Atlantic Menhaden Stock Assessment Update

August 2017

Alexandria, VA

georgiaconservancy.org

Overview

- Data used
- Stock assessment
  - Sensitivity and retro info, too
- Output changes from last assessment
- Reference points in detail

Data

- Life history data
  - Maturity: historical data
  - Natural mortality: age-varying, time constant values; scaled to estimates from the tagging data
  - Growth: estimated from fishery-dependent data
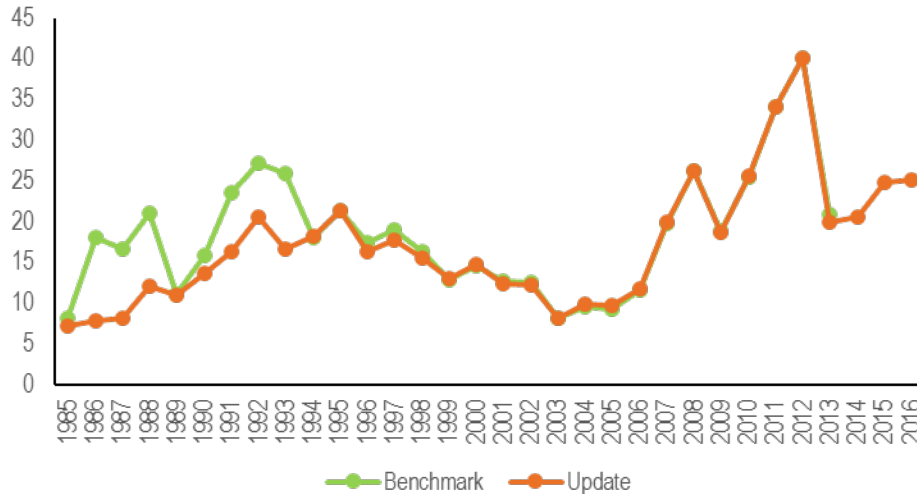 - All consistent with that used for the benchmark
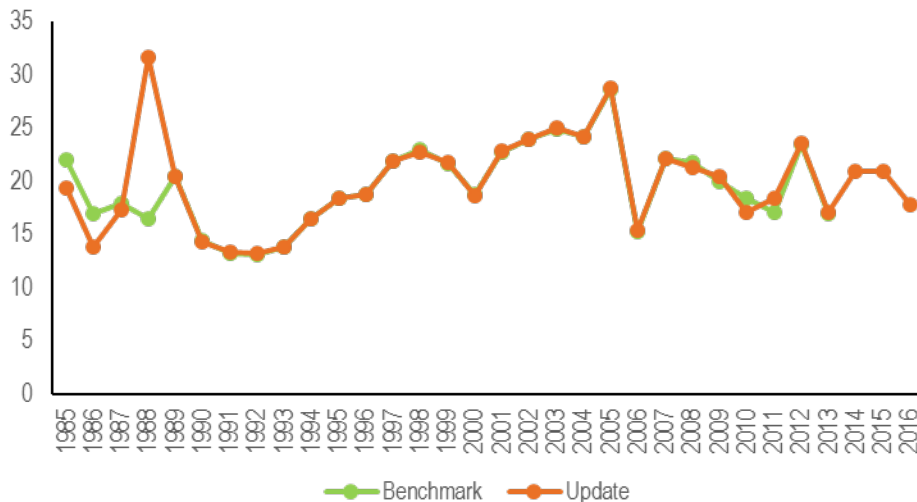
Data – Reduction Landings
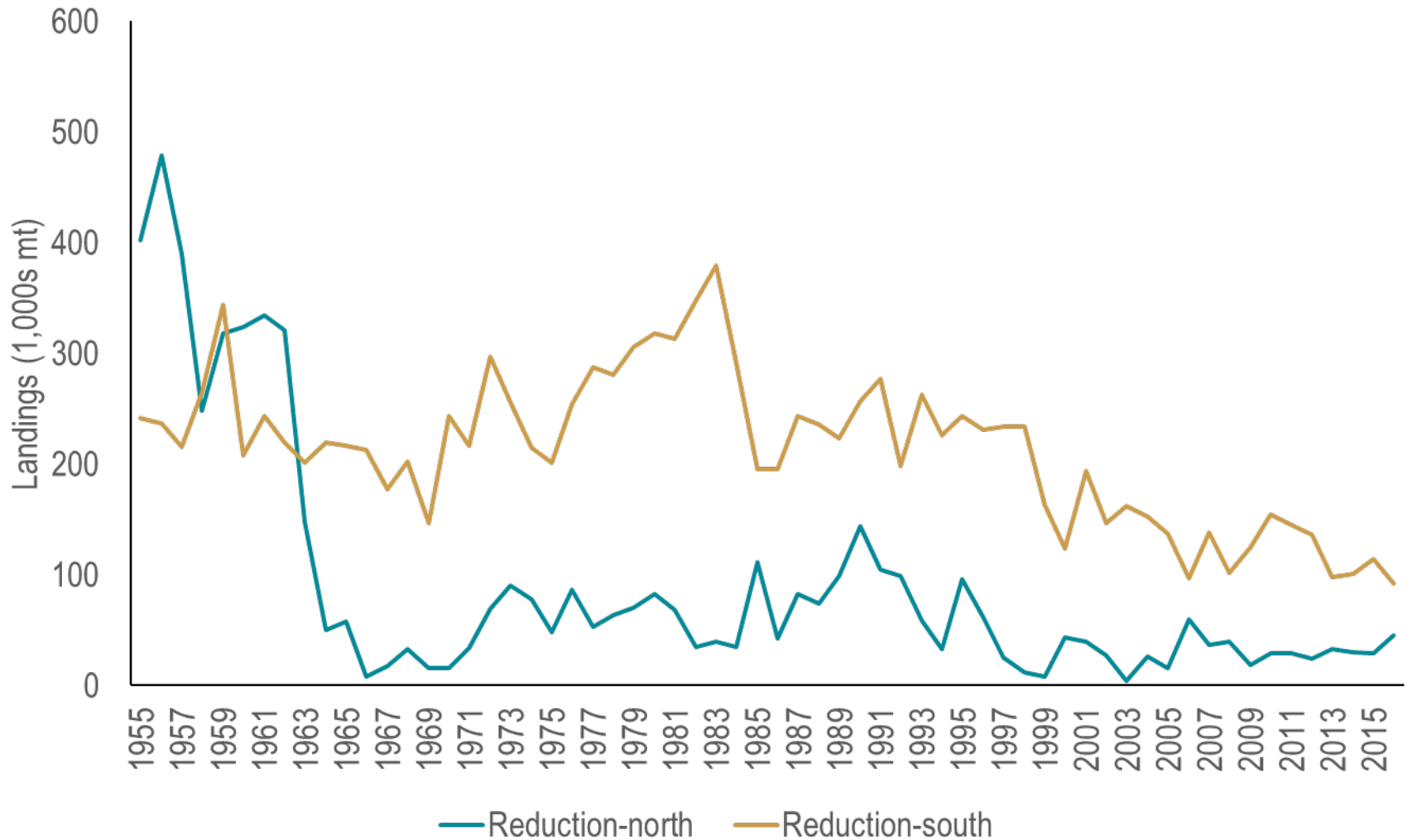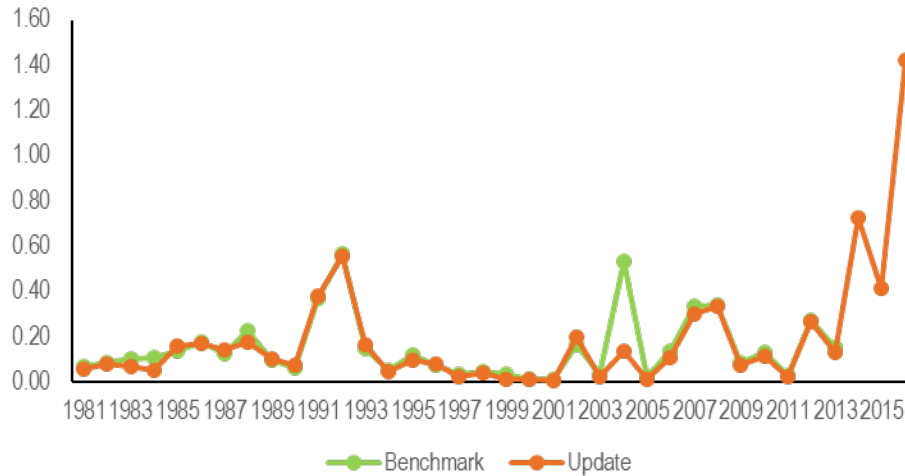
Data – Bait Landings

Northern Bait Landings

- SAS recommended using updated landings

- Differences due to double counting of FL and ME reduction landings during benchmark and several states updating landings data

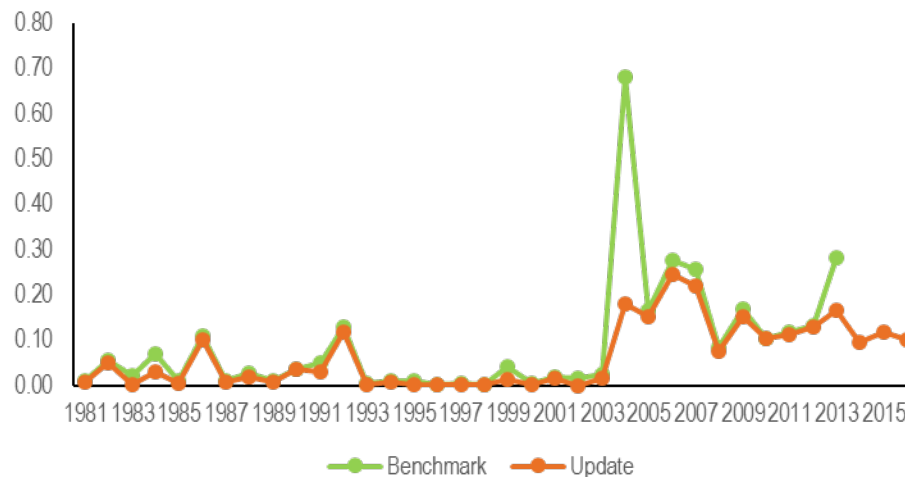Southern Bait Landings

Data – Recreational Landings

Northern Recreational Landings

Southern Recreational Landings

- SAS recommended moving to the updated landings

- Differences due to MRIP changes over time

Data – Fishery Independent

- Datasets reviewed and used during benchmark were used to create standardized indices
  - Accounts for catchability differences due to factors such as time of year or environmental variables
  - Treatment is consistent with that used for benchmark
  - Analysis conducted by FIG
- 3 indices of relative abundance: YOY index, northern adult index (NAD), and southern adult index (SAD)

Data – Fishery Independent

SAD Index

Data – Fishery Independent

NAD Index
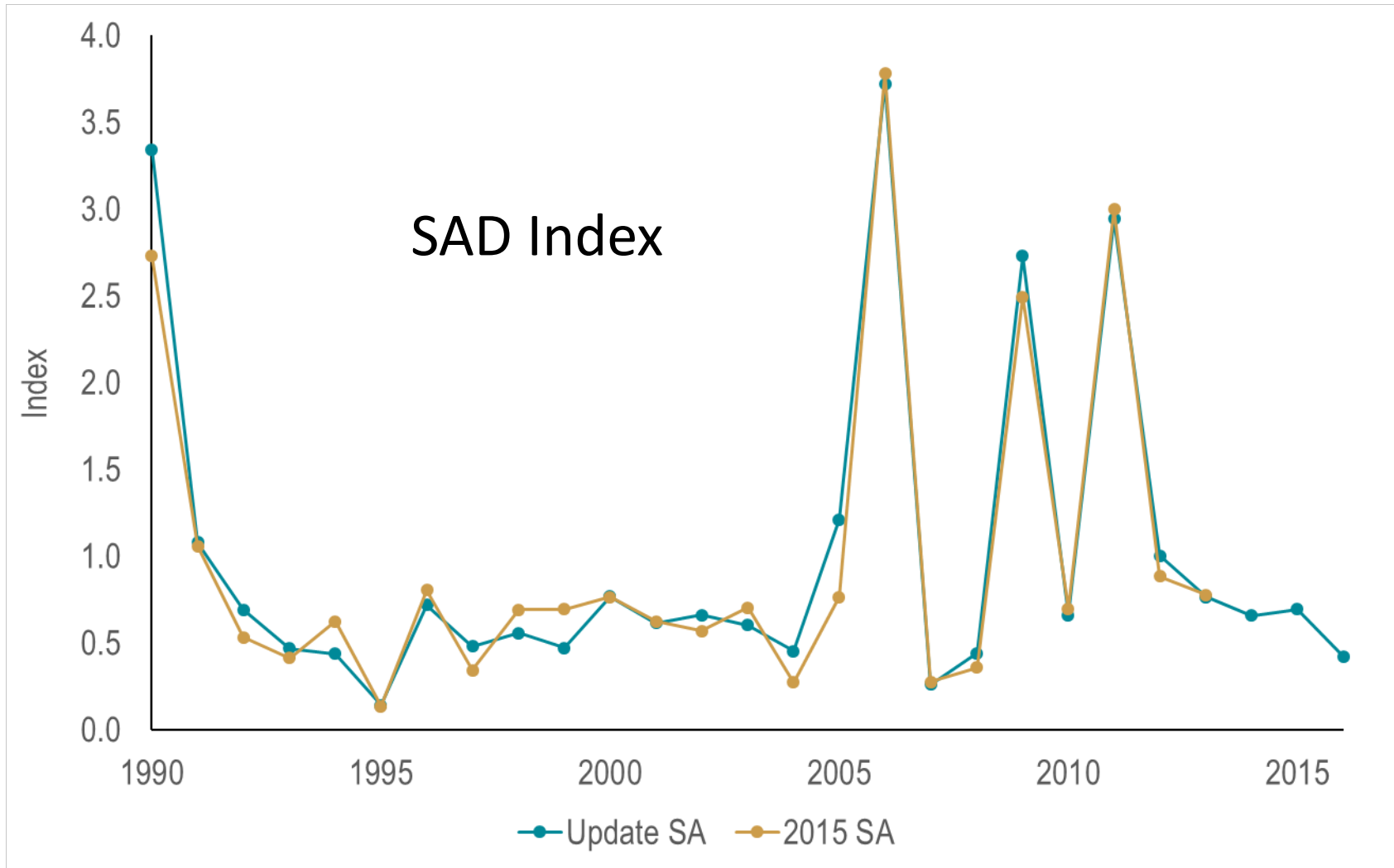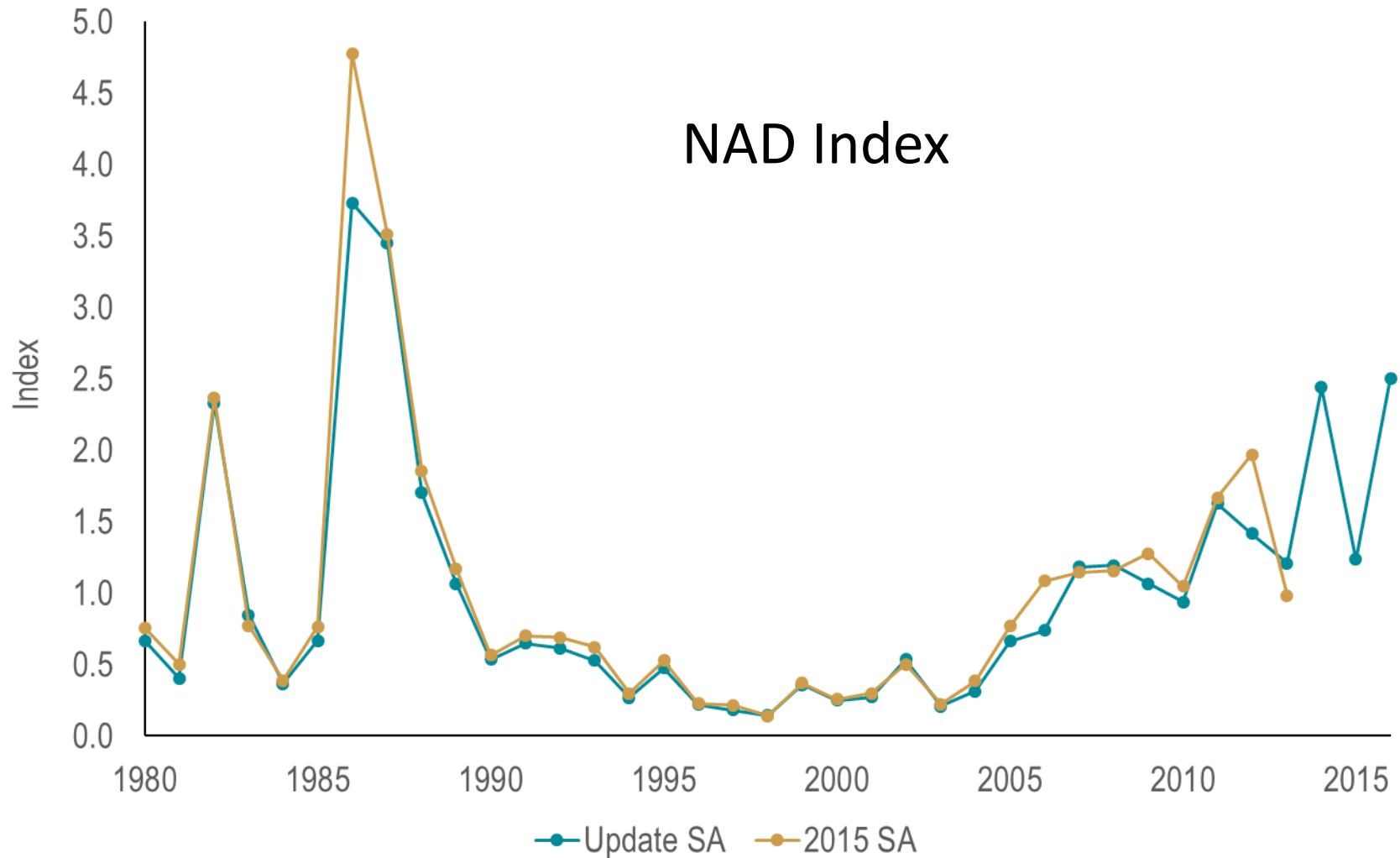
Data – Fishery Independent
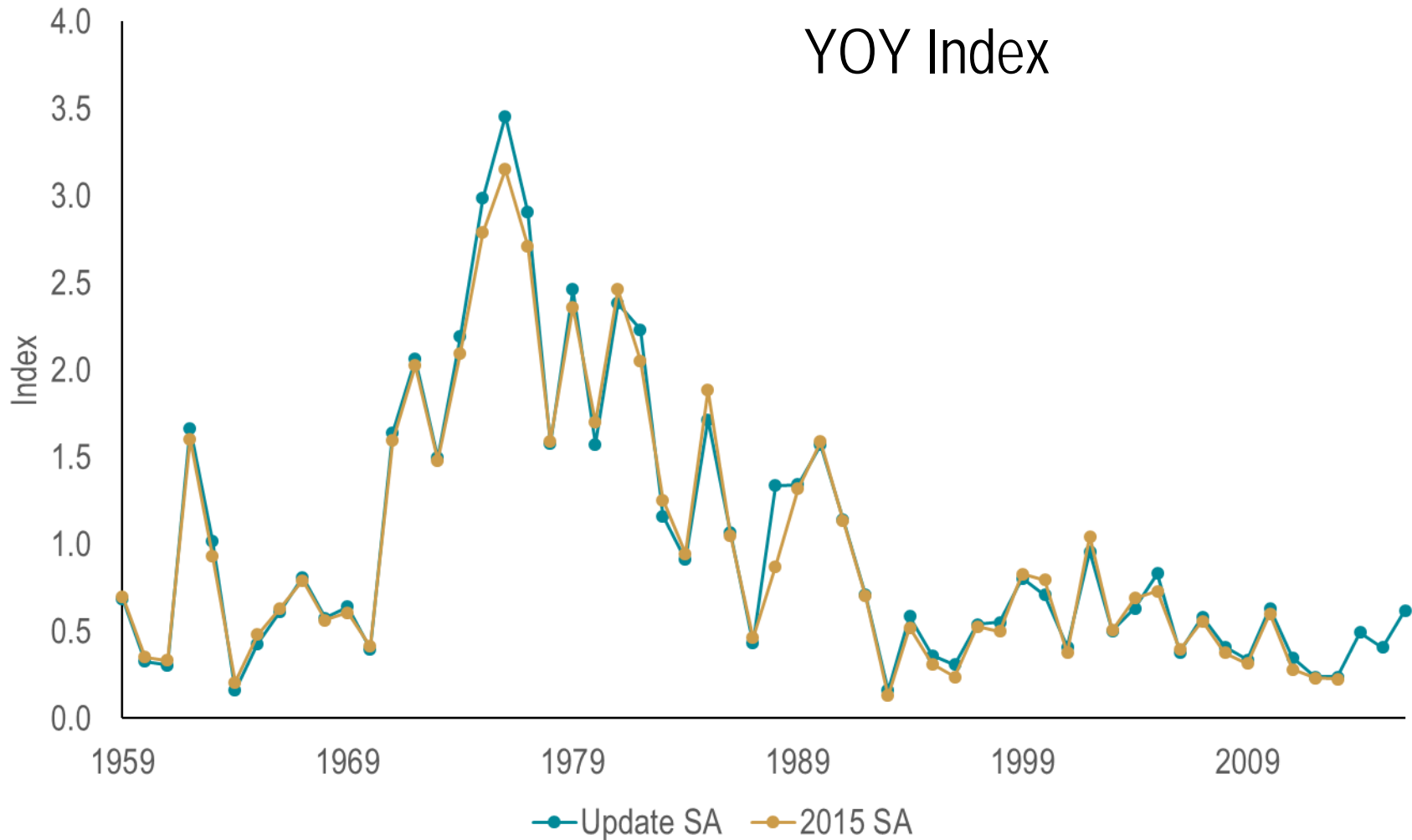
Data

- Reduction catch at age, number of collections, and number of fish aged were all updated

- Bait catch at age, number of collections, and number of fish aged were all updated

- Length comps for SAD and NAD were updated with slight differences due to some slight data differences by state

Stock Assessment

- Start year: 1955
- Terminal year: 2016
- Age classes: 0 – 6+
- Day 1 in model is March 1
- Fleets as areas model
- 4 fisheries with landings and age compositions
- 1 YOY index; 2 adult indices
- 2 sets of length compositions

Stock Assessment

- Data were split into northern and southern regions
  - Migration, fishery dynamics, tagging data
  - Better accounts for population dynamics and fishery removals over time

- Using run recommended by SEDAR Review Panel
  - Same as base run in benchmark report except length composition information down weighted
  - Allows length information to inform selectivity of the indices, but not other model outputs

Stock Assessment - Output
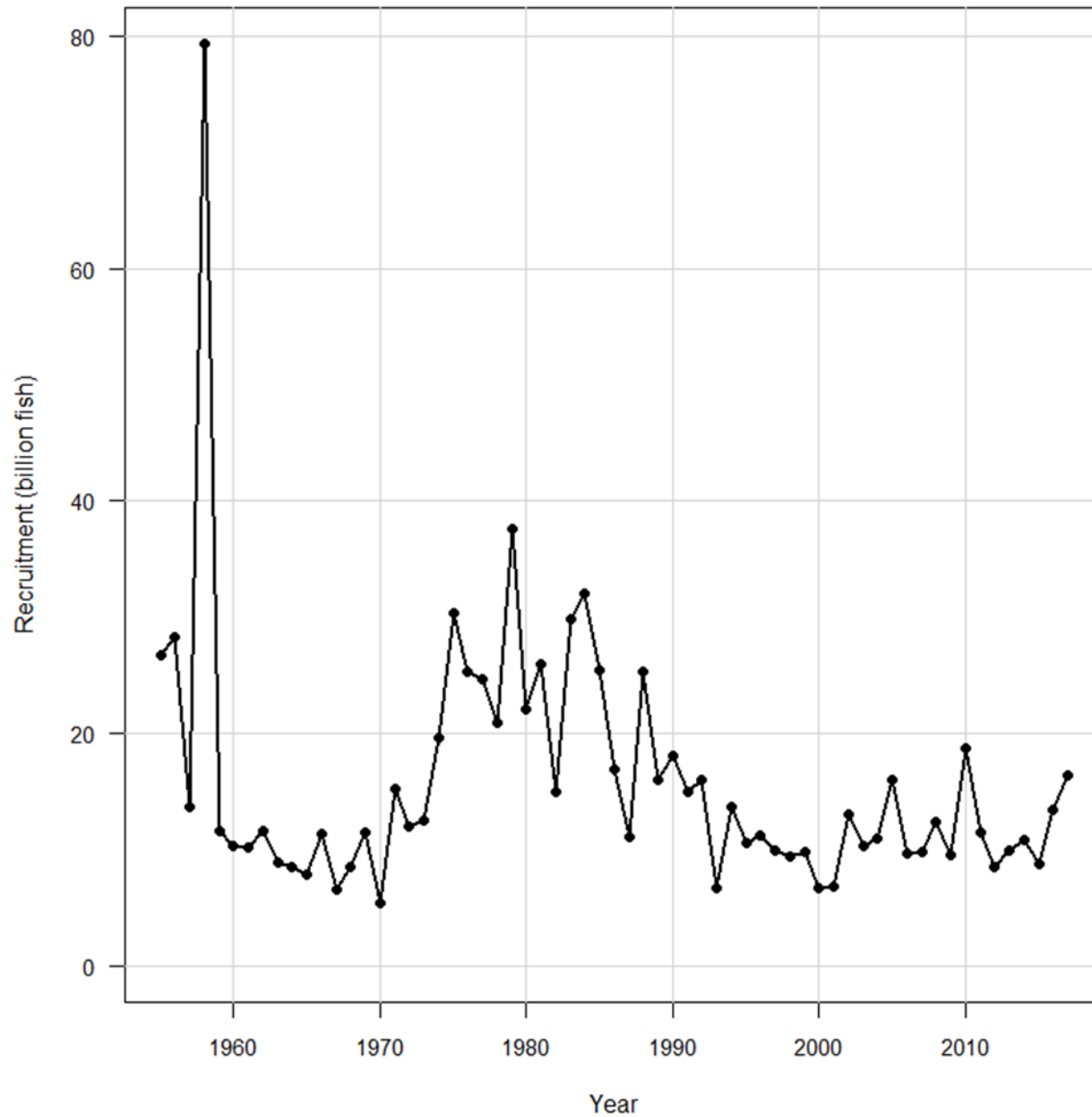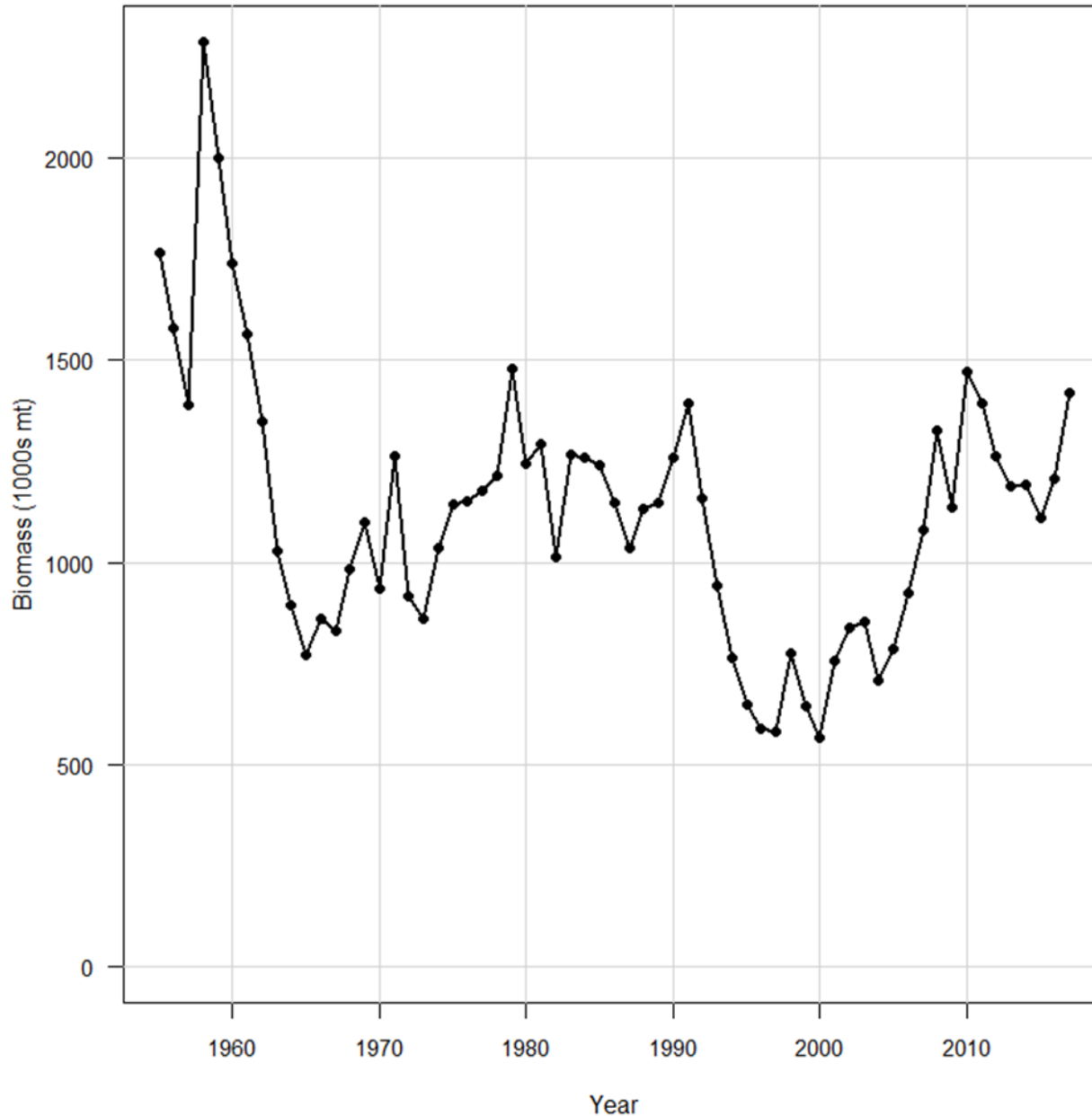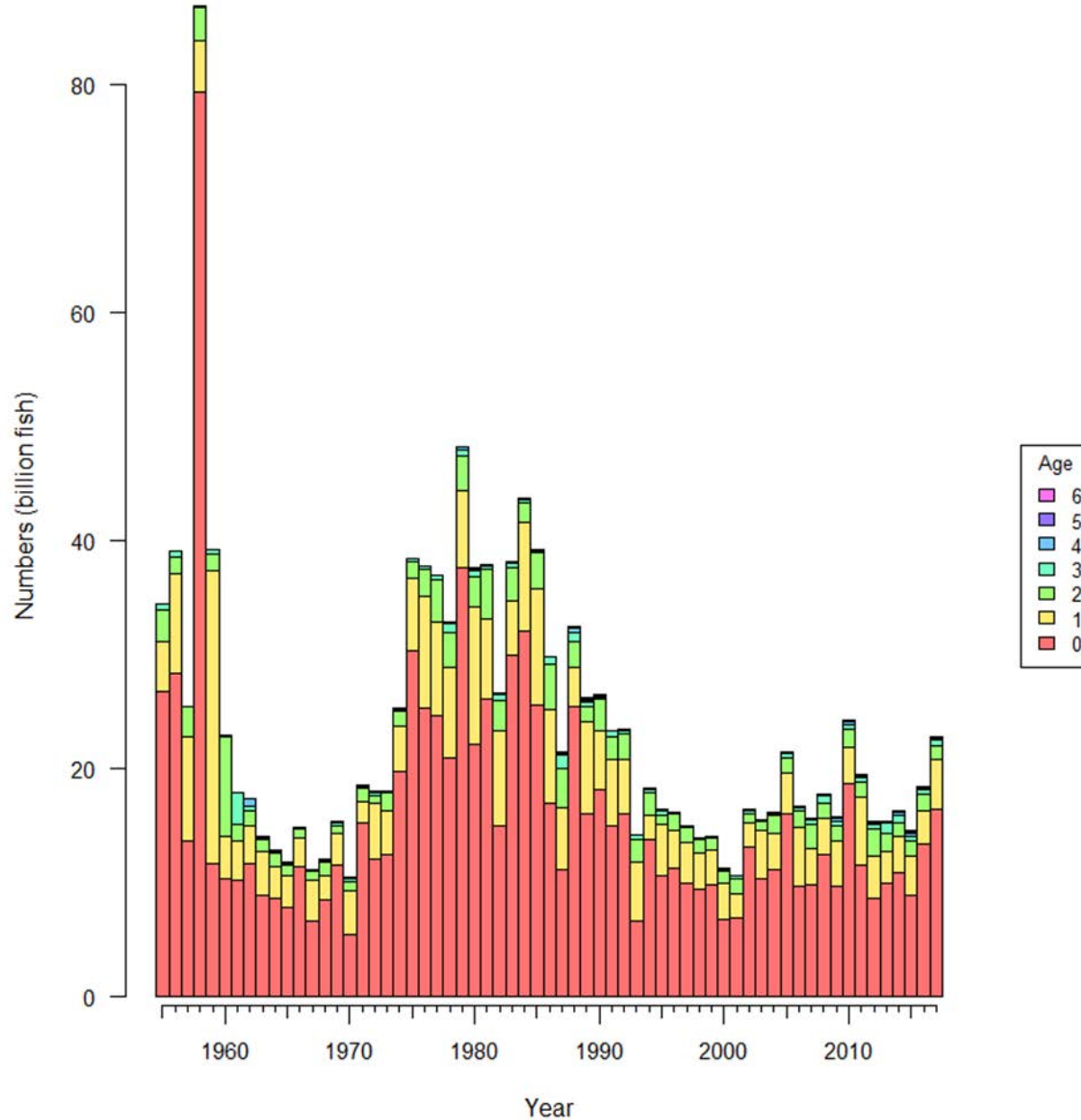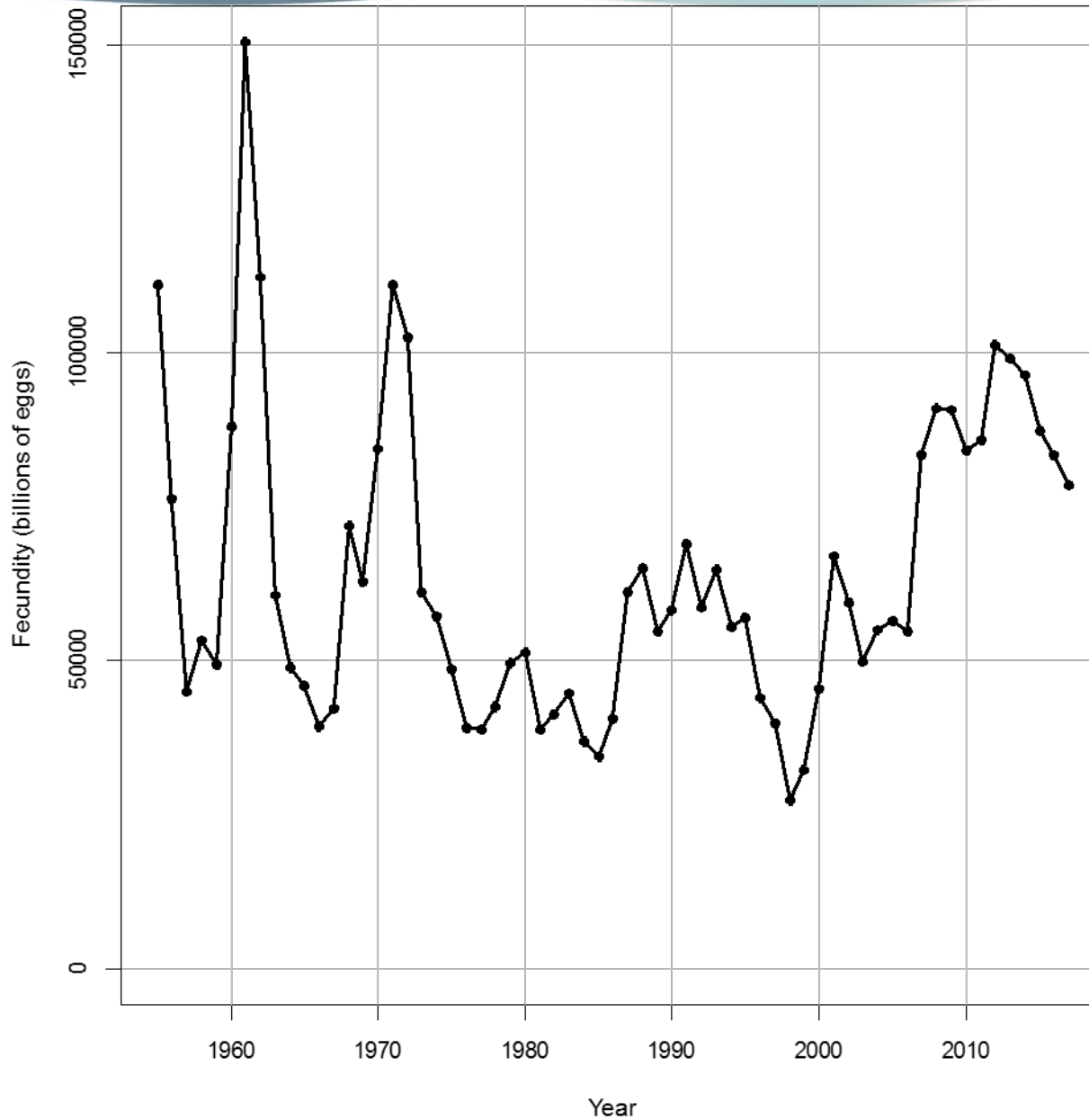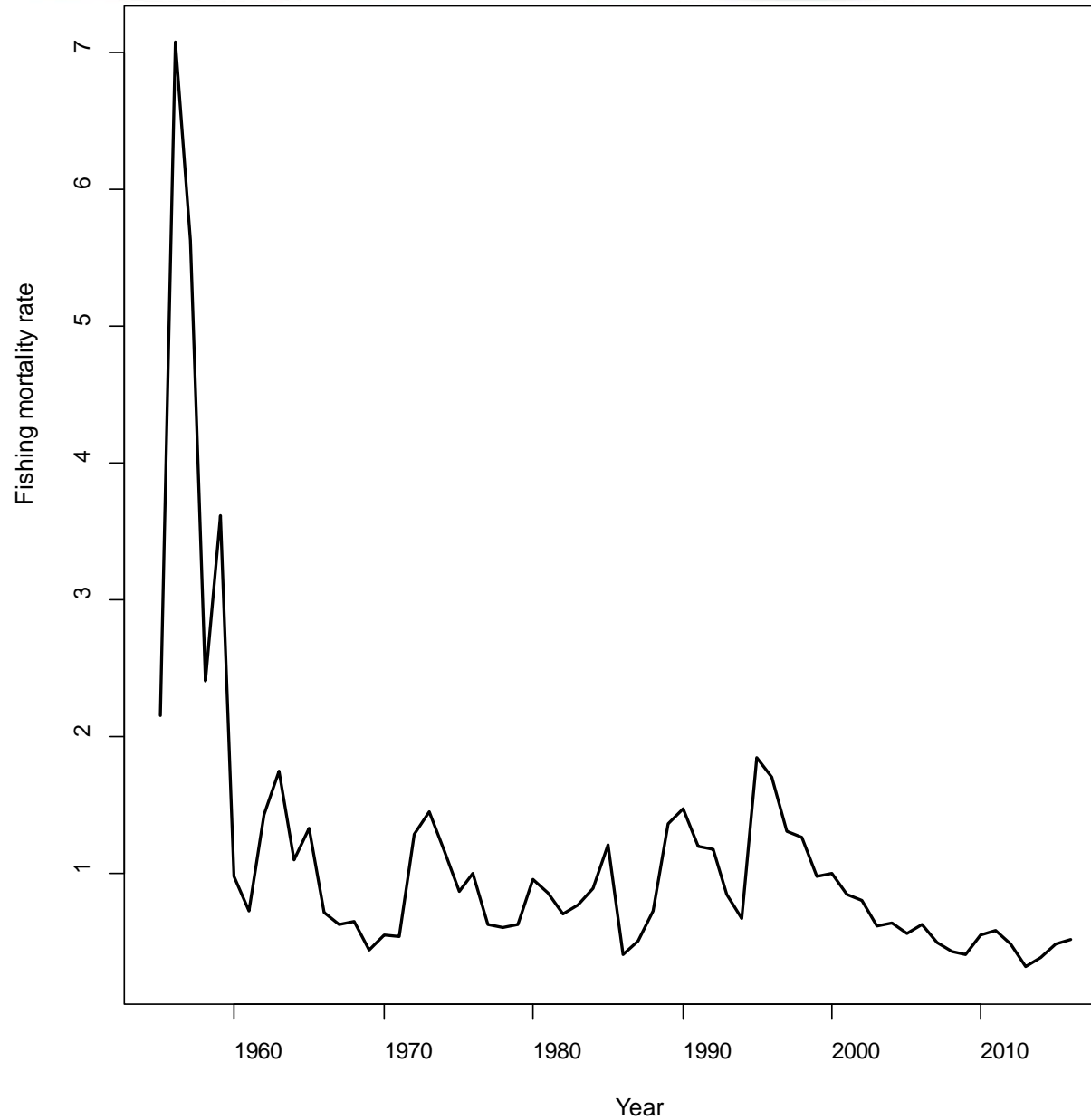
Stock Assessment - Output

Stock Assessment - Output

- Runs
  - Fixed q for NAD index
  - Dropped NAD index and length comps
  - Upper and lower M
  - One q for YOY index

Stock Assessment - Sensitivities
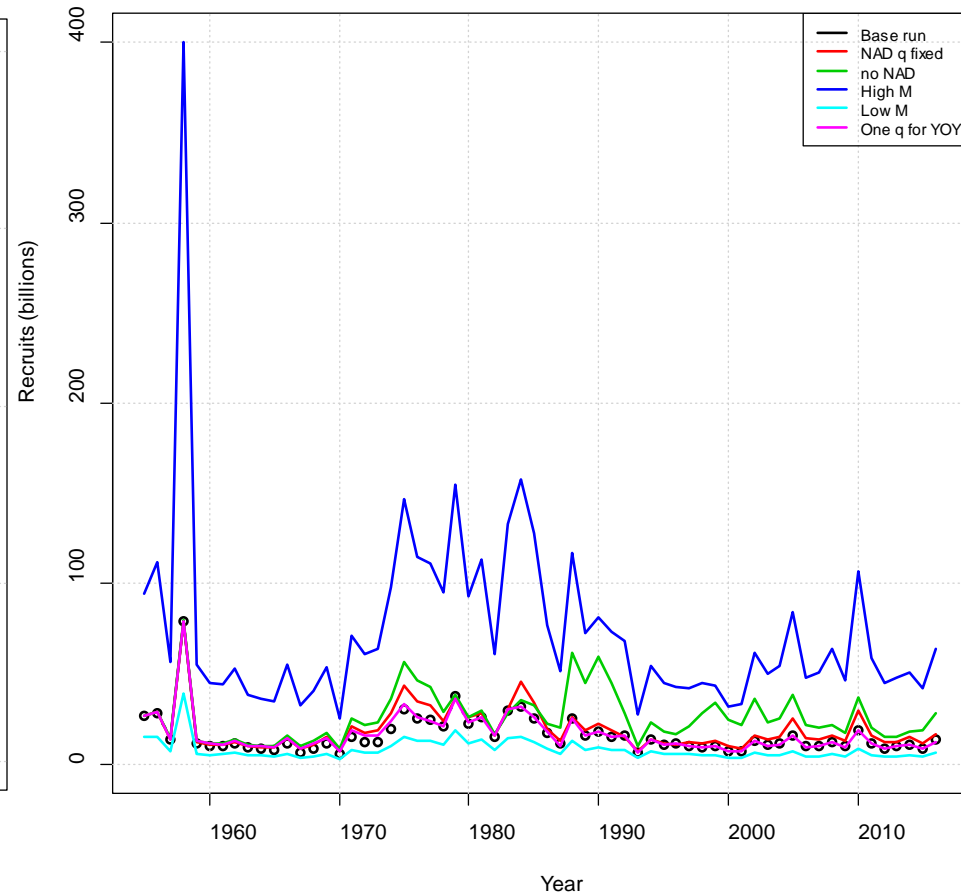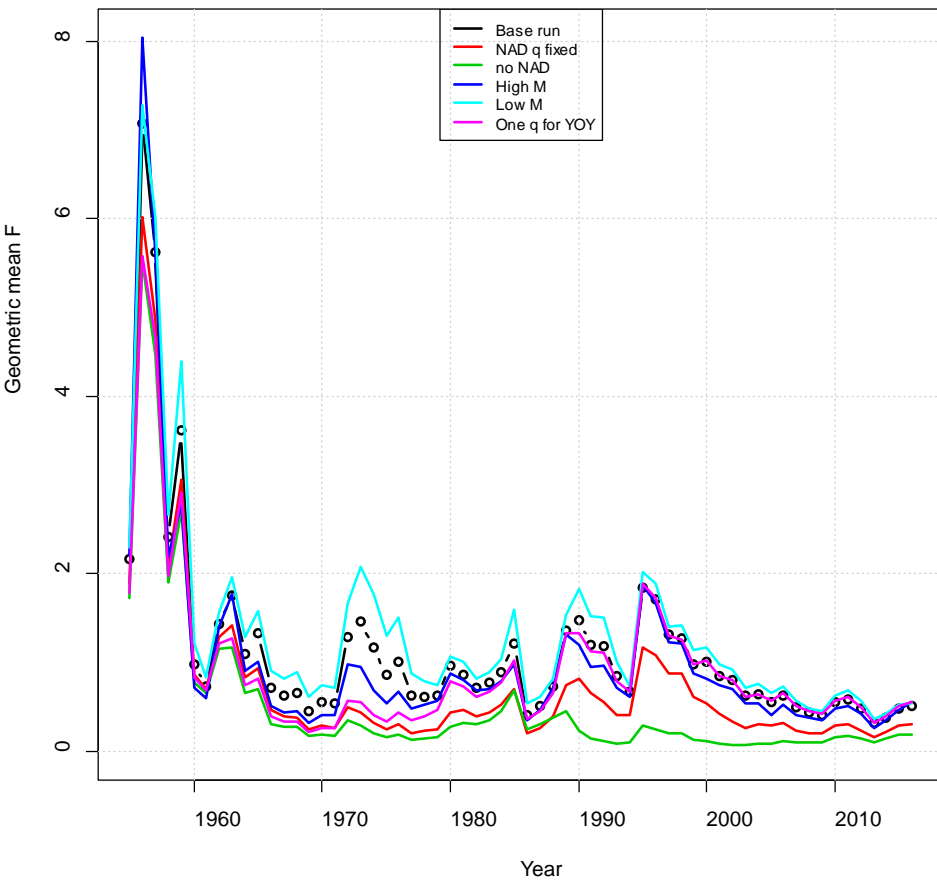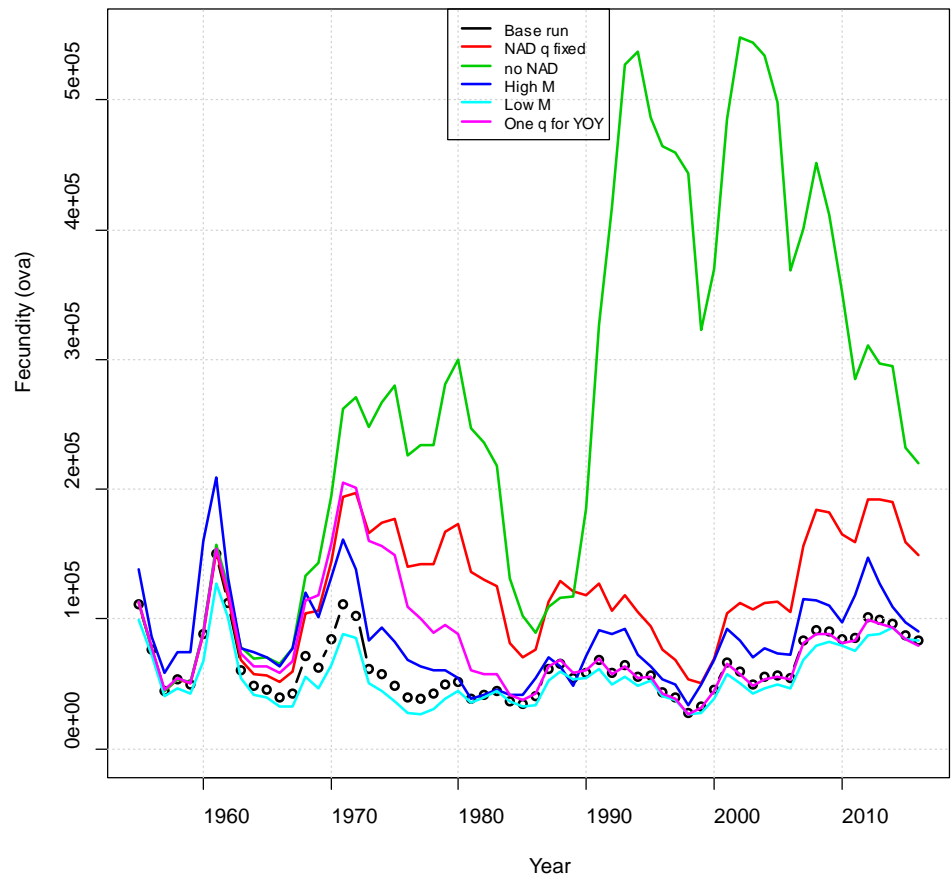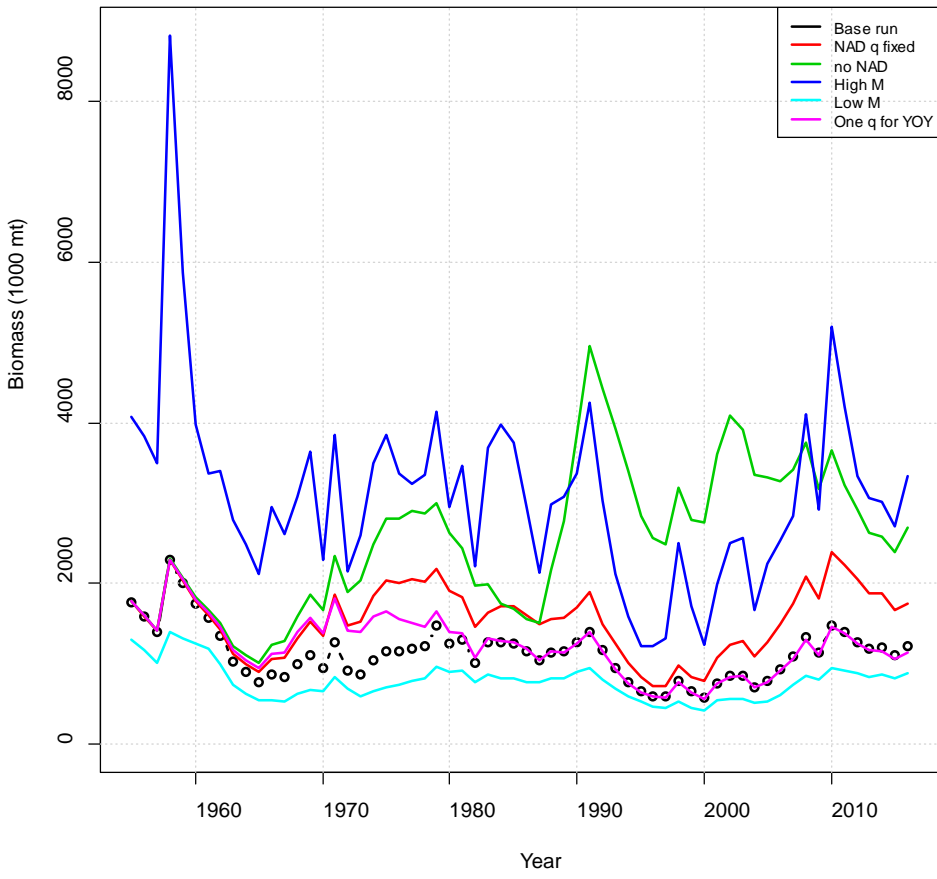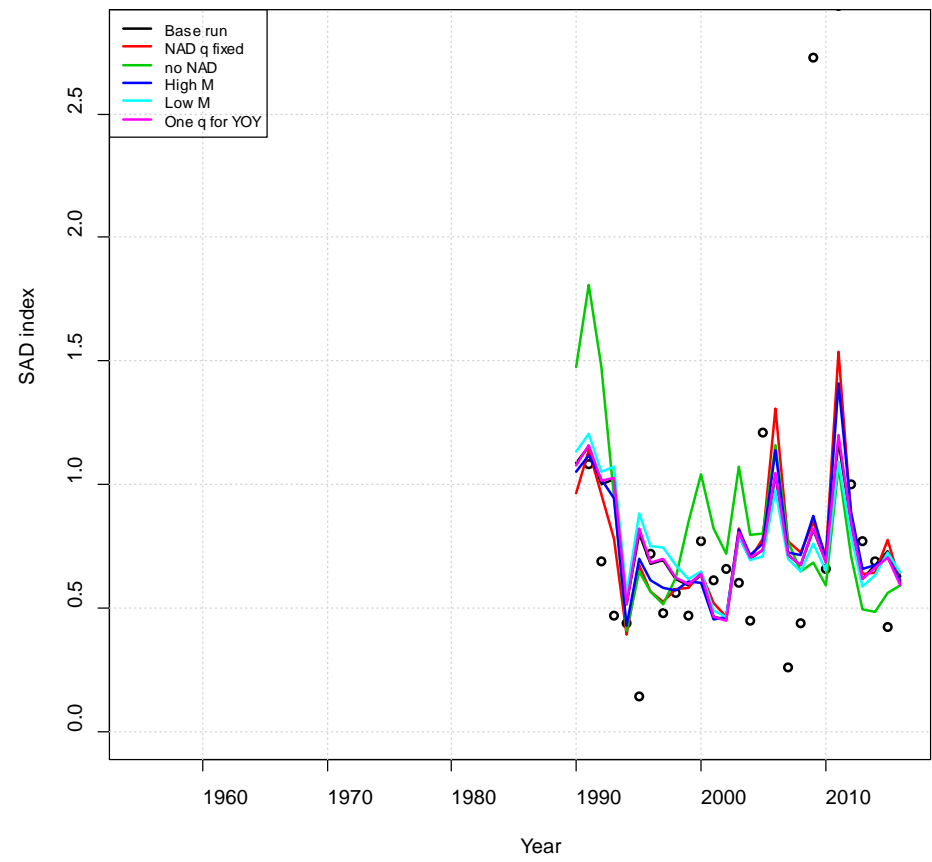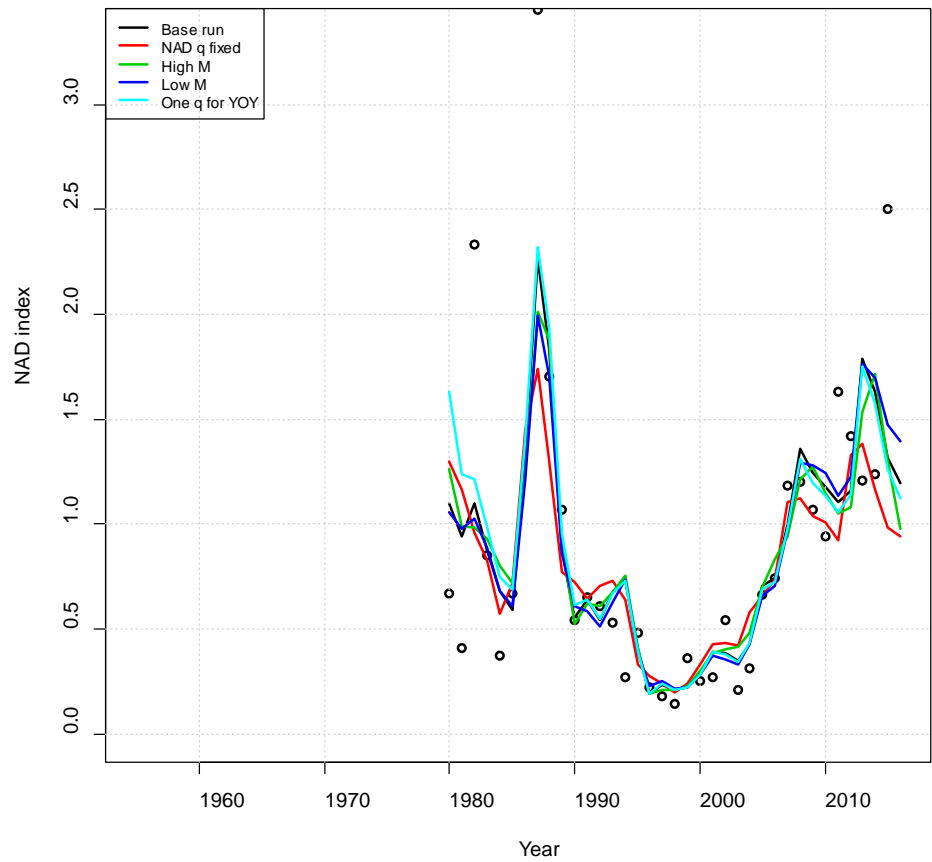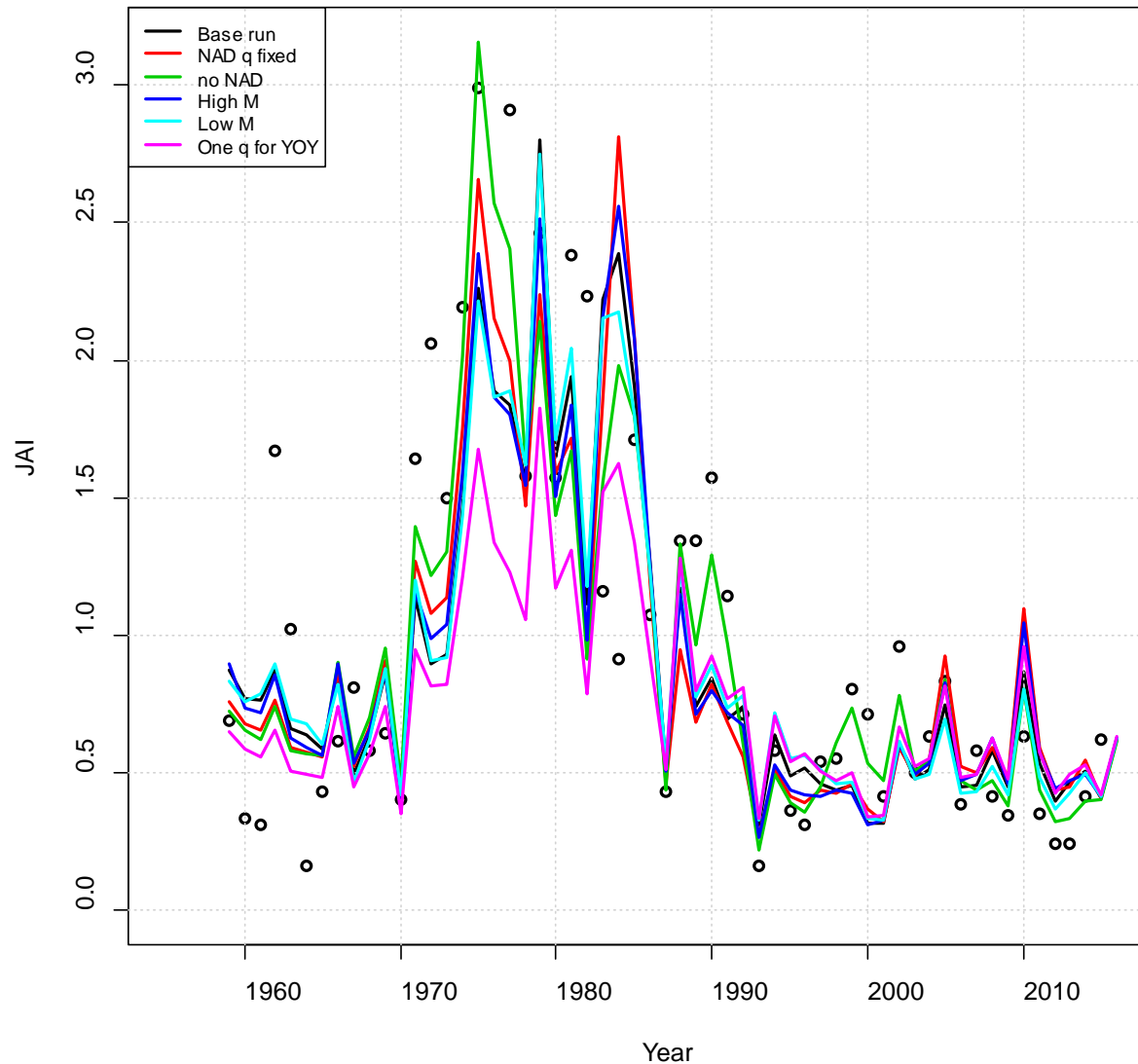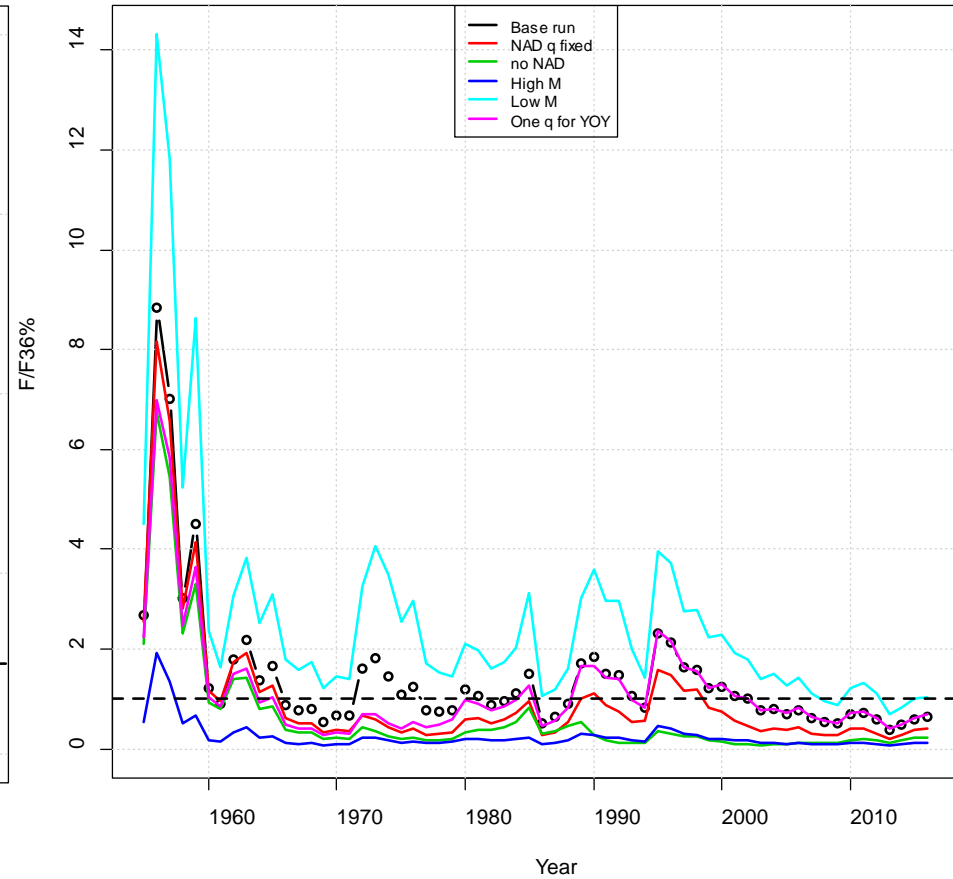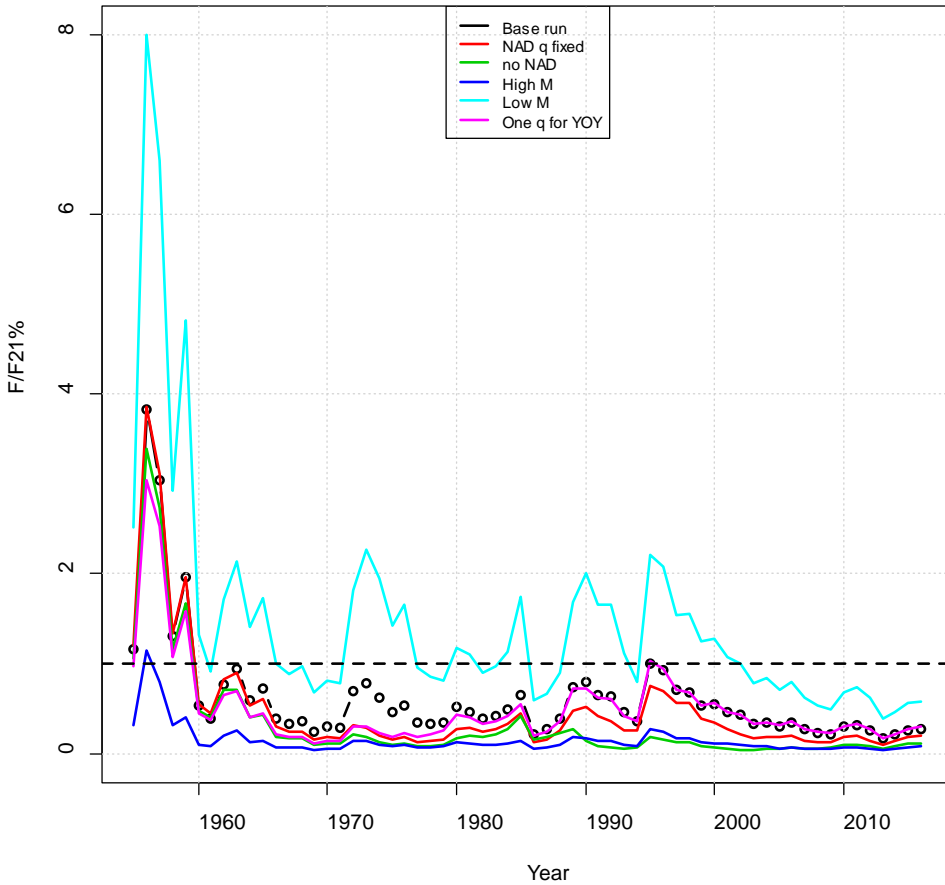
Stock Assessment - Sensitivities

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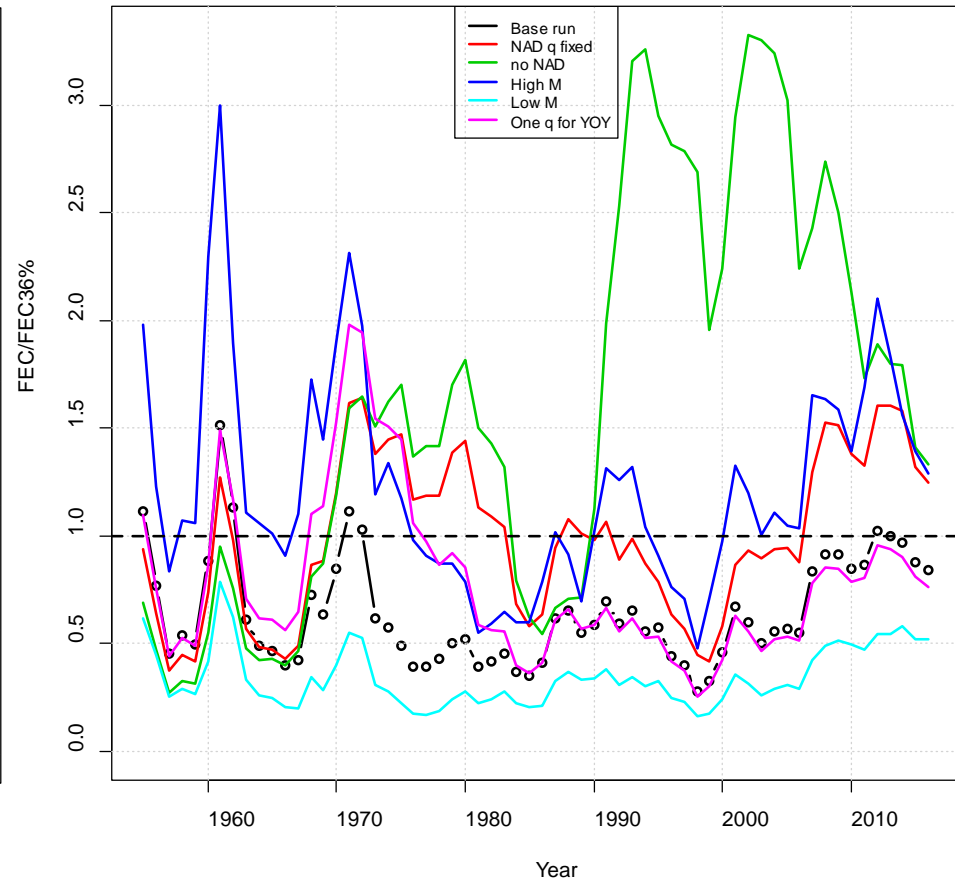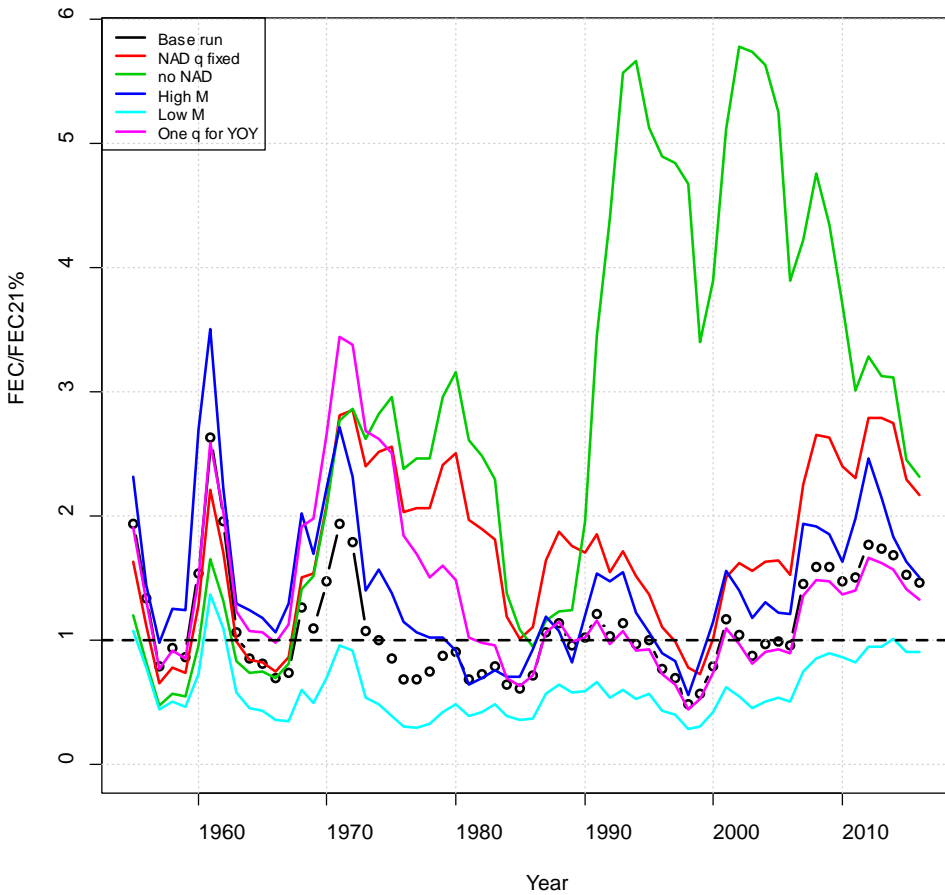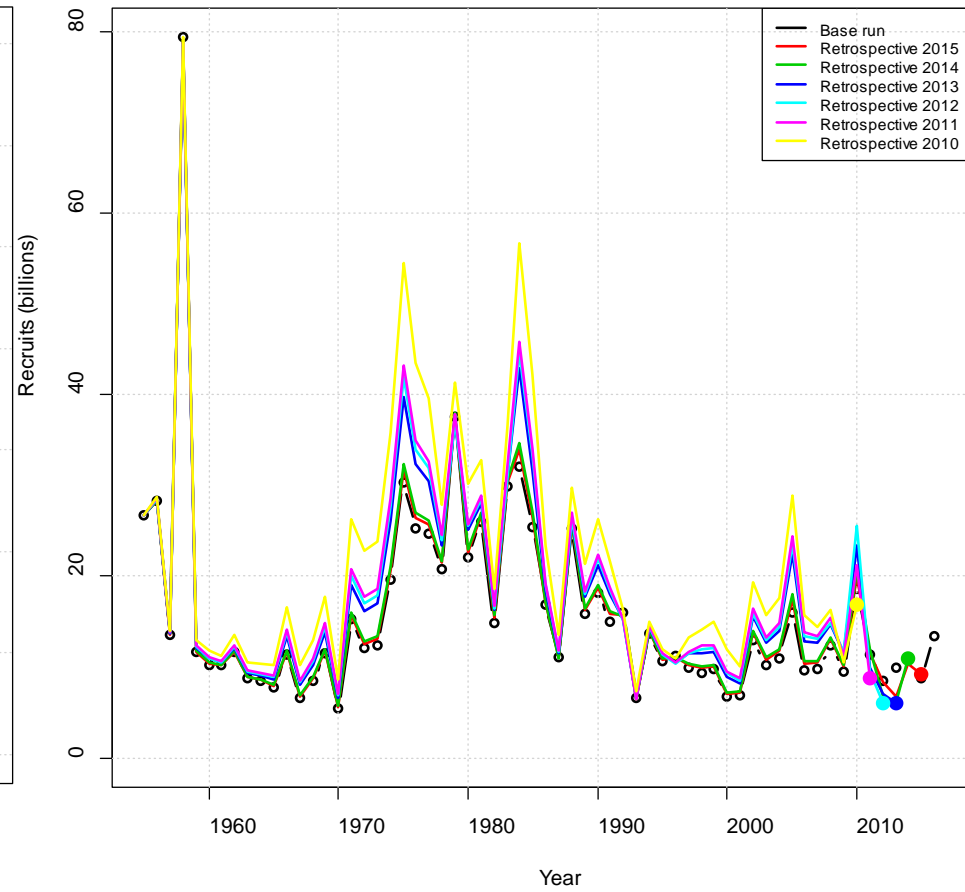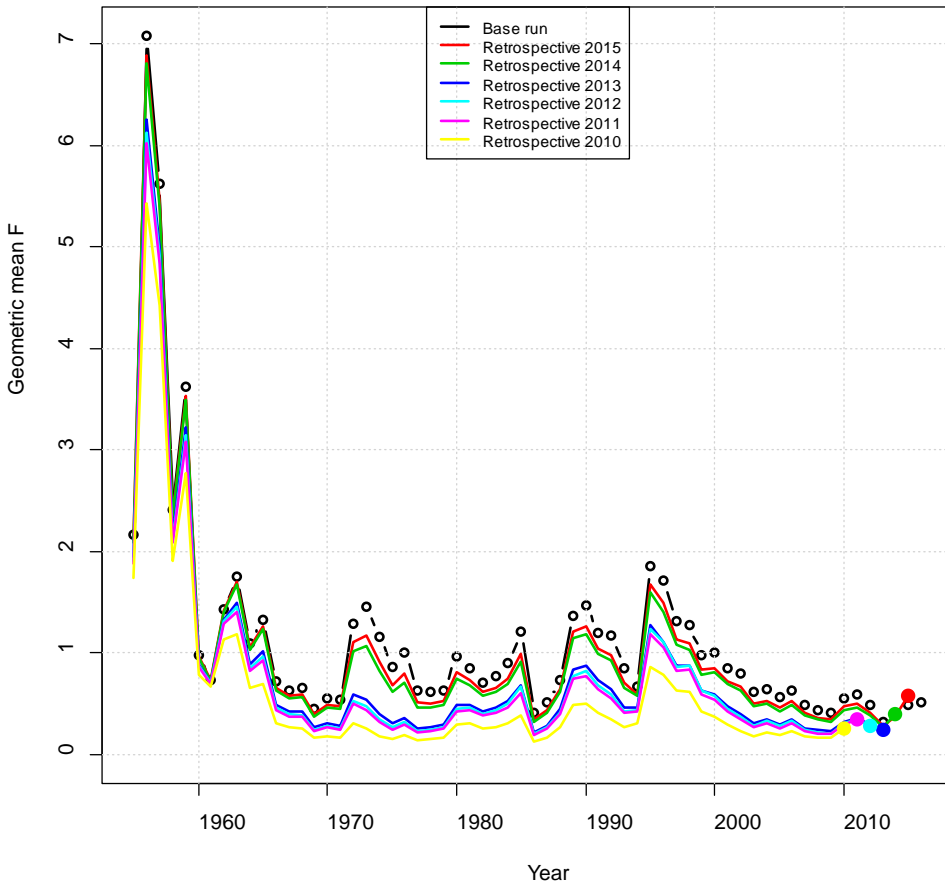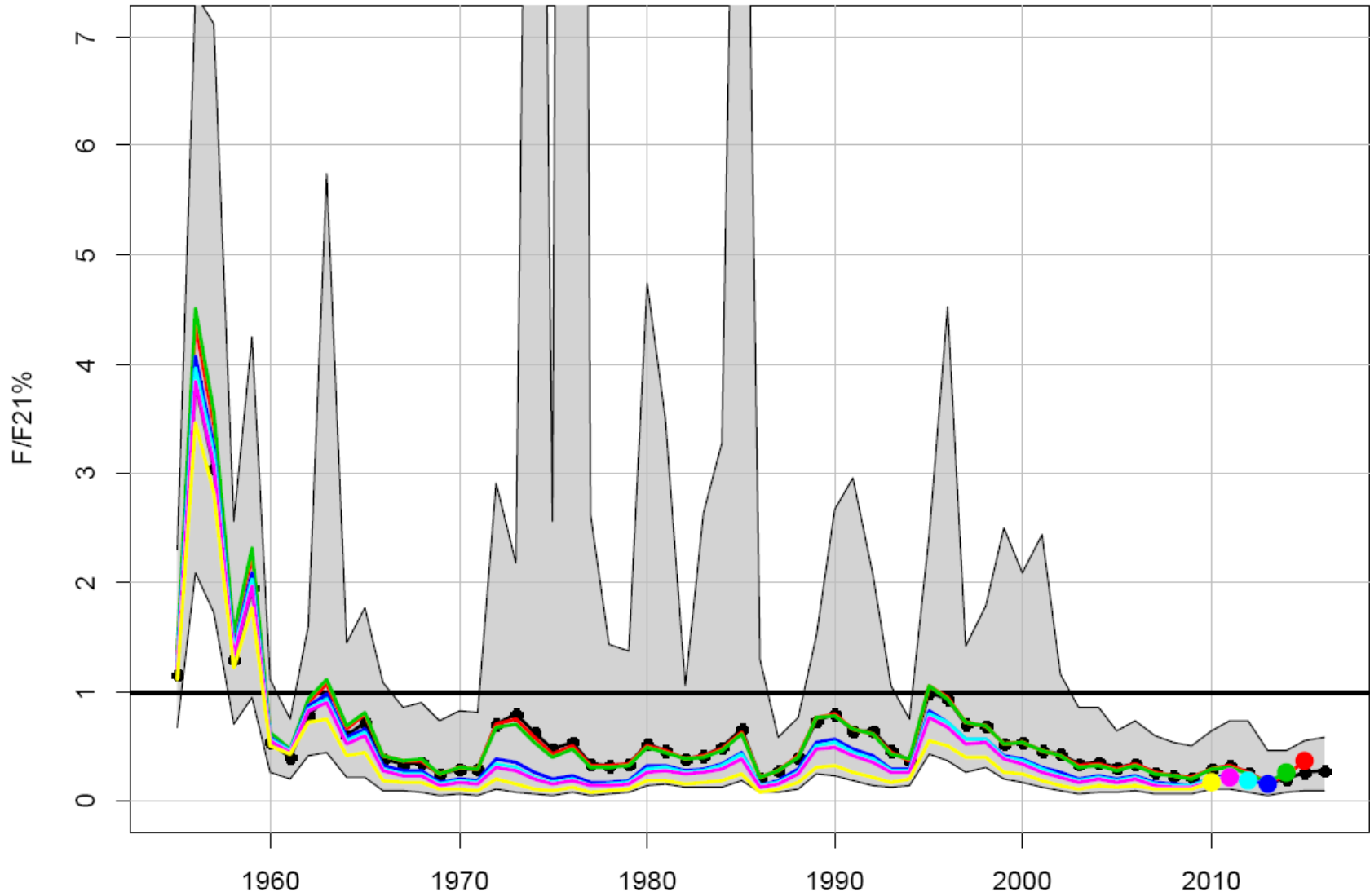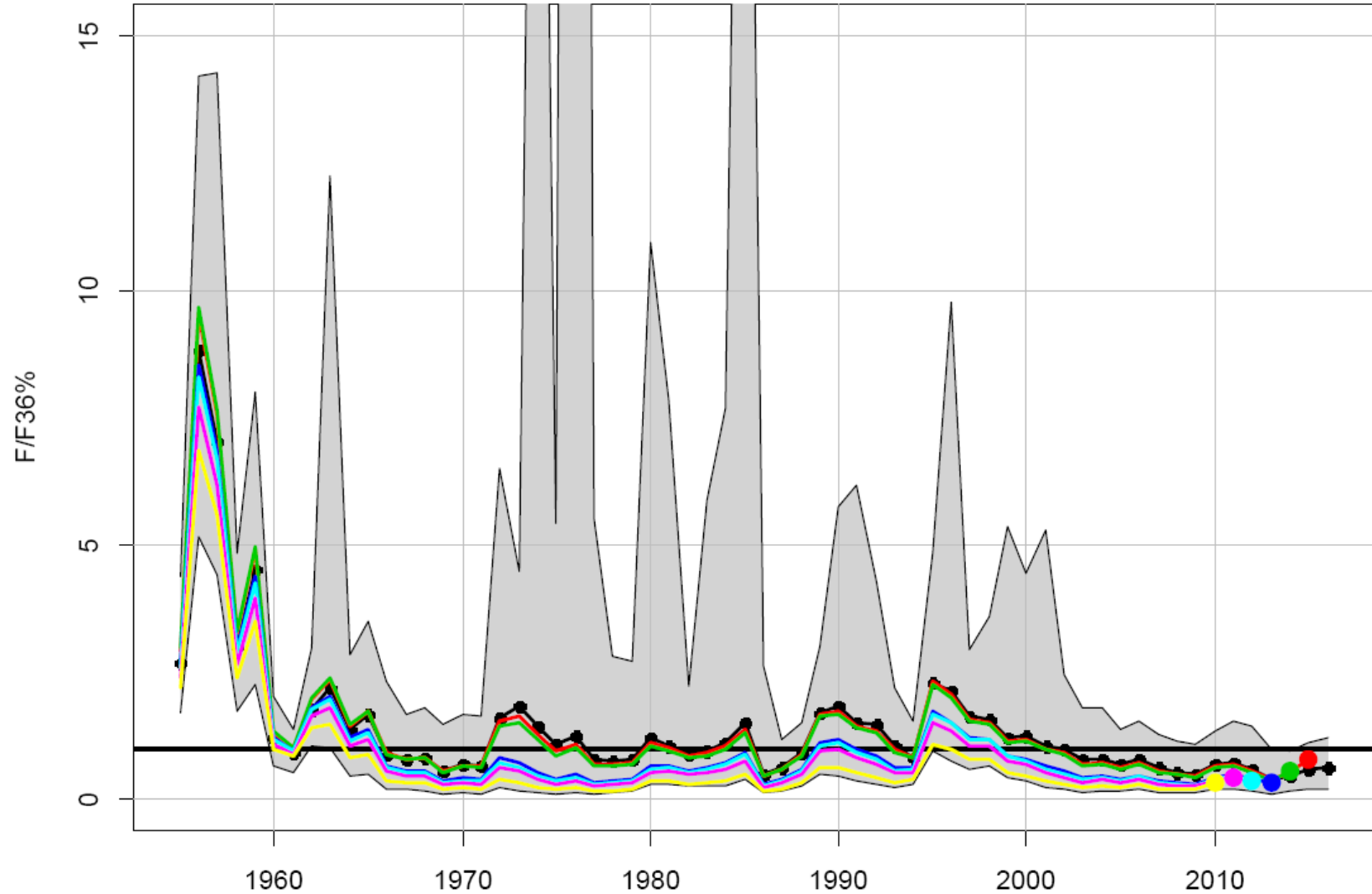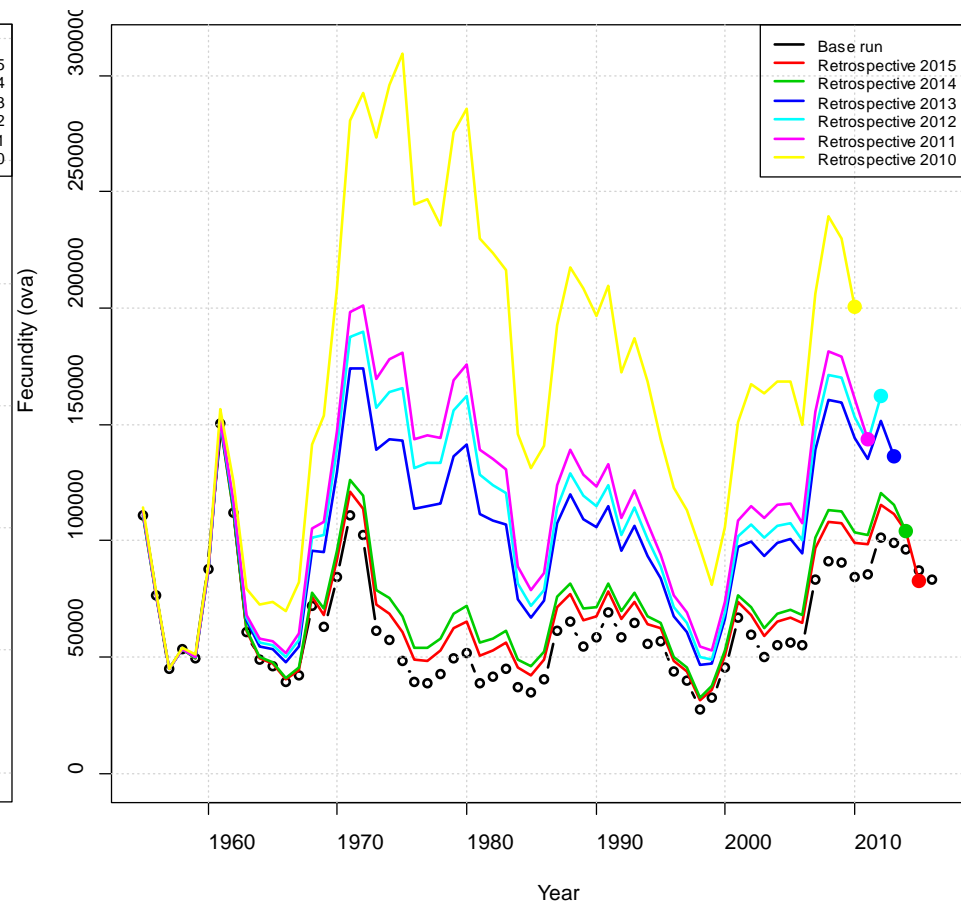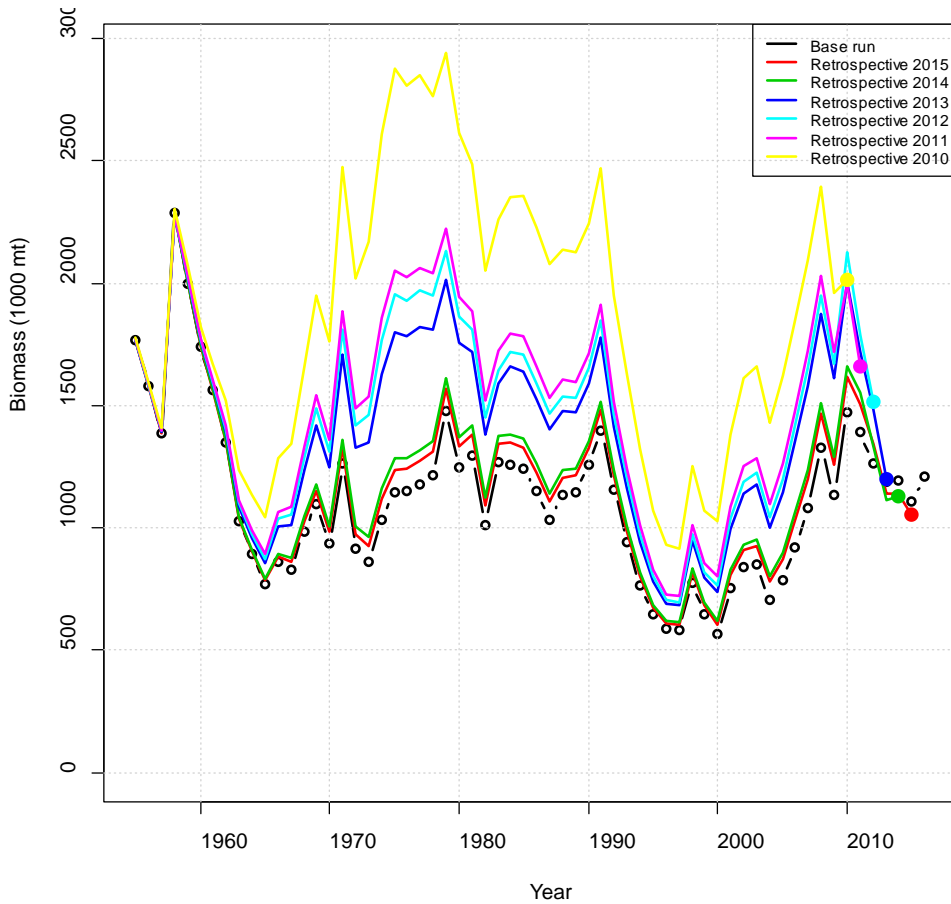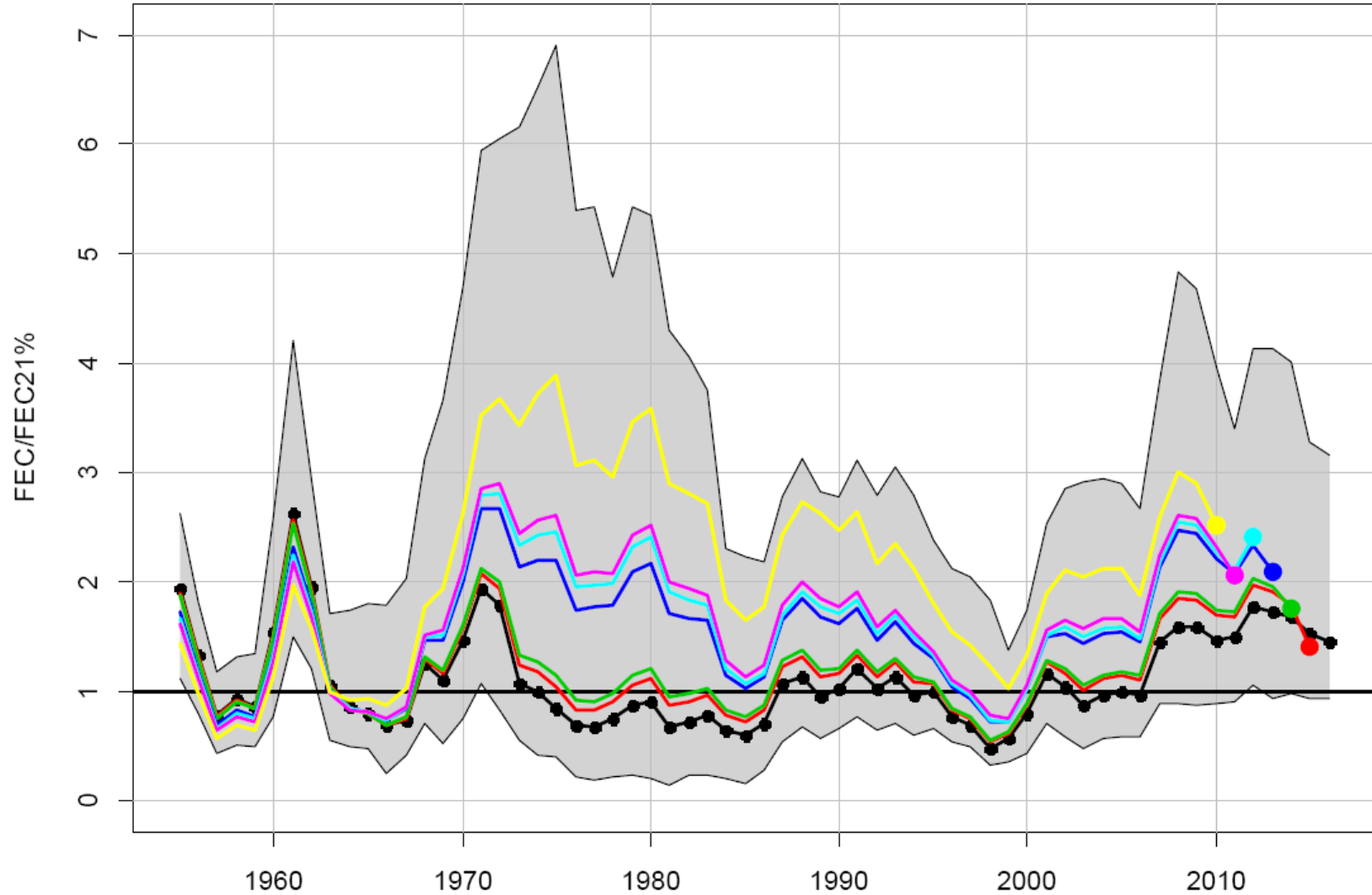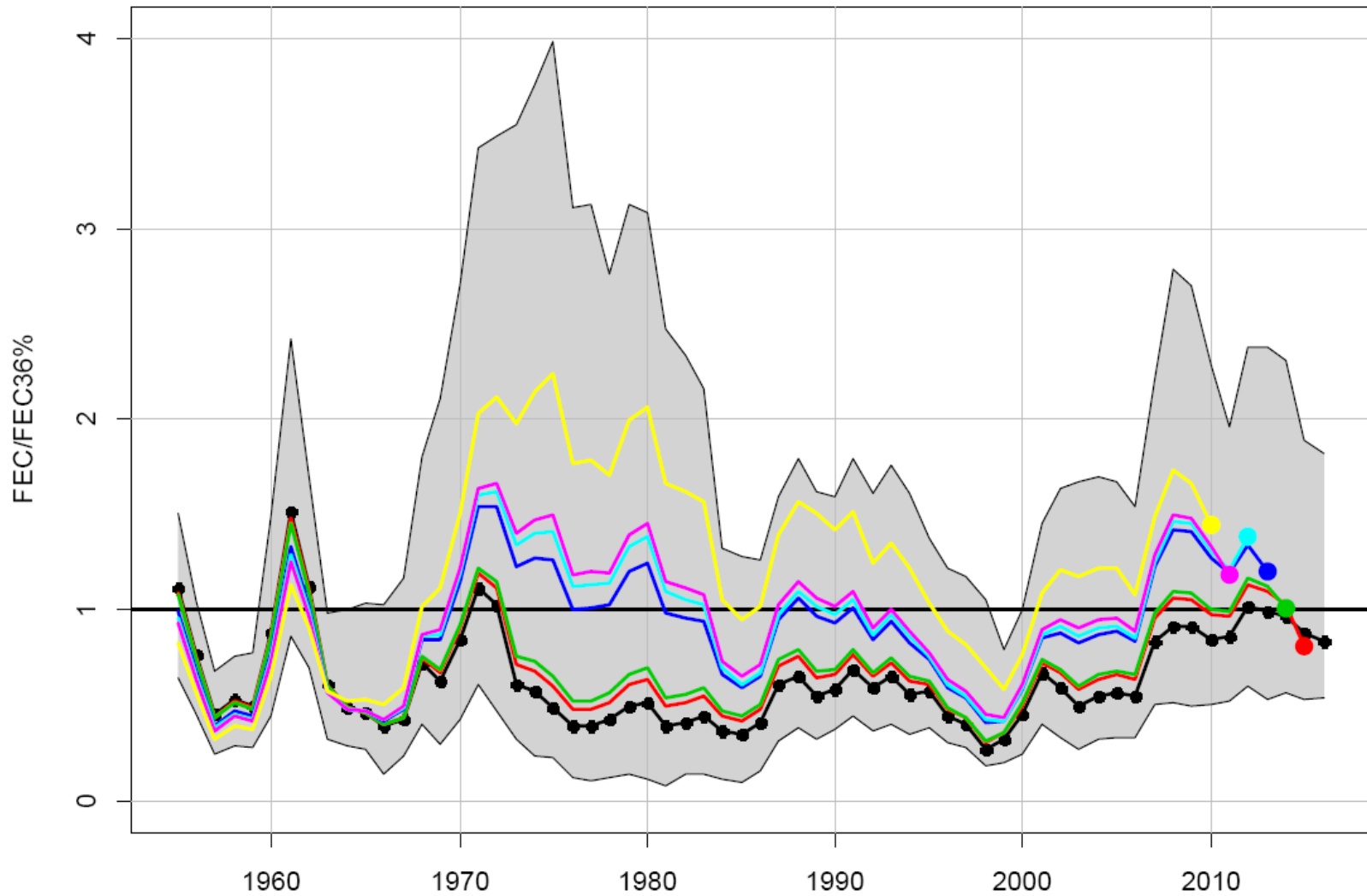
Changes from Last Assessment

- All strategies, data, assumptions were the same between the benchmark and the updated assessment

- Scale and trend differences have occurred between benchmark and update

  - Isolated the cause of the difference to 2014-2016 NAD index

  - SAS recommended allowing scale to estimate independently and to calculate the reference points using the same methods from benchmark

Changes from Last Assessment
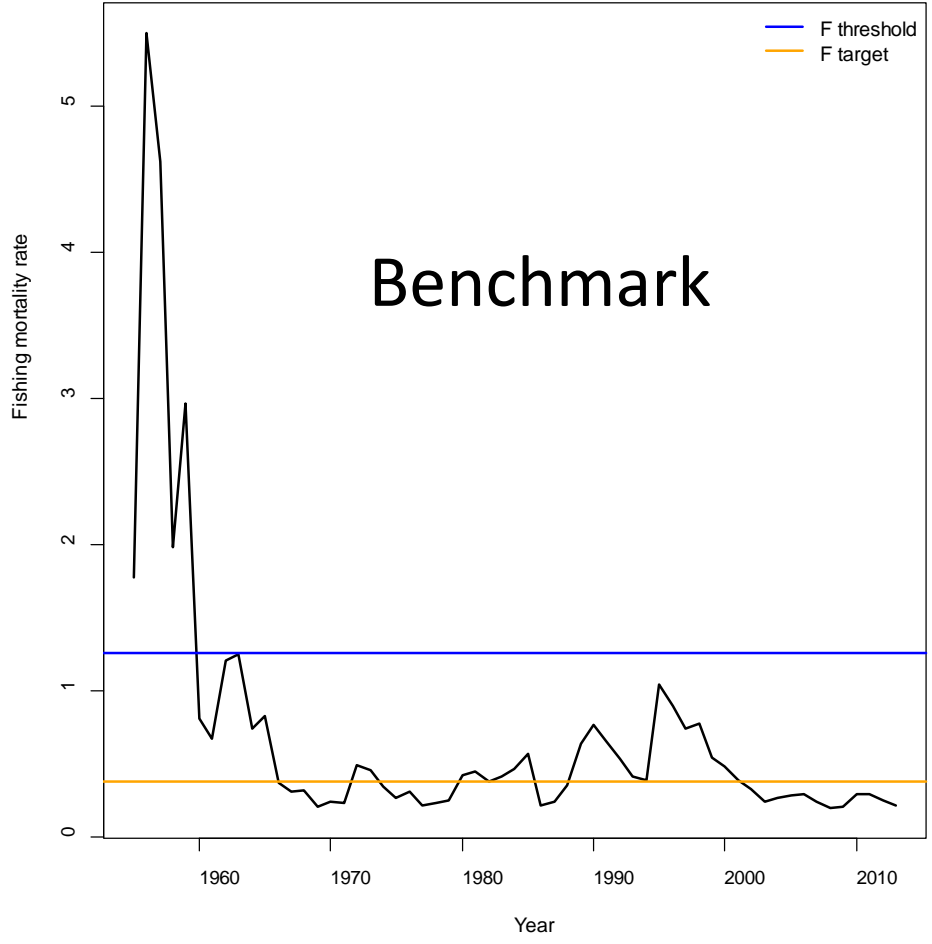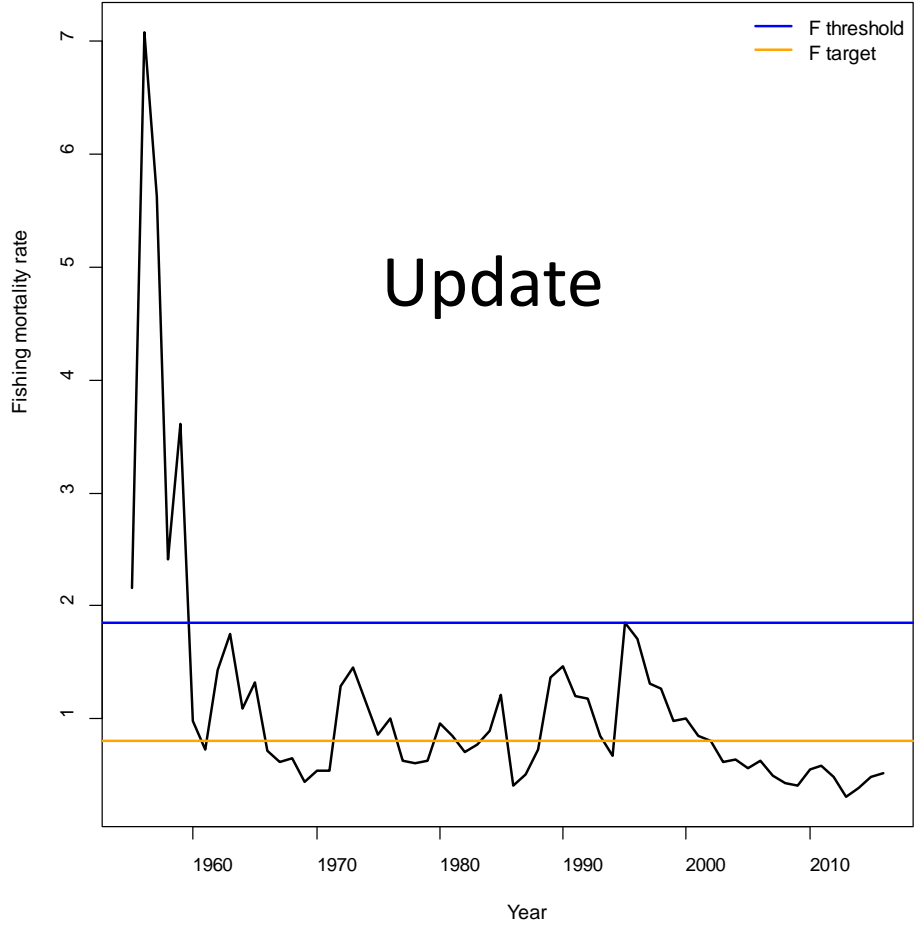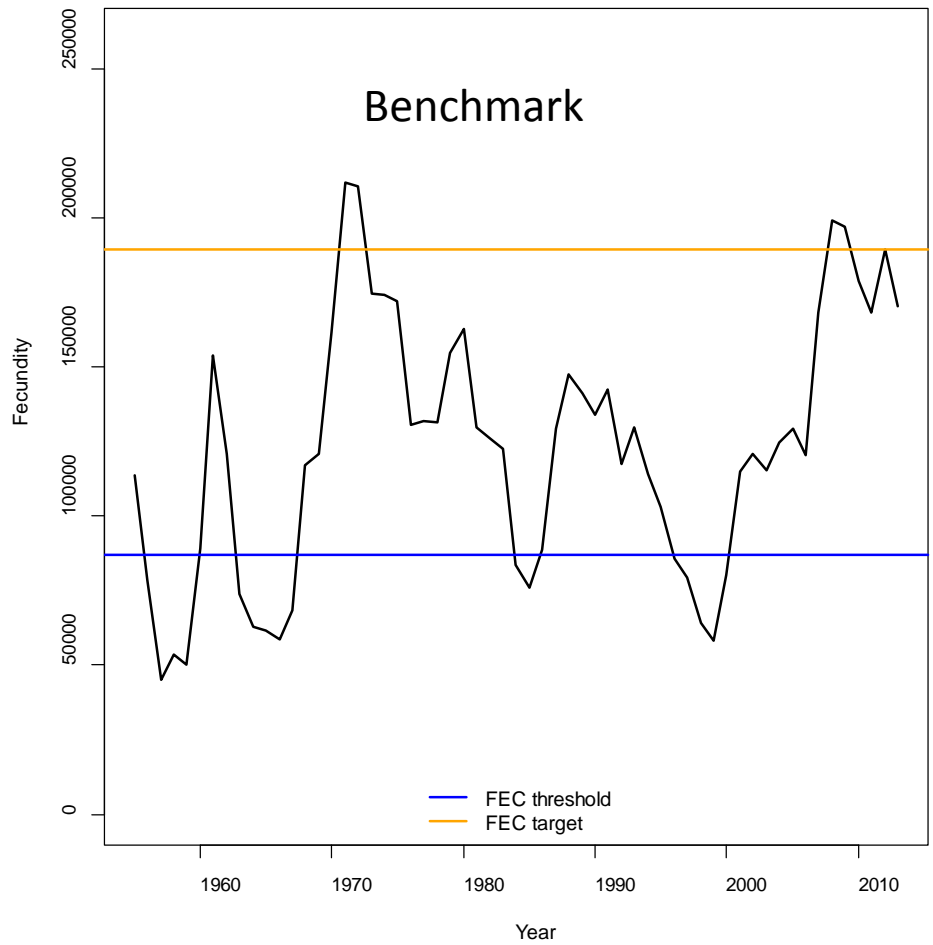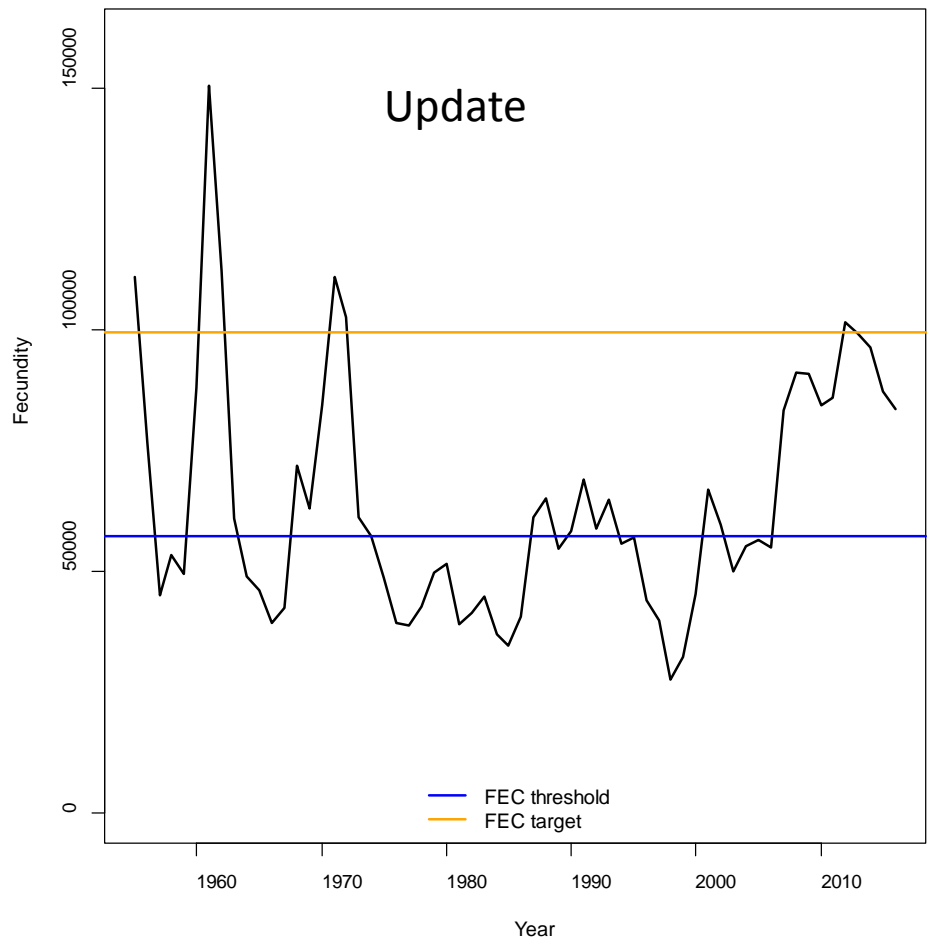
Reference Points

- 2015 benchmark reference points were
  - F57%, F38%
  - FEC57%, and FEC38%

- Updated reference points are
  - F36%, F21%,
  - FEC36%, and FEC21%

- Ref Pts for Update calculated using exact methods from 2015 benchmark assessment

Reference Points

- Why the difference?

- Ref Pts calculated through spawner-per-recruit analysis using mean values of time-varying components (i.e., growth, maturity)

- Overfishing definition based on historical performance calculated as maximum and median geometric mean F rate for ages 2 to 4 during 1960-2012
  - period deemed sustainable

Reference Points

- Because update resulted in higher F values throughout time series, maximum and median F values were estimated higher compared to the 2015 benchmark

- Based on the current Ref Pts, stock status is **not overfished and overfishing is not occurring**

- Additionally, stock currently below F target, but below FEC target

Reference Points
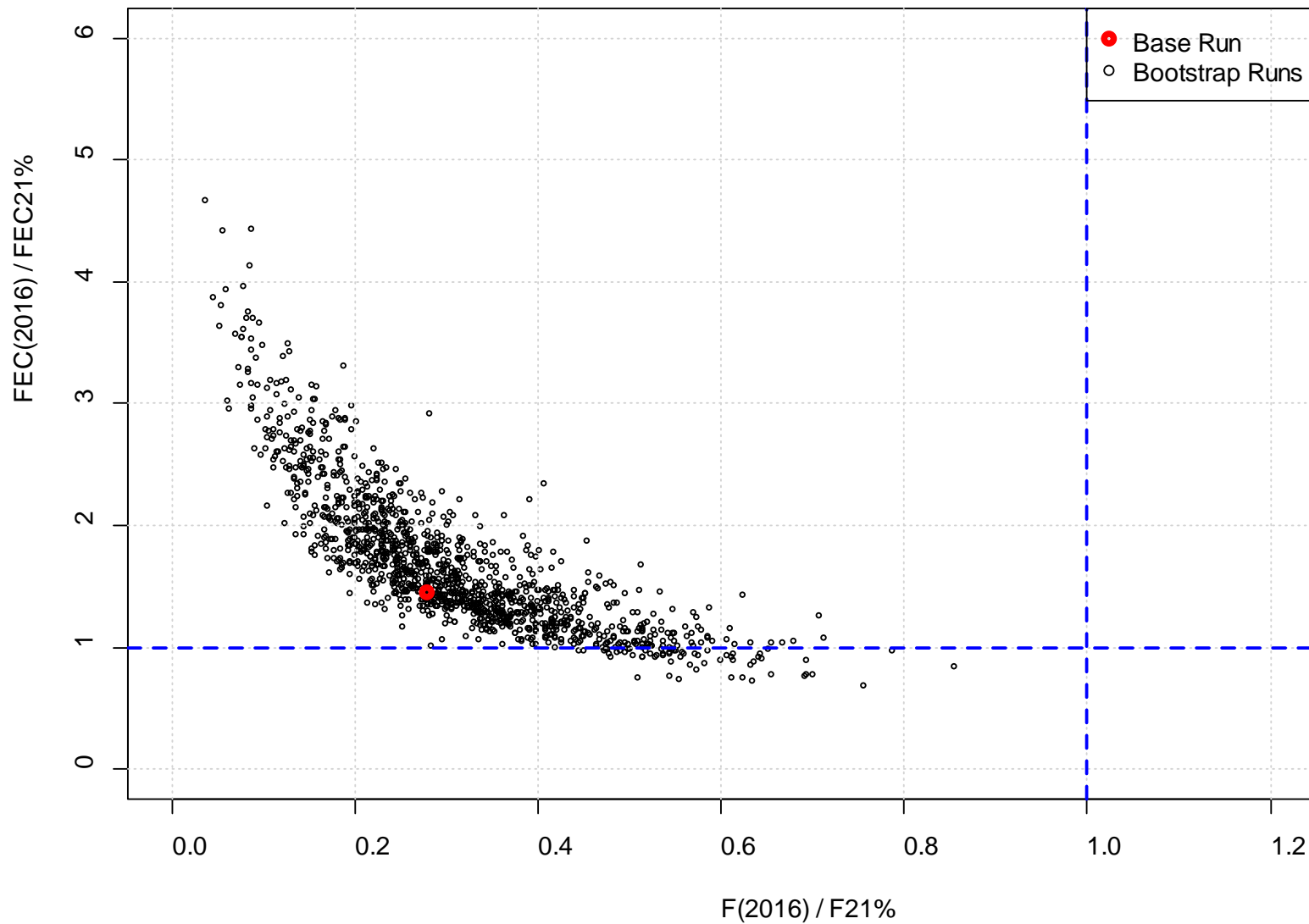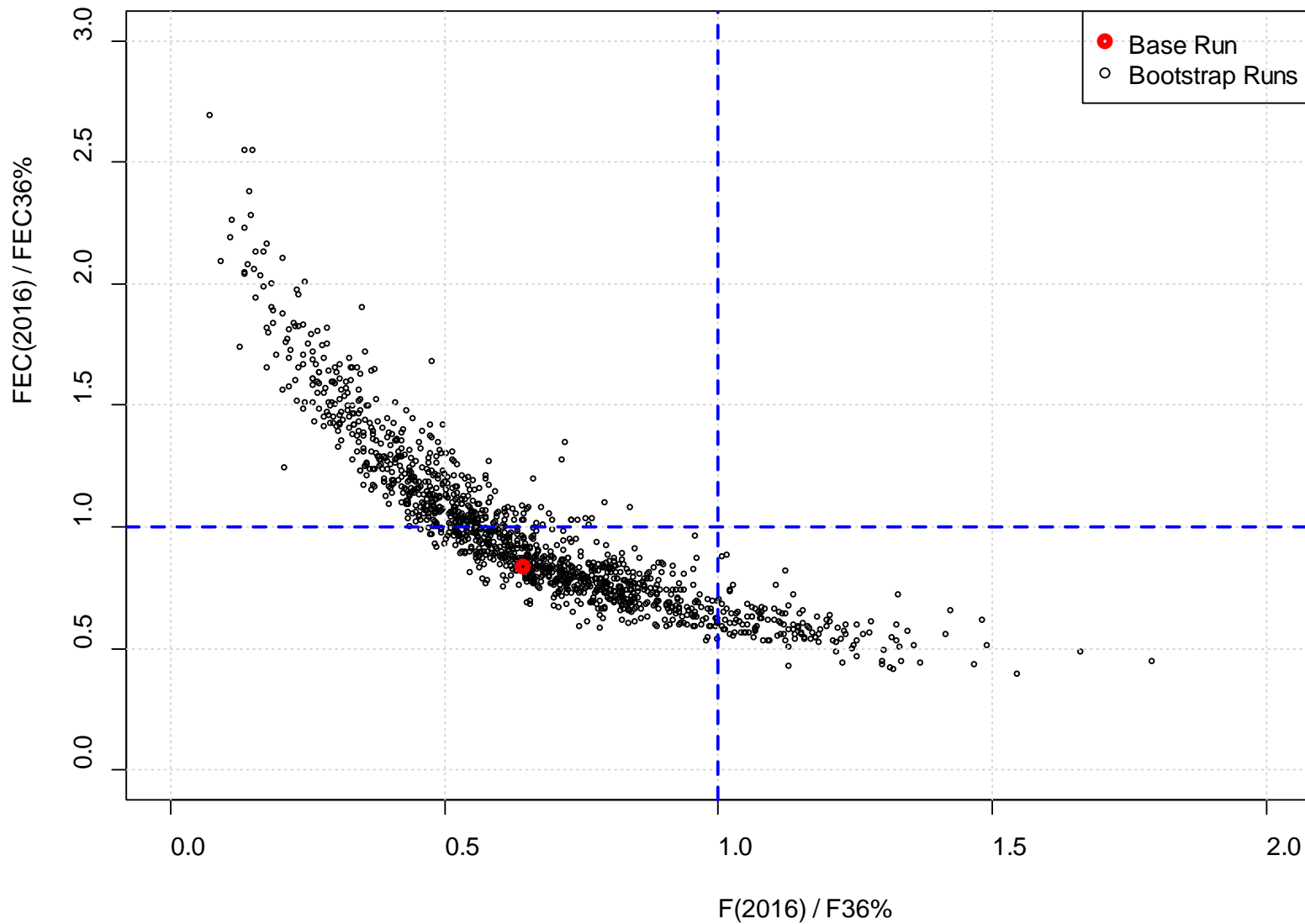
Reference Points

Reference Points

Reference Points	Update Values
$F_{21\%MSP\ (THRESHOLD)} = 1.85$	$F_{48\%MSP}$ (F in 2016) = 0.51
$F_{36\%MSP\ (TARGET)} = 0.80$	
$FEC_{21\%MSP\ (THRESHOLD)} = 57{,}295$ billion eggs	$FEC_{2016} = 83{,}486$ billion eggs
$FEC_{36\%MSP\ (TARGET)} = 99{,}467$ billion eggs	

Summary

- Model continues to perform well, though a change in scale and trend occurred with 3 years of additional data
    - Main driver of change was NAD survey

- Assessment information still useful for management advice

- Based on the current Ref Pts, stock status is **not overfished and overfishing is not occurring**

BERP Workgroup Review of Hilborn et al. 2017

August Meeting Week 2017

Board Task

- BERP review Hilborn et al. 2017
  - *When does fishing forage species affect their predators?*

- WG developed questions to help guide the discussion

- Dr. Hilborn presented conclusions of research

Hilborn et al. 2017 Conclusions

- Modeling needs to be approached on a case-by-case basis

- High natural variability of forage fish populations
  - Adaptation of predators to that variability

- Predators consuming immature fish may not be affected by fishing pressure on their forage species
  - Forage species production heavily influenced by environmental conditions

- Factors that should be incorporated into models
  - Flexible prey preferences, size selectivity by the predators, fishery size selectivity, environmental effects on recruitment strength etc.

- Trophic models often do not incorporate these factors and can overestimate the effect of fishing on forage fish on predators

Recommendations

- Models of Intermediate Complexity for Ecosystem assessments (MICE) recommended
  - Models built to address management questions
- 2015 Atlantic Menhaden Peer Review Workshop Report also recommended "minimum sufficient complexity" models
- WG developing suite of intermediate complexity menhaden-specific models
  - Match recommendations from both

Recommendations

- Hilborn et al. (2017) and Pikitch et al. (2012) agree that specific ecosystem models are preferred

- Pikitch et al. (2012) recommend the use of default generic reference points
  - Negative response in predator populations caused by forage fisheries

- Hilborn et al. (2017) recommend that generic reference points are not applicable
  - Little evidence that forage fisheries affect population growth rate of predators

Recommendations

- The BERP WG did find issues/caveats while translating generalized reference points into single-species equivalents
  - More later!
- Reference points selection dependent on management goals/objectives
  - And ability to test if reference points meet these goals/objectives
- General recommendations of Hilborn et al. 2017 are consistent with previous conclusions of the WG

Questions?

Consider Draft Amendment 3 for Public Comment
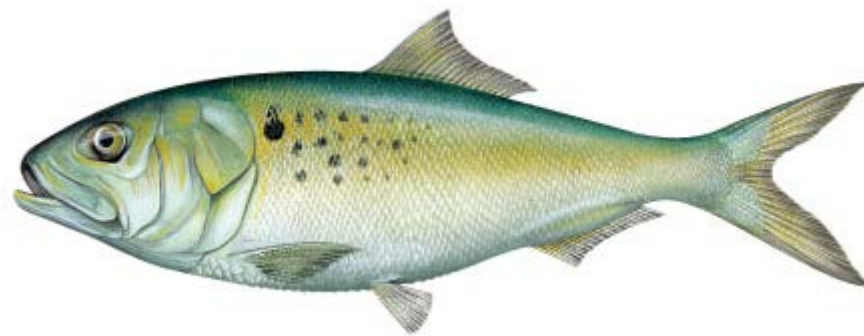
Atlantic Menhaden Management Board

August 2, 2017

Timeline

	Oct 2016	Nov 2016 – Jan 2017	Feb 2017	Mar - July 2017	Aug 2017	Aug – Oct 2017	Nov 14, 2017
Approval of Draft PID by Board	X						
Public Comment on PID		X					
Board review public comment; Board direction on Draft Amendment 3			X				
Preparation of Draft Amendment 3				X			
Consider Draft Amendment 3 for Public Comment					X		
Public Comment on Draft Amendment 3						X	
Select mgmt. alternatives and Board approval of the final Amendment 3							X

Outline

- Interim reference point calculations (K. Drew)

- Management issues & alternatives (M. Ware)

- AP report (J. Kaelin)

- PDT report on NY proposal (M. Ware)

- Board Discussion

INTERIM REFERENCE POINT OPTIONS

Interim BRP Options

- How the reference points were calculated

- Reference point values

- Caveats and concerns

Calculations

- Single species BRPs: age-structured model

- Interim ERPs: ecosystem models, limited size structure

→ How to convert from one model/framework to another?

Calculations

- Single-species reference points
- F target and threshold: Median and maximum geometric mean of F on ages 2-4 for 1960 - 2012
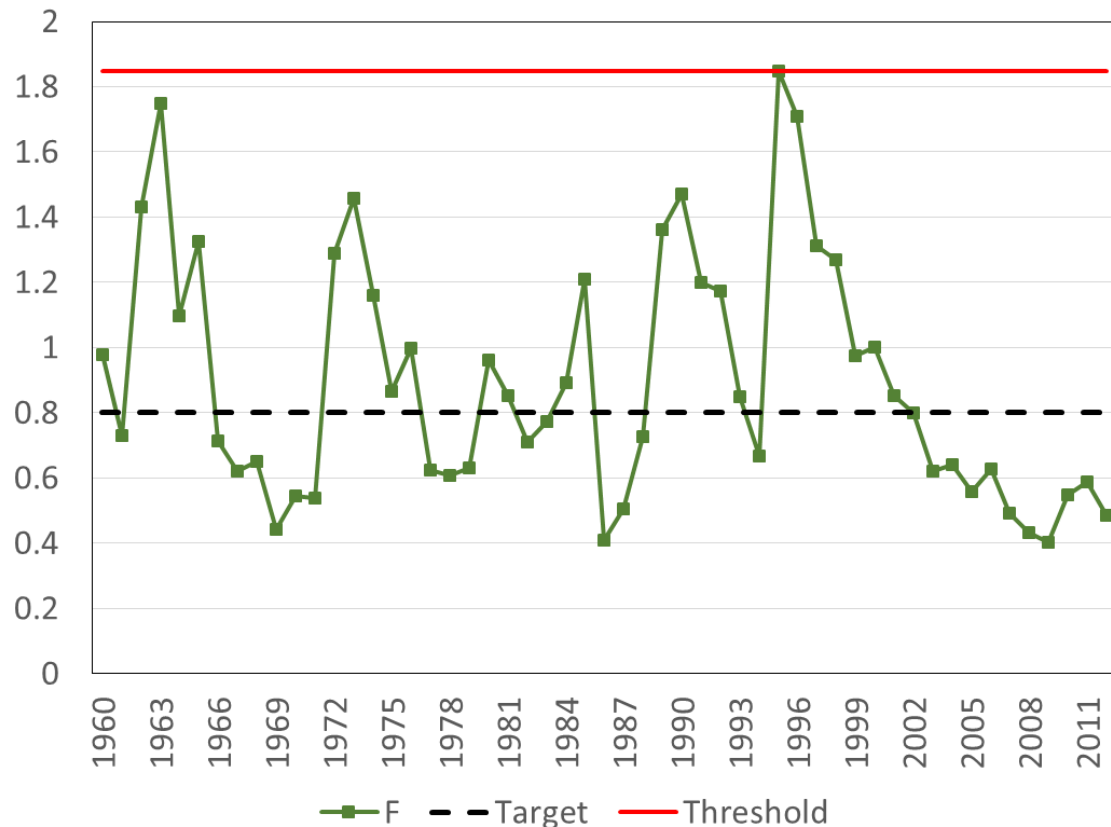
Calculations

- Pikitch et al. 2012 (Option C): Maximum F = 0.5M
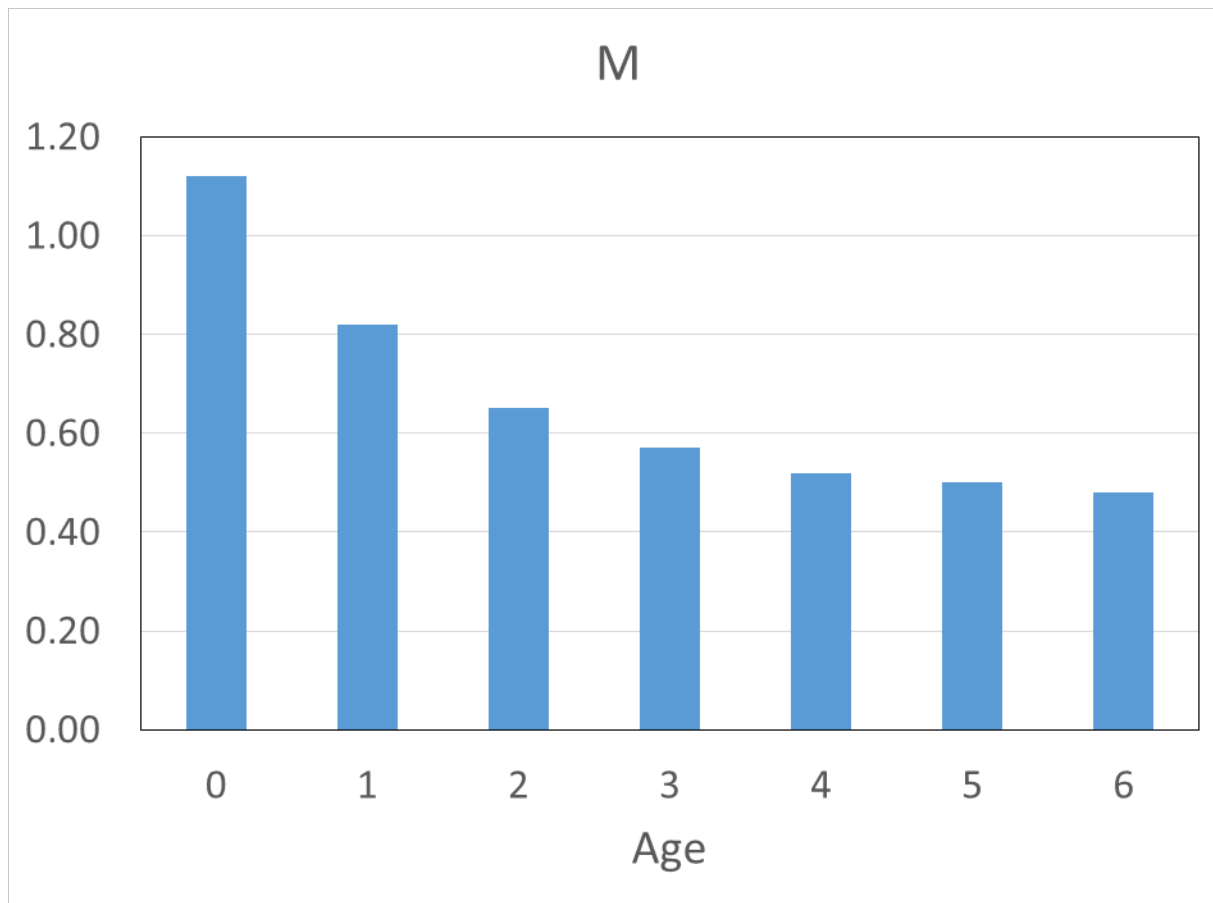
Calculations

- Pikitch et al. 2012: Maximum F = 0.5M

→ Biomass-weighted average M

Calculations

- Pikitch et al. 2012: Hockey stick control rule
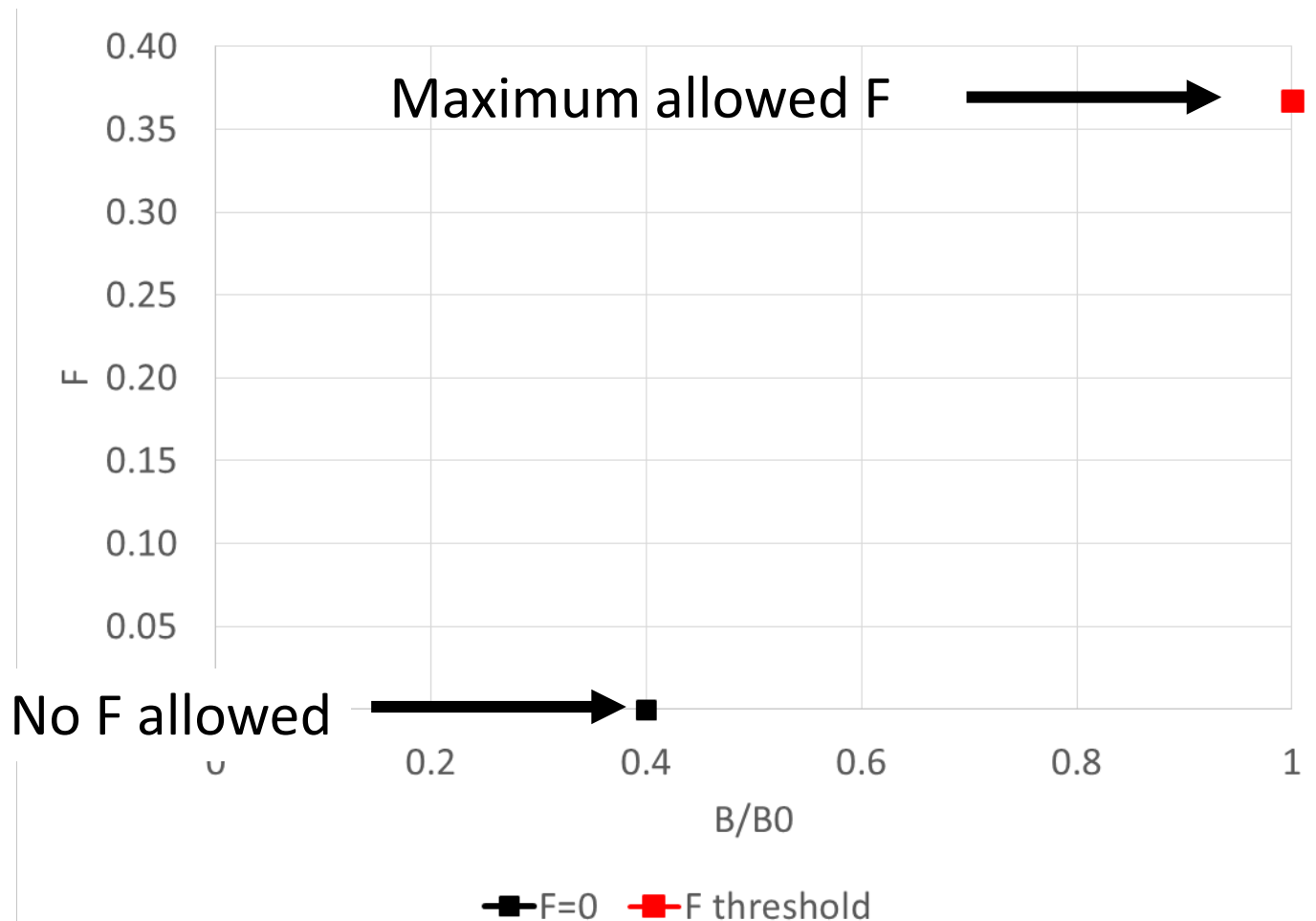
Calculations

- Pikitch et al. 2012: Hockey stick control rule
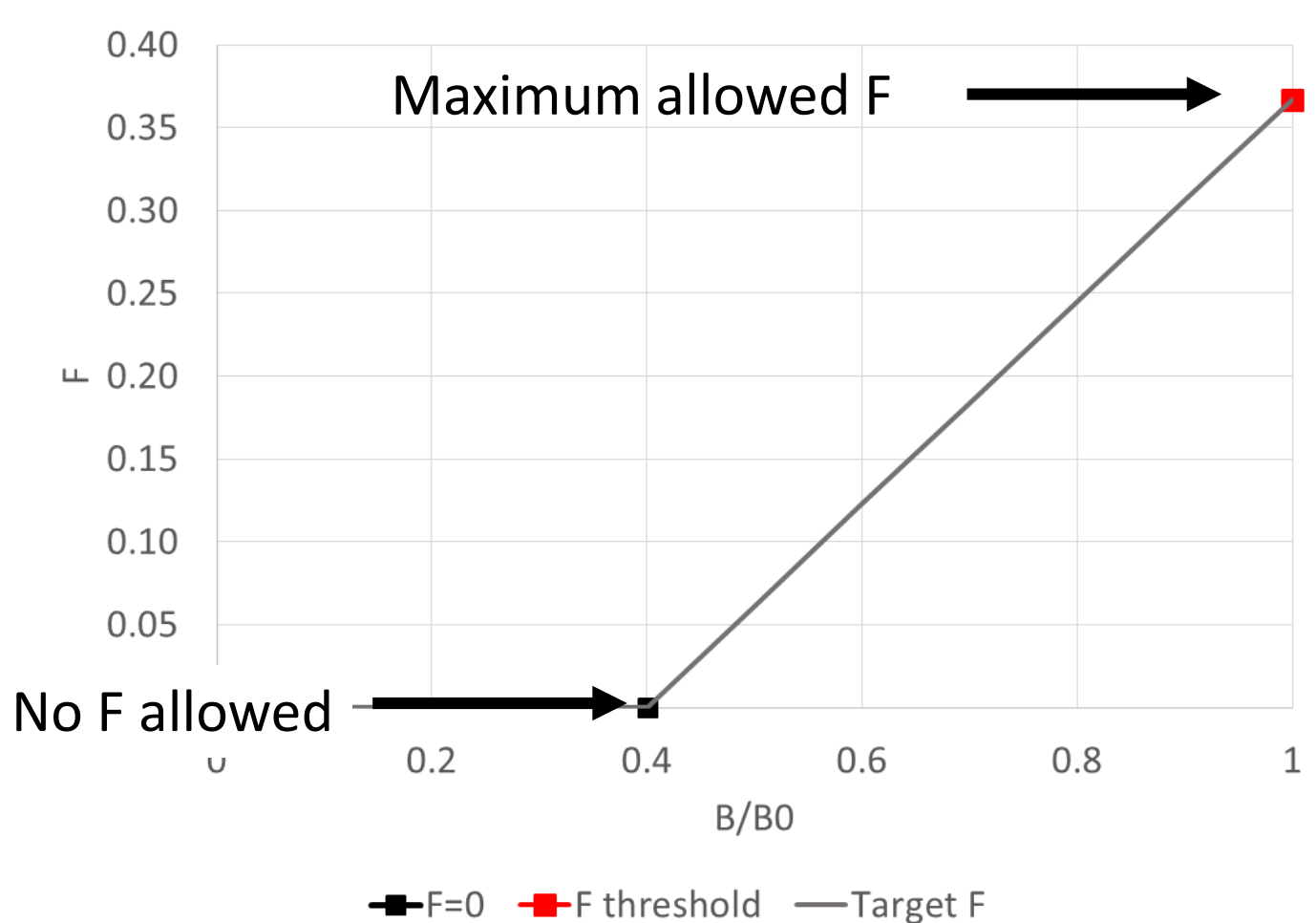
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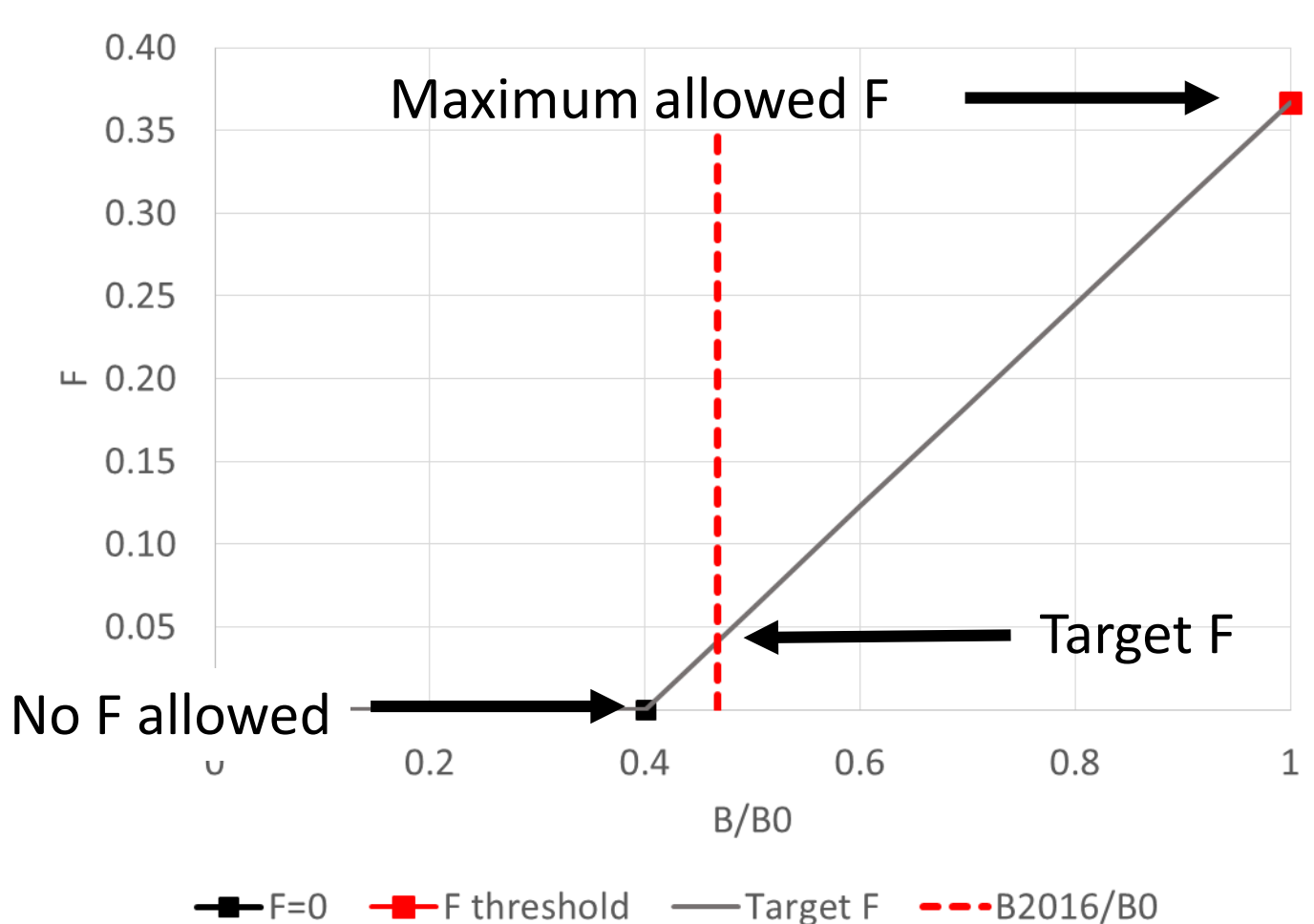
Calculations

- B75% rule of thumb/$F_{B75\%}$ & $F_{B40\%}$ target and threshold (Options D/E)

- Used a per-recruit model to find the levels of F that results in total biomass that is 40% and 75% of unfished biomass

- Same model and inputs used in the assessment to calculate %FEC

Calculations

- All three methods report F on different components of the population
  - Singe species: average F on 3 most heavily exploited ages
  - 75% & 40%B_0 : maximum F experienced by any age
  - 0.5M: average F over the entire population

- Not directly comparable as calculated

Calculations

- Converted all F estimates into biomass-weighted average F over the entire population

$F=F_{75\%B0}$
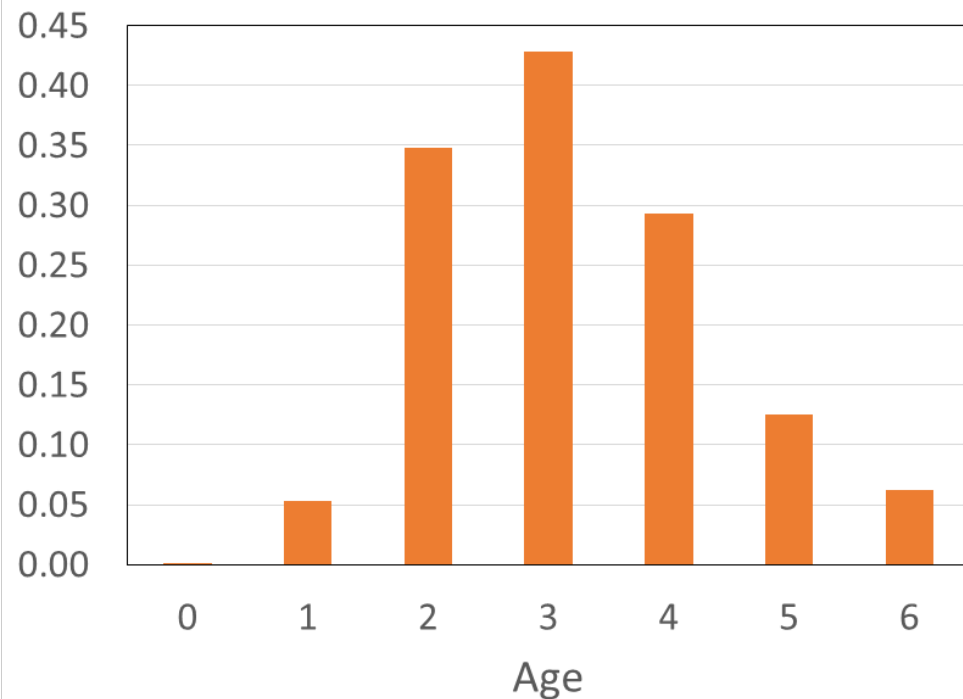
Equilibrium Total Biomass
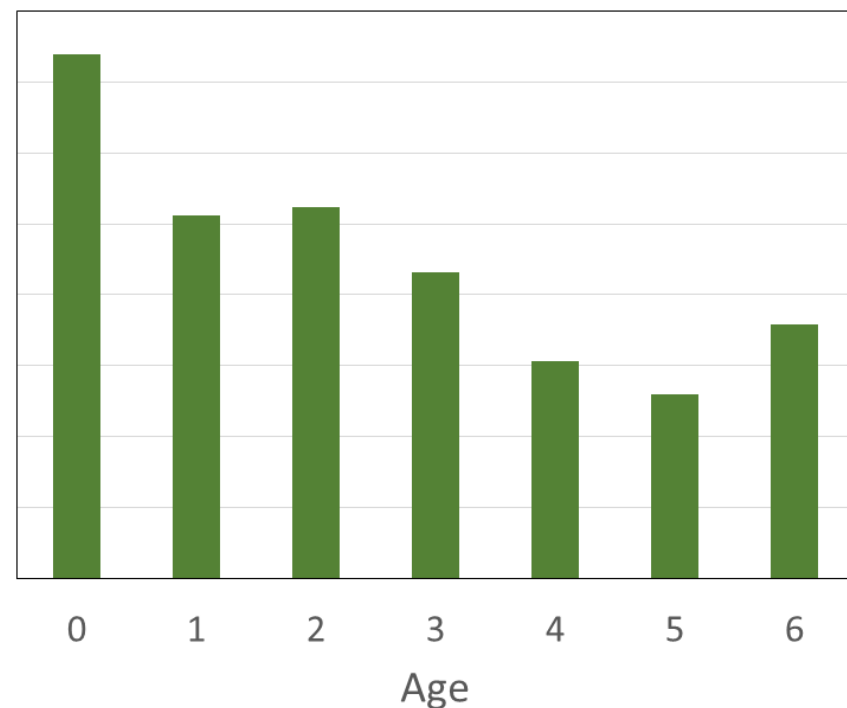
BRP Estimates

Description	Reference Point	B-weighted F
Single species target and threshold from 2017 assessment update (Options A/B)	$F=F_{FEC21\%}$	1.164
	$F=F_{FEC36\%}$	0.408
Hockey-stick harvest control rule Pikitch et al. 2012 (Option C)	$F_{threshold}$ (F=0.5M)	0.367
	F_{target}	0.041
B75% rule of thumb/$F_{B75\%}$ & $F_{B40\%}$ target and threshold (Options D/E)	$F=F75\%B_0$	0.160
	$F=F40\%B_0$	1.493

BRP Estimates

Note that B75% is a threshold under Option D and a target under Option E.

Caveats

- BRPs that focus on conserving total biomass may result in a level of spawning potential well below the FEC limit

Caveats

- Biomass-weighted average F allows comparison across different methods/assumptions, but makes even very high full F values look low

- The ecosystem models used to develop the interim ERPs use fundamentally different assumptions about the behavior of the fisheries and the impacts of fishing on forage fish populations than the BAM assessment model

Draft Amendment 3 Management Alternatives

Questions to Think About

- Is the management alternative beneficial for my state?

- Is the management alterative beneficial for the coastwide management of menhaden?

2.6 Reference Points

Option A: Single Species Reference Points

- Calculated from BAM model
- Reference points based on maximum and median fishing mortality rates for ages 2-4 from 1960-2012
- Development of ERPs would not be pursued

Option B: BERP Continues to Develop Menhaden-Specific ERPs with Interim Use of Single Species Reference Points

- BERP continues to develop menhaden-specific ERPs
- In meantime, use single species reference points described above

Option C: BERP Continues to Develop Menhaden-Specific ERPs with Interim Use of Pikitch et al. Reference Points

- BERP continues to develop menhaden-specific ERPs
- In meantime, use a hockey stick harvest control rule
- F does not exceed 1/2M
- As biomass decreases, fishing rate linearly decreases
- If biomass falls below 40% unfished biomass, fishing is prohibited

(B=B0, F=0.5M)

(B=0.467, F=0.041)

(B=0.4, F=0)
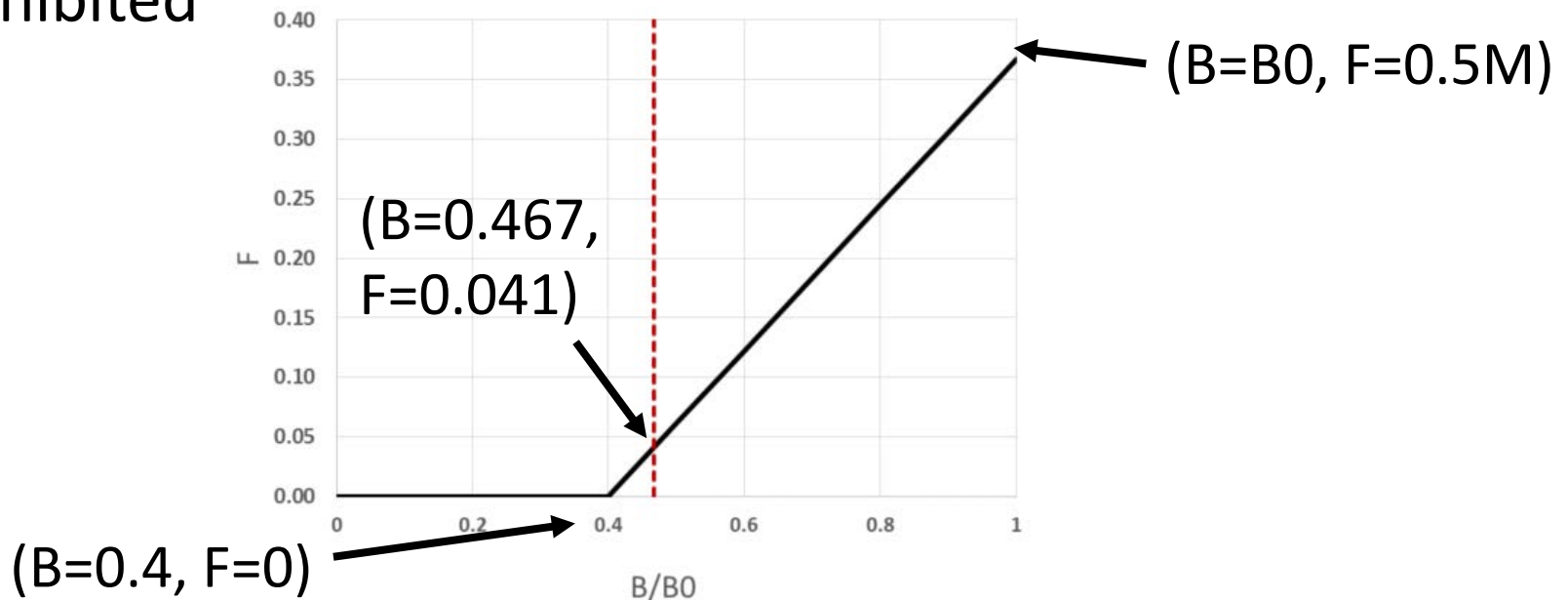
Option D: BERP Continues to Develop Menhaden-Specific ERPs with Interim Use of 75% Rule of Thumb

- BERP continues to develop menhaden-specific ERPs
- In meantime, use fishing mortality rate that achieves 75% unfished biomass

Option E: BERP Continues to Develop Menhaden-Specific ERPs with Interim Use of 75% Target, 40% Threshold

- BERP continues to develop menhaden-specific ERPs
- In meantime, use target fishing mortality rate that achieves 75% unfished biomass and threshold mortality rate that achieves 40% unfished biomass

Reference Point	Fishing Mortality Rule	Resulting Biomass-Weighted F
Single-species reference points (Options A and B)	$F = F_{FEC21\%}$	1.164 (threshold)
	$F = F_{FEC36\%}$	0.408 (target)
Pikitch et al. reference points (Option C)	$F = 0.5M$	0.367 (threshold)
	F at current B/B_0	0.041 (target)
75% rule of thumb (Option D)	$F = F75\%B_0$	0.160
75% target with 40% threshold (Option E)	$F = F40\%B_0$	1.493 (threshold)
	$F = F75\%B_0$	0.160 (target)
Current status	F(2016)	0.204

4.3.1.2 Indecision Clause

Purpose
- Specifies what happens if Board cannot agree on a TAC
- A non-preferred option which encourages the Board to approve a TAC

If Board is unable to approve TAC for subsequent year…
- <u>Option A:</u> TAC will be set as three-fourths of current TAC
- <u>Option B:</u> TAC will remain the same but unused quota from current year cannot be rolled over and quota overages in subsequent year cannot be addressed through quota transfers/reconciliation
- <u>Option C:</u> TAC will remain the same but no episodic events program and no incidental catch provision
- <u>Option D:</u> All provisions of current management plan are maintained, including the TAC

4.3.2 Quota Allocation

1. Dispositional

2. Allocation Based on TAC Level

3. Fleet Capacity

4. Jurisdictional

   -Fixed Minimum Approach

5. Regional

6. Coastwide

Dispositional Allocation

- <u>Sub-Option 1</u>: 30% goes to bait, 70% goes to reduction

- <u>Sub-Option 2</u>: Split based on historic landings

- If bait quota is not further divided, a trip limit of 25,000 pounds will be implemented once 80% of the bait allocation is reached to minimize overages

See Tables 2a-b (pg 53)

	Bait Quota	Reduction Quota
2009-2011	21.2%	78.8%
2012-2016	24.8%	75.2%
1985-2016	13.5%	86.5%
1985-1995	8.3%	91.7%
Weighted	14.1%	85.9%

Allocation Based on TAC Level
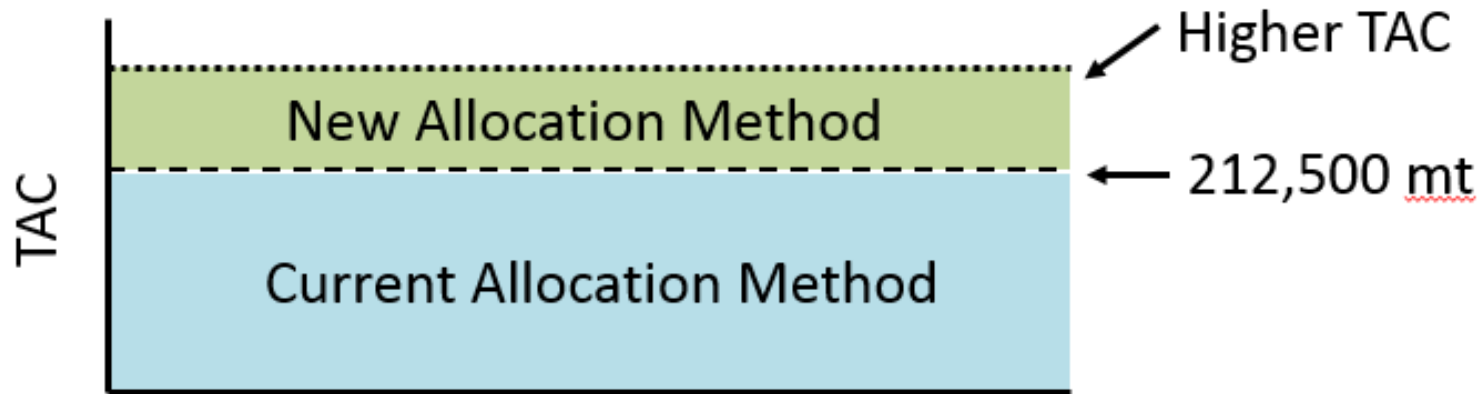
- – Sub-Option 1: If the TAC is greater than 212,500 mt, the difference is allocated such that the reduction fishery gets 50% and the other 50% is distributed to state bait fisheries

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

Allocation Based on TAC Level

See Tables 3 and 4 (pg 54-55):

	2009-2011 TAC %	2012-2016 TAC %	1985-2016 TAC %	1985-1995 TAC %	Weighted TAC %
ME	0.04%	0.45%	0.22%	0.11%	0.32%
NH	0.00%	0.00%	0.01%	0.04%	0.01%
MA	1.99%	1.19%	1.99%	3.54%	2.09%
RI	0.05%	0.30%	2.16%	7.39%	3.02%
CT	0.04%	0.02%	0.10%	0.12%	0.06%
NY	0.17%	0.51%	0.41%	0.57%	0.53%
NJ	26.66%	25.42%	19.17%	12.04%	20.29%
PA	0.00%	0.00%	0.00%	0.00%	0.00%
DE	0.03%	0.06%	0.06%	0.10%	0.08%
MD	3.57%	4.00%	3.60%	3.22%	3.70%
PRFC	1.47%	1.72%	3.66%	7.06%	3.77%
VA	64.76%	65.90%	66.65%	61.53%	64.22%
NC	1.17%	0.31%	1.55%	3.04%	1.36%
SC	0.00%	0.00%	0.00%	0.00%	0.00%
GA	0.00%	0.00%	0.00%	0.00%	0.00%
FL	0.05%	0.12%	0.42%	1.24%	0.55%

Fleet Capacity Quota

- **Sub-Option 1: 2 Fleets (Large, Small)**
  - <u>Sub-Option A:</u> All quotas are hard caps
  - <u>Sub-Option B:</u> Small fleet operates under a soft cap and   there is a 25,000 pound trip limit
- **Sub-Option 2: 3 Fleets (Large, Medium, Small)**
  - <u>Sub-Option A:</u> All quotas are hard caps
  - <u>Sub-Option B</u>: Small fleet operates under a soft cap and there is a 10,000 pound trip limit

Fleet Capacity Quota

What is a soft cap?

- Sets a target quota for the small-scale fleet but does not subject the fleet to a fishery closure
- Gears potentially subject to a soft cap represent less than 6% of total landings
- Advantages:
  - Relieves the administrative burden on states to implement timely quota monitoring
  - Provides flexibility and minimizes discards
  - Minimizes economic impacts to small-scale community fisheries
- Disadvantages:
  - Small-scale fleet could exceed target quota
- Harvest control measures included for a soft cap, such as a trip limit, ability for the Board to reduce the trip limit or remove a gear from a soft cap, and the requirement that states report landings yearly to monitor trends

Fleet Capacity Quota

See Tables 5a-c and 6a-c (pg56-57)

	2009-2011	2012-2016	1985-2016	1985-1995	Weighted
Large Capacity Quota	96.22%	94.18%	96.17%	96.04%	95.37%
Small Capacity Quota	3.78%	5.82%	3.83%	3.96%	4.63%

	2009-2011	2012-2016	1985-2016	1985-1995	Weighted
Large Capacity Quota	96.22%	94.18%	96.17%	96.04%	95.37%
Medium Capacity Quota	3.69%	5.56%	3.70%	3.86%	4.48%
Small Capacity Quota	0.09%	0.26%	0.13%	0.09%	0.15%

Jurisdictional Quota

See Tables 10a-c (pgs 64-65)

	2009-2011 TAC%	2012-2016 TAC%	1985-2016 TAC %	1985-1995 TAC %	Weighted
ME	0.02%	0.22%	0.89%	1.88%	1.28%
NH	0.00%	0.00%	0.00%	0.01%	0.00%
MA	0.84%	0.59%	0.55%	0.62%	0.61%
RI	0.02%	0.15%	0.60%	1.29%	0.88%
CT	0.02%	0.01%	0.03%	0.02%	0.02%
NY	0.07%	0.25%	0.11%	0.10%	0.15%
NJ	11.29%	12.62%	5.31%	2.10%	5.90%
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%	1.00%	0.56%	1.08%
PRFC	0.62%	0.85%	1.01%	1.23%	1.10%
VA	85.08%	83.07%	82.75%	81.82%	82.27%
NC	0.50%	0.16%	7.53%	9.94%	6.40%
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%	0.20%	0.41%	0.28%

Jurisdictional Quota w/ Fixed Minimum

- Quota allocated to states but each state receives minimum percentage of TAC

- On an annual basis, states can choose to forgo their fixed quota or retain 10,000 lbs for bycatch; relinquished quota is redistributed to the states

  - Sub-Option 1: 0.5% fixed minimum quota
  - Sub-Option 2: 1% fixed minimum quota
  - Sub-Option 3: 2% fixed minimum quota

Jurisdictional Quota w/ Fixed Minimum

See Tables 7a-c, 8a-c, and 9a-c (pgs 58-63)

	2009-2011 TAC %	2012-2016 TAC %	1985-2016 TAC %	1985-1995 TAC %	Weighted
ME	0.52%	0.70%	1.32%	2.23%	1.68%
NH	0.50%	0.50%	0.50%	0.51%	0.50%
MA	1.28%	1.04%	1.01%	1.07%	1.06%
RI	0.52%	0.64%	1.05%	1.69%	1.31%
CT	0.52%	0.51%	0.53%	0.52%	0.52%
NY	0.57%	0.73%	0.60%	0.59%	0.64%
NJ	10.89%	12.11%	5.38%	2.44%	5.93%
PA	0.50%	0.50%	0.50%	0.50%	0.50%
DE	0.51%	0.53%	0.52%	0.52%	0.52%
MD	1.89%	2.33%	1.42%	1.02%	1.49%
PRFC	1.07%	1.29%	1.43%	1.63%	1.51%
VA	78.77%	76.92%	76.63%	75.77%	76.19%
NC	0.96%	0.64%	7.43%	9.64%	6.39%
SC	0.50%	0.50%	0.50%	0.50%	0.50%
GA	0.50%	0.50%	0.50%	0.50%	0.50%
FL	0.52%	0.55%	0.69%	0.88%	0.76%

Regional Quota

- Sub-Option 1: Three regions (ME-CT, NY-DE, MD-FL)

- Sub-Option 2: Four regions (ME-CT, NY-DE, MD-VA, NC-FL)

See Tables 11a-e and 12a-c (pgs 66-69)

	2009-2011 TAC %	2012-2016 TAC %	1985-2016 TAC %	1985-1995 TAC %	Weighted
ME, NH, MA, RI, CT	0.90%	0.97%	2.07%	3.82%	2.79%
NY, NJ, PA, DE	11.38%	12.90%	5.44%	2.22%	6.08%
MD, PRFC, VA, NC, SC, GA, FL	87.73%	86.12%	92.49%	93.96%	91.13%

	2009-2011 TAC %	2012-2016 TAC %	1985-2016 TAC %	1985-1995 TAC %	Weighted
ME, NH, MA, RI, CT	0.90%	0.97%	2.07%	3.82%	2.79%
NY, NJ, PA, DE	11.38%	12.90%	5.44%	2.22%	6.08%
MD, PRFC, VA	87.21%	85.91%	84.76%	83.61%	84.44%
NC, SC, GA, FL	0.52%	0.21%	7.74%	10.35%	6.69%

4.3.2 Quota Allocation

Tier 1	Tier 2
• Dispositional • Allocation based on TAC level • None of the above	• Fleet capacity • Fixed minimum • None of the above
Tier 3 • Coastwide • Jurisdictional • Regional	**Tier 4** • 2009-2011 • 2012-2016 • 1985-2016 • 1985-1995 • Weighted

4.3.2 Quota Allocation

Tier 1	Tier 2
• Dispositional • Allocation based on TAC level • None of the above	• Fleet capacity • Fixed minimum • None of the above

Tier 3	Tier 4
• Coastwide • Jurisdictional • Regional	• 2009-2011 • 2012-2016 • 1985-2016 • 1985-1995 • Weighted

4.3.2 Quota Allocation

Tier 1	Tier 2
• Dispositional • Allocation based on TAC level • None of the above	• Fleet capacity • Fixed minimum • None of the above
Tier 3 • Coastwide • Jurisdictional • Regional	**Tier 4** • 2009-2011 • 2012-2016 • 1985-2016 • 1985-1995 • Weighted

Tier 4 – Allocation Timeframes

- **Option A: 2009-2011**
- **Option B: 2012-2016**
- **Option C: 1985-2016**
  - Sub-Option A: VA reduction landings only
  - Sub-Option B: All reduction landings
- **Option D: 1985-1995**
  - Sub-Option A: VA reduction landings only
  - Sub-Option B: All reduction landings
- **Option E: Weighted Allocation**
  - Sub-Option A: VA reduction landings only
  - Sub-Option B: All reduction landings

4.3.3 Quota Transfers

*Only for regional or state-based quotas

Option A: Quota Transfers Permitted

- Two or more states, under mutual agreement, 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

- Intent is to streamline the quota transfer process
- If TAC is not exceeded, quota overages automatically forgiven
- If TAC is exceeded, unused quota is pooled and equally distributed to states/regions with an overage. Any remaining overage deducted from subsequent year
- Quota rollovers are not permitted under quota reconciliation

Option D: Quota Reconciliation w/ Accountability Measures

- Intent is to dissuade states from habitually exceeding quota
- If the TAC is not exceeded, a % of the quota overage is forgiven
  – The % forgiven depends on # of previous years of overage
- If TAC is exceeded, unused quota is pooled and equally distributed to states/regions with an overage.
  – The % accepted by a state/region depends on # of previous years of overage.
- Quota rollovers are not permitted under quota reconciliation

# of Consecutive Years of Overage	% of Overage Forgiven
0	100%
1	75%
2	50%
3 or more	0%

4.3.4 Quota Rollovers

- Rollovers permitted if stock is not overfished and overfishing is not occurring
- Unused quota is rolled over on July 1st
  - Landings submitted on April 1st are often preliminary
  - Landings typically finalized by July 1st
  - Minimize changes to the amount of quota that can be rolled over and administrative burden of program

Option A: No Quota Rollovers

Option B: 100% Unused Quota Rollover

Option C: 10% Total Quota Rollover

Option D: 5% Total Quota Rollover

Option E: 50% Unused Quota Rollover

4.3.5 Incidental Catch

Small Scale Gears	Non-Directed Gears	Stationary Multi-Species Gears (SMSG)
Cast nets/bait nets Traps/pots Haul seines Fyke nets Hook-n-line/hand line Bag nets/hoop nets Trammel nets	Pound nets Anchored gillnets Drift gillnet Trawl Fishing weir Fyke nets Floating fish trap	Pound nets Anchored/staked gillnet Fishing weirs Floating fish traps Fyke nets

4.3.5 Incidental Catch

In Below Options, Incidental Catch Not Included in TAC

Option A: Trip Limit for Non-Directed Gears

- 6,000 pound trip limit; 12,000 lbs for two indv. on SMSG

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

- 6,000 pound trip limit; 12,000 lbs for two indv. on SMSG

Option C: Catch Cap and Trigger

- Cap set at 2% of TAC (not a set aside)

- Action triggered to reduce incidental catch if exceed cap by more than 10% in a single year or two years in a row

- 6,000 pound trip limit; 12,000 lbs for two indv. on SMSG

4.3.5 Incidental Catch

In Below Options, Incidental Catch <u>Is</u> Included in TAC

Option D: Incidental Fishery Set Aside

- 2% of TAC set aside for incidental catch after quota met
- For small-scale and non-directed gears
- 6,000 pound trip limit; 12,000 lbs for two indv. on SMSG
- Landings reported through compliance reports

Option E: Small Scale Fishery Set Aside

- 1% of TAC set aside for small scale gears to harvest from throughout the year
- No trip limit now, but can be implemented through Adaptive Mgmt.
- Landings reported through compliance reports

Option F: All Catch Included in TAC

- Once the directed quota is met, the fishery closes

4.3.6 Episodic Events

- Eligibility for ME-NY

- Same mandatory provisions as current program
    - Harvest restricted to state waters
    - 120,000 trip limit
    - Daily trip level reporting

Option A: 1% of TAC is Set Aside

Option B: 3% of TAC is Set Aside

Option C: 0% of TAC is Set Aside

4.3.7 Ches. Bay Cap

- **Option A:** Cap Set at 87,216 mt

  Sub-Option A: Maximum rollover of 10,976 mt of unused Cap

  Sub-Option B: No rollover

- **Option B:** Cap Set at 51,000 mt (5-year average)

  Sub-Option A: Maximum rollover of 6,418 mt of unused Cap

  Sub-Option B: No rollover

- **Option C:** Remove Cap

How can we create a successful document for public comment?

AP Report

Reference Points

- AP recommended stock projections be developed for interim reference point options to be able to understand how they translate to a TAC

- AP recommended methods used by BERP Workgroup to calculate interim reference points be provided

  → BERP memo on interim ref points calculations was included in Briefing Materials

TAC and Allocation Methods

- AP supported wider options for indecision clause; recommended Option D be added which continues mgmt. plan from previous year, including the TAC

  → PDT added Option D to document

- One AP member asked for further clarification on Option C in the indecision clause, specifically how episodic set aside is handled

  → PDT provided clarifying language

- One AP member commented that the fleet capacity option may create a race to fish

Other Commercial Mgmt. Measures

- One AP member asked the language describing quota reconciliation be clarified

  →PDT clarified language in the document

- One AP member recommended a greater variety of options be added for the set aside programs (episodic events, small-scale fishery, incidental catch) including 0.5%, 1%, 1.5%, 2%, 2.5%, 3%, etc.

- One AP member recommended that the redistribution of quota from various program occur on the same date

- Two AP members asked that a research set aside program be established in Draft Amd. 3, with options that allow for up to 3% of the TAC to be set aside

- One AP member recommended the fishing year start on May 1st, rather than January 1st, so that redistributed quota from the previous year can be used in the early spring

NY Proposal to Recalibrate Landings

NY Landings Recalibration

- NY submitted proposal to re-calibrate landings due to inconsistent or non-existent reporting

- Compare landings and number of trips from 2013-2016 to 2009-2012 to scale historic landings

- Options to scale landings range from 2.9 to 4.62 depending on whether landings or number of trips are used as scaling factor

PDT Report

- PDT feels methods used by NY to recalibrate landings are appropriate
  - Higher comfort level using landings, rather than number of trips, to scale landings
- PDT notes that an increase in menhaden abundance in NY waters may contribute to higher landings reported in 2013-2016
- Under the current timeline, there is no time to review proposals from other states which seek to recalibrate their landings
- Assumptions must be made about how recalibrated landings are divided by gear type since this information is not provided

Questions for Board

1. Does the Board want to keep all three fixed minimum options: 0.5%, 1%, 2%?
2. Does the Board want to keep both fleet-capacity options: two fleet, three fleet?
3. Does the Board want to keep both regional allocation methods: three region, four region?
4. Does the Board want to include all historic reduction landings in the allocation percentages, or just those of VA?
5. Does the Board want to accept NY's proposal to re-calibrate their landings given insufficient reporting prior to Amendment 2?
6. Are there any other management alternatives the Board would like to remove, edit, or add?

Fixed Minimum Allocation

- Mgmt. alternative under which each jurisdiction has the ability, to some degree, to participate in the menhaden fishery

- 2% fixed min option provides greatest minimum level of quota
  - Results in growth opportunities for many states
  - However, 8.8 million pounds is well in excess of what some states have landed annually
  - Significant allocation reductions for NJ and VA

- 0.5% and 1% provides more moderate amount of quota
  - Still provides growth opportunities for many states
  - Smaller impacts to NJ and VA

- Staff recommends 2% fixed min option is removed

Fleet Capacity Options

- Mgmt. alternative secures quota for various gear types
- Three-fleet option separates small-capacity gears (i.e. cast nets, hand lines) from medium-capacity gears (i.e. pound nets, gill nets)
  - Limits flexibility for medium-capacity gears since they are not subject to a soft cap
  - Maintains administrative burden on states to implement timely quota monitoring (for ~5.5% of total landings)
- Two fleet option combines small-capacity and medium-capacity gears into a single fleet
  - A simpler management alternative which still ensures gears have access to quota
  - Reduce administrative burden on states for timely quota monitoring
- Staff recommends the three-fleet option be removed

Regional Allocation Method

- Four-region approach separates the Ches. Bay states from the South Atlantic states
  - Ches. Bay and S. Atlantic differ in terms of timing of fishery and gears used
  - Due to confidentiality, limited in what can be shown when four region approach is combined with the fleet capacity approach
  - More percentages can be shown for the three region approach
- Under both regional options, there are large swings in allocation depending on the timeframe chosen
  - This may hinder the ability of the Board to identify a viable, coastwide option
- Staff recommends regional options only be used in combination with another allocation method

Reduction Landings

- Sub-options which ask whether all historic reduction landings should be included, or just those of VA
  - Including all historic reduction landings accurately reflects fishery in each state but it can increase some state's allocations to levels above recent landings
  - Including only VA reduction landings may provide a more accurate reflection of recent fishery performance but it may limit future growth opportunities in some states
- Due to confidentiality rules, there are limitations on the bait/reduction allocation percentages that can be shown when only VA reduction landings are included
  - Primarily impacts older and longer timeframes
  - However, these older, longer timeframes reduce bait allocations and may not meet goals and objectives of Amendment 3

New York Proposal

- PDT feels methods used by NY to recalibrate landings are appropriate
  - Higher comfort level using landings, rather than number of trips, to scale landings
- PDT notes that an increase in menhaden abundance in NY waters, as opposed to solely an increase in reporting, may explain higher landings reported in 2013-2016
- Assumptions must be made about how recalibrated landings are divided by gear type since this information is not provided
- Under the current timeline, there is no time to review proposals from other states which seek to recalibrate their landings

Other Comments/Edits

Does the Board have any other comments or edits on Draft Amendment 3?

- Reference points
- Indecision clause
- Allocation method
- Allocation timeframe
- Quota transfers
- Quota rollovers
- Incidental catch and small scale fisheries
- Episodic events
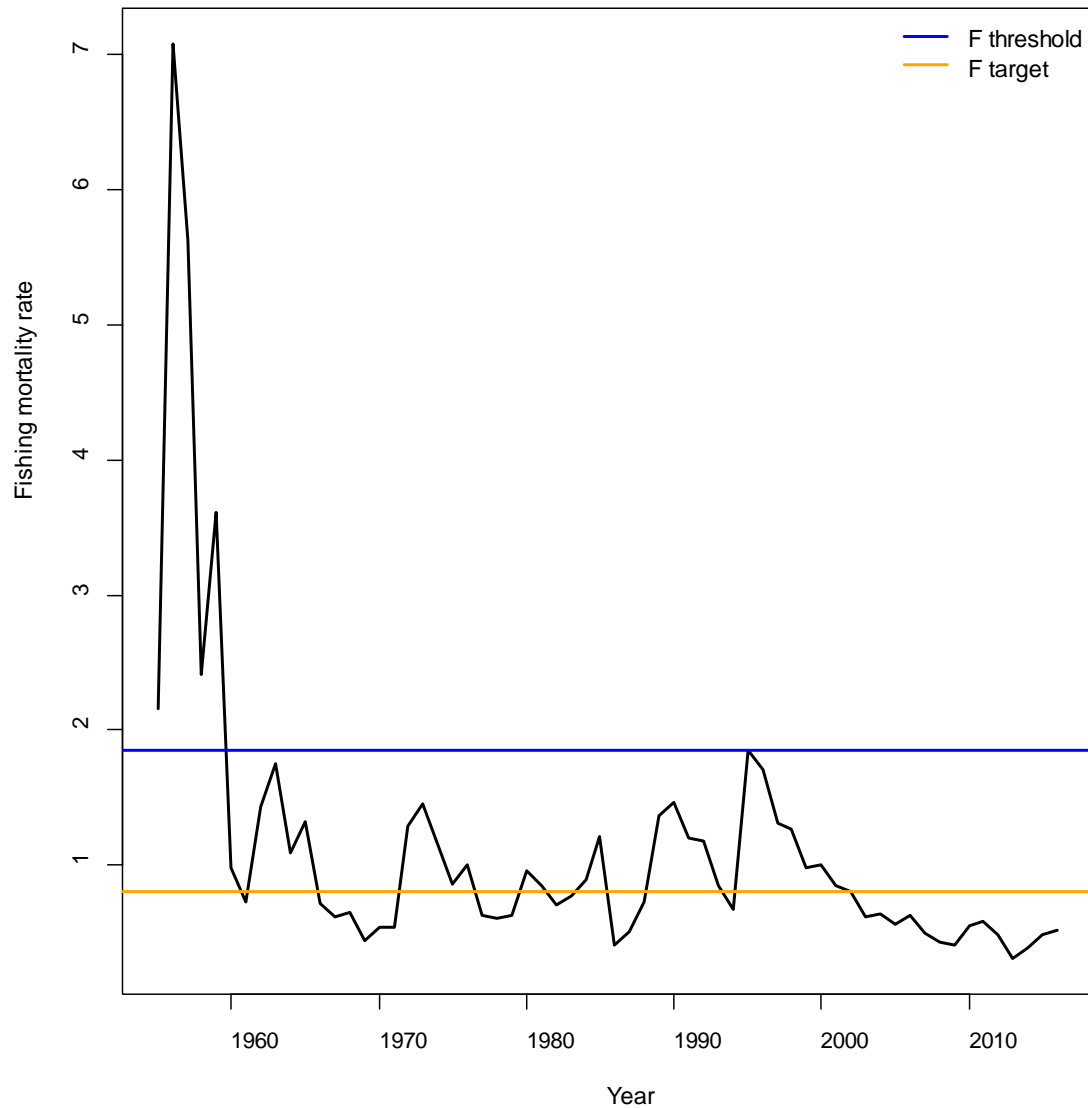- Chesapeake Bay reduction fishery cap
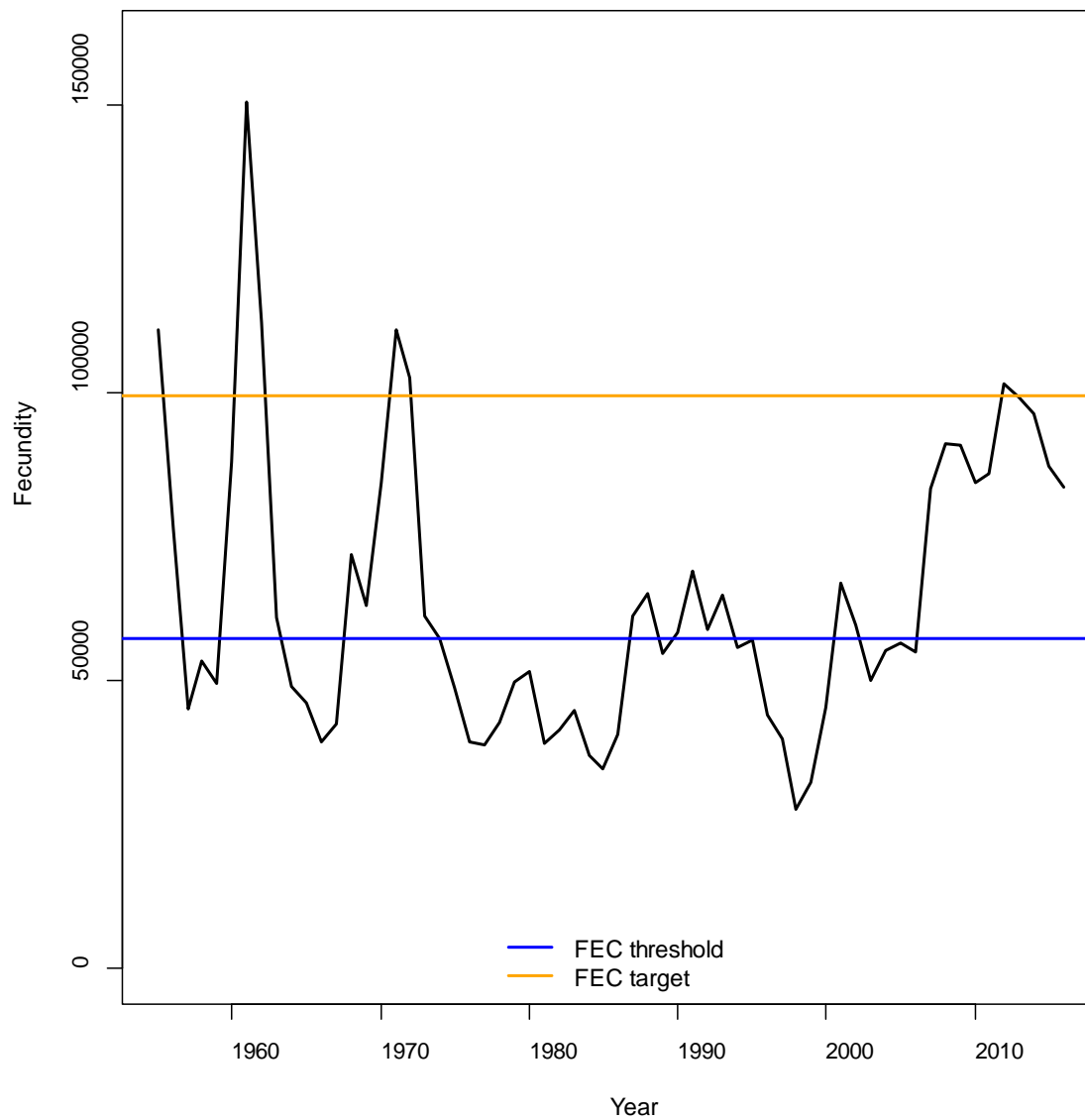
Projection Methods

- Monte Carlo bootstrap runs of 2017 update of the Beaufort Assessment Model (BAM) used as the basis for projections

- 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

- 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

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

- 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

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

Key To Graphs
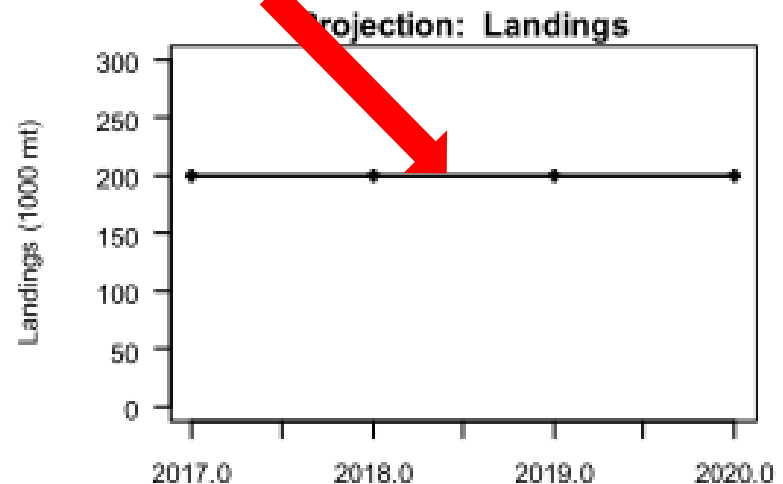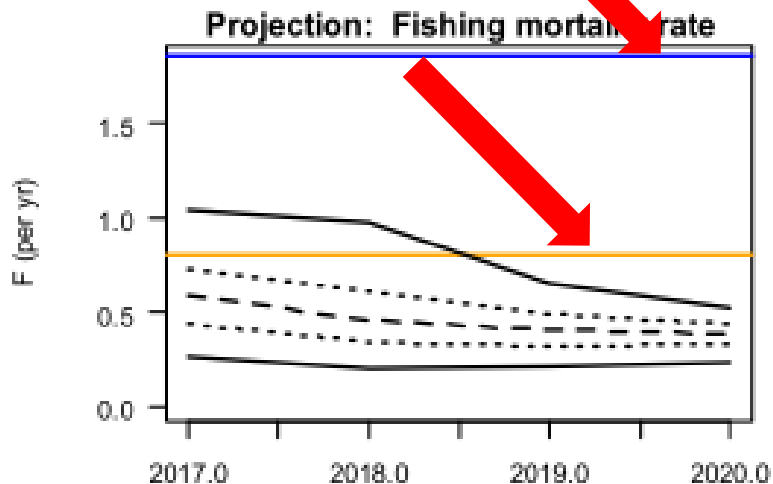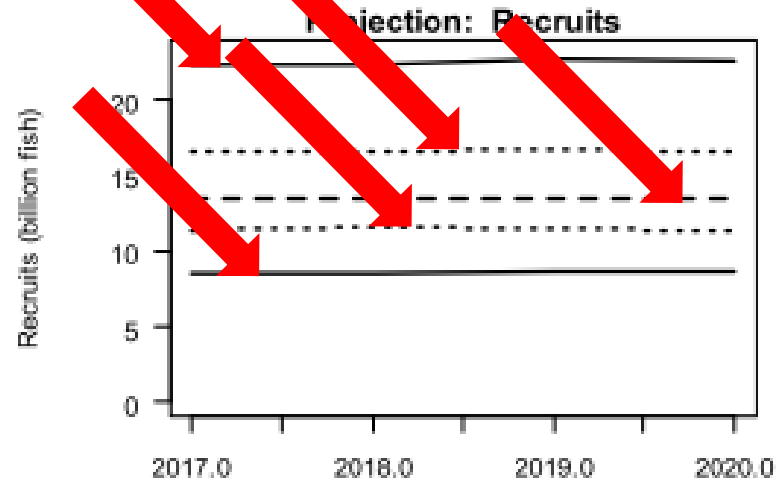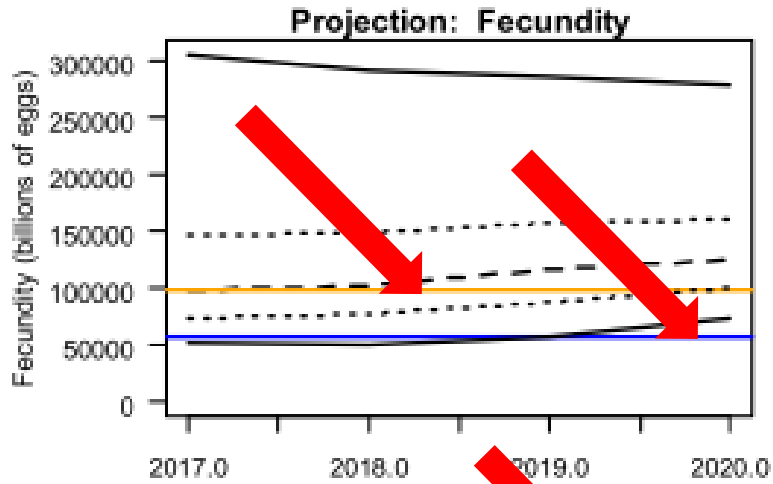
Projections Performed

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%

Projections Performed

Projection Run	TAC	Risk of exceeding $F_{threshold}$		
		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%

Projections Performed

Projection Run	TAC	Risk of exceeding F_{target}	Risk of exceeding $F_{threshold}$
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%

AP Comments on 2018 TAC

- AP met via conference call on June 26th to provide recommendations on the 2018 fishery specification

- AP members in attendance included commercial harvesters, recreational anglers, and conservation coalition members

- AP was not unanimous in its recommendation to the Board

AP Comments on 2018 TAC

- 6 AP members did not support any increase in the TAC
  - Board should wait to increase the TAC until menhaden fully expand to their former range, particularly in the Gulf of Maine
  - Given the potential to change reference points under Amendment 3, the Board should maintain status quo
  - Highlight importance of considering ERPs given menhaden's ecological role as forage fish

- 4 AP members recommended an increase in the TAC
  - One AP member recommended the TAC be increased to 240,000mt; noted that at 314,500mt there is only a 50% risk of exceeding the F_{target} which is conservative from a federal council perspective
  - One AP member recommended the TAC be increased to 288,500mt as there is minimal risk of exceeding $F_{threshold}$
  - One AP member commented the TAC should be, at a minimum, 212,500mt which is status quo landings from 2009-2011
  - One AP member commented that the projections, which are based on robust estimates of natural mortality, indicate minimal risk of exceeding ref points
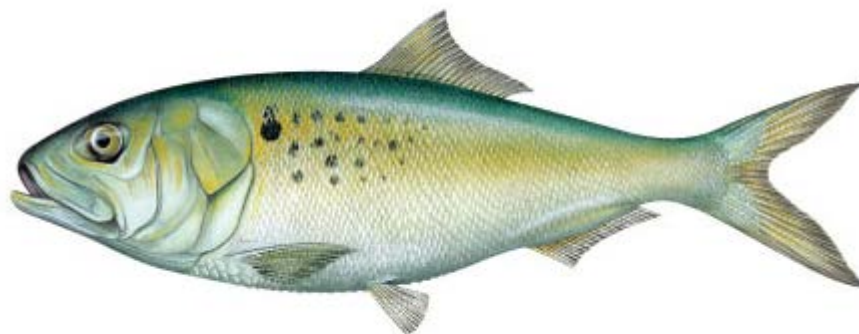
Projections

Questions?

Episodic Events Set Aside

August 2, 2017

Atlantic Menhaden Management Board

Episodic Events

- Episodic events fishery closed July 5th

- At the time, ME, RI, and NY were actively harvesting under the set aside

- Landings indicate a 283,889 pound overage

- Given all of the set aside was used, there will be no distribution of unused set aside on November 1st

2017 Episodic Events Quota	4,409,245 lbs
Harvest by ME, RI, NY	4,693,134 lbs
Percent of Quota Harvested	106.4%
Set Aside Overage	283,889 lbs