



Herring Benchmark Assessment: 2018

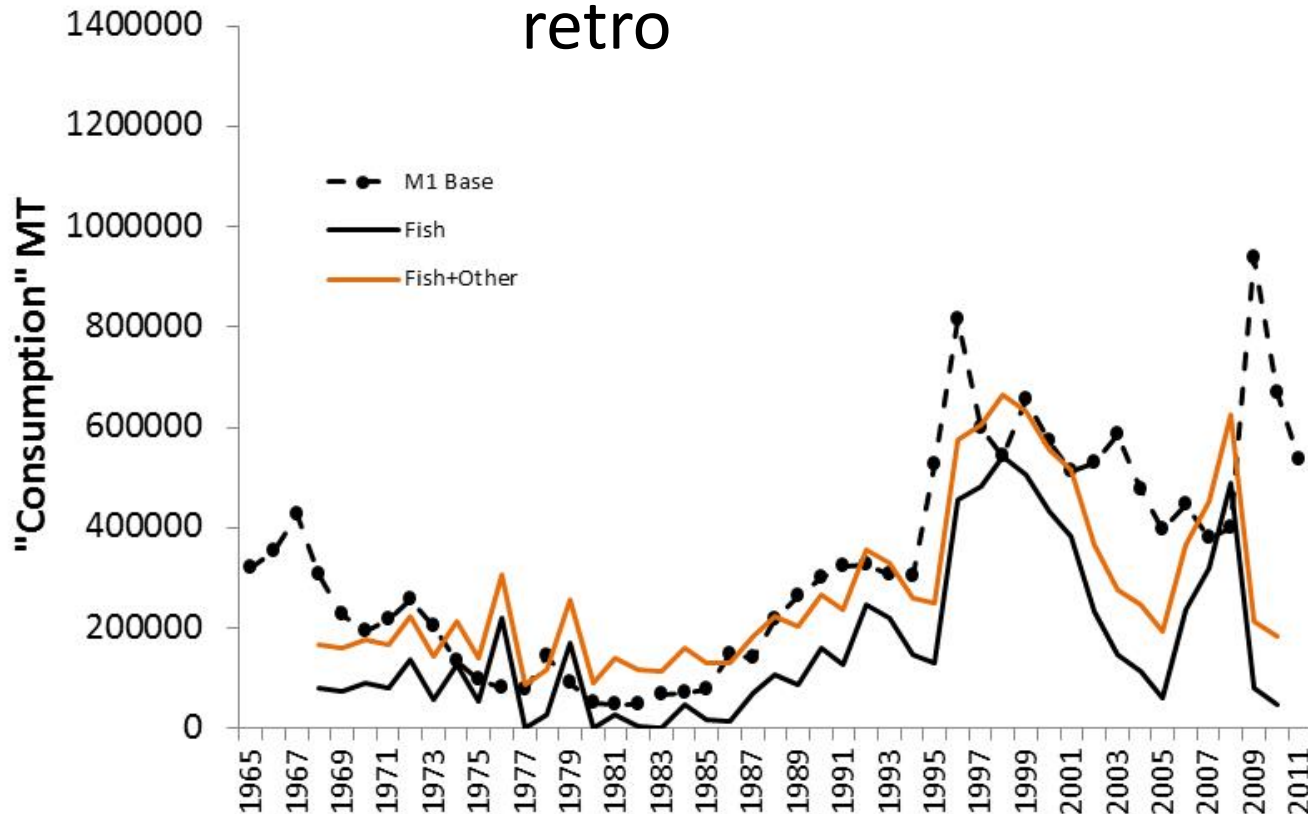
Presented to ASMFC Herring Section
August 7, 2018
Dr. Matt Cieri Maine DMR

With lots of slides ripped off from Dr. Jon Deroba at the NEFSC

Back in 2012



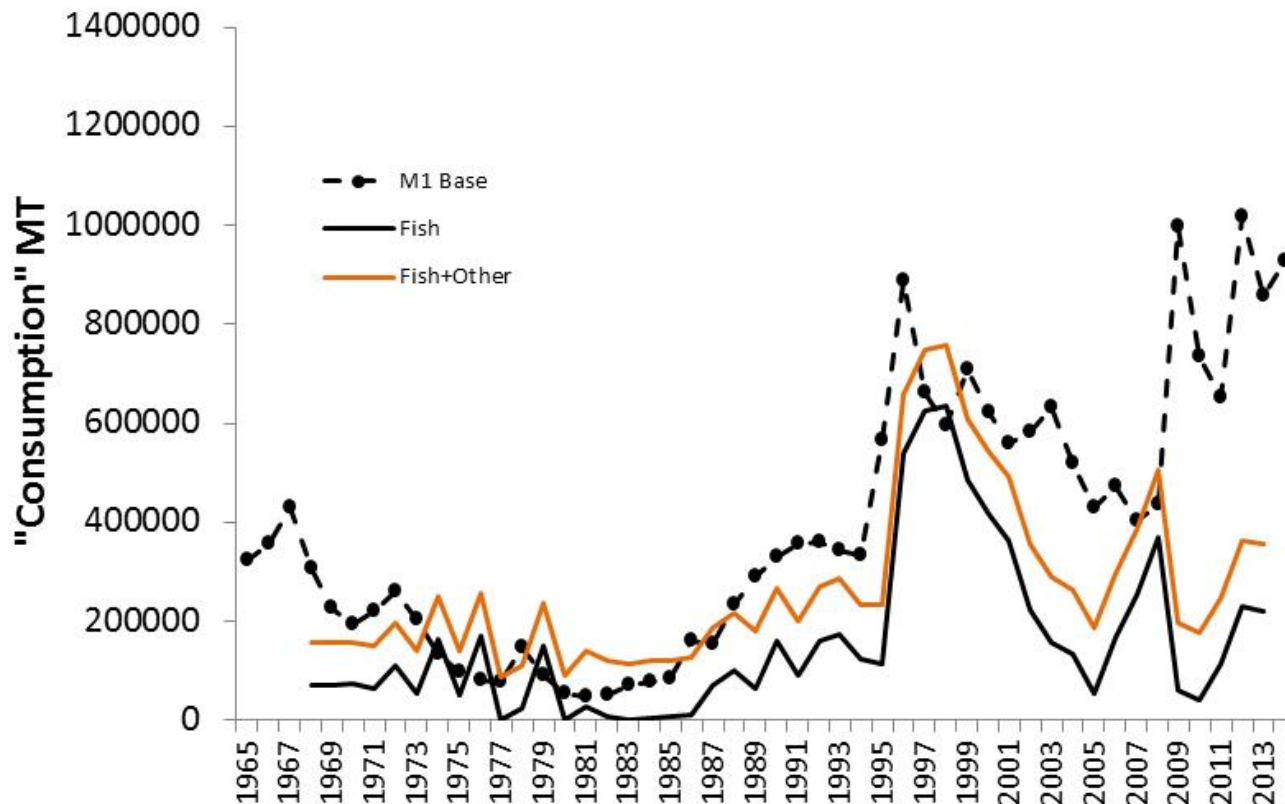
Increase M by 50% 1996-2011 (~0.35 to 0.5) and it match the consumption and improved the retro



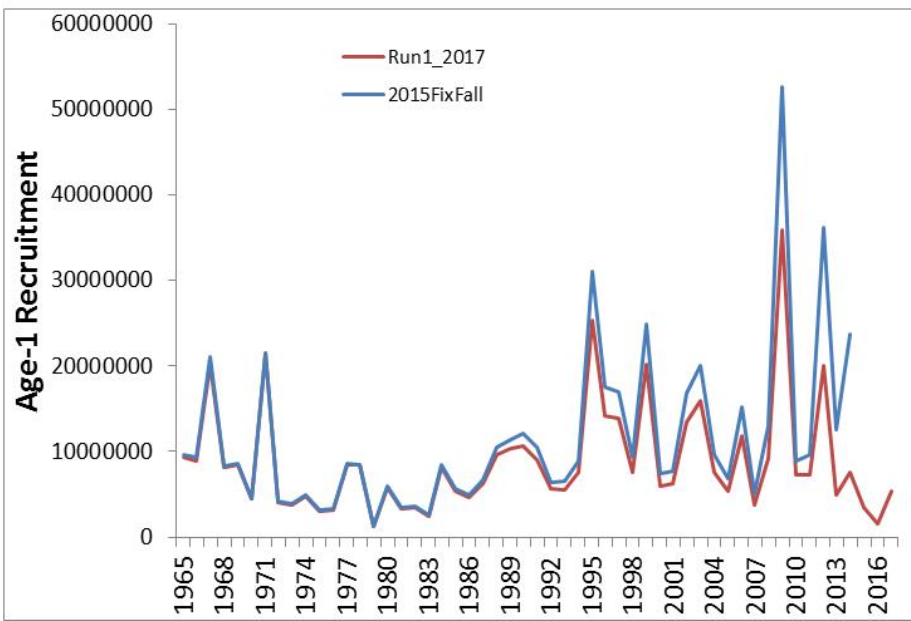
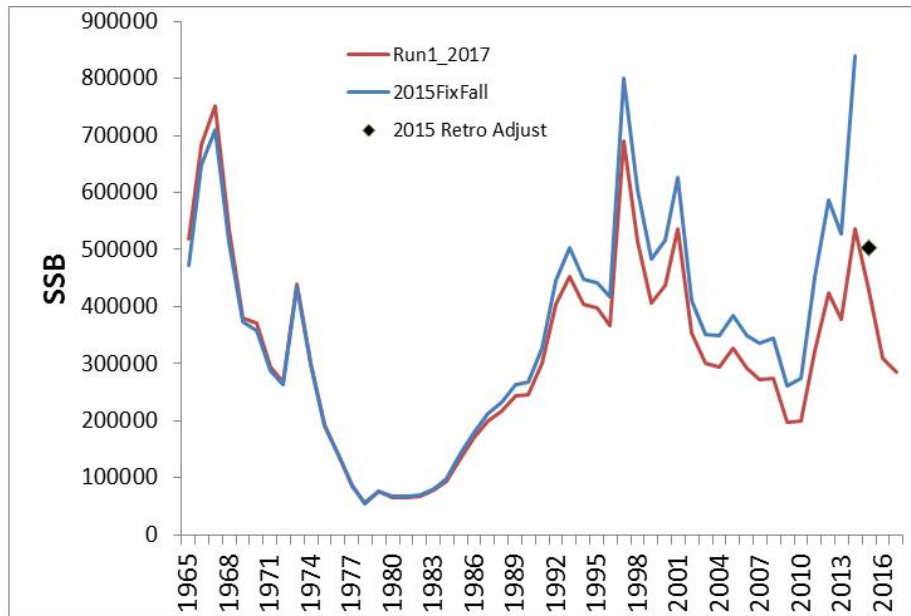
Back in 2015



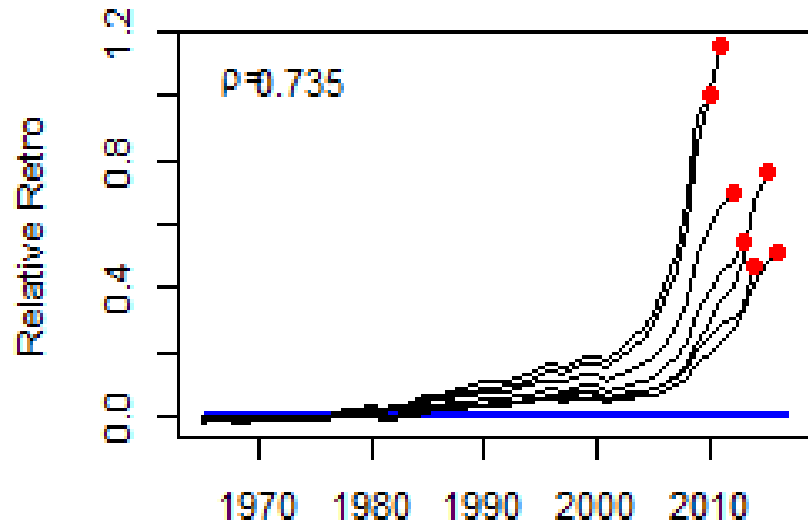
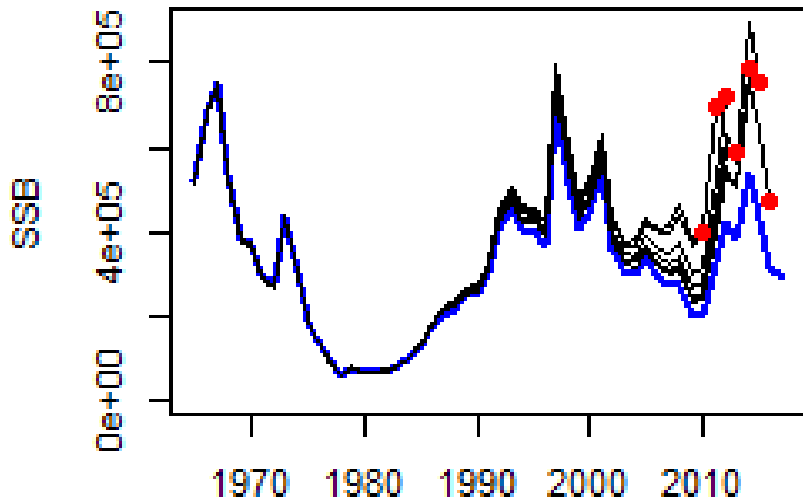
Increase M by 50% 1996-2014 (~0.35 to 0.5) but it no longer matched and retro was back



2018: Continuity Run



Continuity Run



And the retrospective pattern was back yet again

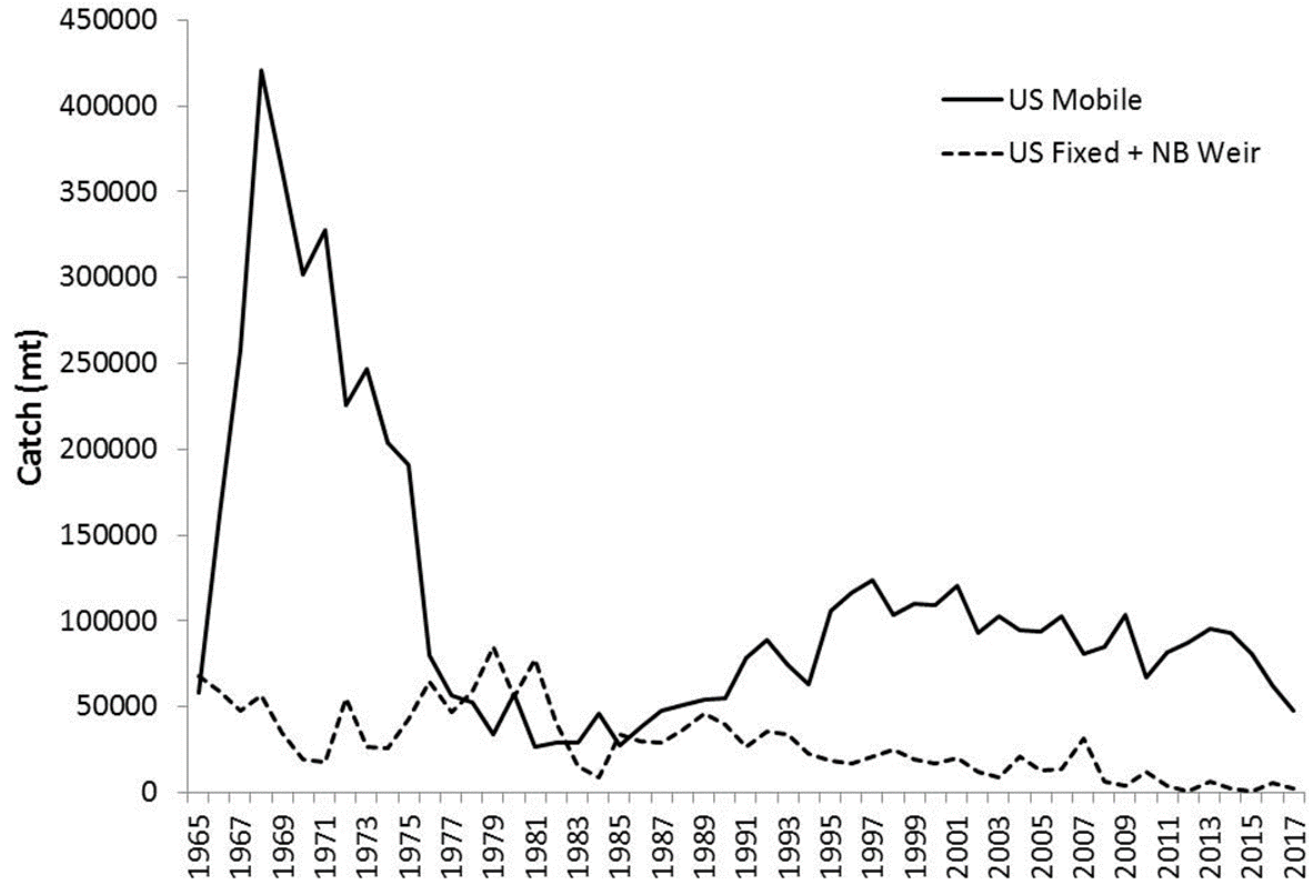
Back to the drawing board



Models Considered in this Assessment

- **ASAP**
 - Used previously and where we spent most time
 - Used as base model
- **SAM**
 - State Space-type flex approach used in ICES
 - Difficult to diagnose as a working group (new)
 - Used to compare to ASAP and multi-model inference appendix
- **Stock Synthesis**
 - Spatially explicit
 - Had issues

Fishery Dependent Data

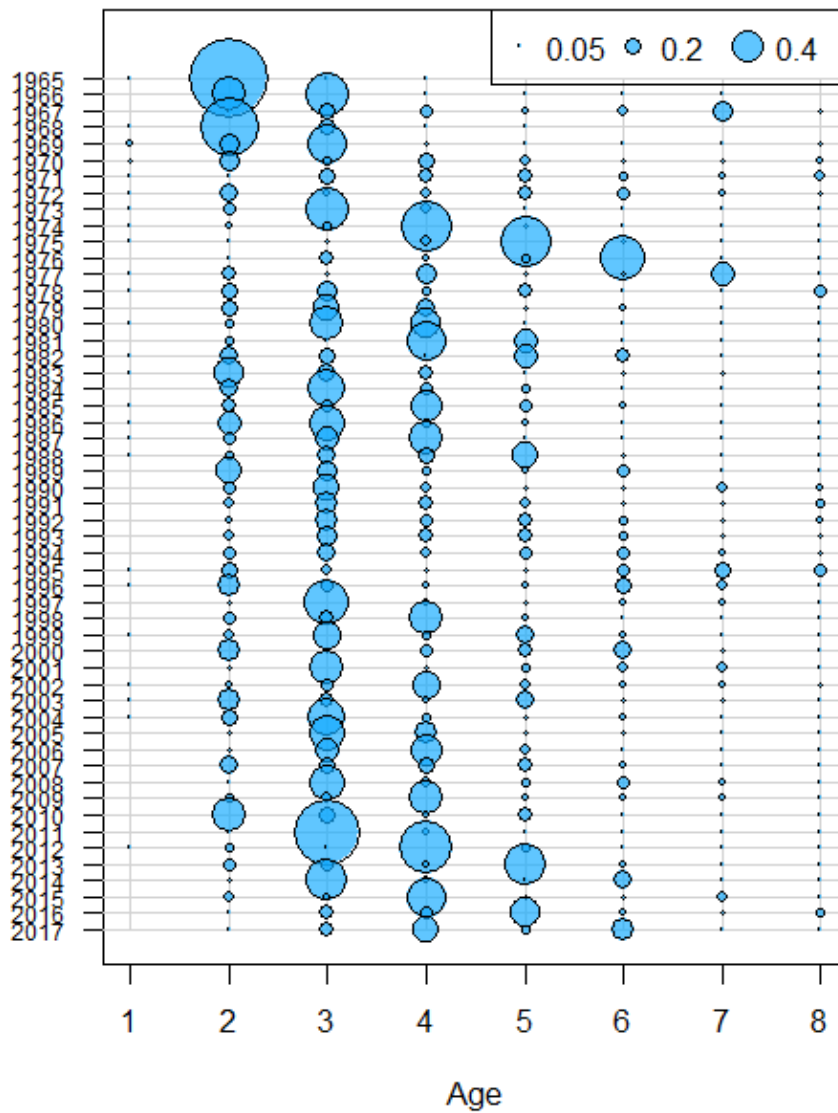


Two Fleets: Mobile and “Fixed Gear”: Stop Seine, Weirs, and Pound nets

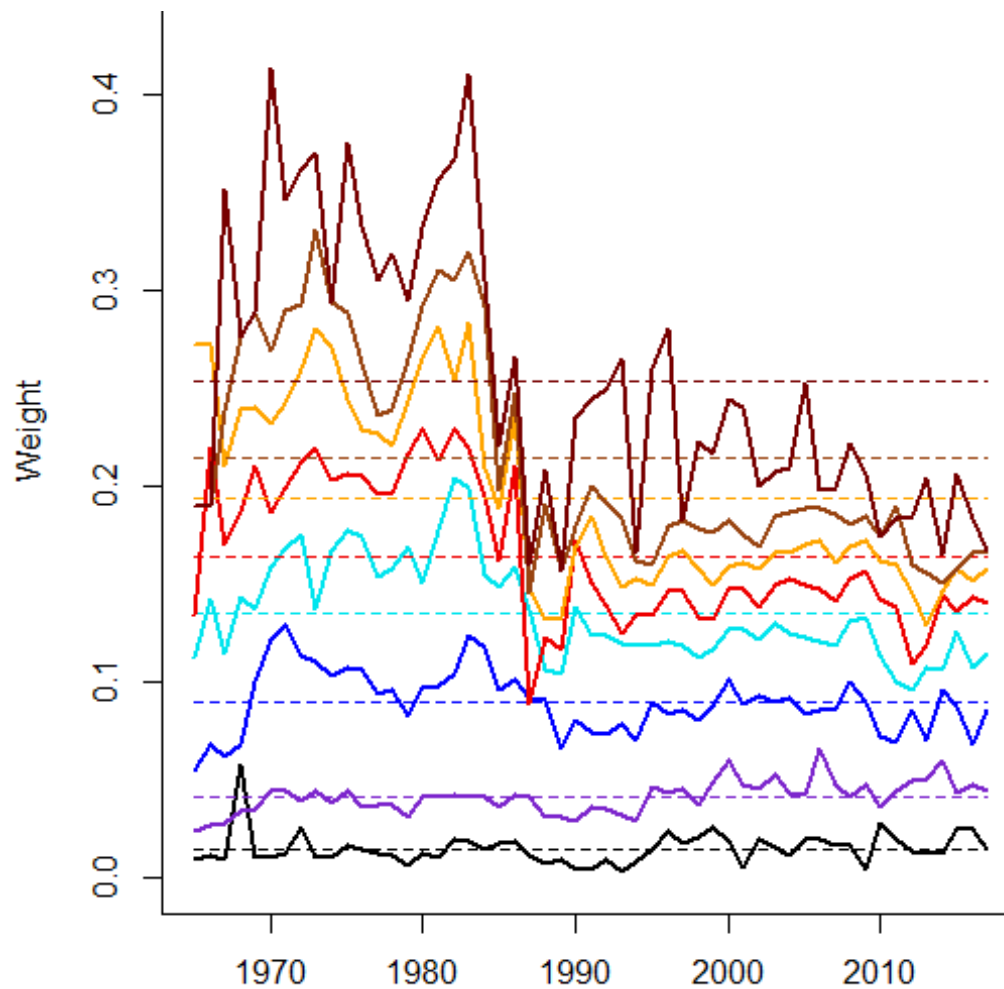
Fishery Dependent



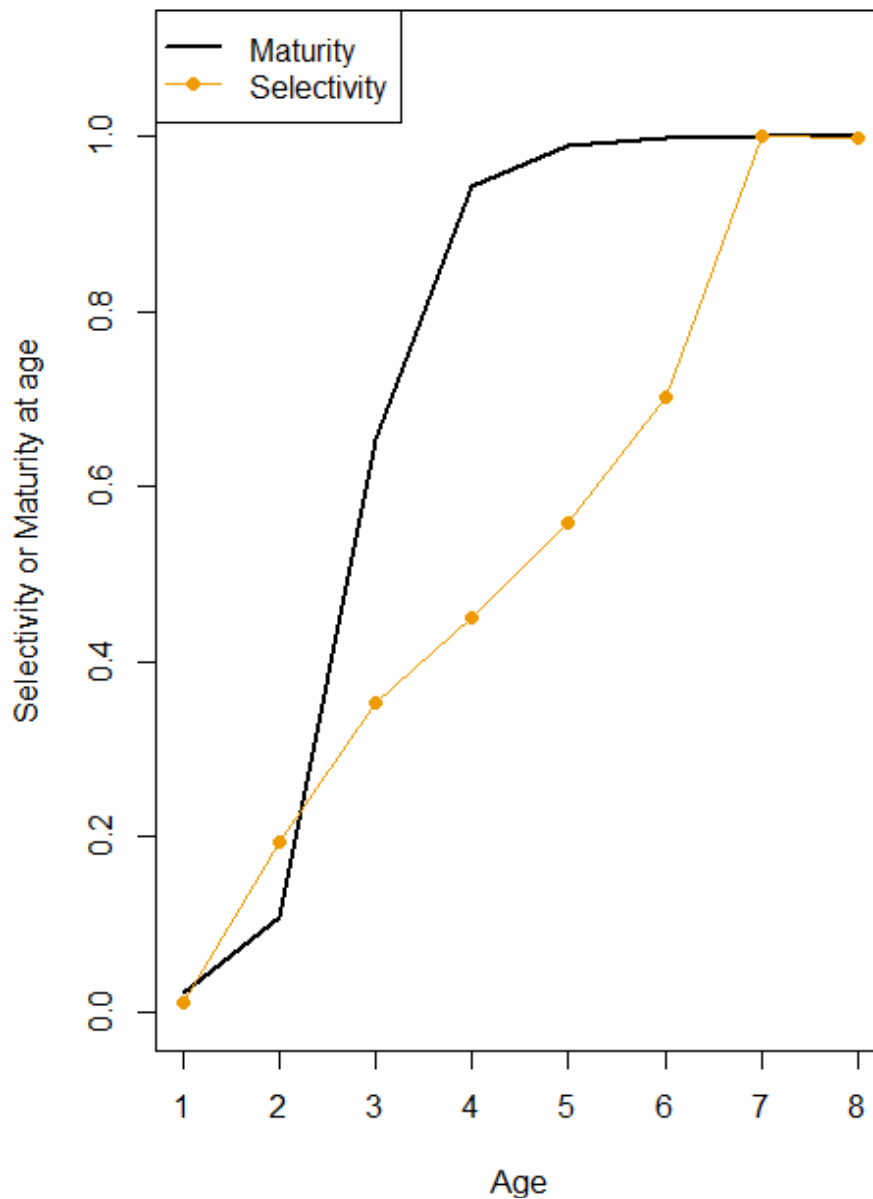
Age Comps for Catch by Fleet 1 (Mobile)



Weights-at-Age catch

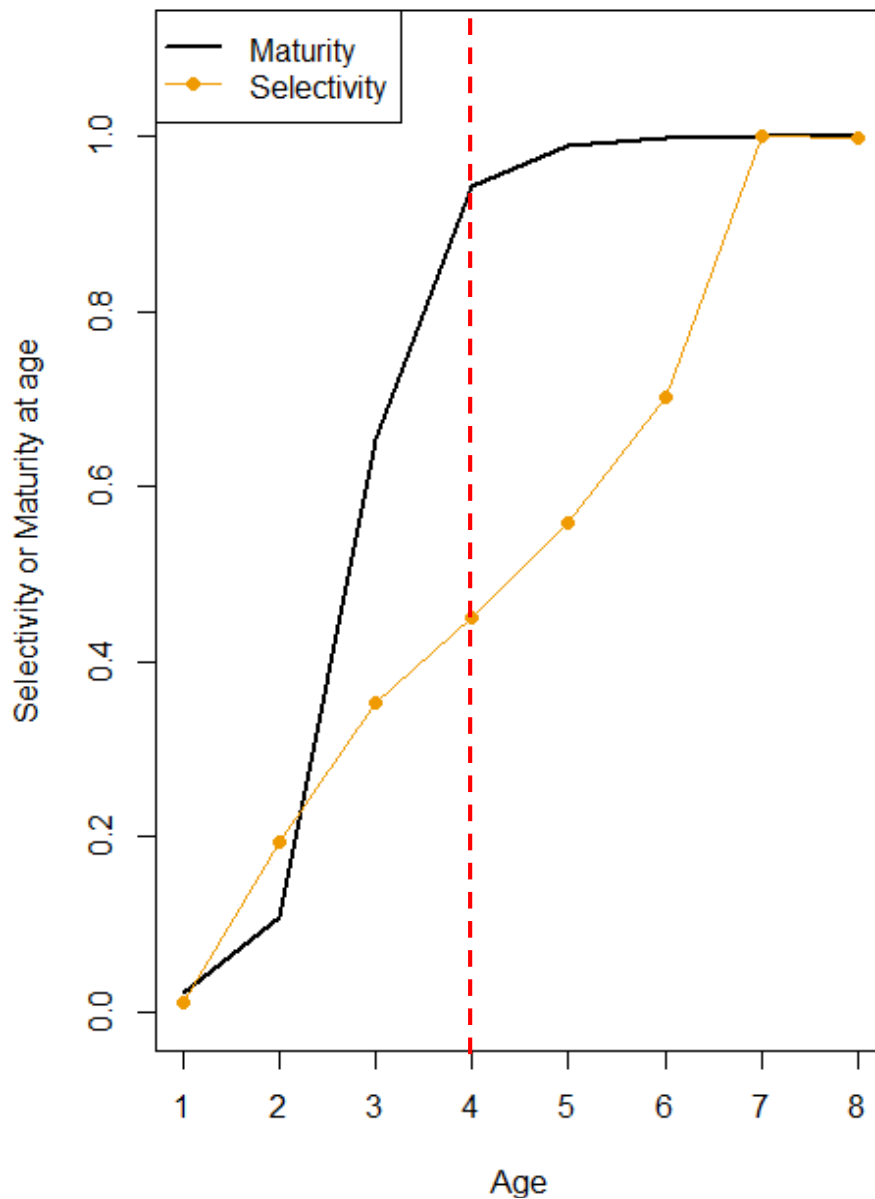


Fishery Dependent



REMEMBER WHAT BAIT YOU USED.

Fishery Dependent



REMEMBER WHAT BAIT YOU USED.

Fishery Dependent



Other Data

- Observer data
 - Confirm discarding is low relative to landings
- FLNDRS (Fisheries Logbook and Data Recording Software) **New!**
 - Self-reported data consistent with VTR
 - Could be basis for more mechanistic studies

Fishery Independent



NMFS Bottom Trawl Surveys

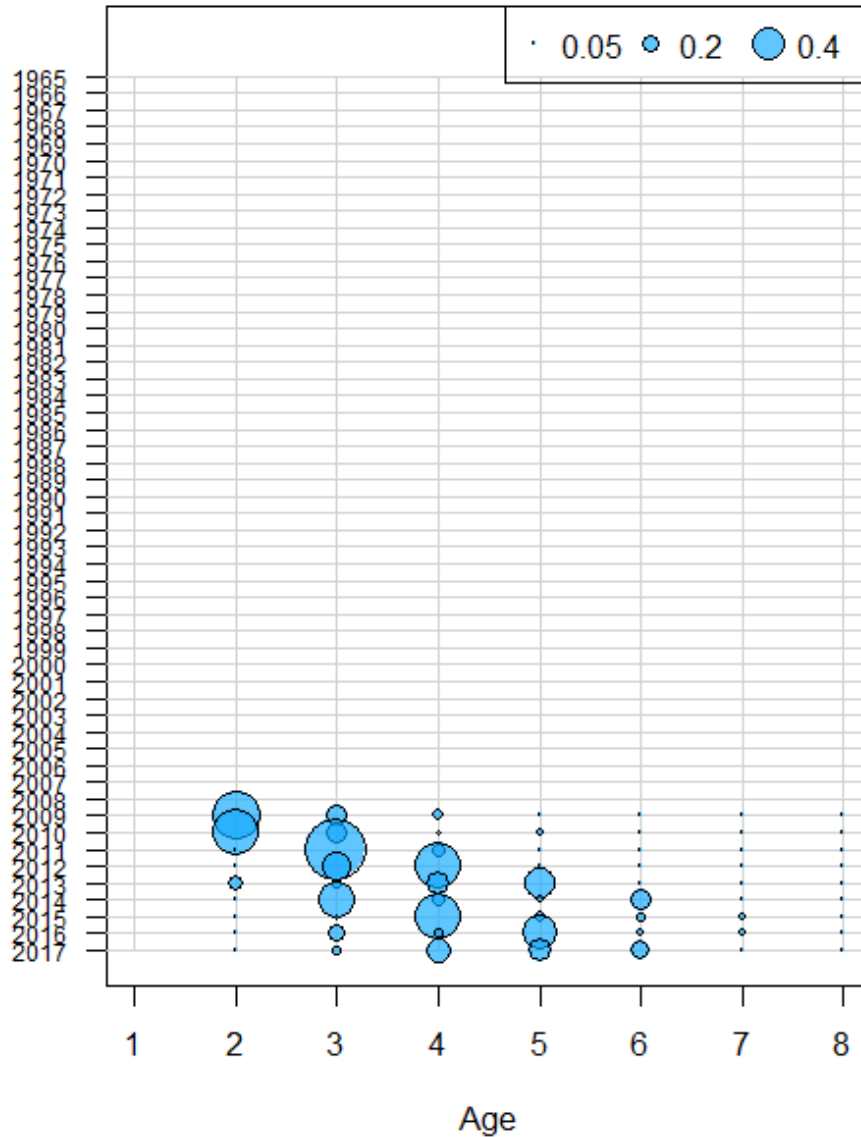
- Fall and Spring
- Broken into time series
 - Prior to 1984: Door Change
 - 1985-2009: Albatross
 - 2009-present as Bigelow: **New!**
- Summer (Shrimp) Survey
 - As used in past years



Fishery Independent



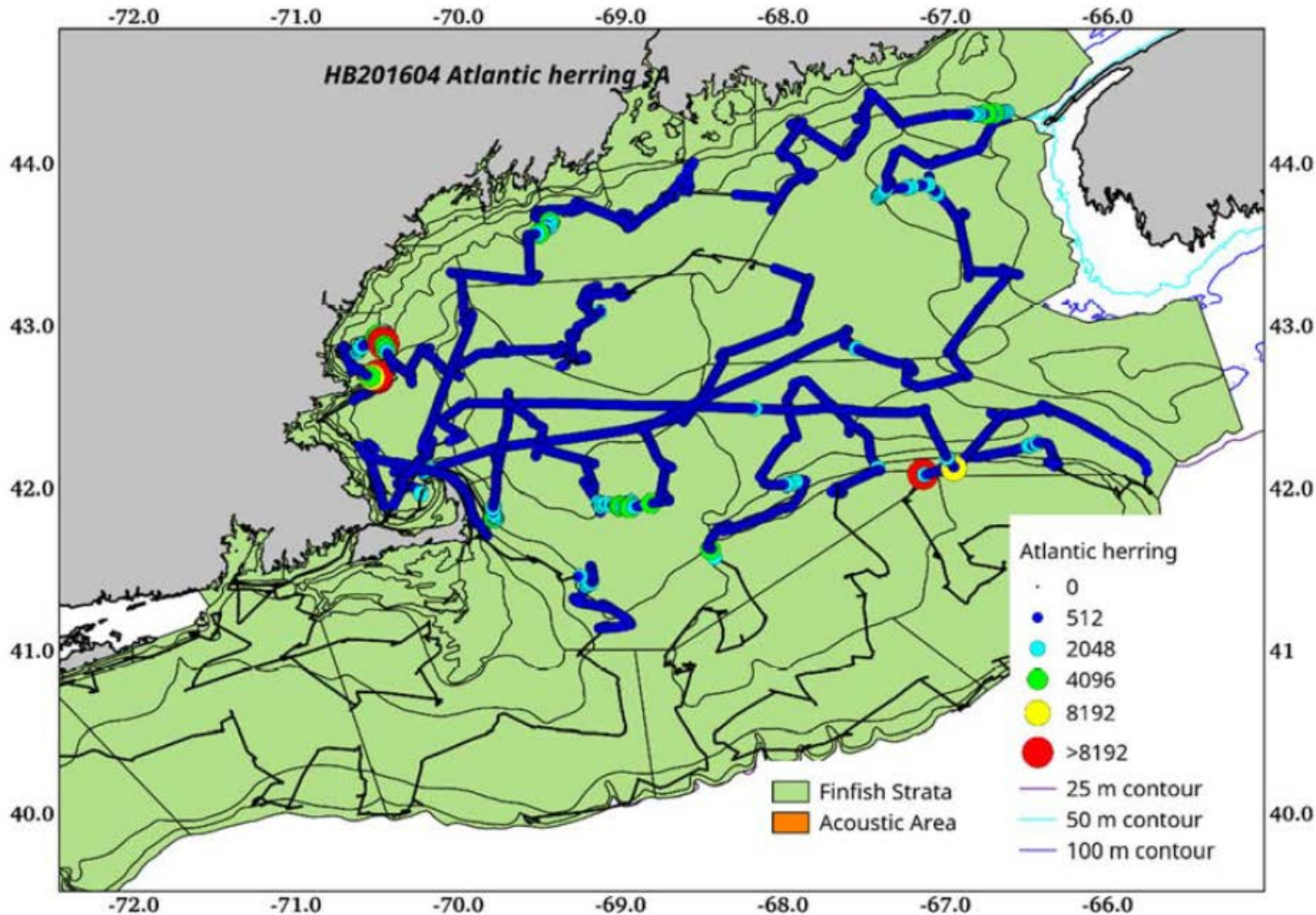
Age Comps for Index 8 (FallBig)



Fishery Independent



New! Acoustic index from the bottom trawl



Fishery Independent



Other Indices Considered But Not Used

- NMFS winter bottom trawl
 - Inconsistent spatial coverage
- State surveys (MA, ME/NH)
 - Inshore: covers only the inshore component
- Food habits index
 - Sensitive to data included (e.g., predator field)

Parameters



Natural Mortality

- 2012 used Lorenzen (variable M at age) scaled to Hoenig (Maximum age)
 - Also increased it by 50% after 1993
 - Match Consumption
 - Reduce Retrospective
- 2015 just used Lorenzen scaled to Hoenig
- 2018 removed the use of Lorenzen
 - Workgroup: Parsimony
 - Improved diagnostics....slightly
 - Had little impact on final results

$$M = ?$$

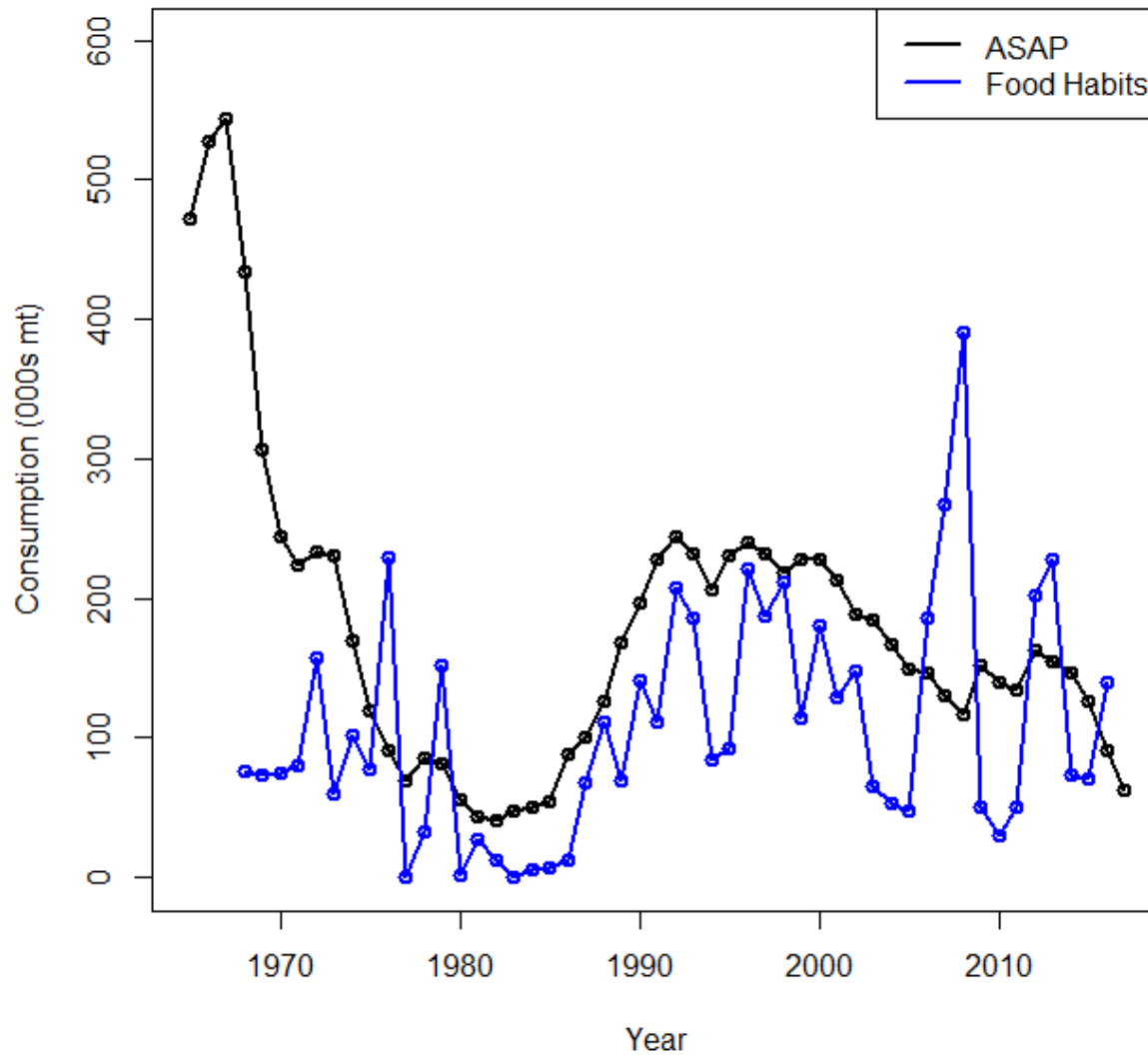
$$M = .2$$

$$M = .2$$

Parameters



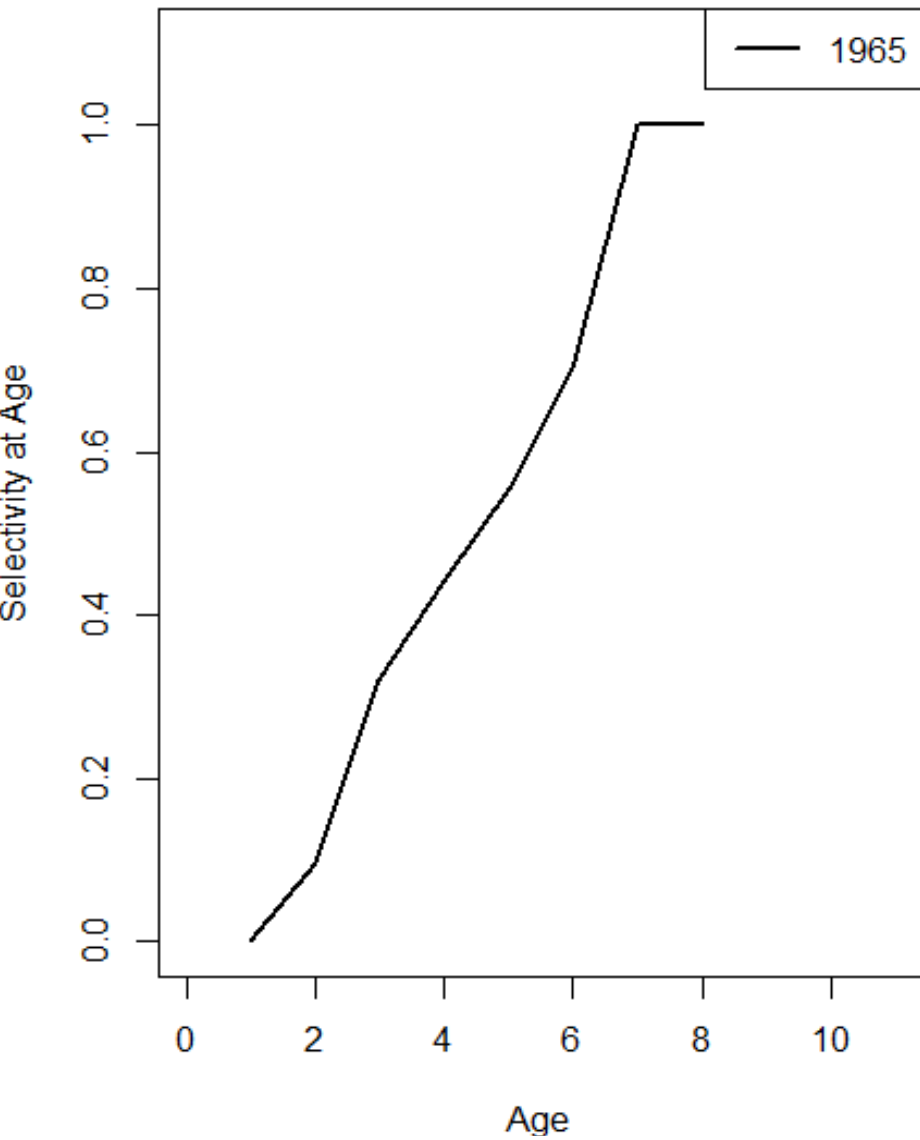
$M = 0.35$



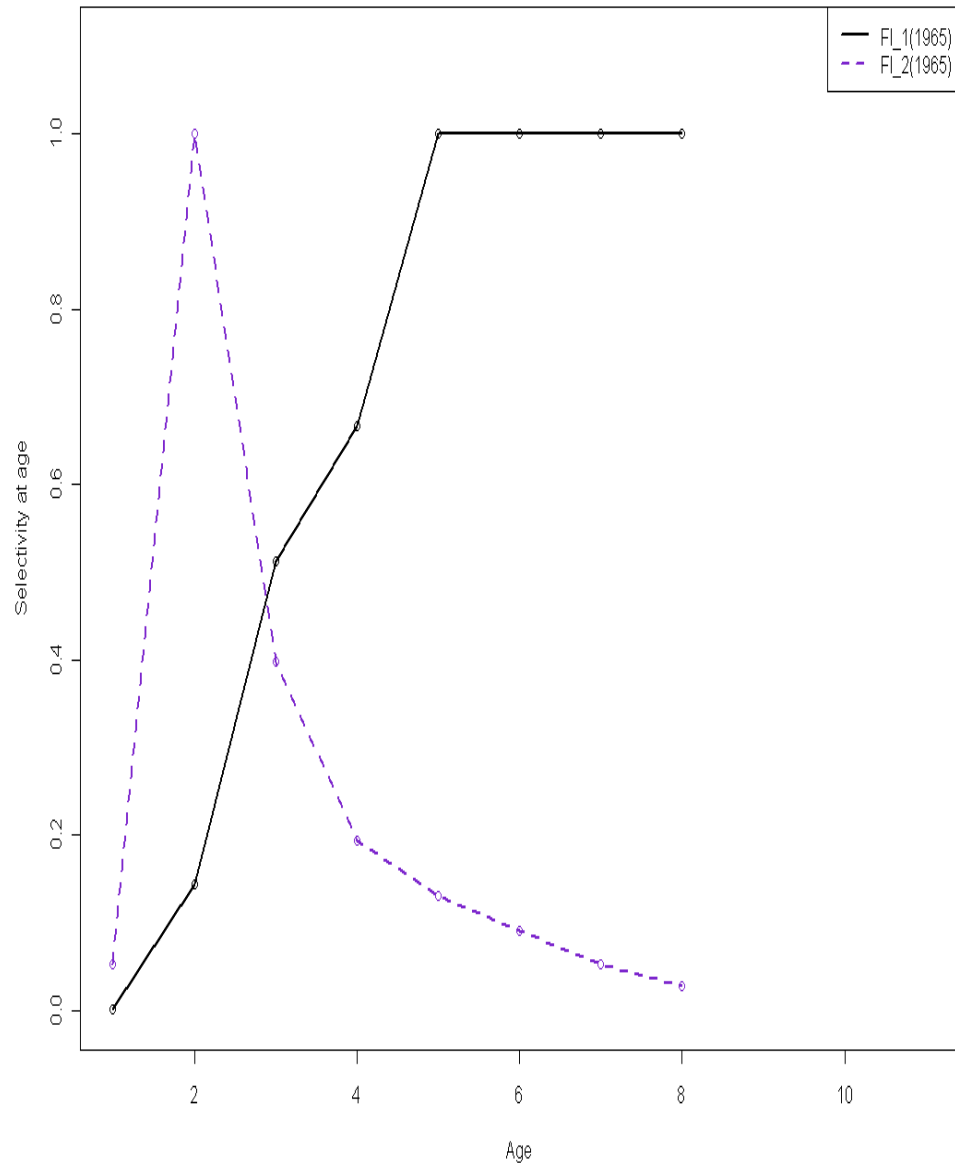
Parameters



2018



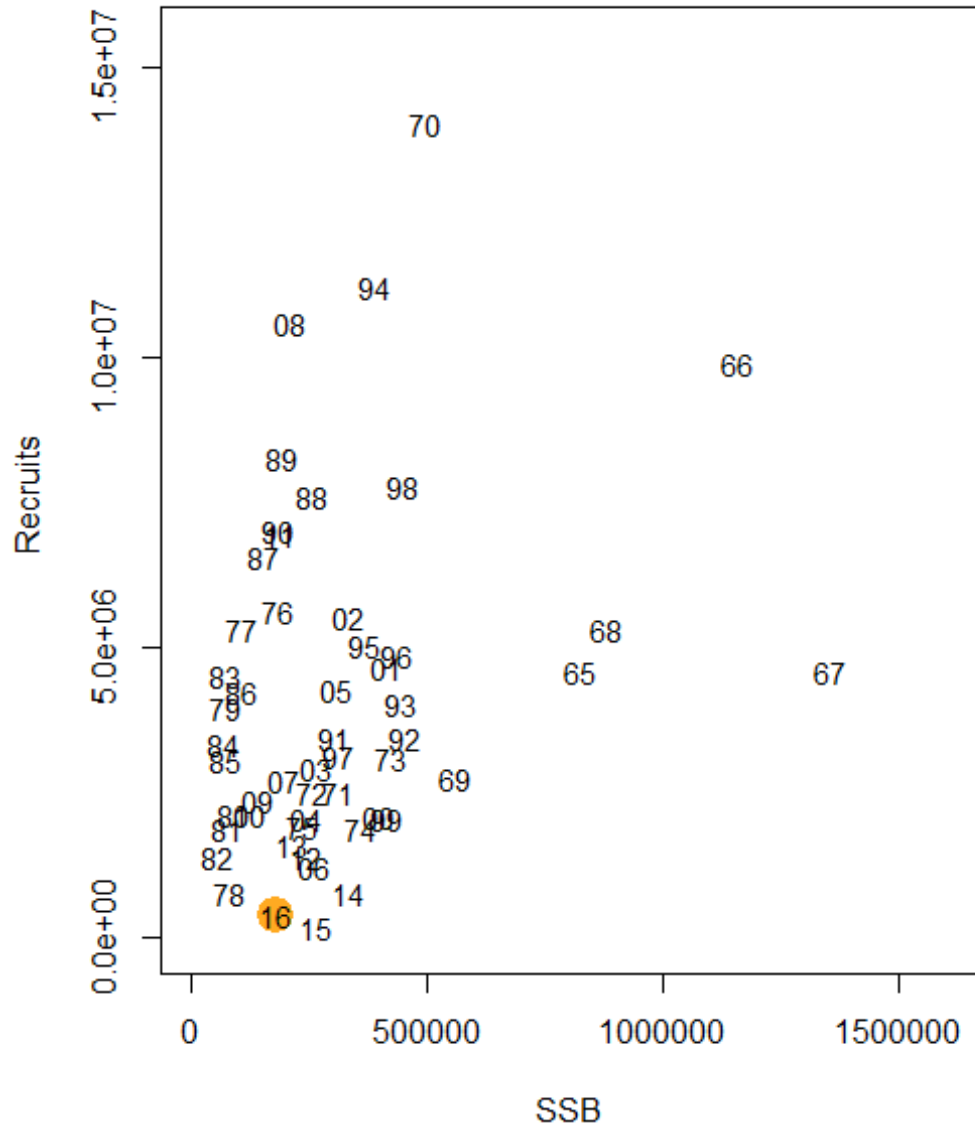
2012



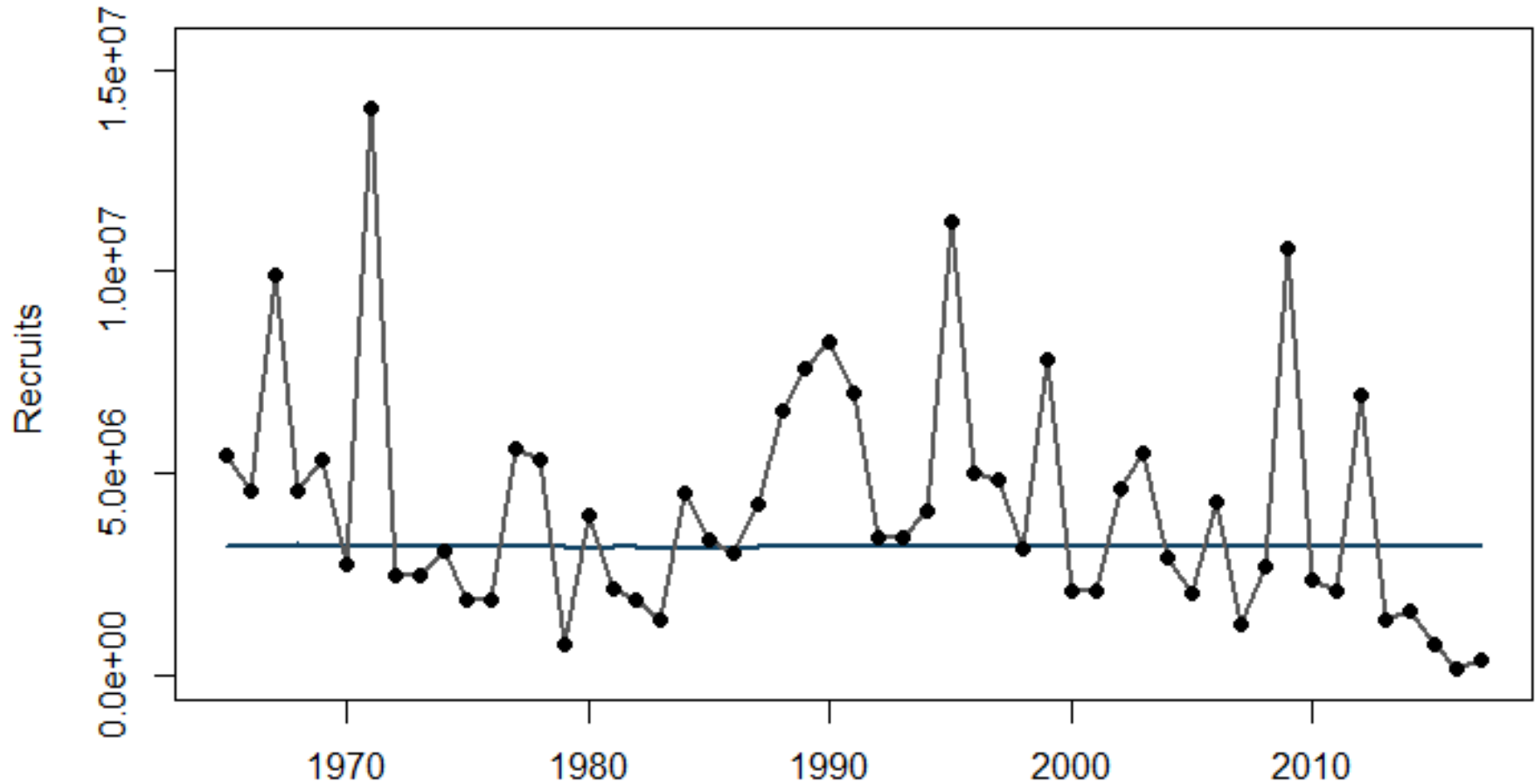
Results: Recruitment



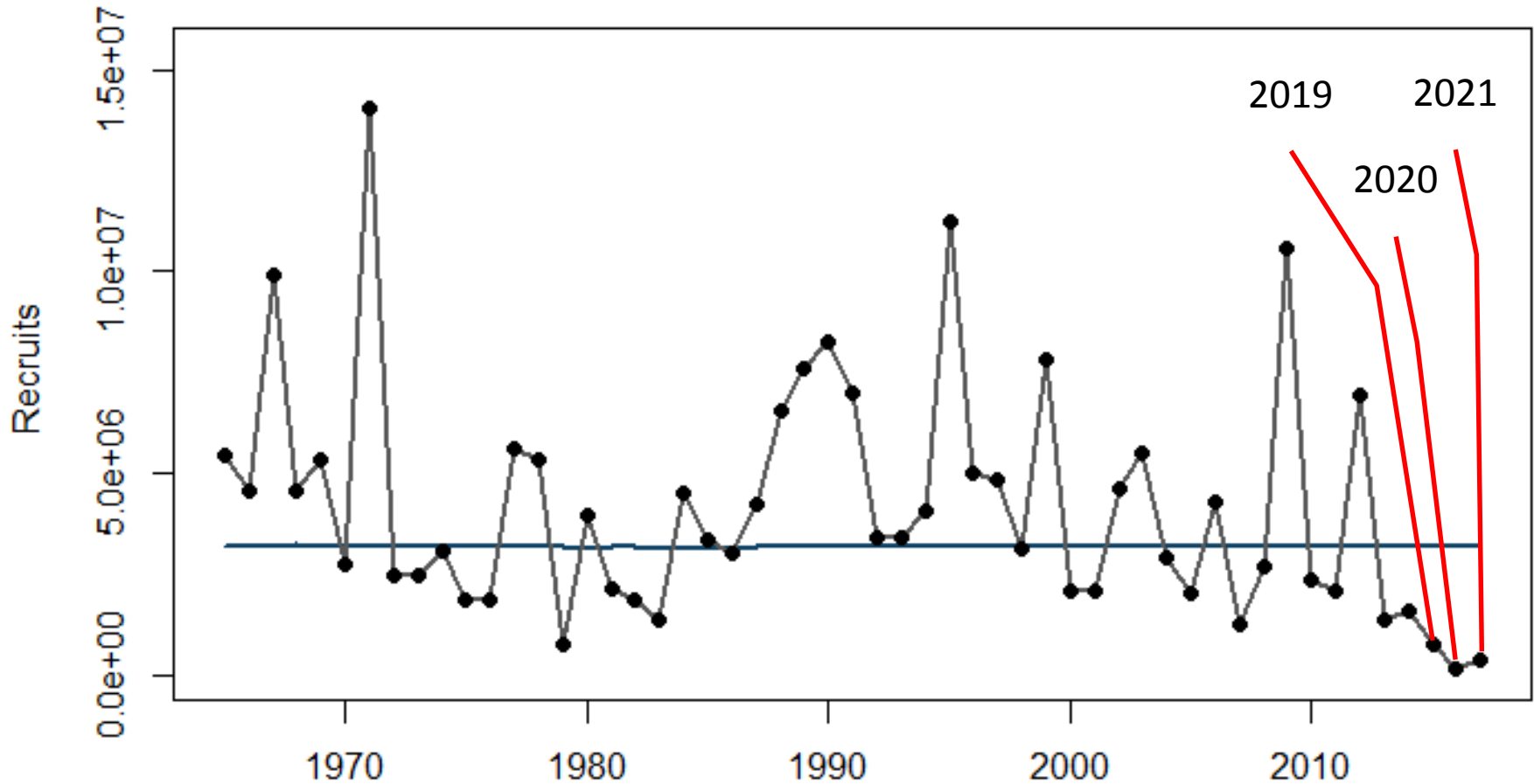
But before that let's talk about recruitment



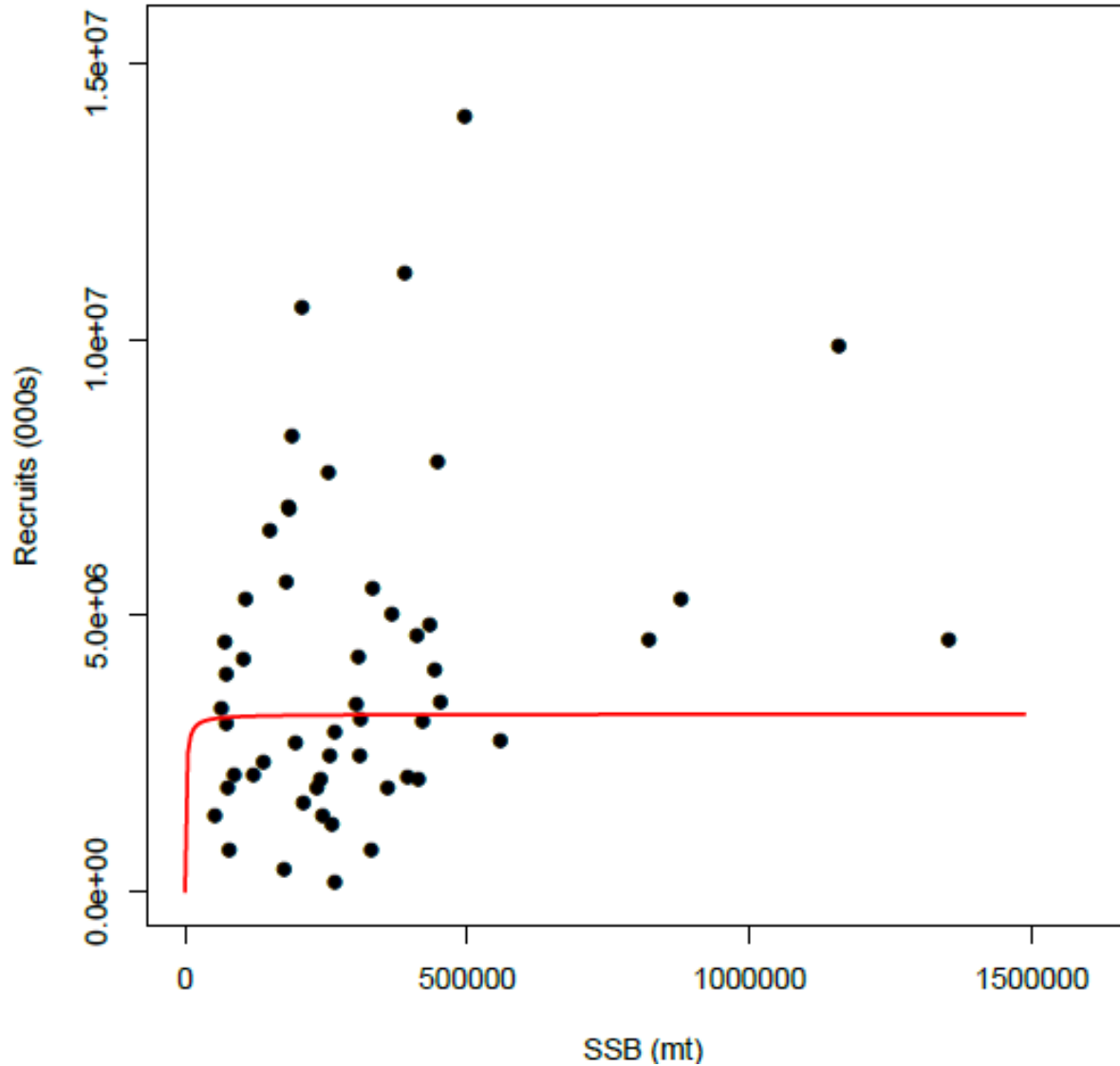
Recruitment



Recruitment



Recruitment



Reference Points



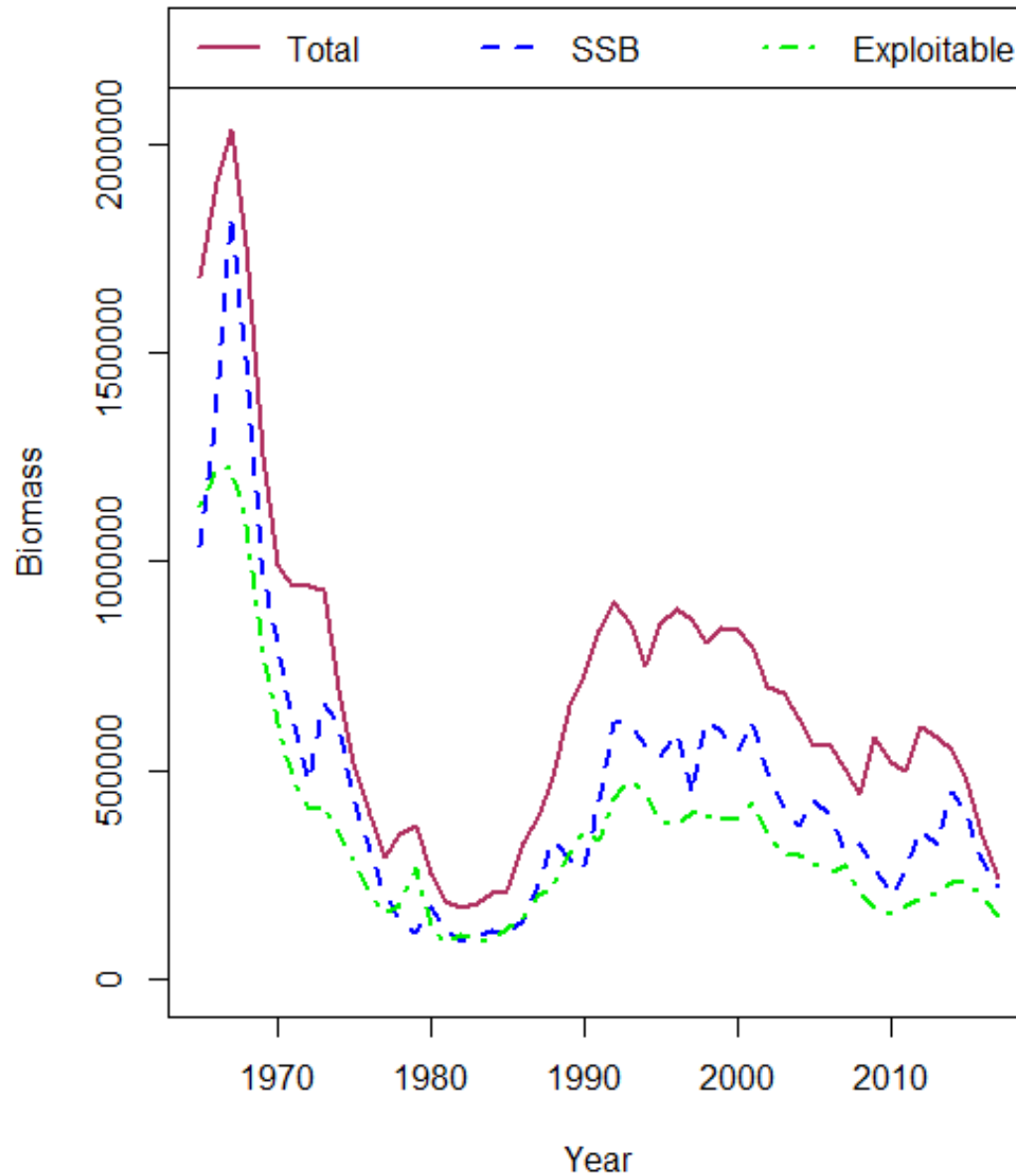
2015

- Based on fit of Beverton-Holt stock-recruit fit
 - $MSY = 77,247$ mt
 - $F_{MSY} = 0.24$
 - $SSB_{MSY} = 311,145$ mt
- Not overfished; overfishing not occurring

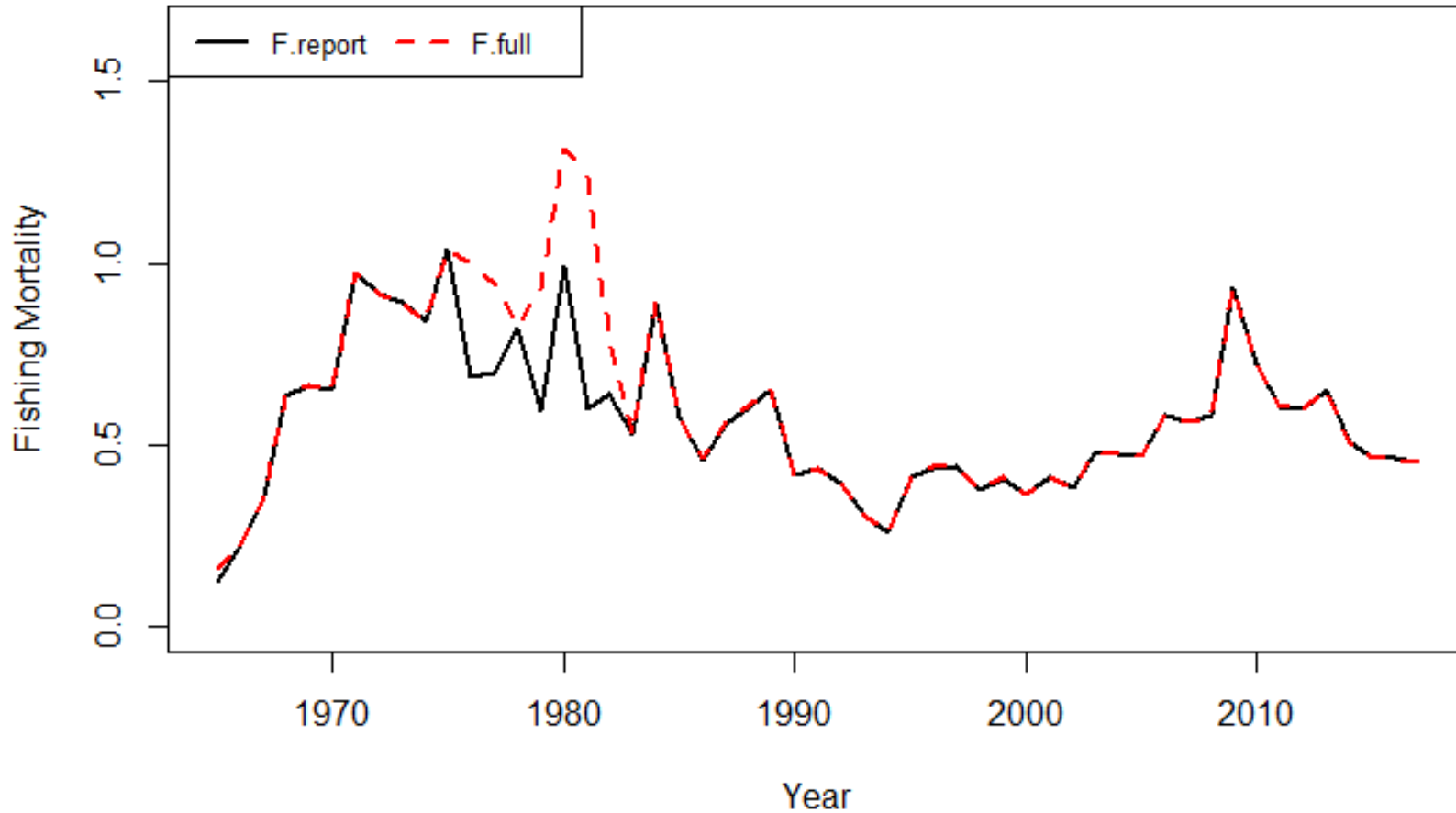
2018

- No estimation of stock-recruit; F40% proxy
 - MSY proxy = 112,000 mt
 - F_{MSY} proxy = 0.51
 - SSB_{MSY} proxy = 189,000 mt
- Existing BRPs unjustified and uninformative

Results



Results

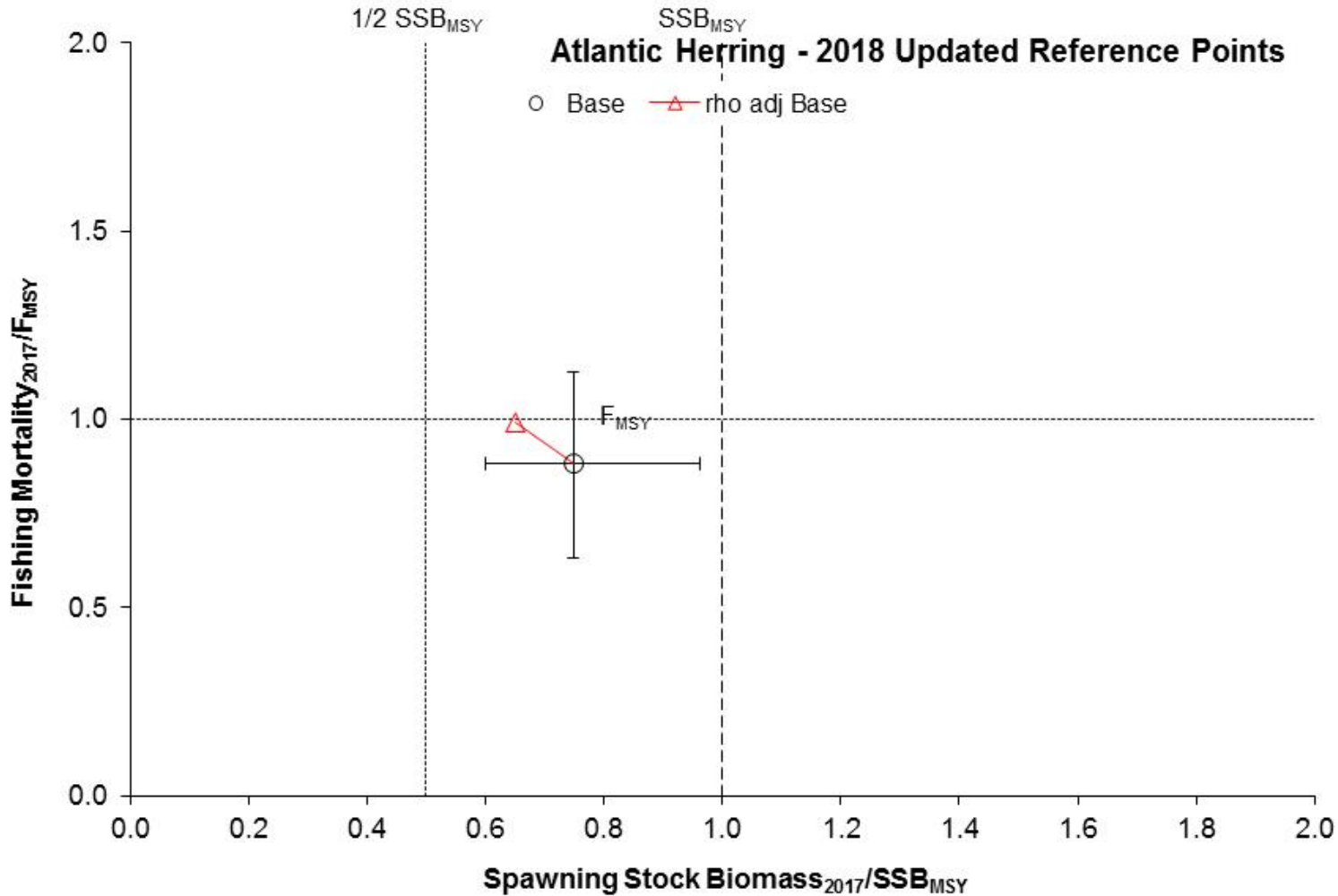


Note: F. full is the maximum F experienced by any of the age classes,

Results



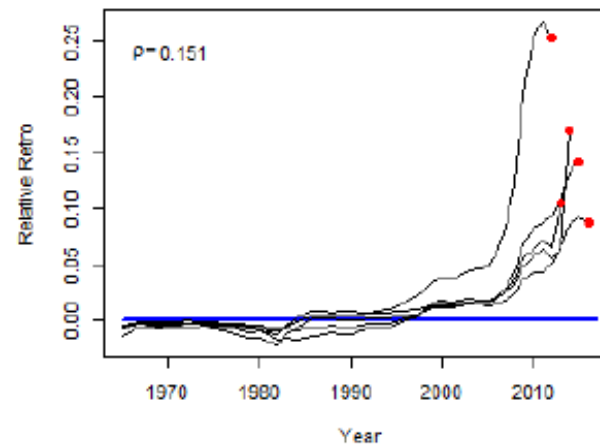
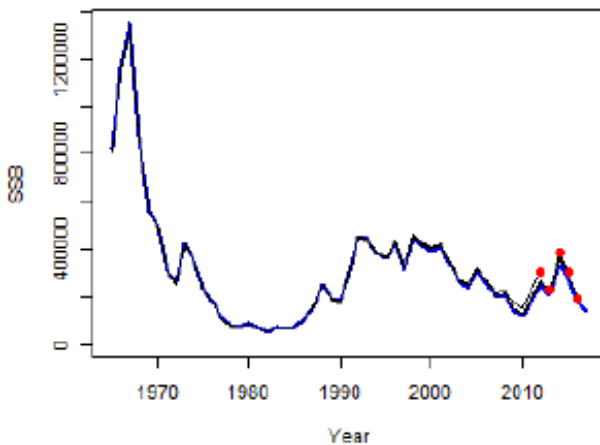
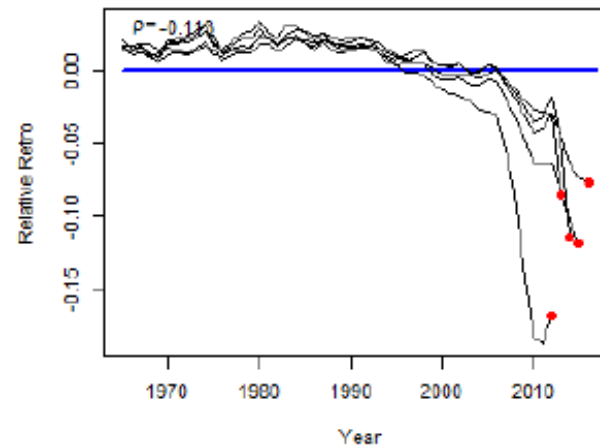
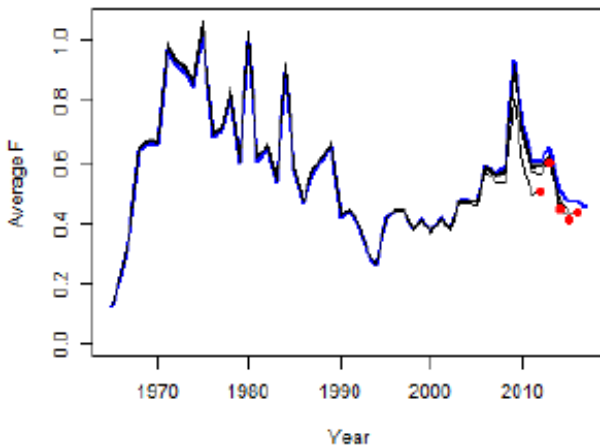
Stock status, "Kobe plot", for the base ASAP model + 80% CI



Diagnostics



- Don't want to get too much into the weeds. But.....



Projections



- 2018 catch = 111,000 mt or 55,000 mt
 - Group didn't think the 2018 quota was likely to be caught
- 2019-2021 $F = F_{MSY}$ proxy
- Median recruitment
 - Left out 2016 and 2017 due to $CV > 1$
- Work group noted that the projections will be optimistic if recruitment stays low

Projections



	2018	2019	2020	2021
Catch (mt)	111,000	13,700	31,000	55,700
Catch 80% CI	NA	4,000-36,600	16,000-62,700	32,100-95,500
F_{7.5}	1.7	0.51	0.51	0.51
F_{7.5} 80% CI	0.83-4	NA	NA	NA
SSB (mt)	32,900	19,700	31,700	85,800
SSB 80% CI	4,700-78,600	5,200-58,700	16,500-71,300	47,500-159,000
P(overfishing)	0.95	NA	NA	NA
P(overfished)	0.96	0.94	0.93	0.58

	2018	2019	2020	2021
Catch (mt)	55,000	28,900	38,000	59,400
Catch 80% CI	NA	17,200-53,100	22,700-70,800	35,300-99,600
F_{7.5}	0.58	0.51	0.51	0.51
F_{7.5} 80% CI	0.4-0.86	NA	NA	NA
SSB (mt)	75,300	43,500	42,600	91,000
SSB 80% CI	46,900-112,100	25,800-86,100	26,400-87,900	52,400-166,100
P(overfishing)	0.69	NA	NA	NA
P(overfished)	0.76	0.92	0.91	0.53

Thoughts



Good

- Not overfished, Not overfishing
- Limited retro
- Better diagnostics
- MSY values more representative of long term catch
- Older age at recruitment
- Higher F_{MSY} lower B_{MSY}

Bad

- Recruitment has been off the last few years
- Leads to lower expected SSB in the near term
- Lack of S/R means MSY proxies

Uncertain

- CV on recruitment the last couple of years > 1
- Will the retro come back?
- Use of proxies increases uncertainty

Peer Review



- SAW/SARC 65 June 26-29, 2018
 - Dr. Pat Sullivan, Chair
Cornell University
 - Dr. Cathy Dichmont
Australia
 - Dr. Geoff Tingley
New Zealand
 - Coby Needle
Marine Scotland - Aberdeen Scotland
- Report not yet available: seemed receptive with mostly positive comments

Summary



Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
US mobile catch	84,650	103,458	67,191	82,022	87,162	95,182	92,566	80,465	62,307	47,889
US fixed catch	31	98	1,263	422	9	9	518	738	1,208	258
New Brunswick weir	6,448	4,031	10,958	3,711	504	6,431	2,149	146	4,060	2,103
Total catch	91,129	107,587	79,413	86,155	87,675	101,622	95,233	81,350	67,574	50,250
Spawning stock biomass	207,711	139,353	121,661	185,013	243,767	210,106	330,492	264,982	175,698	141,473
Recruitment (age 1)	2712	10580	2364	2110	6942	1370	1608	776	175	392
Fully selected F	0.58	0.94	0.72	0.61	0.60	0.65	0.51	0.47	0.47	0.45

Metric	Point Estimate	80% probability interval
F_{MSY}	0.51	NA
SSB_{MSY}	189,000 mt	128,000 – 278,000 mt
MSY	112,000 mt	78,000 – 157,000 mt

More Interesting Stuff in the Appendices



B. Atlantic Herring – List of appendices

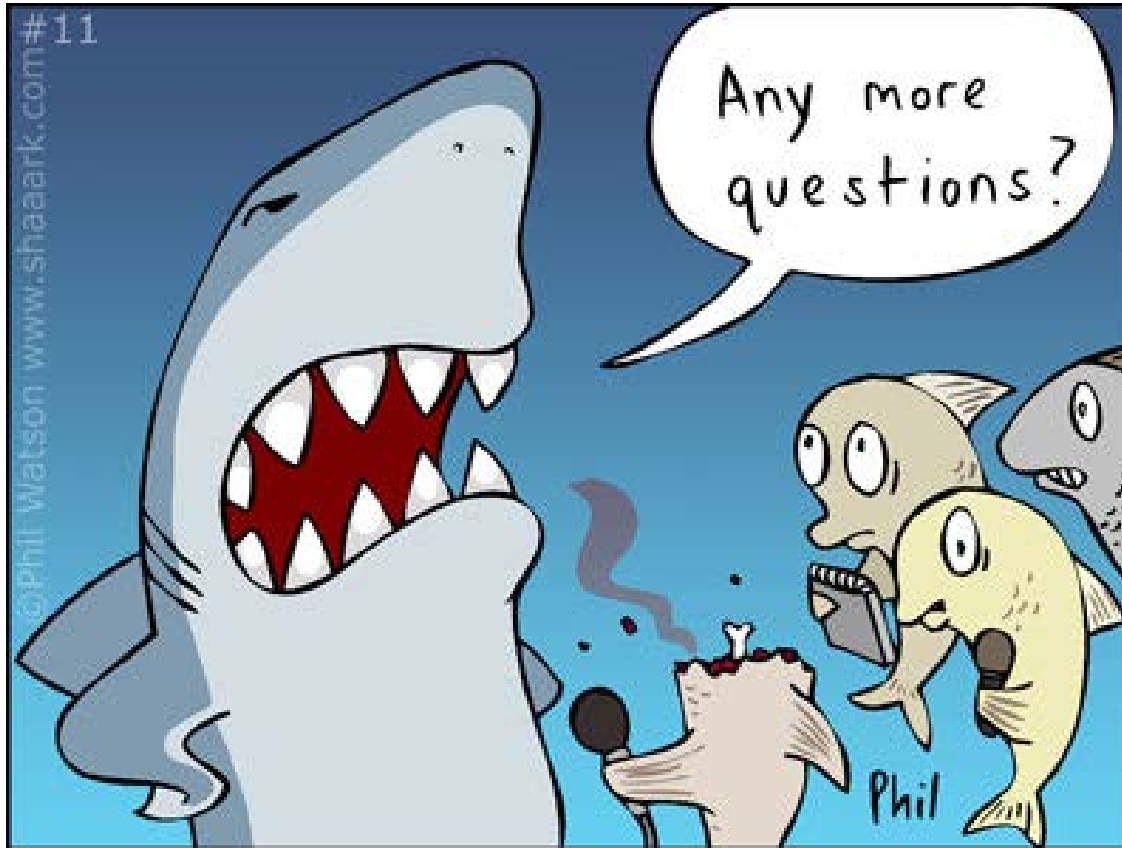
- **Appendix B1** - Herring ageing: the history and recent exchanges
- **Appendix B2** - A State-Space Stock Assessment Model (SAM) for Gulf of Maine – Georges Bank Atlantic Herring
- **Appendix B3** – Consideration of a model ensemble – model averaging ASAP and SAM
- **Appendix B4** - Two area Stock Synthesis application
- **Appendix B5** - Working Paper: Predation Pressure Index to Inform Natural Mortality
- **Appendix B6** - The NEFSC Study Fleet Program's Fisheries Logbook Data and Recording
- Software and its use the Atlantic Herring Fishery
- **Appendix B7** - Maturity and spawning seasonality of Atlantic herring (*Clupea harengus*) in US waters. **Spring Spawning!**

Herring Working Group members are



- Jon Deroba – NEFSC Population Dynamics (Assessment lead)
- John Manderson – NEFSC Coop Research
- Chris Legault- NEFSC Population Dynamics
- Deirdre Boelke – New England Fishery Management Council
- Sarah Gaichas – NEFSC Ecosystem Dynamics and Assessment
- Matt Cieri –ME DMR
- Ashleen Benson – Landmark Fisheries
- Gary Shepherd – NEFSC Population Dynamics (WG-Chair)

End





Atlantic Herring 2018 Sub-ACLS



Atlantic Herring Section
August 7, 2018

Background



- In June, the NEFMC discussed preliminary results of the 2018 Herring Stock Assessment
- Projections:

2018 Coastwide Harvest	2019 Coastwide Catch
111,000 mt (2018 ABC)	13,700 mt
55,000 mt (half of 2018 ABC)	28,900 mt

- Overall, projections suggest that an in-season adjustment in 2018 could reduce the severity of cuts in 2019



NEFMC Recommendation



Upon approval of the 2018 Atlantic Herring Stock Assessment peer review, or sooner if possible, the Regional Administrator, under existing authority allowing for in-season adjustments, take action to cap the 2018 harvest of herring at 2017 catch levels in management areas 1A, 1B, and 3. The Area 2 sub-ACL should be set at 8,200 mt for 2018 sub-ACL.

	Current 2018 Sub-ACL (mt)	2018 Sub-ACL Recommended by NEFMC (mt)	Difference (mt)	% of Current Sub-ACL
Area 1A	32,084	28,682	-3,402	89.40%
Area 1B	3,552	2,639	-913	74.30%
Area 2	31,137	8,200	-22,937	26.34%
Area 3	43,763	14,134	-29,629	32.30%



Section Sub-ACLs



- If NOAA Fisheries makes an in-season adjustment, ASMFC will have different herring sub-ACLs in place for 2018
 - A November 2015 Section motion approved the 2016-2018 herring specification package
- If the Section would like to align state and federal sub-ACLs, need a motion to reconsider the 2018 herring sub-ACLs
 - Requires 2/3rds majority vote
- Note: NOAA Fisheries has not released action on the 2018 in-season adjustment
 - Don't have final sub-ACL values if in-season adjustment is implemented



Potential Section Action



Potential actions for Section to consider:

1. No action

- Means state and federal sub-ACLs could be different

2. Motion to reconsider 2018 sub-ACLs conditional on action by NOAA Fisheries

- Ensures state/federal sub-ACLs align but don't know final numbers

3. Wait for action by NOAA Fisheries and address sub-ACL change via conference call

- Section will have to quickly meet via conference call once the in-season adjustment is finalized





Atlantic Herring 2019-2021 Specifications



Atlantic Herring Section
August 7, 2018

Overview



- 2019-2021 marks new specification package in Atl. herring fishery
 - Specifications will be impacted by results of 2018 stock assessment and the control rule chosen in Amendment 8
- Specification Components:
 - $OFL \geq ABC \geq ACL$
 - **Overfishing Limit (OFL)** → catch amount if exceeded would result in overfishing
 - **Acceptable Biological Catch (ABC)** → accounts for scientific uncertainty, potentially impacted by control rule in Amd. 8
 - **Stock-wide Annual Catch Limit (ACL)** → accounts for management uncertainty



Additional Spec Components



- **Sub-ACLs (including seasonal splits)** → division of ACL between management areas
- **Border Transfer (BT)** → amount of herring that can be taken in US waters and transshipped to Canada
- **Research Set-Aside (RSA)** → 0-3% of a sub-ACL utilized for research
- **Fixed Gear Set Aside (FGSA)** → up to 500 mt of Area 1A set aside for fixed gear fisheries west of Cutler
- **River Herring/Shad Catch Caps (RH/S CC)** → limits on RH/S catch in specific region/gear types



2016-2018 Specifications



OFL	2016 – 138,000 mt 2017 – 117,000 mt 2018 – 111,000 mt
ABC	111,000 mt
ACL	104,800 mt
Area 1A Sub-ACL (28.9%) [0% Jan – May; 100% June – Dec]	30,300 mt
Area 1B Sub-ACL (4.3%) [0% Jan – April; 100% May – Dec]	4,500 mt
Area 2 Sub-ACL (27.8%)	29,100 mt
Area 3 Sub-ACL (39%)	40,900 mt
BT	4,000 mt
RSA	3%
FGSA	295 mt
RH/S Catch Caps	GOM midwater trawl - 76.7 mt CC midwater trawl - 32.4 mt SNE/MA midwater trawl - 129.6 mt SNE/MA bottom trawl - 122.3 mt

Potential New Timeline



2019 Rule-Making, 2020-2021 Specification Package

Splits 2019 from 2020-2021 specification package. This means Amendment 8 control rule would not impact the 2019 ABC.

Oct 2018	SSC considers 2019 ABC
Dec 2018	Council considers 2019 ABC recommended by SSC
Jan 2019	2019 rule published; Council considers methods to set 2020-2021 sub-ACLs, RH/S Caps, BT, RSA
April 2019	SSC recommends ABC for 2020-2021
June 2019	Council final action on 2020-2021 specs
Aug 2019	EA reviewed by NMFS
Dec 2019	Final rule published

Questions for Section Discussion



- Does the Section recommend NEFMC set aside quota for research?
 - If yes, does the Section recommend the RSA be maintained at 3% or should a range of options be considered?
- Does the Section recommend Area 1A quota be set aside for fixed gear west of Cutler?
 - If yes, does the Section recommended it be maintained at 295 mt or should a range of options be considered?
- Does the Section recommend NEFMC look at various alternatives on how to distribute the ACL between management areas?
 - If yes, are there specific factors which those alternatives should consider?
- Does the Section recommend NEFMC consider any other alternatives to the seasonal split of Area 1A quota besides 100% June- Dec?

