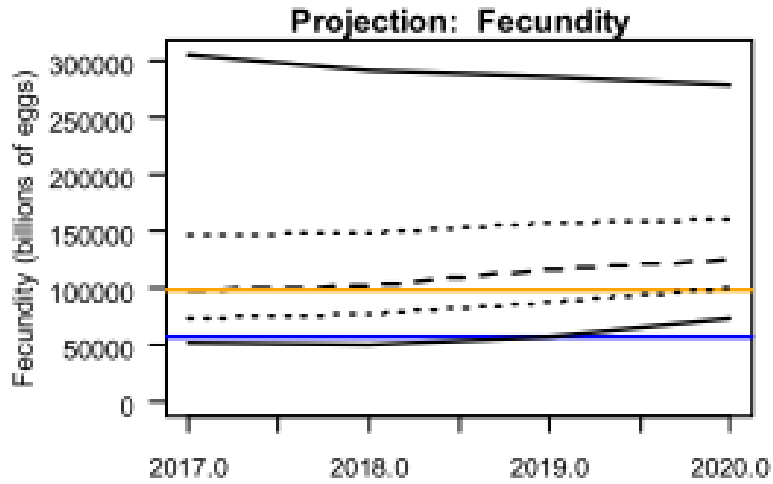
Projection Run	TAC	Risk of exceeding $F_{\text{threshold}}$		
		2018	2019	2020
1. Current TAC	200,000	0%	0%	0%
2. 5% increase to current TAC	210,000	0%	0%	0%
3. 10% incr to current TAC	220,000	0%	0%	0%
4. 20% incr to current TAC	240,000	0.5%	0%	0%
5. 30% incr to current TAC	260,000	1.5%	0%	0%
6. 40% incr to current TAC	280,000	2.5%	0%	0%

Previous Projections Performed



Projection Run	TAC	Risk of exceeding F_{target}	Risk of exceeding $F_{\text{threshold}}$
7. 50% probability of being below the F target in 2018	314,500	50%	5%
8. 55% probability of being below the F target in 2018	288,500	45%	3%
9. 60% probability of being below the F target in 2018	286,000	40%	3%

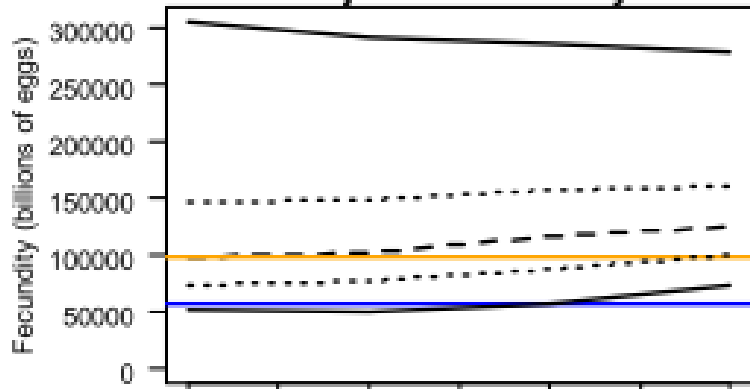
Key To Graphs



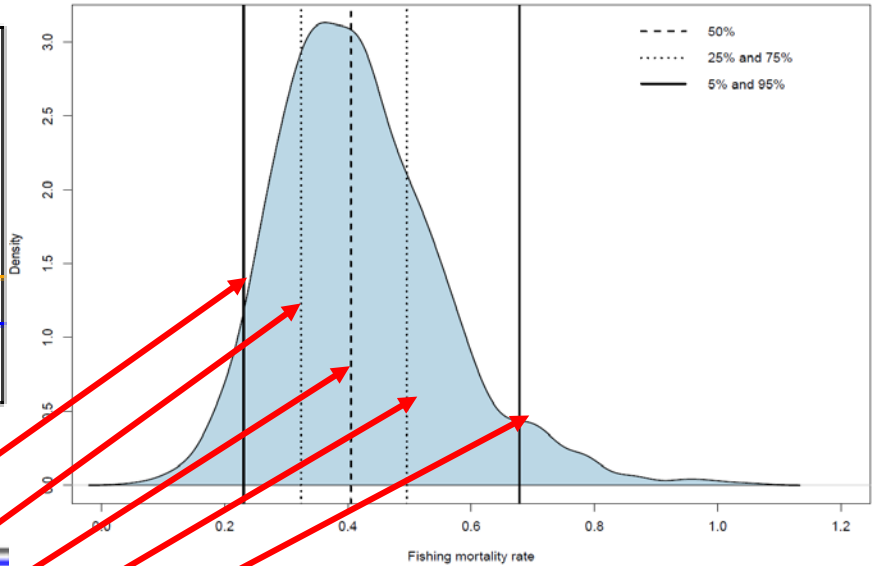
Key To Graphs



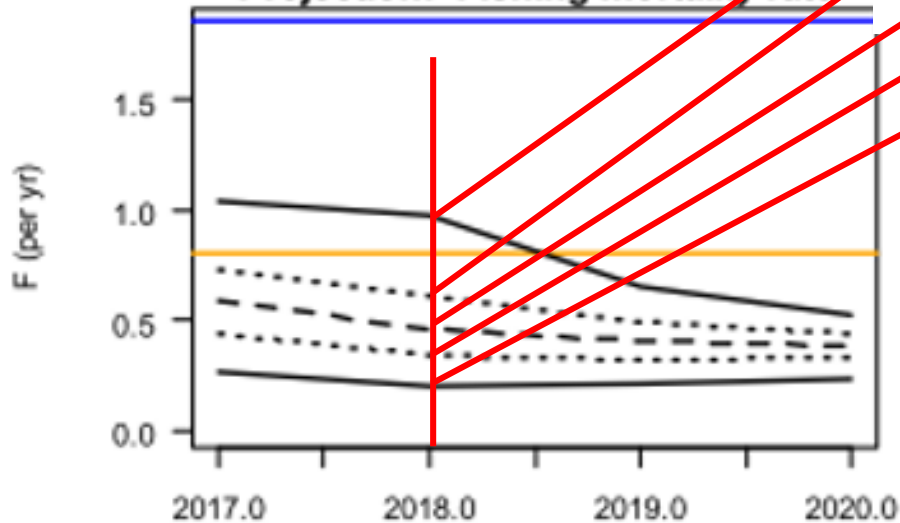
Projection: Fecundity



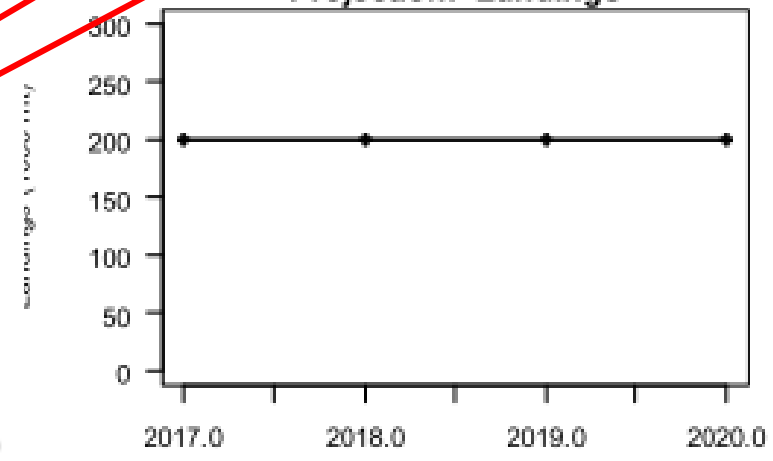
Density plot for Amendment 3: Options A and B



Projection: Fishing mortality rate



Projection: Landings



Year

Year

The End...



Questions?



Photo credit: Emily Liljestrand