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Management Track Assessment (Level 2) Gulf of Maine Winter Flounder

Lead Scientist: Paul Nitschke
Last Assessed: 2017 Operational Assessments
30+ cm Survey Area-Swept
September 15th, 2020

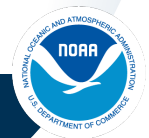


Gulf of Maine Winter Flounder

Assessment Model

2020_FLW_GM_Supplemental_Information_Tables_Figures.pdf

- 30+ cm Survey Area-Swept Calculation
- Last assessed in the 2017 Operational Assessment (Developed in SARC 52 (2011) and used in 2014 & 2015 Operational assessments).



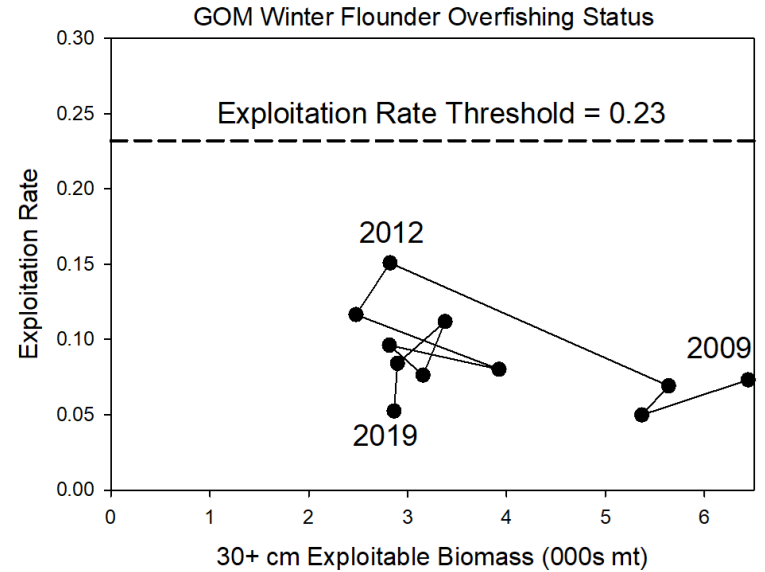
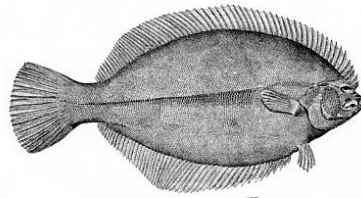
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Gulf of Maine Winter Flounder

Stock Status

- Overfished status is Unknown
- Overfishing is not occurring

Not in a rebuilding plan since Gulf of Maine winter flounder was never declared overfished.



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Assessment History



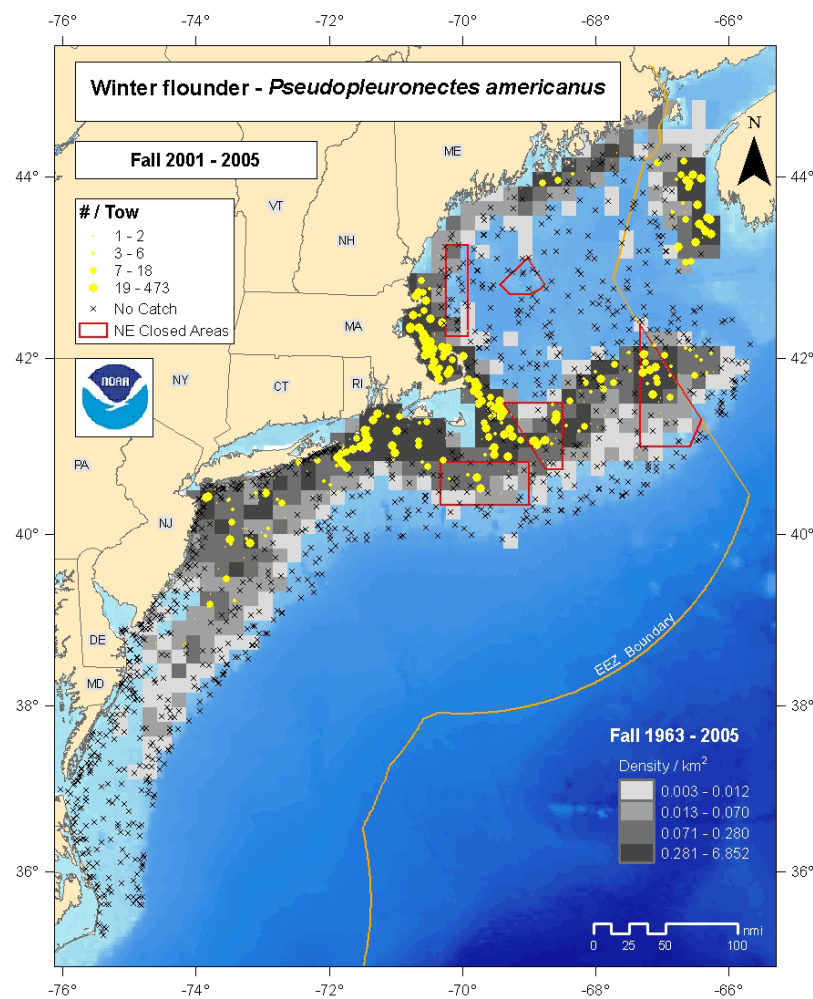
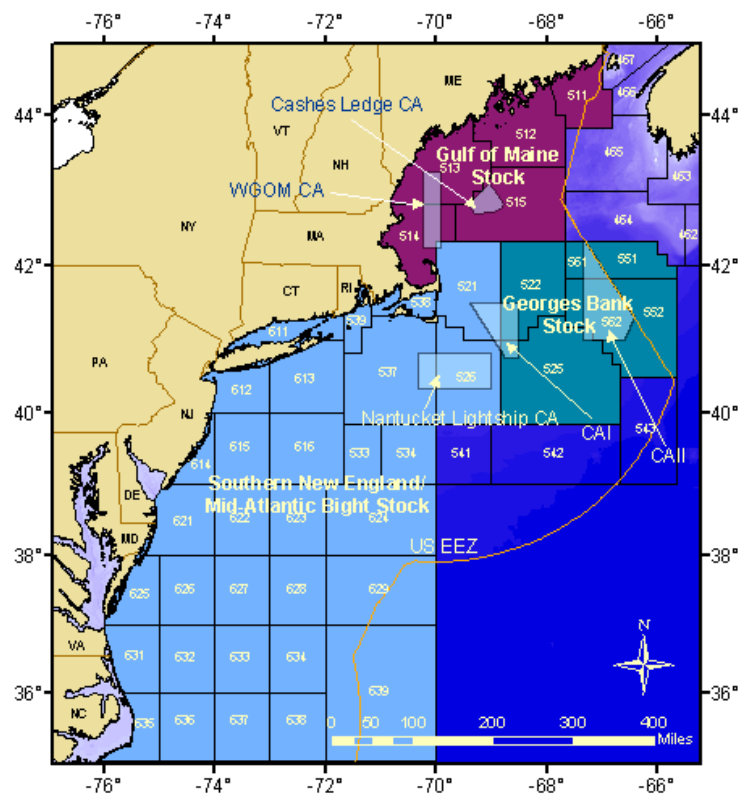
- Analytical model died at GARM III (2008) & again at the SARC 52 Benchmark (2011) due to concerns with a large retrospective pattern. Models (VPA, SCALE, ASAP, SCAA) have difficulty with the apparent lack of a relationship between a large decrease in the catch with little change in the indices and age and/or size structure over time.
- Assessment is now based on 30+ cm area-swept biomass estimated directly from the surveys.

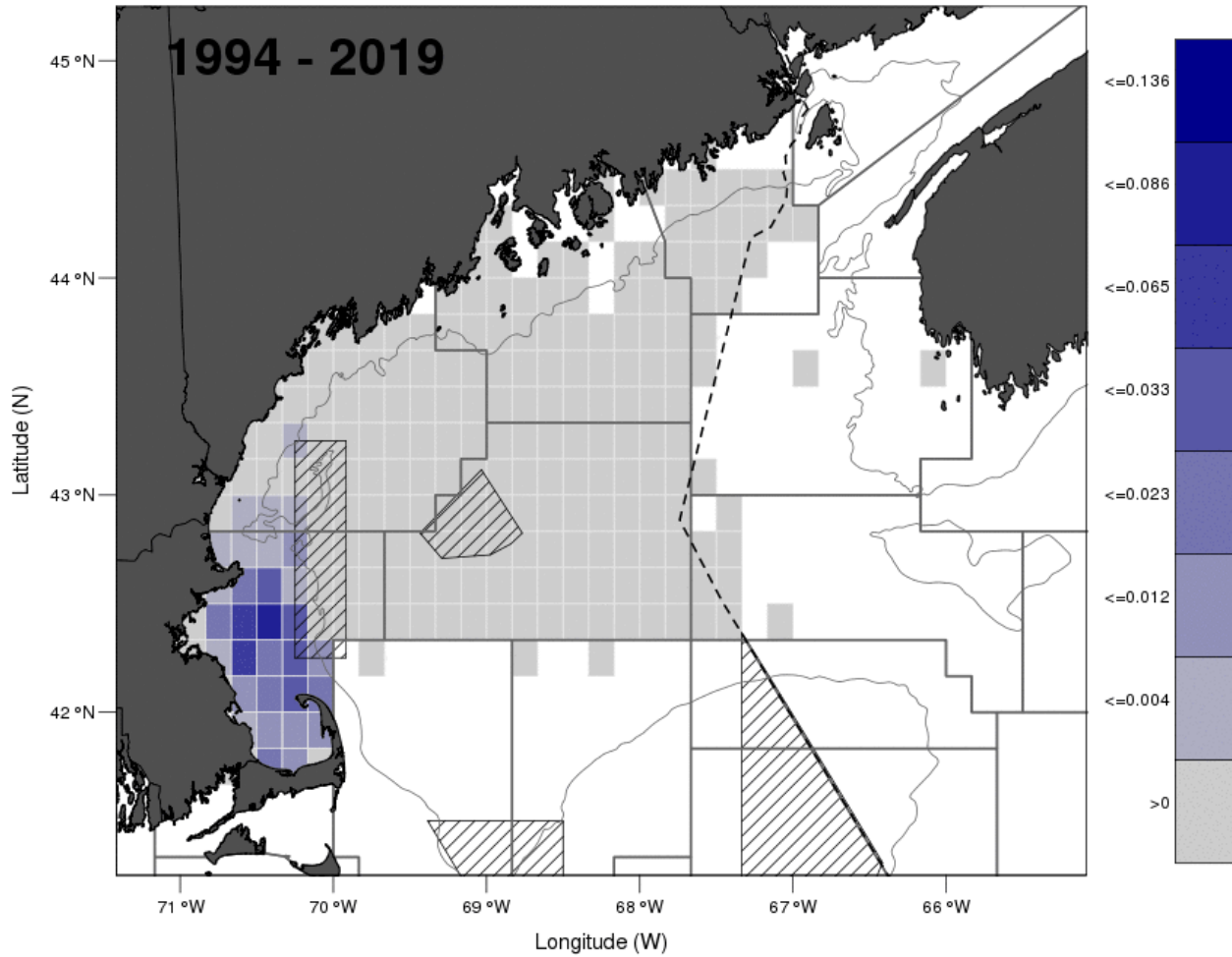


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Current Status

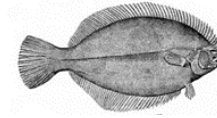
- Overfished status is Unknown
- Overfishing not occurring





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Gulf of Maine Winter Flounder Assessment

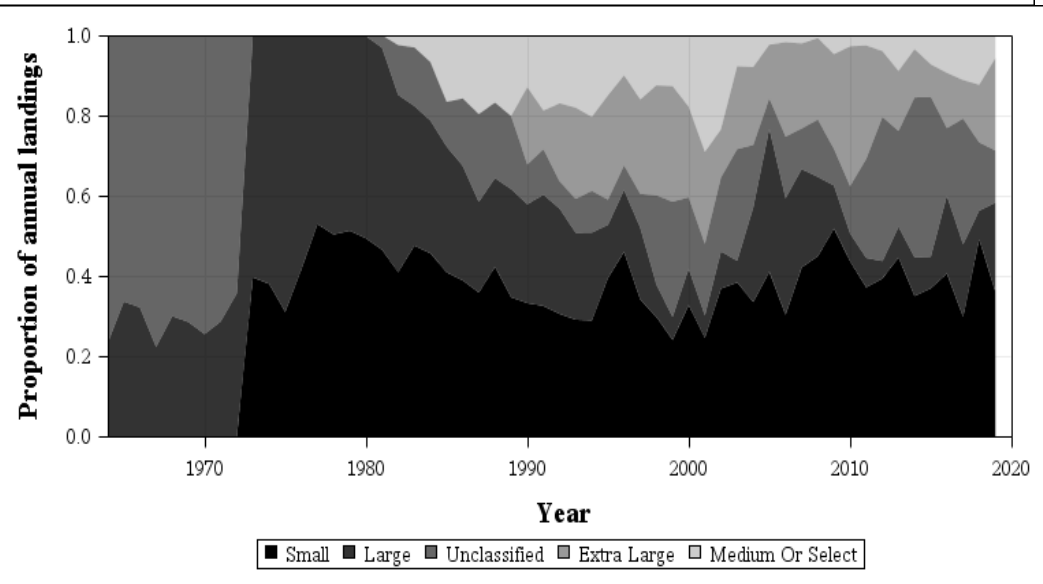
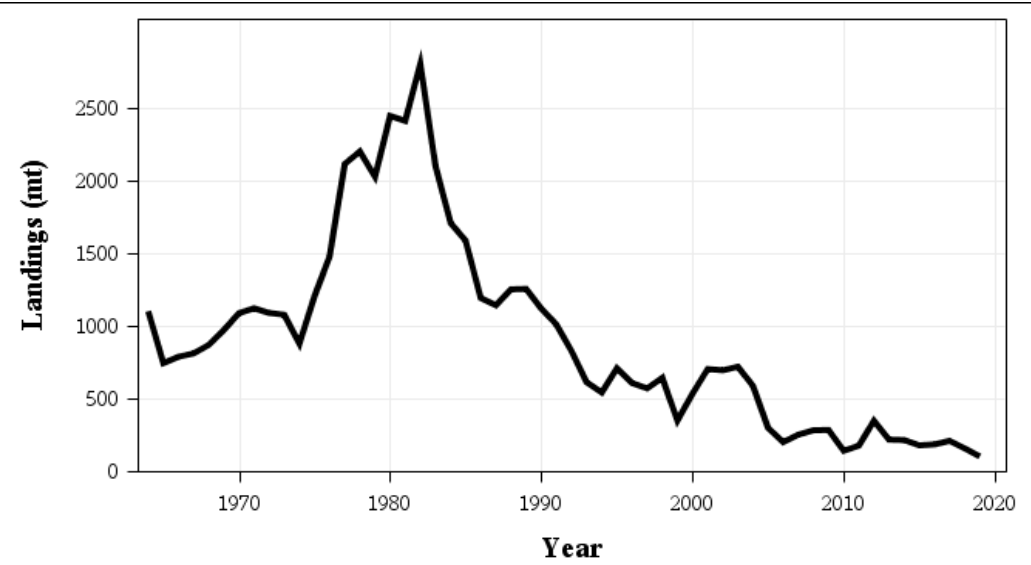


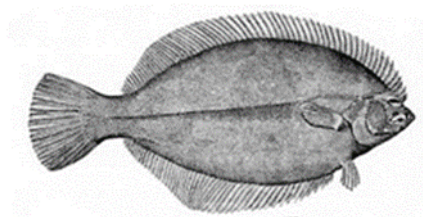
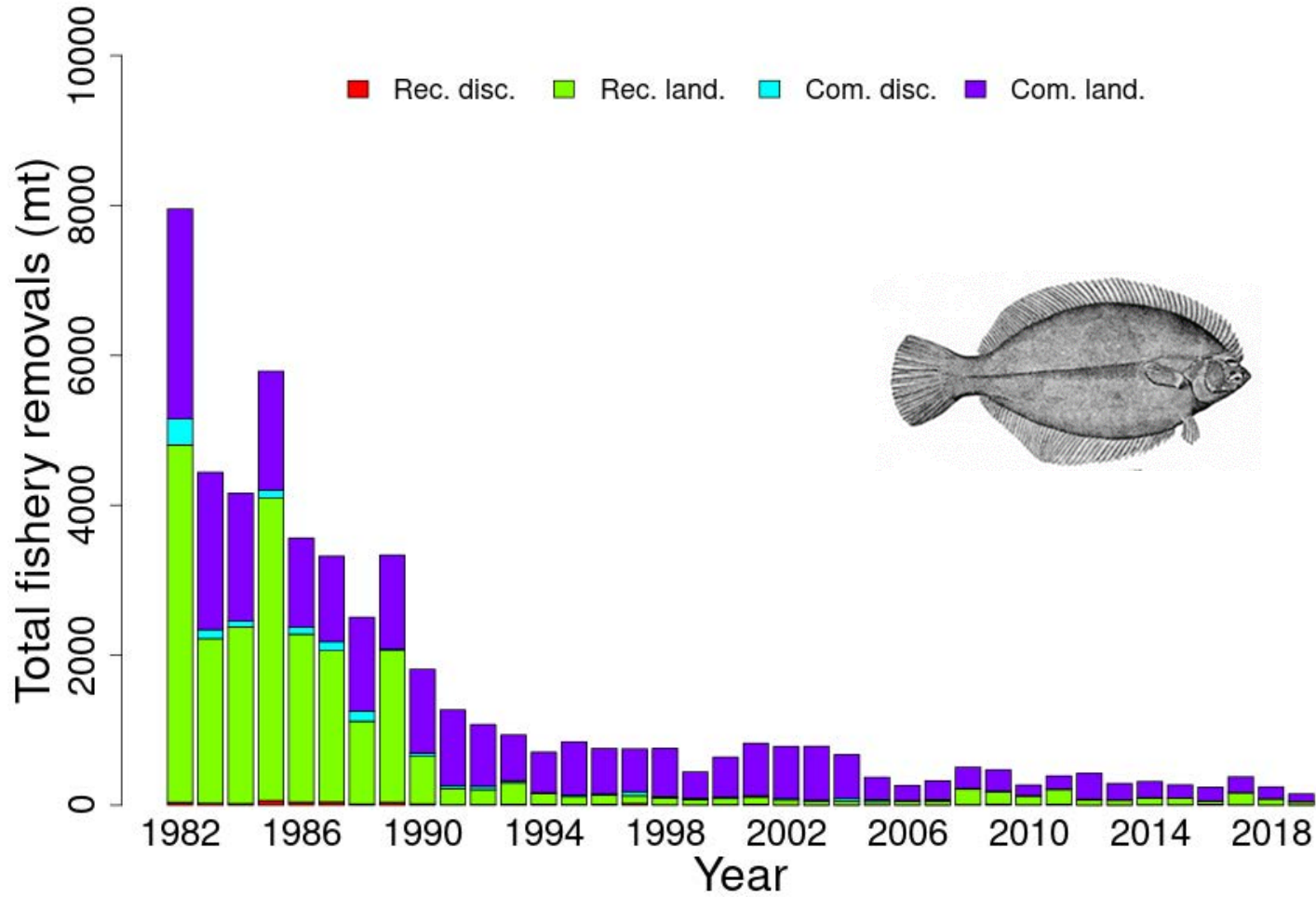
- Update trends in the NEFSC, MDMF, and MENH survey indices.
- Estimate 2009 to 2019 30+ cm survey area swept biomass for non-overlapping strata from the NEFSC, MDMF, and MENH surveys.
- Estimate 2009 to 2019 catch (commercial & recreational landing, recreational discards, large mesh trawl discards and gillnet discards).

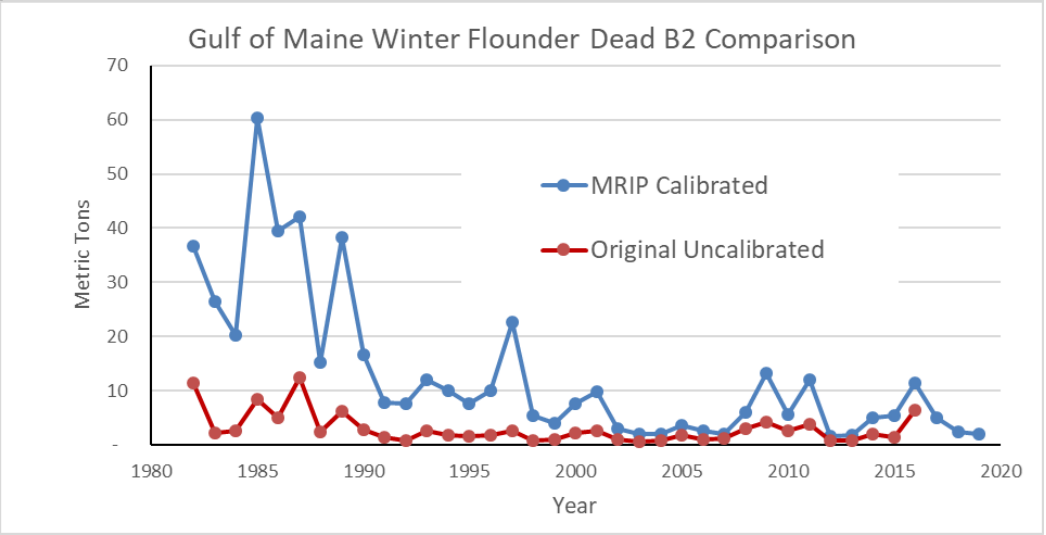
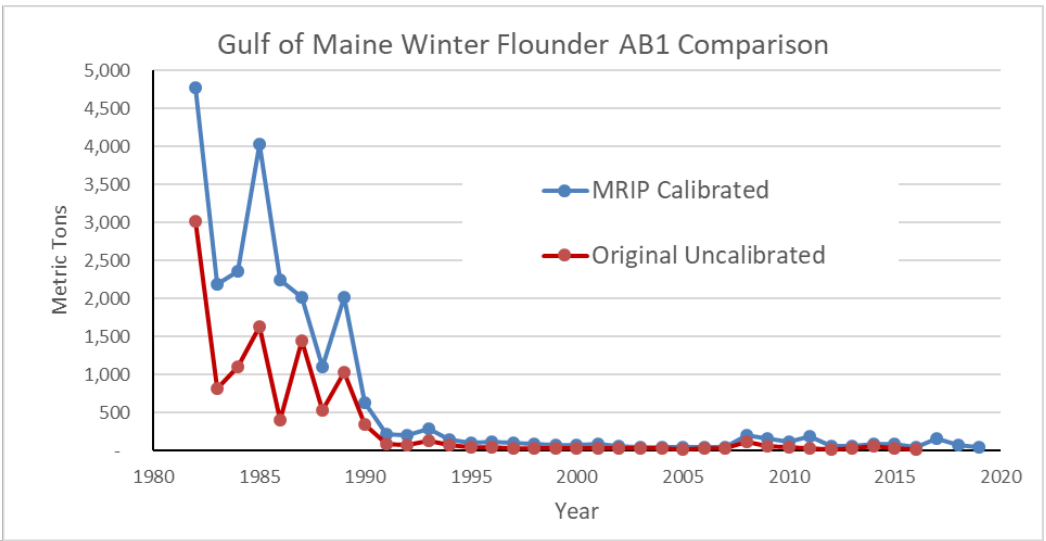


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TOR 1 Catch

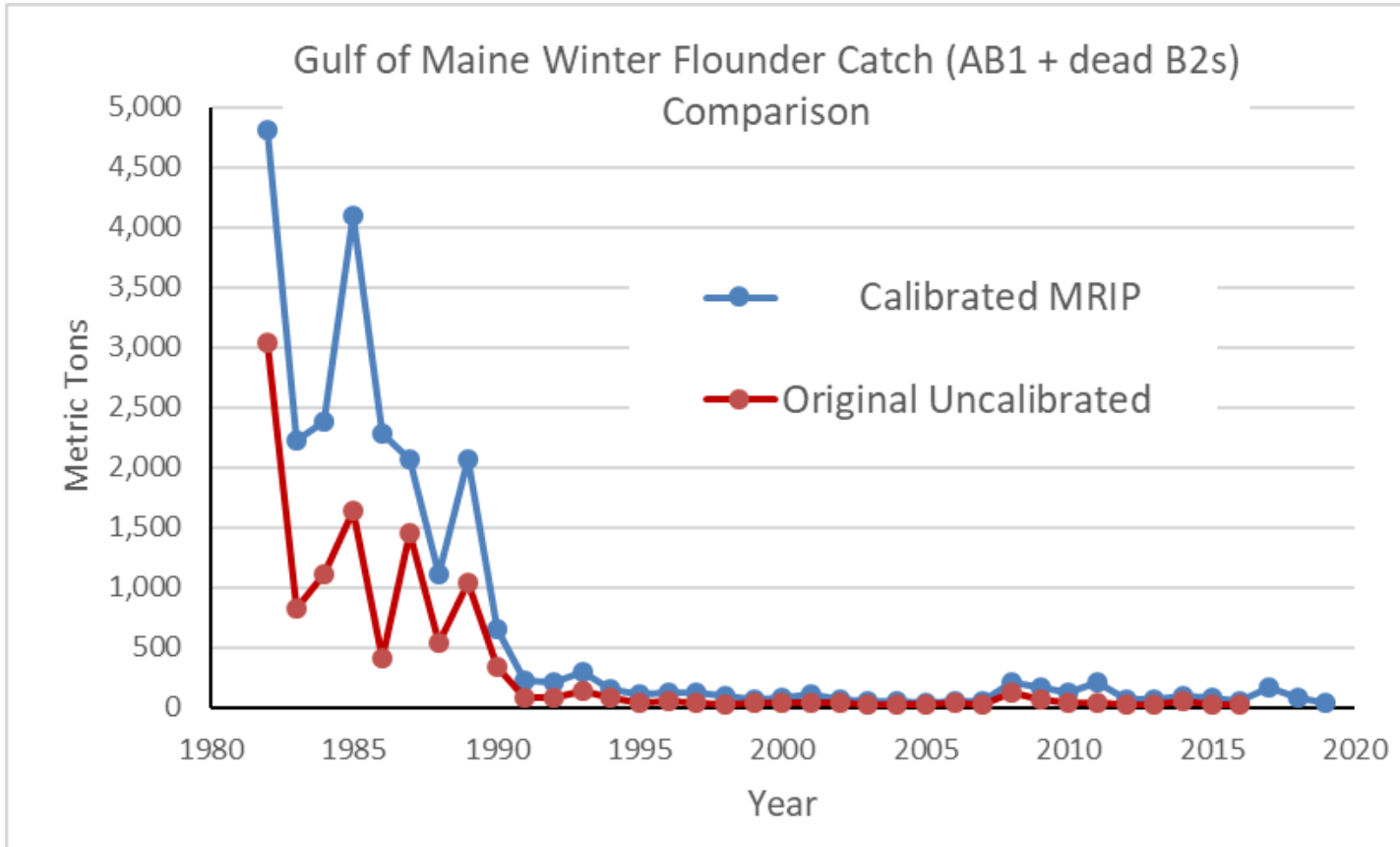






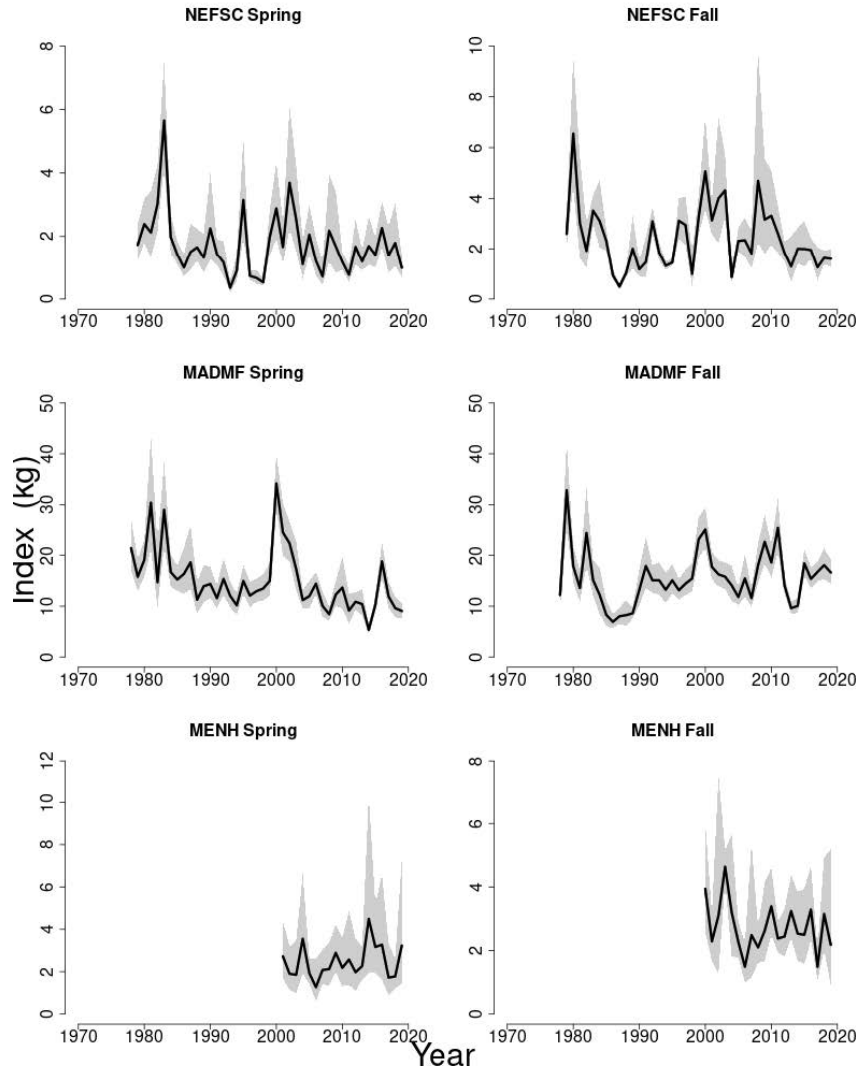
15 mortality rate
Assumed on B2s





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TOR 2 Surveys

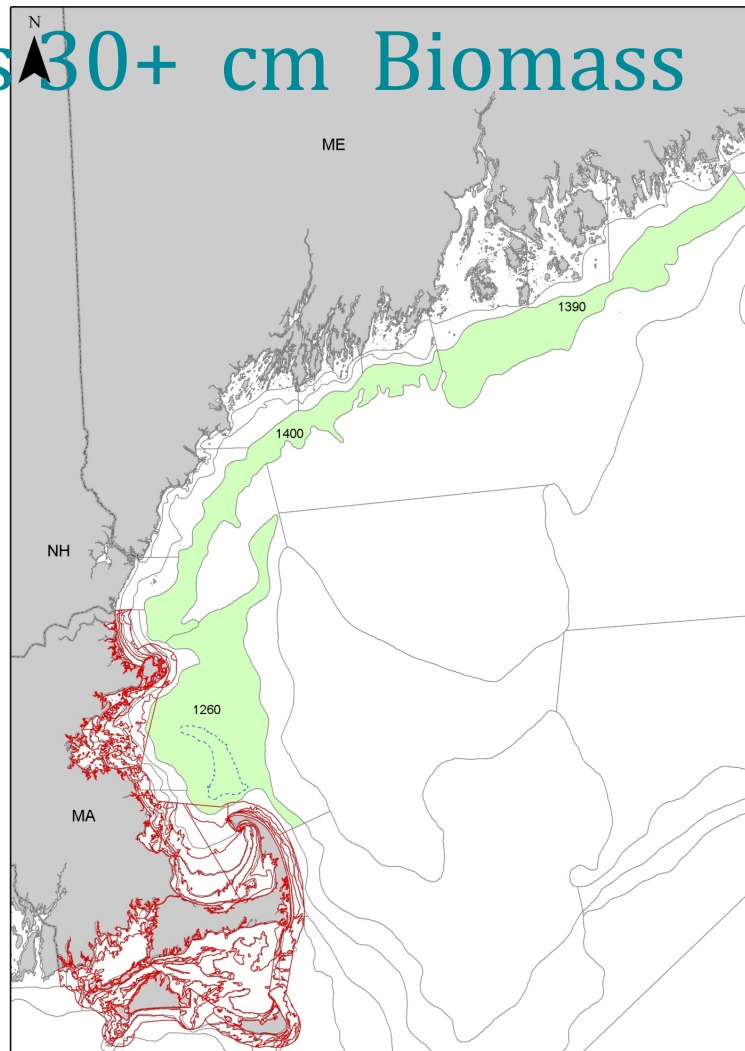
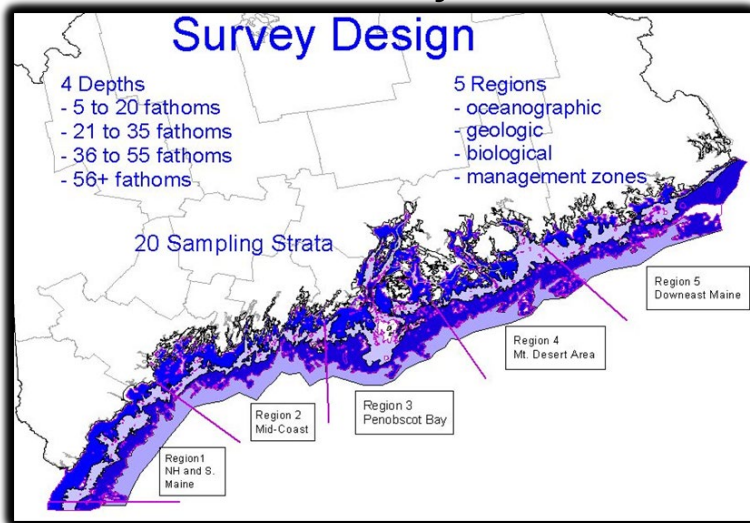


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Combined Surveys 30+ cm Biomass Estimate

2009-2019

30+ cm biomass from the NEFSC, MDMF and MENH surveys.



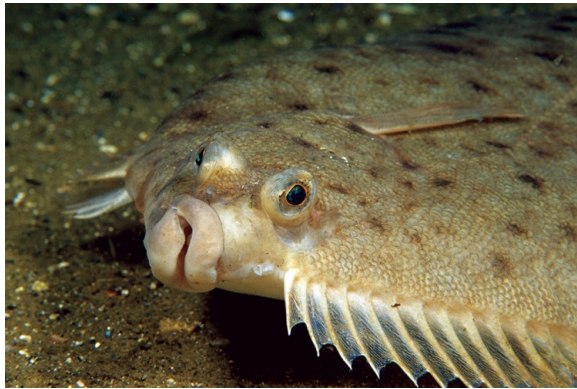
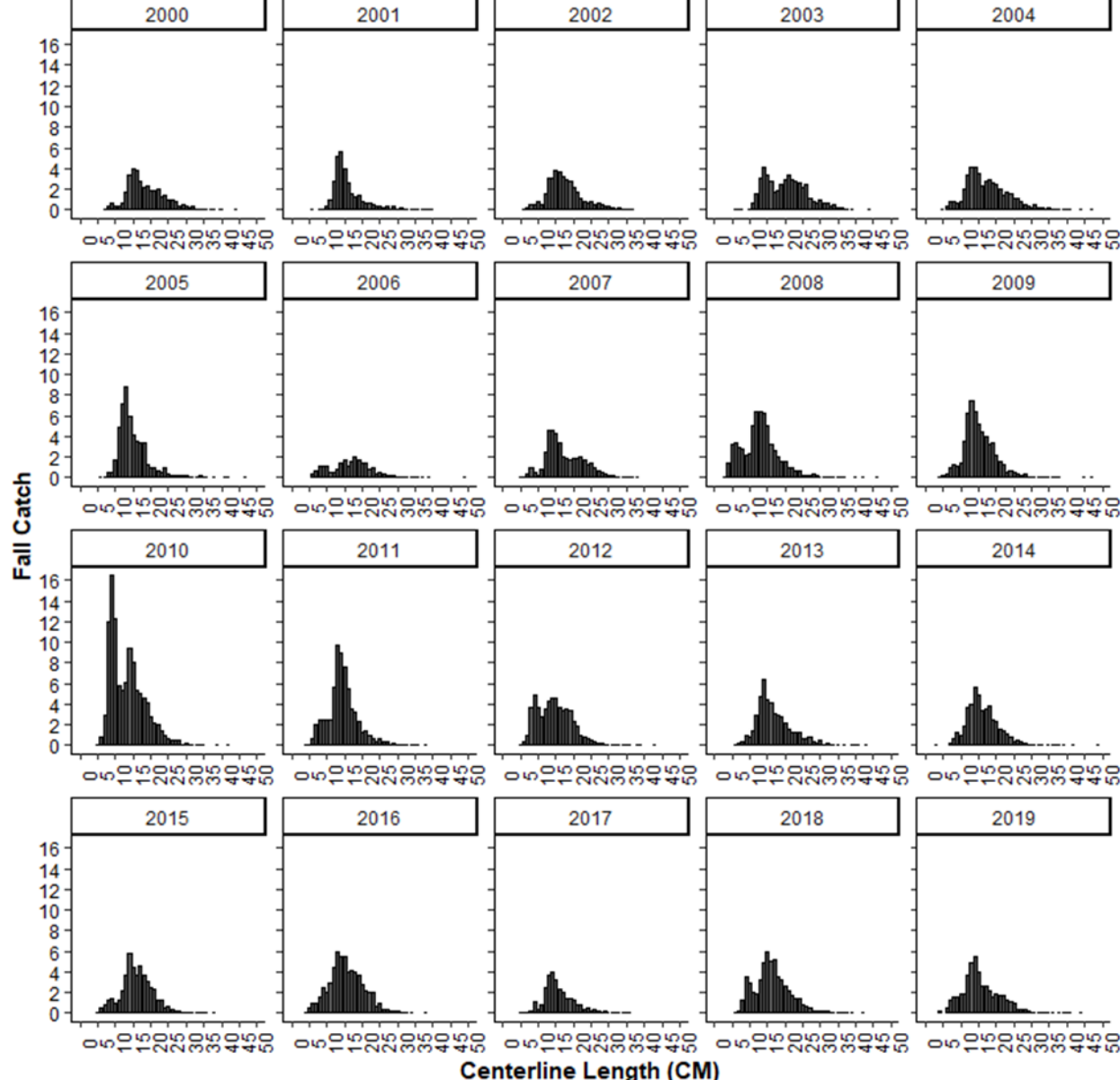


Table 7

	Combined Survey Estimate		
	NEFSC	MDMF	MENH
survey area (nm2)	2,990	309	3,475
Avg tow (wing area swept)	0.00700	0.00385	0.00462
Total area/tow footprint	427,143	80,343	752,154
Tow duration	20 min	20 min	20 min
Numbers per tow	34-65	80	35



MENH Survey Length Distributions



Gulf of Maine Winter Flounder

New Sources of Information

- Additional tows from the twin trawl experiment for revised estimates of Q (Miller et al. 2020).
- New MRIP recreational catch estimates. However, catch data will not affect the catch advice.

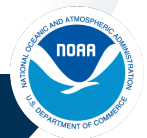
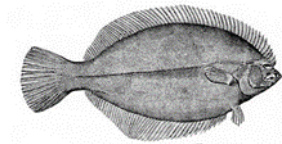


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Gulf of Maine Winter Flounder Assessment

30+ cm Survey Area Swept Biomass Estimate.

- Exploitable Biomass = 30+ cm biomass index per tow x total survey area / tow footprint x q
- Exploitation rate = catch / 30+ cm biomass
- Overfishing BRPs are based on $F_{40\%}$ from length based YPR with 30 cm knife edge selectivity.



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TOR 4 BRPs

Length based YPR from SARC 52

$m=0.3$

FMSY = F40% = 0.31

Exploitation rate, EMSY = 0.23

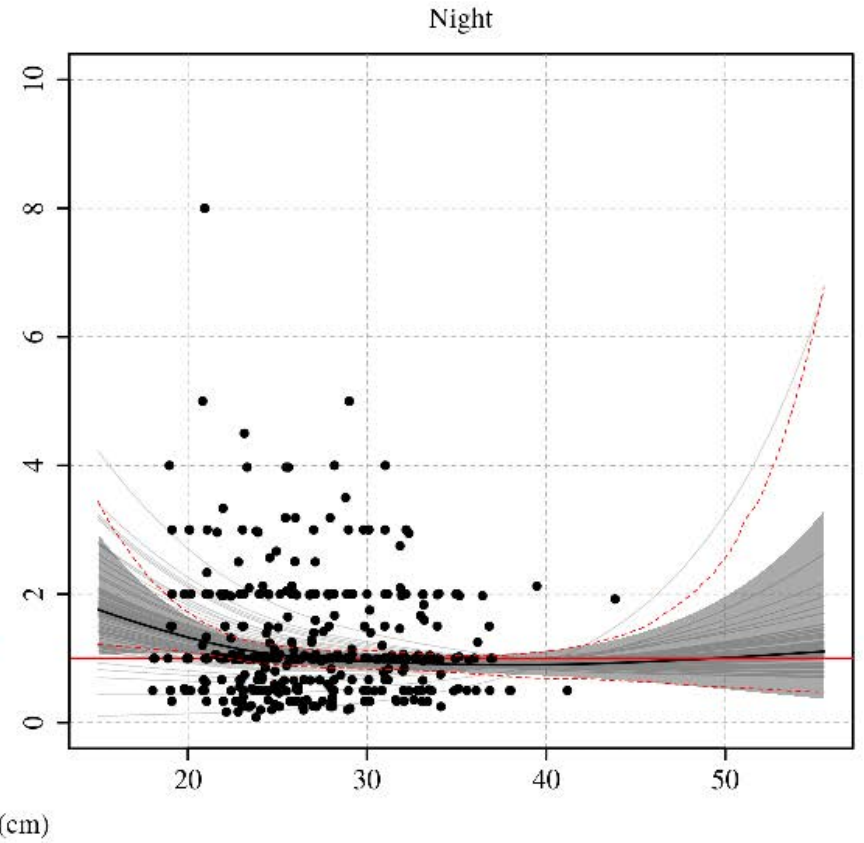
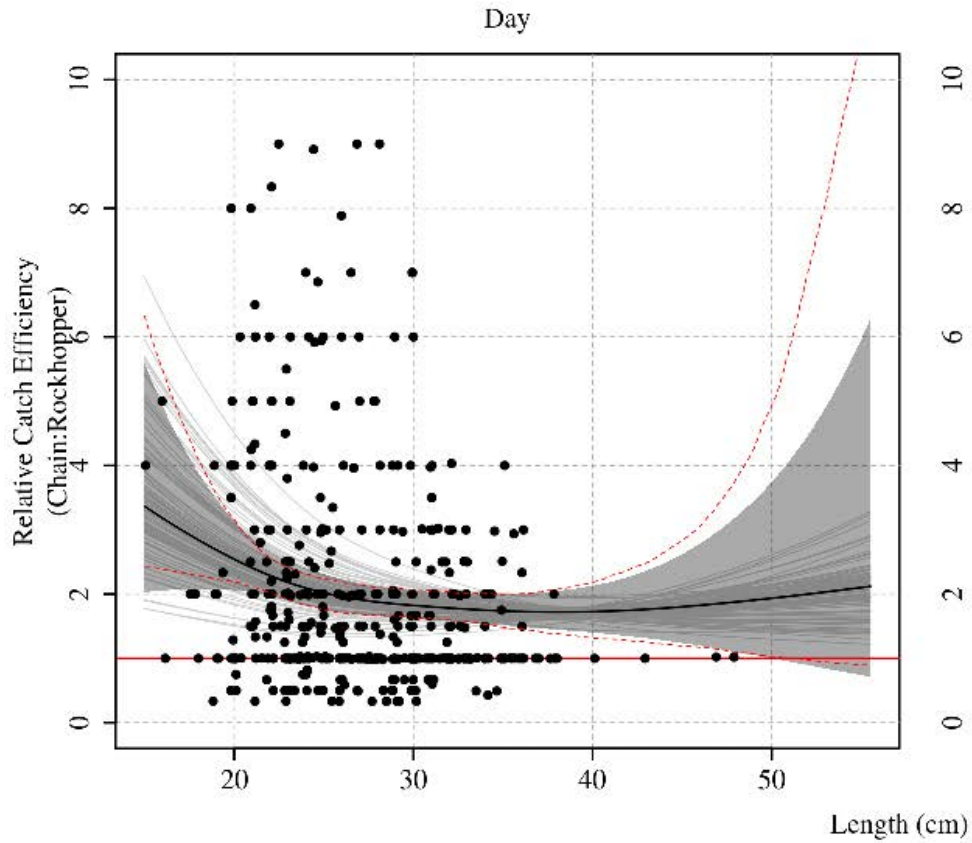
75%FMSY = 0.24

Exploitation rate, 75%EMSY = 0.17

Knife edge selectivity at 30 cm



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Implied GOM 30+cm winter flounder efficiency



Table 7. Implicit annual and seasonal efficiencies of unconverted swept area biomass estimates as measured by the ratio to the chainsweep-based estimates for winter flounder stocks in Table 4.

Year	GB winter flounder		GOM winter flounder		SNE winter flounder	
	Spring	Fall	Spring	Fall	Spring	Fall
2009	0.61	0.81	0.59	0.88	0.65	0.76
2010	0.66	0.71	0.60	0.66	0.73	0.66
2011	0.68	0.73	0.58	0.68	0.72	0.90
2012	0.75	0.62	0.70	0.76	0.91	1.00
2013	0.68	0.92	0.62	0.68	0.78	0.79
2014	0.79	0.66	0.58	0.68	0.65	0.84
2015	0.71	0.78	0.67	0.63	0.70	0.90
2016	0.75	0.61	0.65	0.70	0.64	0.79
2017	0.62	0.63	0.69	0.66	0.79	0.60
2018	0.55	0.88	0.54	0.66	0.72	0.82
2019	0.65	0.89	0.63	0.81	0.76	0.78



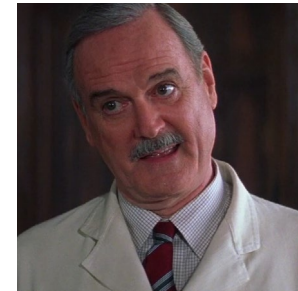
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Q (Wing Spread Efficiency)

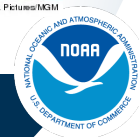
Plan-B in SARC 52 provided a sensitivity of Q for the 30+ biomass estimates (0.6, 0.8, & 1.0). The SARC 52 review panel used an assumed $Q=0.6$.

The sweep experiment estimated an average Q of 0.866 from 2009-2016 for the GOM winter Flounder NEFSC fall survey.

Sweep experiment re-estimated an average Q of 0.71 for the fall and 0.62 for the spring from 2009-2019.



Columbia Pictures/MGM

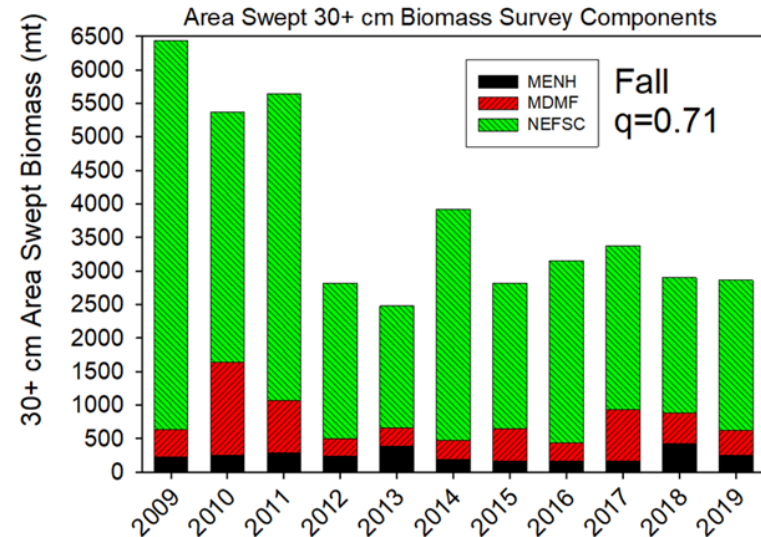
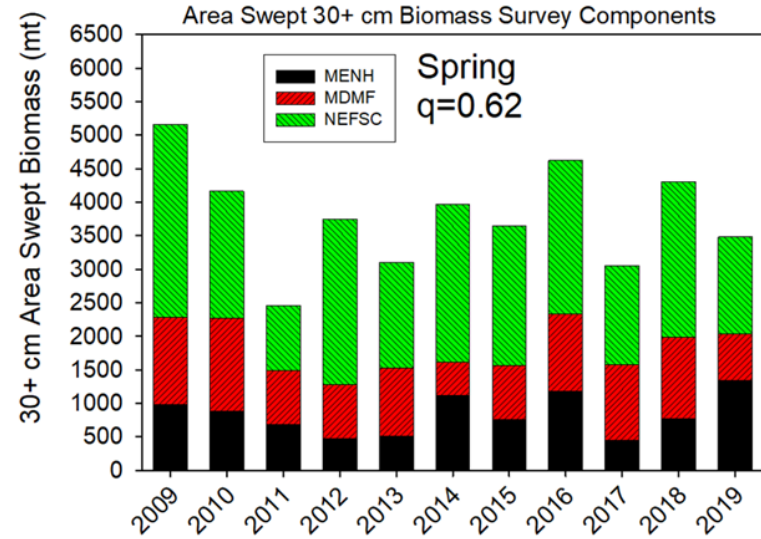
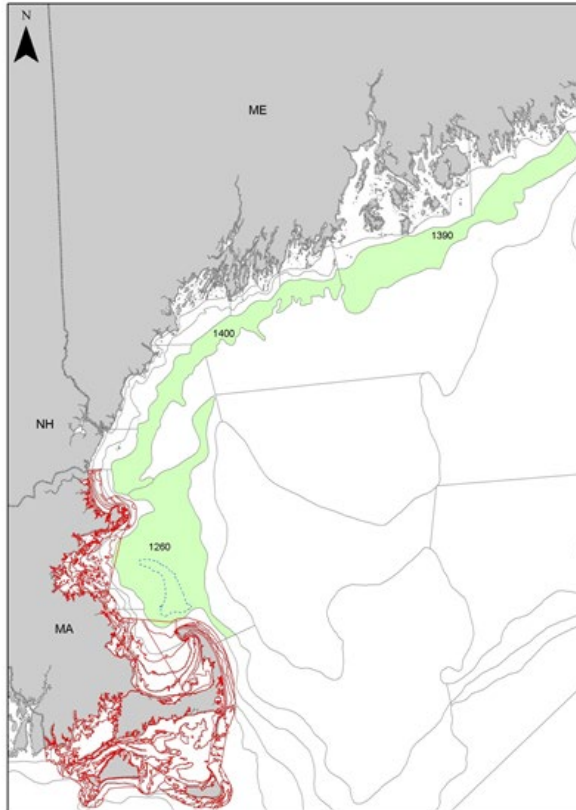


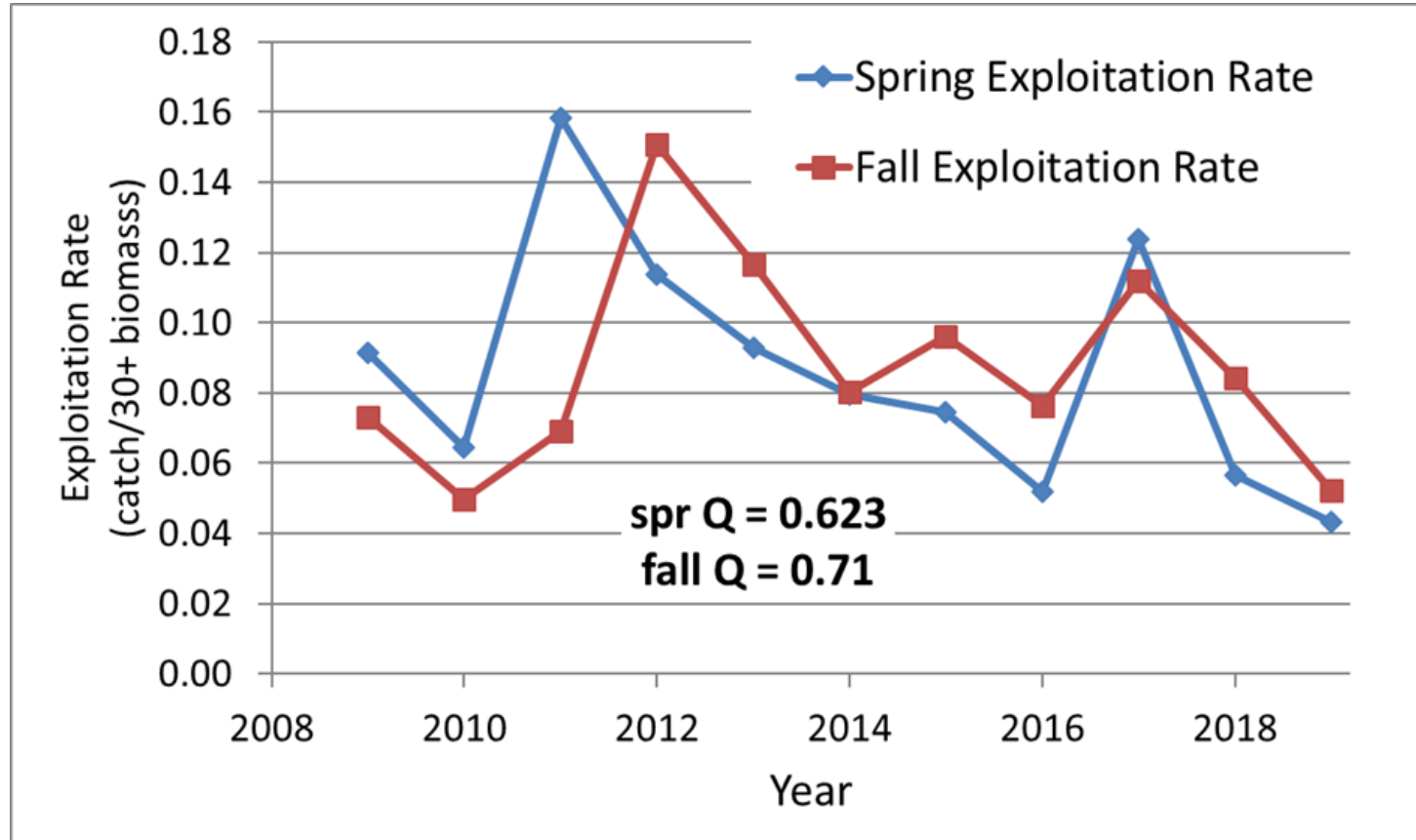
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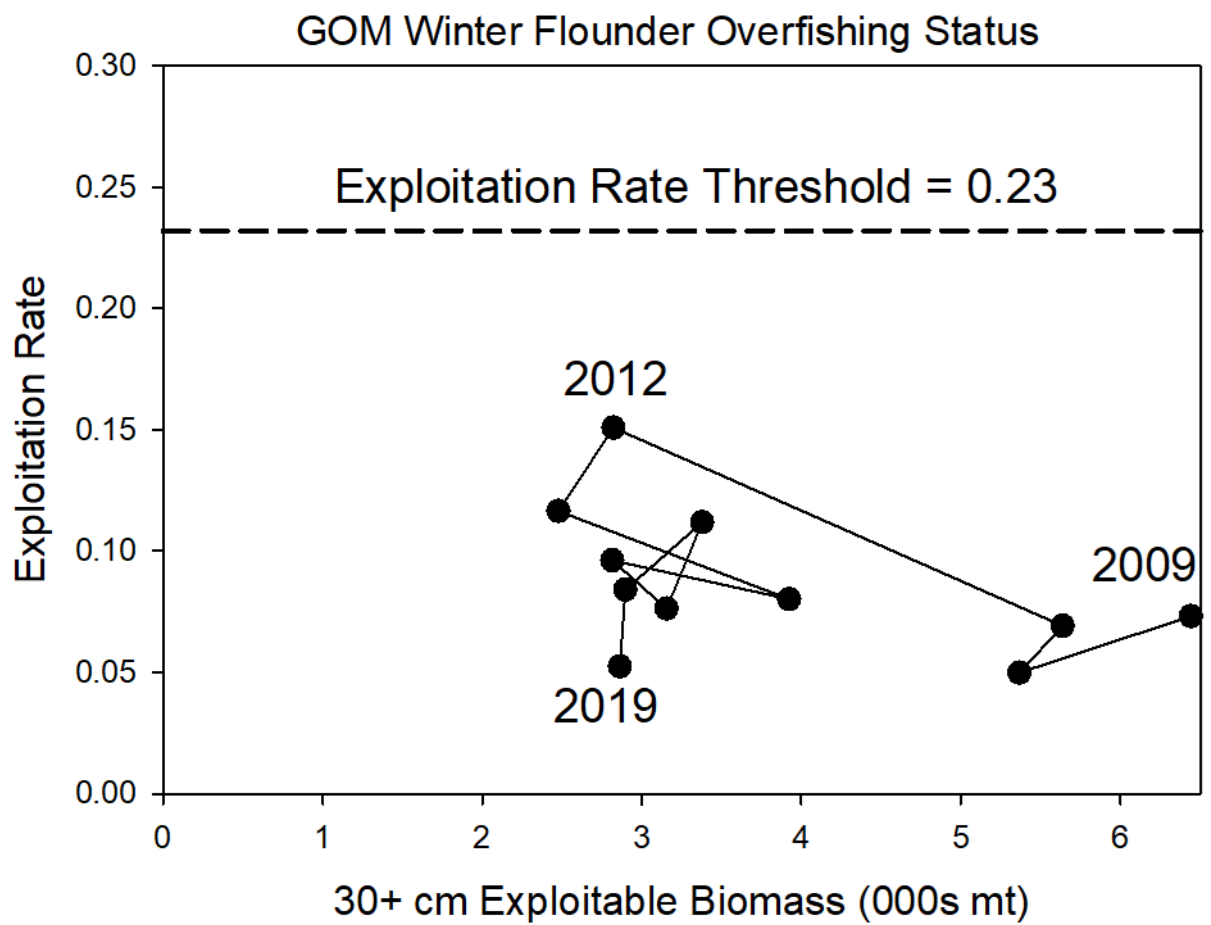
TOR 3 F Stock Biomass

30+ cm biomass from the NEFSC, MDMF and MENH surveys.

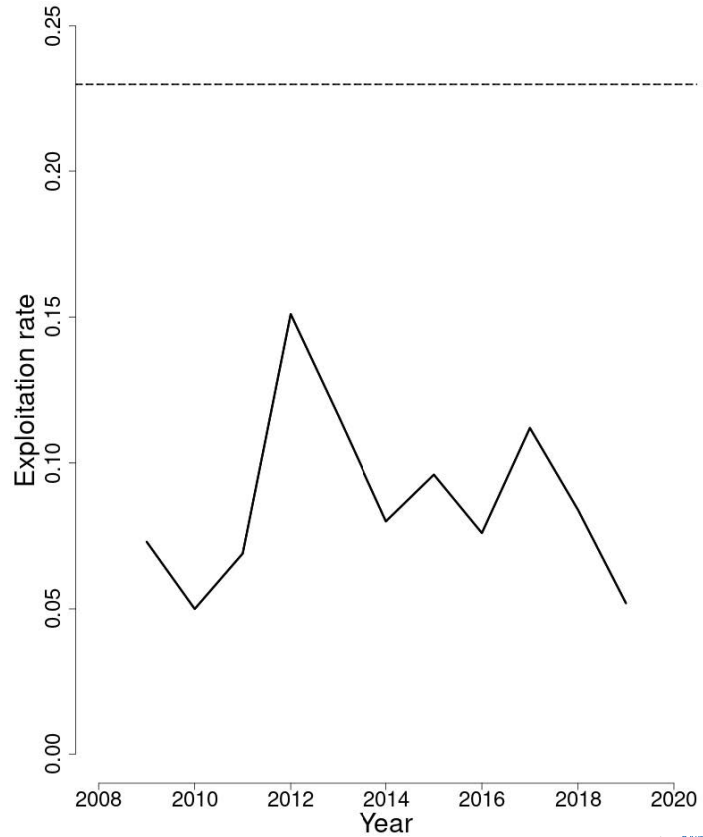
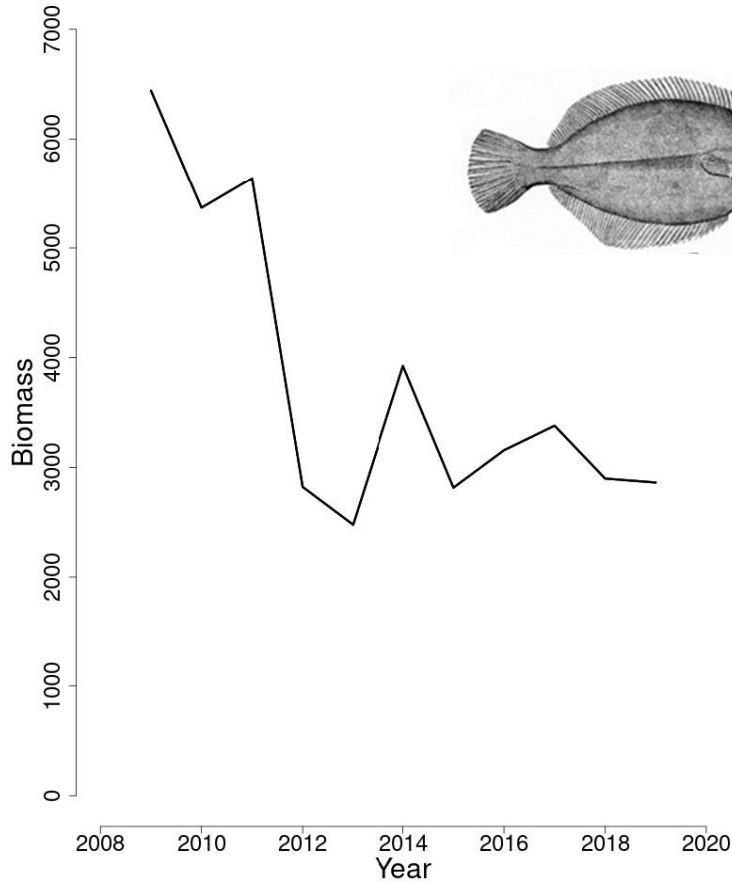




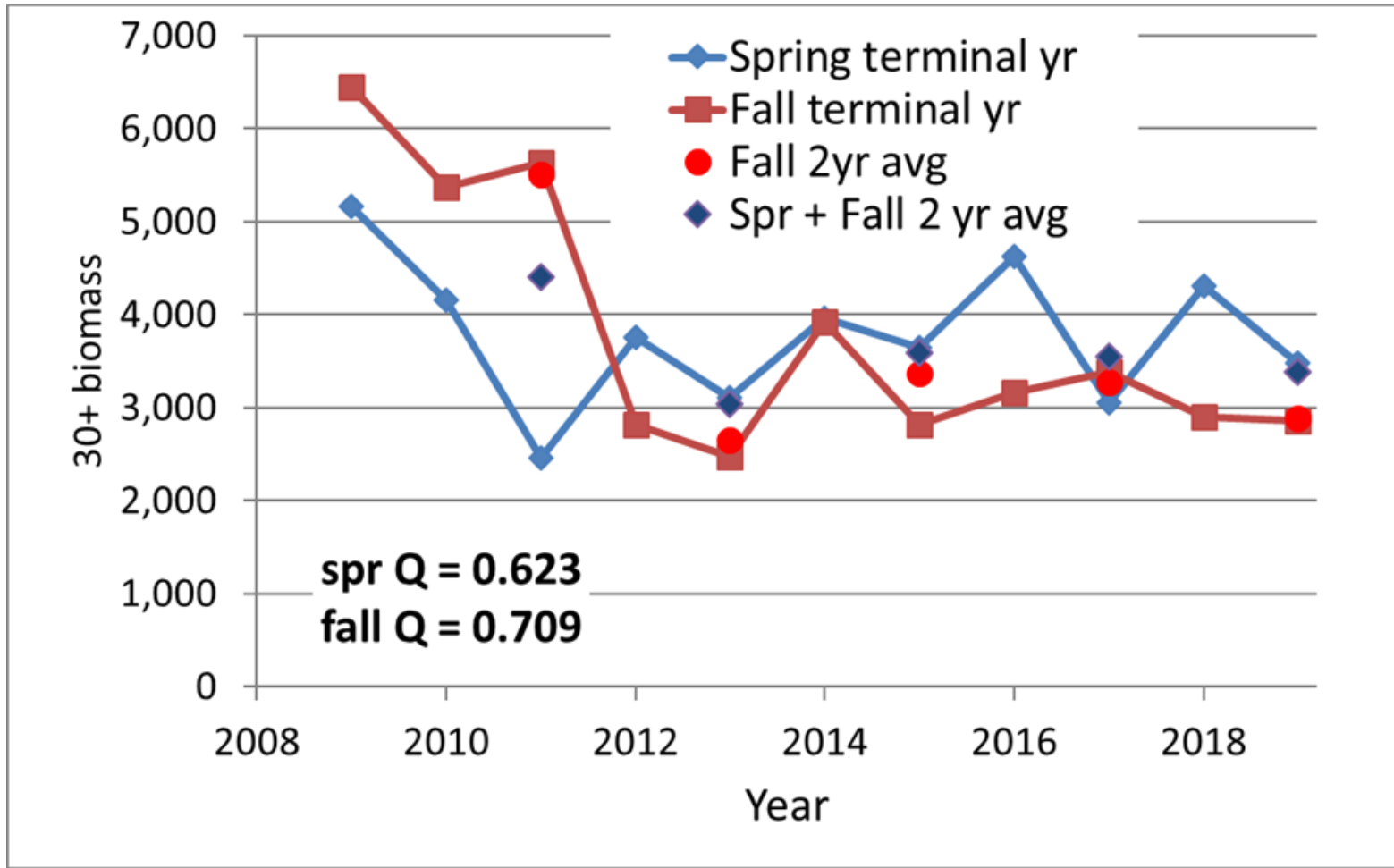
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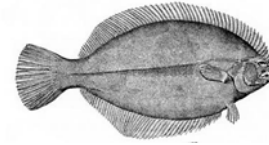


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TOR 5 Projections

Gulf of Maine Winter Flounder

Stock Projection Methodology



- $ABC = 75\%E_{40} \times 30\text{-cm biomass from fall surveys.}$

I propose the change to using two years of information from fall surveys for the biomass estimate and catch advice. This should stabilize the estimates and use a greater amount of new information available for the planned two year specification cycle.



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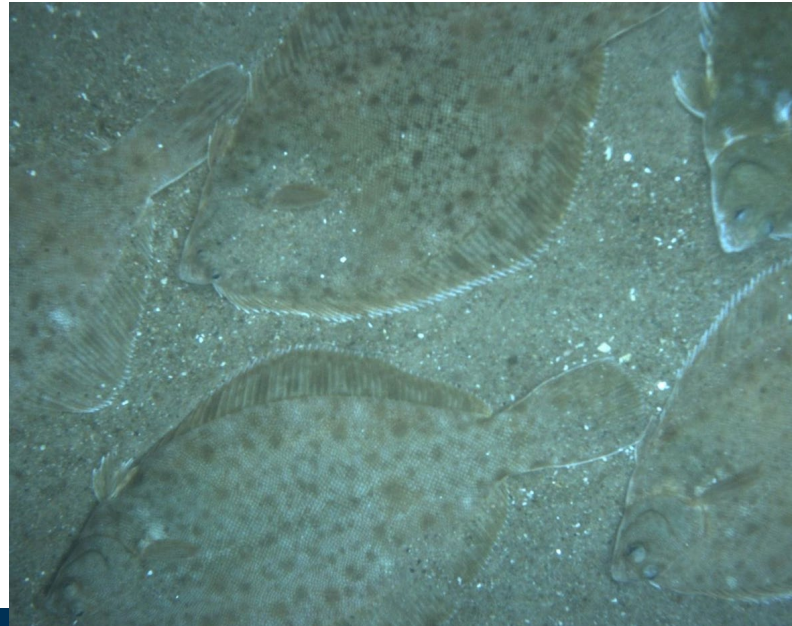
Sources of Uncertainty

- Biomass and exploitation rate estimates are sensitive to the survey q assumption. This 2020 management track assessment does incorporate the use of re-estimated q s from 2009-2019 from the sweep study. Additional efficiency studies on federal and state surveys should further reduce the uncertainty around q and the tow footprint.
- Stabilizing the catch advice may also be desired and could be obtained through the averaging of the area-swept fall survey estimates.



Concerns

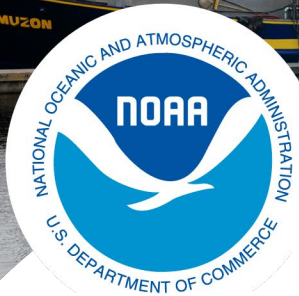
The general lack of a response in the survey 30+ cm biomass is a source of concern with catches remaining far below the overfishing limit. Unknown biomass status with this method remains a concern.



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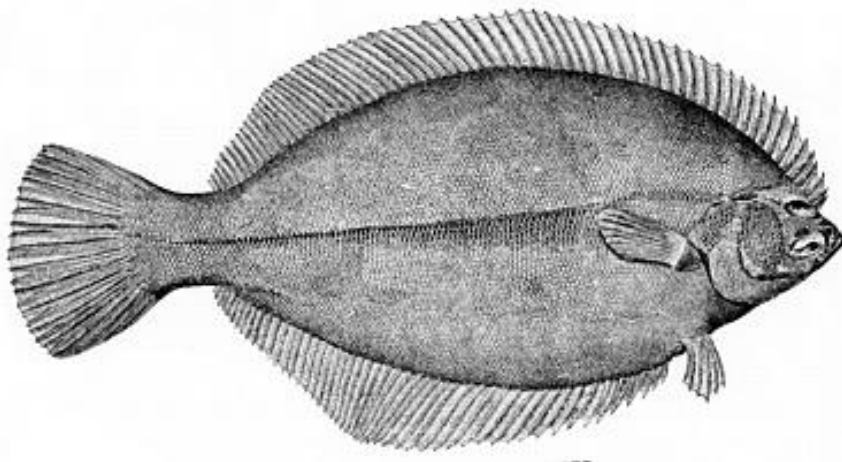
Questions?



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NEFSC

ASMFC Winter Flounder Board Meeting

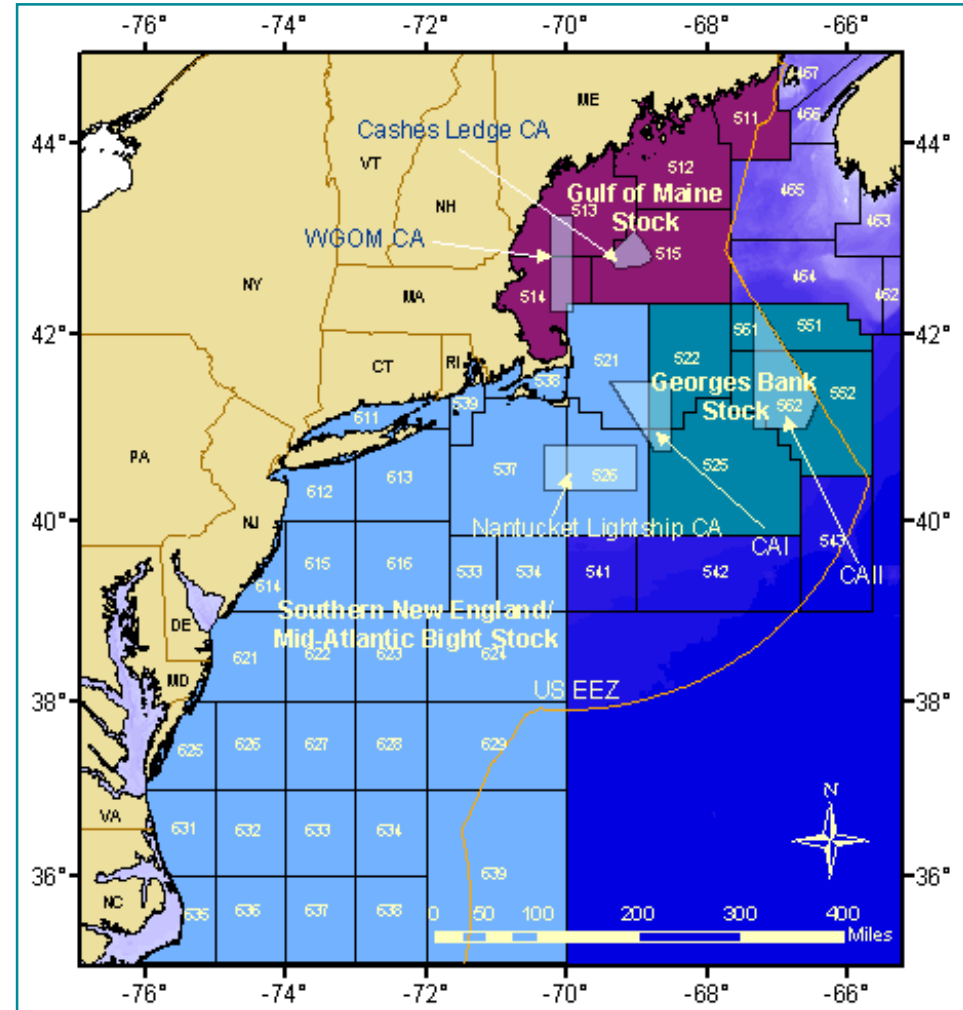
Southern New England Winter Flounder
Pseudopleuronectes americanus



October 19th 2020

Southern New England Winter Flounder

- Last assessment: 2017 operational groundfish
- Statistical catch-at-age model: ASAP ages 1-7+, years 1981-2016
- Reference points: $F_{MSY} = 0.34$, $SSB_{MSY} = 24,687$ MT
- Stock status: overfished ($SSB_{2016} = 4,360$ MT), overfishing not occurring ($F_{2016} = 0.21$)

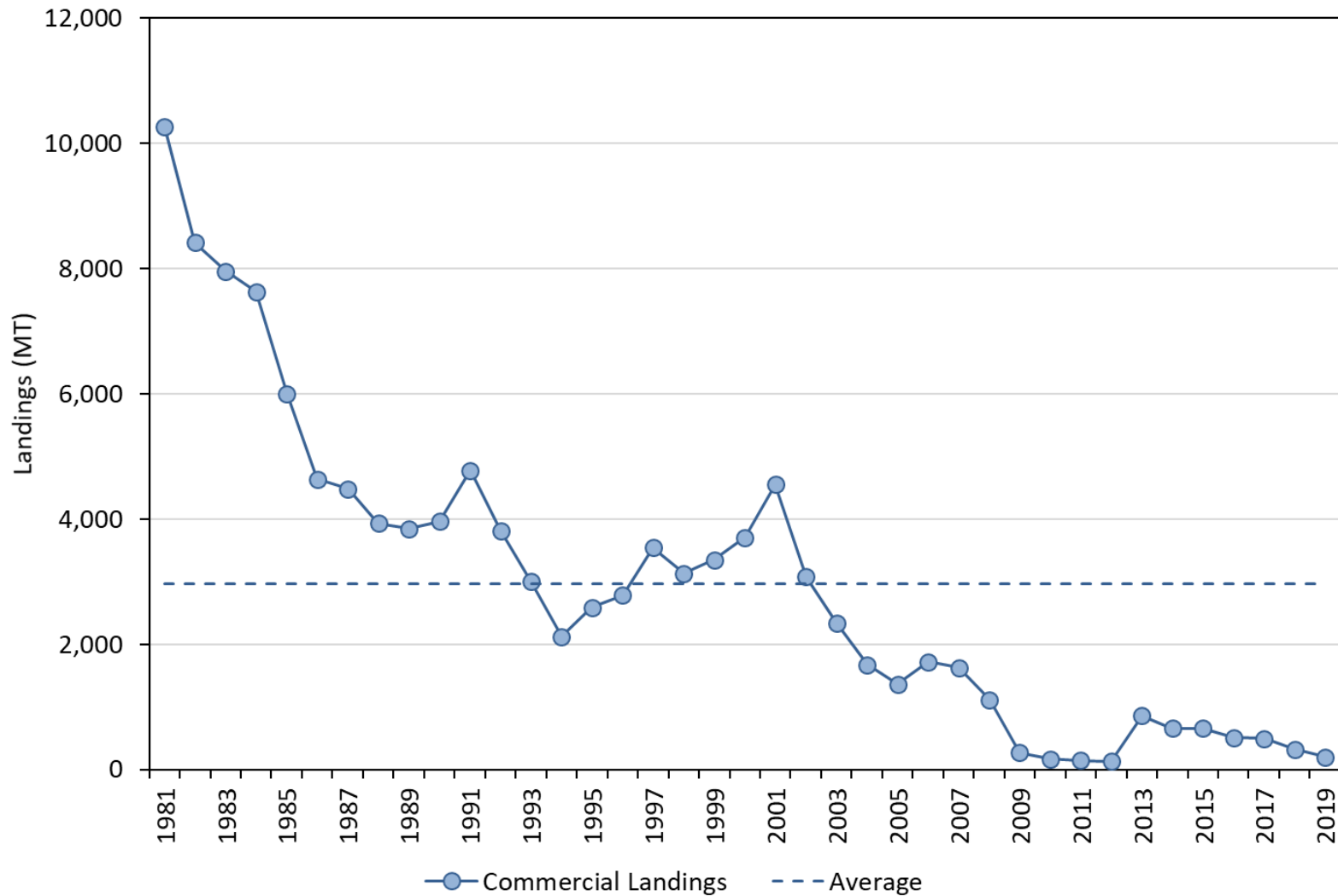


TOR 1: Estimate catch from all sources including landings and discards

Fishery Dependent: 1981-2019 ages 1-7+

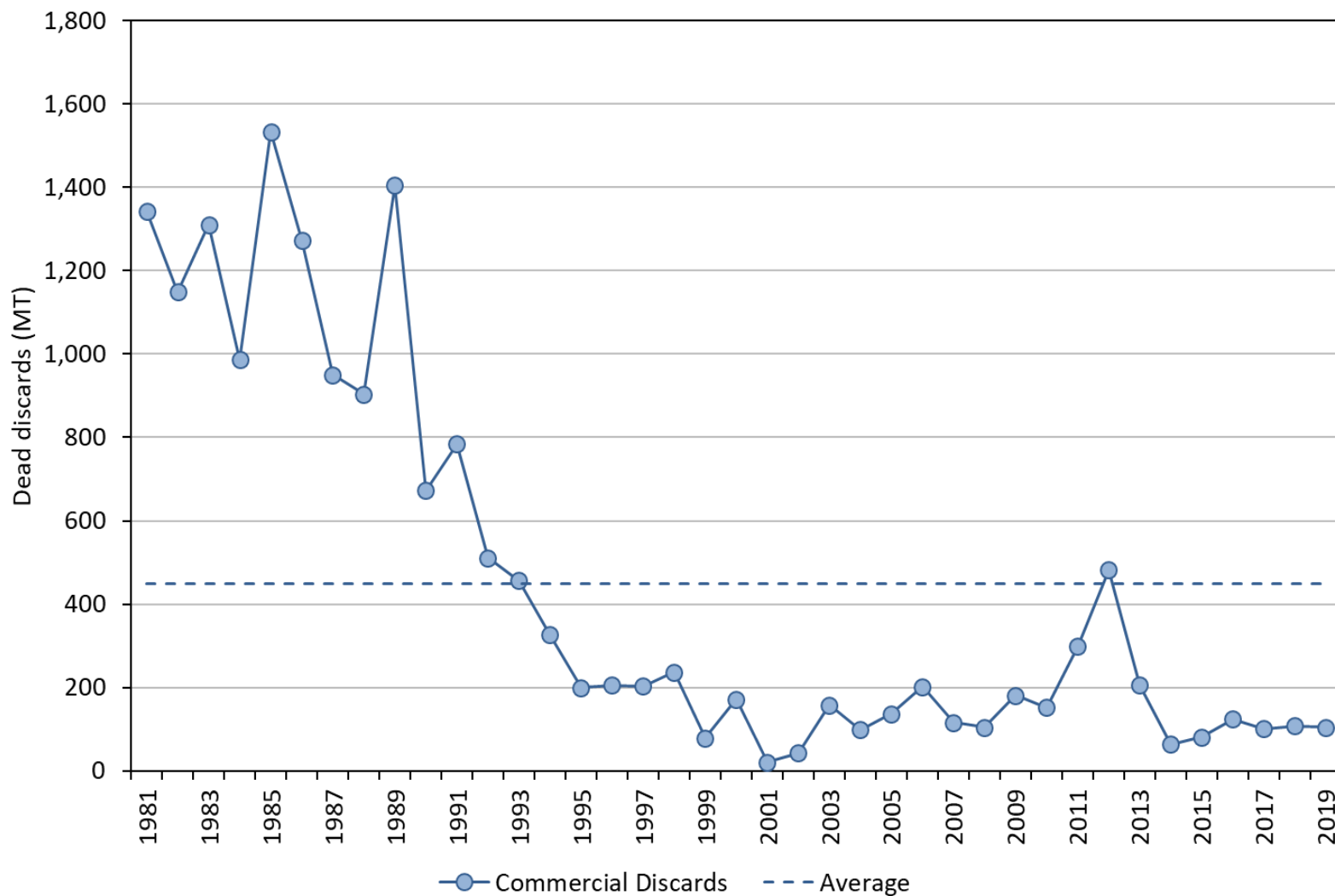
- Commercial Landings: AA Tables, market category by quarter or half year
- Commercial Discards: SBRM
- Recreational Landings: MRIP calibrated (A+B1)
- Recreational Discards: MRIP calibrated (B2)

SNEMA WFL Commercial Landings 1981-2019



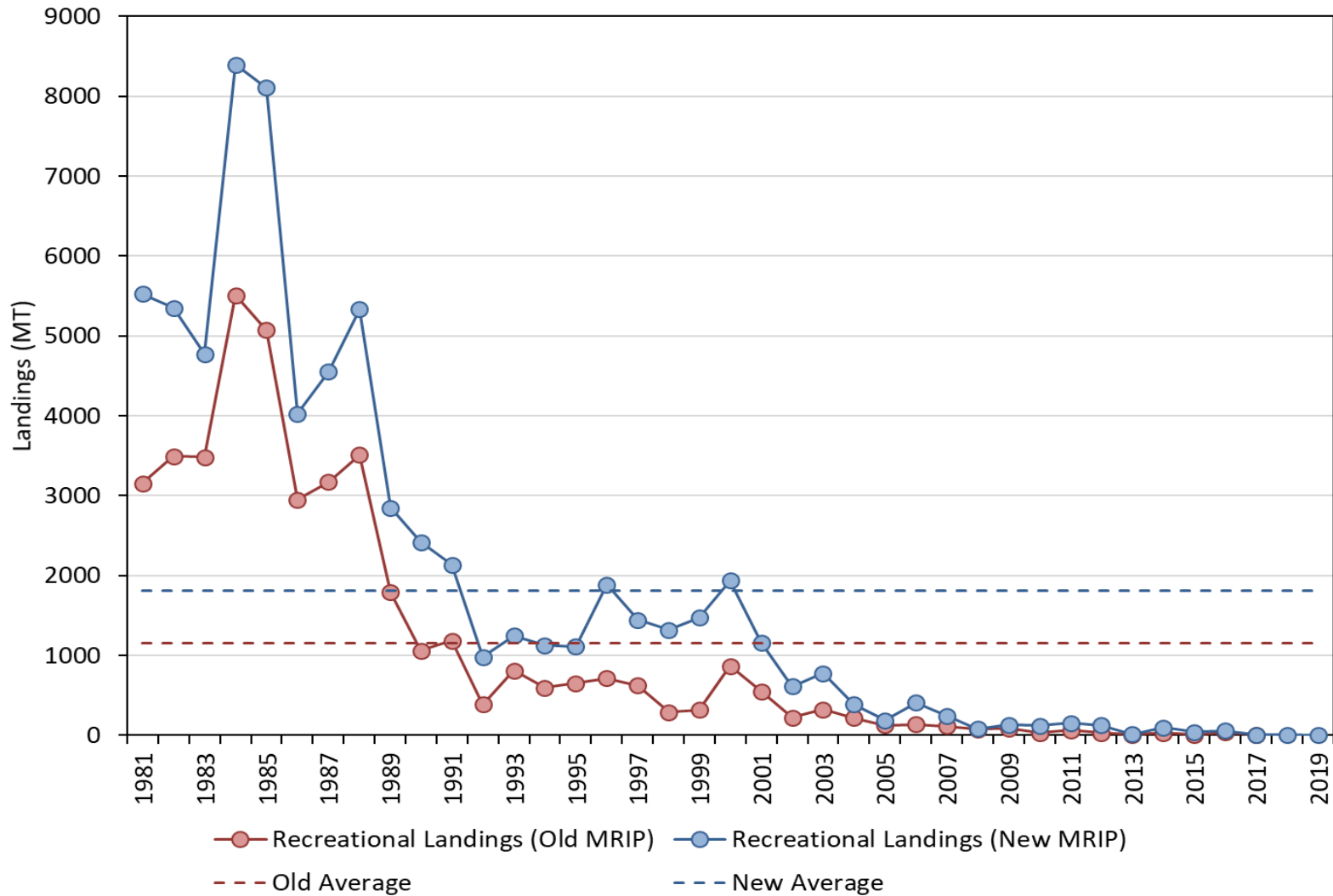
- 2019 landings were 202 MT, time-series average = 2,973 MT

SNEMA WFL Commercial Discards (50% mortality) 1981-2019



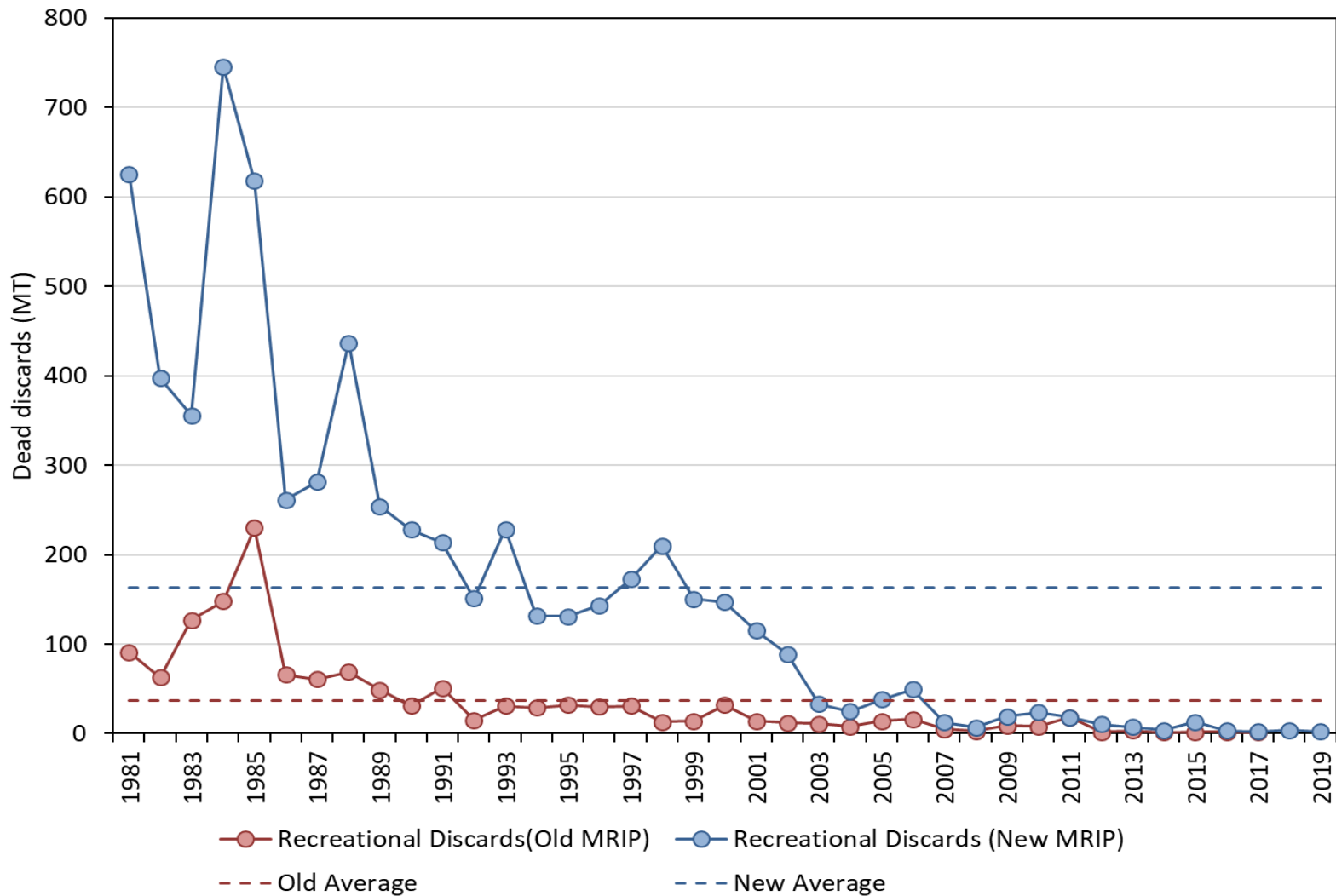
- 2019 commercial discards were 105 MT, time-series average = 448 MT

SNEMA WFL Recreational Landings 1981-2019



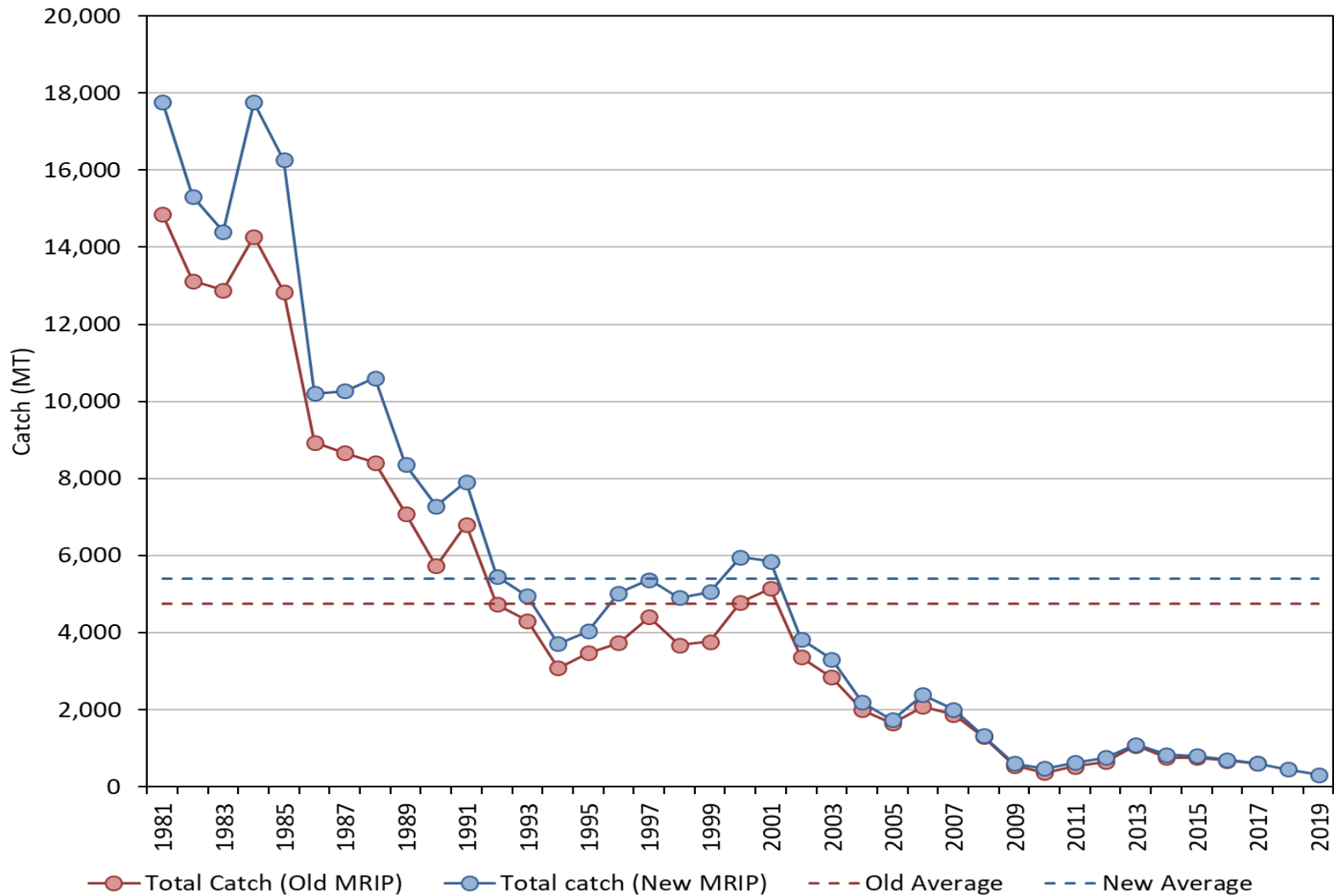
- 2019 recreational landings were 0.5 MT, time-series average = 1,811 MT (Old = 1,158 MT)

SNEMA WFL Recreational Discards 1981-2019



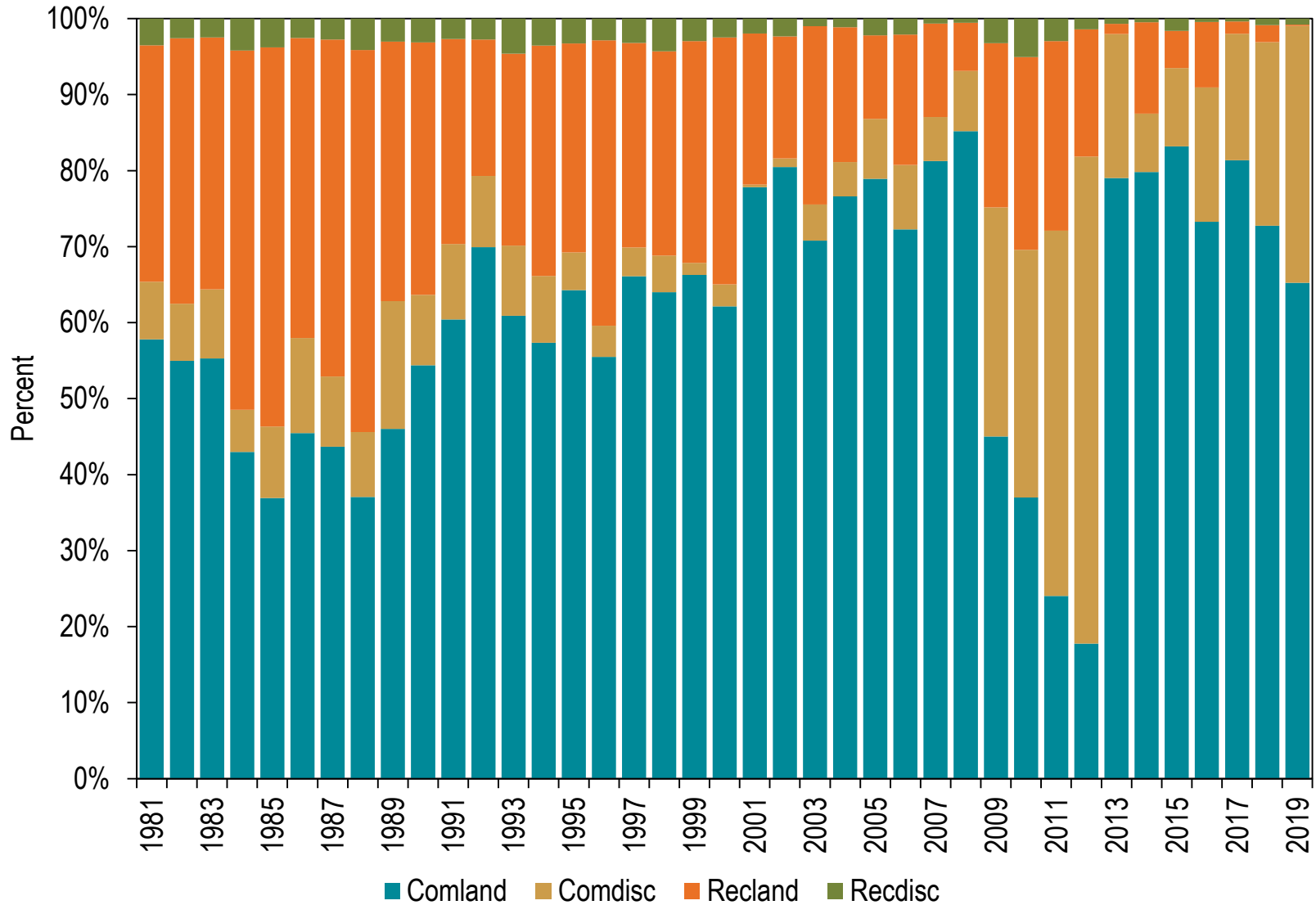
- 2019 recreational discards were 2.4 MT, time-series average = 163 MT (Old = 37 MT)

SNEMA WFL Total catch 1981-2019



- 2019 Total catch was 310 MT, time-series average = 5,396 MT (Old = 4,750 MT)

SNEMA WFL Total catch components 1981-2019

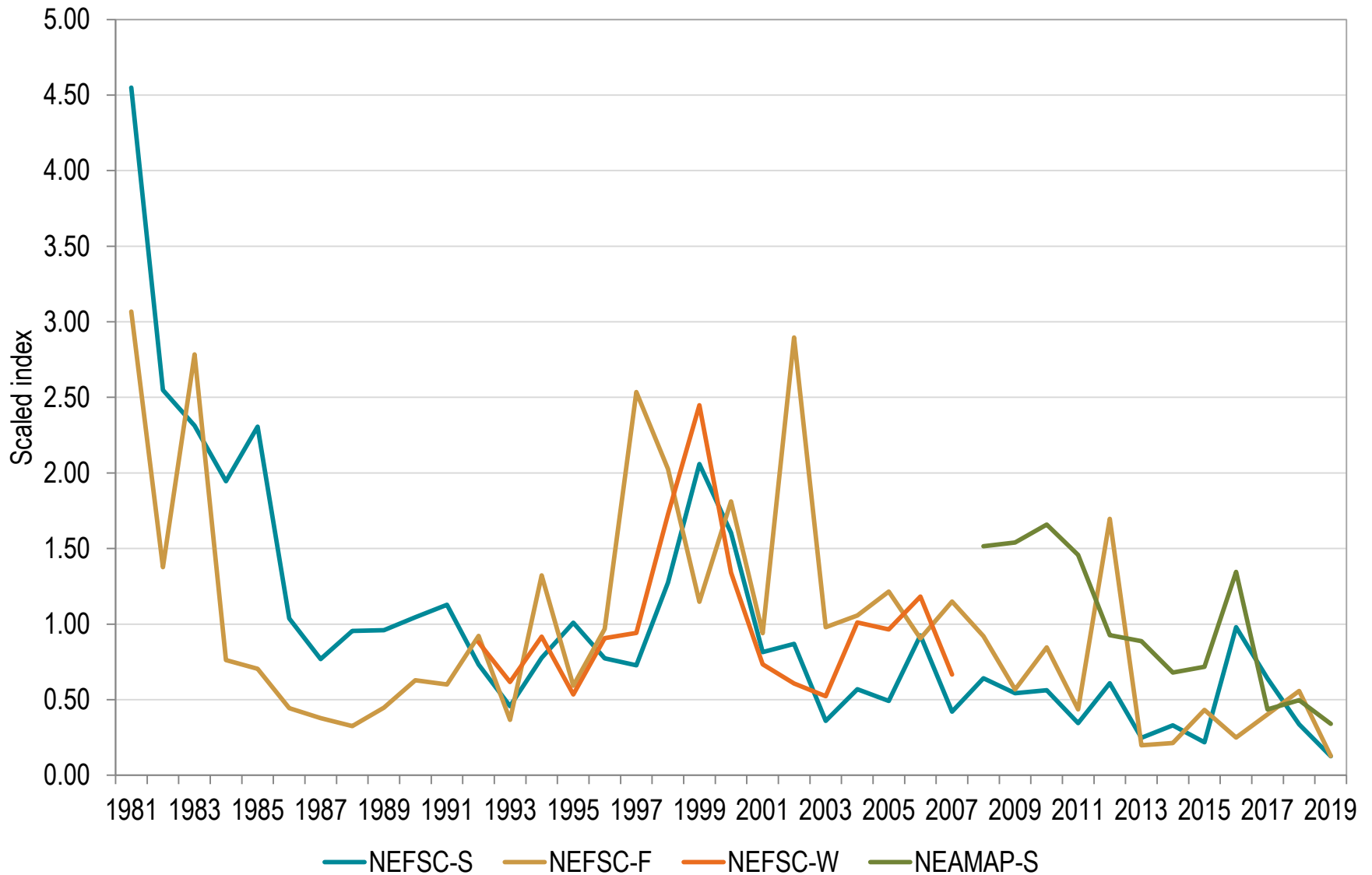


TOR 2: Evaluate indices used in the assessment

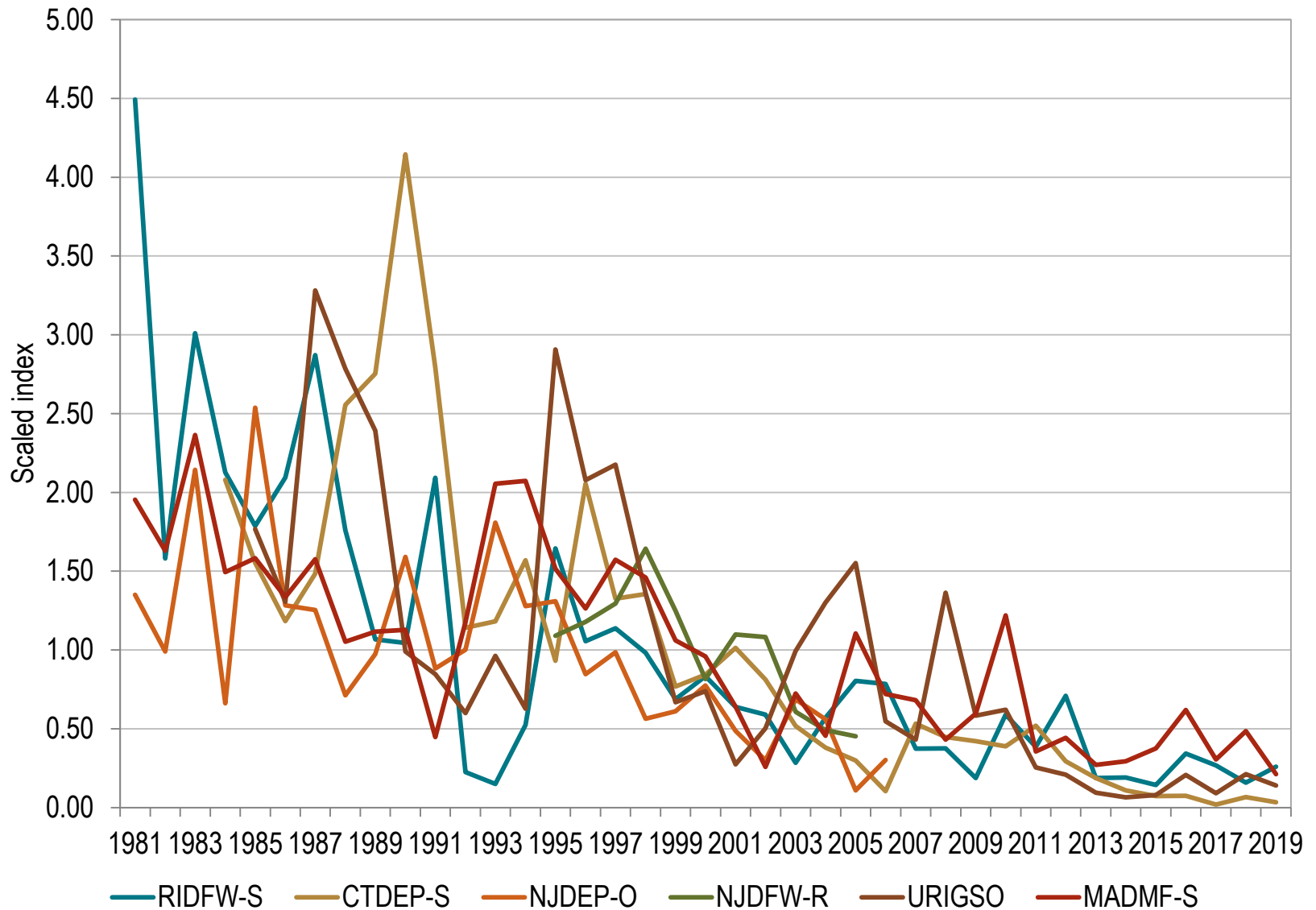
Fishery Independent: 1981-2019 ages 0-7+

- NEFSC winter, spring, and fall
- NEAMAP spring
- MADMF spring
- RIDMF spring
- CTDEP spring
- NJDFW ocean and river
- URIGSO
- Recruits: MADMF, CTDEP

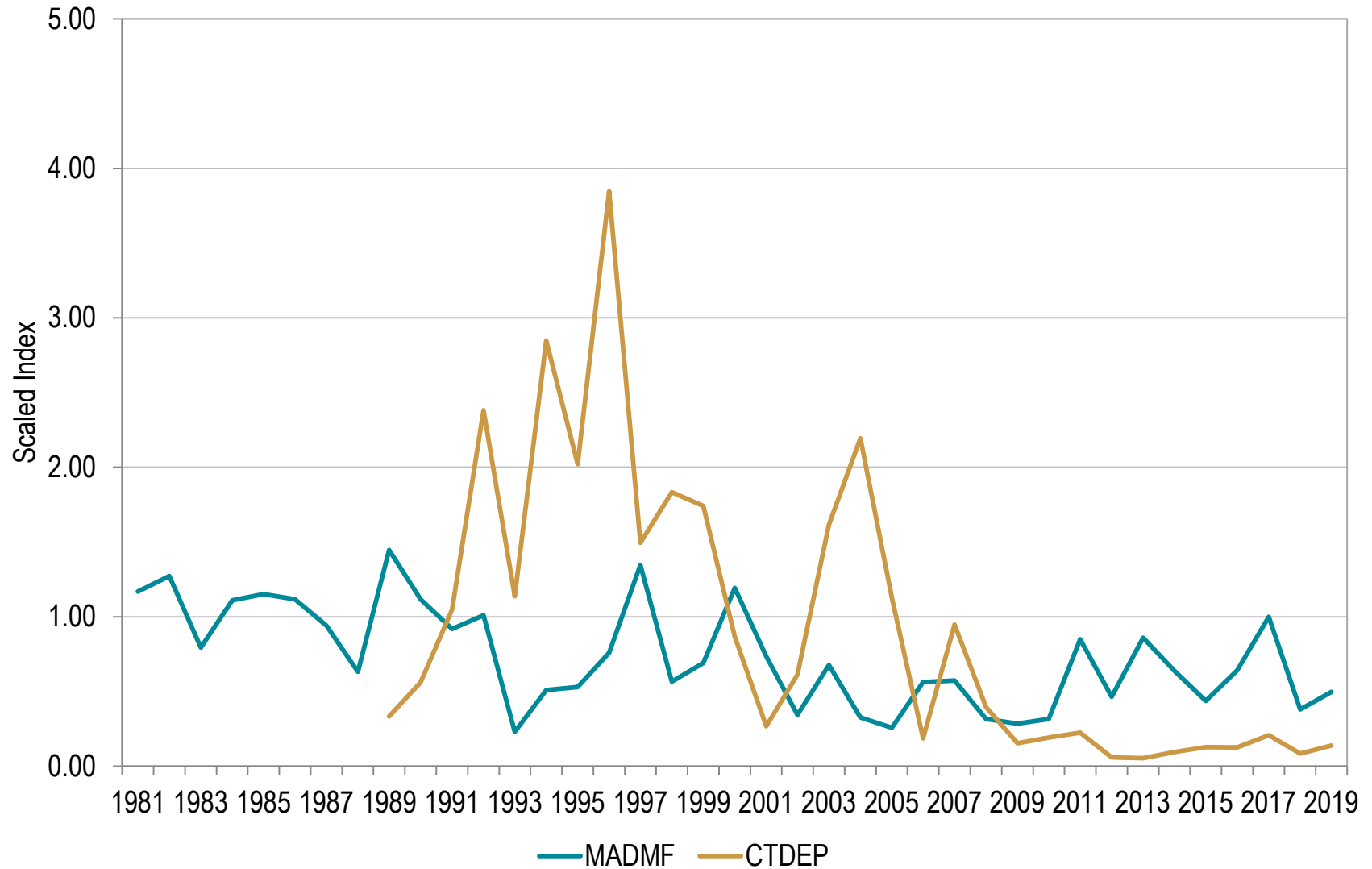
NEFSC BTS and NEAMAP regional survey indices



State survey indices



State Age 0 survey indices



Biology

- $M = 0.3$
- Maturity: MADMF Spring survey data provide maturity information
 - Data from 1982-2008 used in SAW52
 - Age 1: 0%, Age 2: 8%, Age 3: 56%, Age 4: 95%
Age 5+: 100%
- These input values were retained for the 2020 operational assessment

TOR 3: Estimate annual fishing mortality, recruitment and stock biomass (both total and spawning stock) as possible (depending on the assessment method) for the time series using the approved assessment method and estimate their uncertainty. Include retrospective analyses if possible (both historical and within-model) to allow a comparison with previous assessment results and projections, and to examine model fit.

a. Include bridge runs to sequentially document each change from the previously accepted model to the updated model proposed for this peer review.

b. Prepare a “Plan B” assessment that would serve as an alternate approach to providing scientific advice to management if the analytical assessment were to not pass review

2017 Operational Model Configuration

- Single Fleet: Commercial and Recreational Landings and Discards
- Two selectivity blocks: 1981-1993, 1994-2016, SAA
- 11 survey indices (9 Age 1-7, 2 YoY)
- Penalties on F_{mult} in Year1, F_{mult} Devs, q devs, N_{year1}
 - Most of these unnecessary as lamdas are turned off in OBF

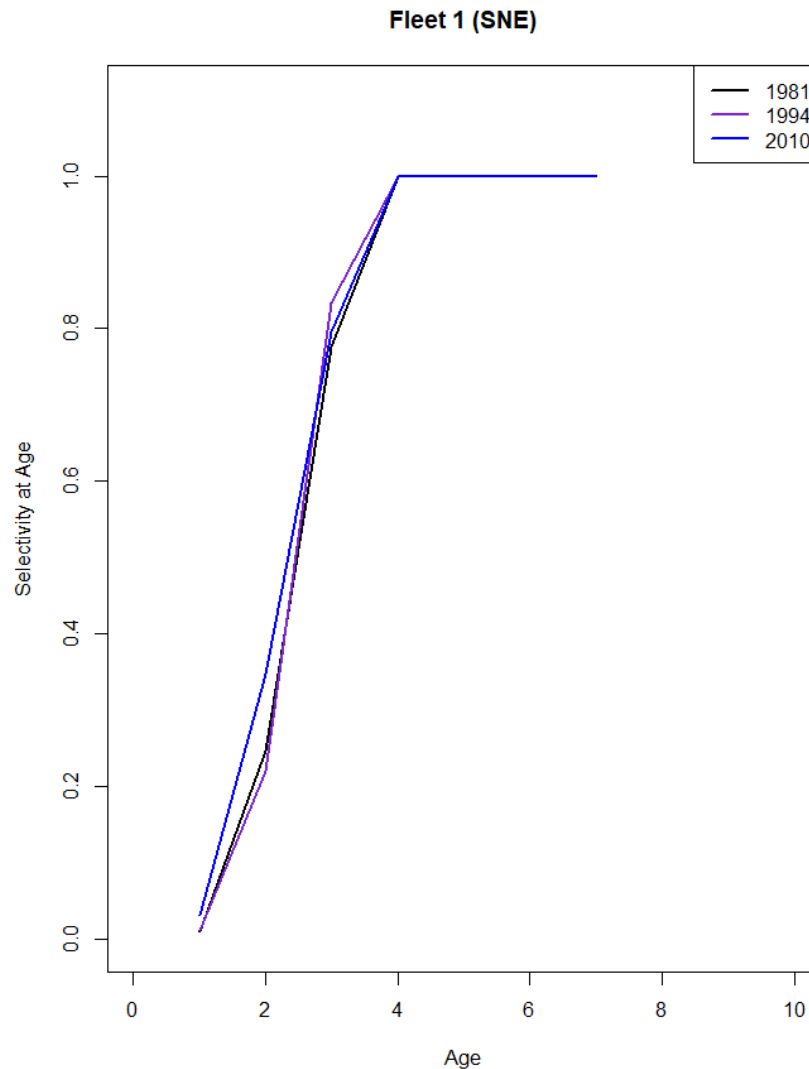
Model Bridge

1. Continuity Run = 2017 OA model updated through 2017
2. Add new calibrated MRIP data through 2017
3. Update model through 2019
4. Base Model = Remove the needless penalties on $F_{mult\ yr1}$, $F_{mult\ Devs}$, $q\ Devs$ (no effect on model estimates)
5. Add new selectivity block from 2010 to present: 3 selectivity blocks, 1981-1993, 1994-2009, 2010-present (SSC recommendation)
6. Flat top fleet selectivity (SSC recommendation)
7. Add NEAMAP spring survey = Final Model

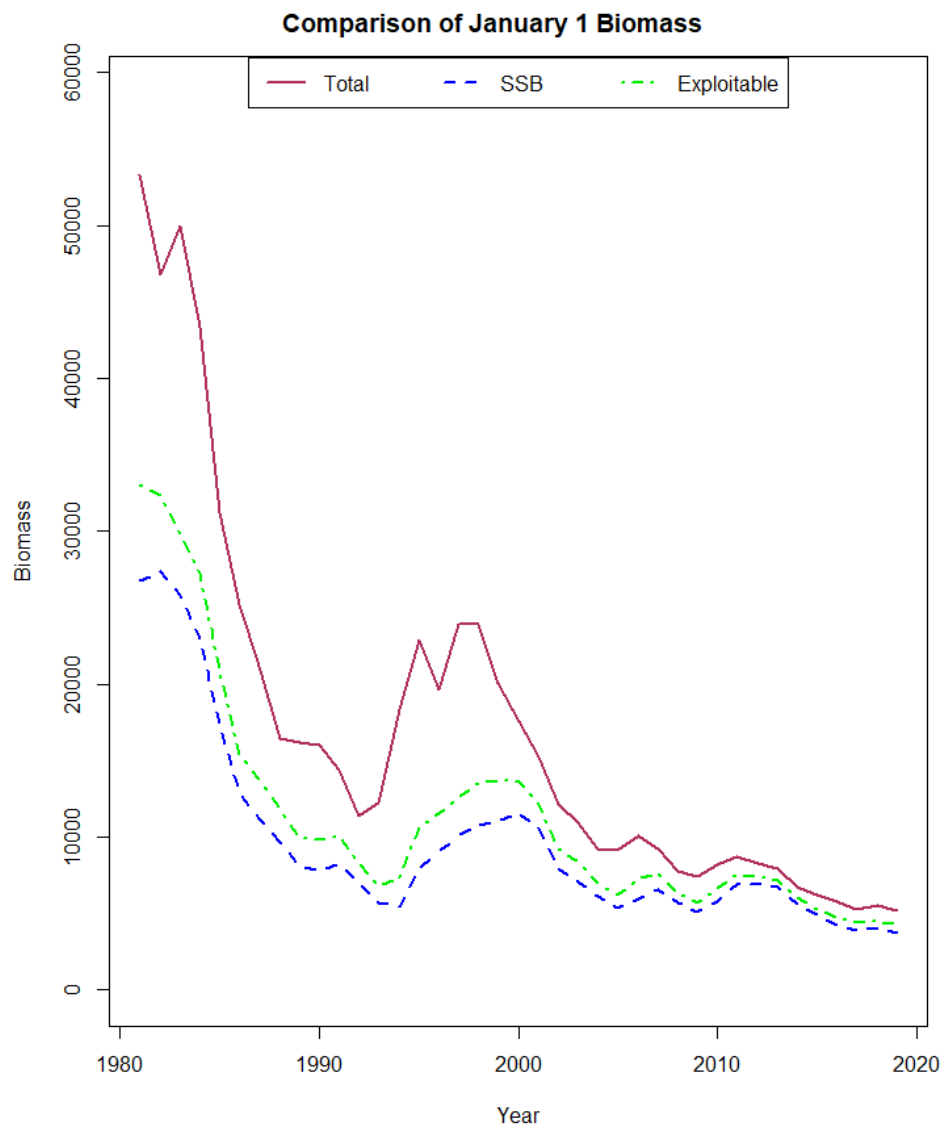
2020 Final Model Configuration

- Single Fleet: Commercial and Recreational Landings and Discards
- Three selectivity blocks: 1981-1993, 1994-2009, 2010+
 - Flat top selectivity
- 12 survey indices (10 Age 1-7, 2 YoY)
- Penalties on Nyear1

Results: Fleet Selectivities



Results: Biomass



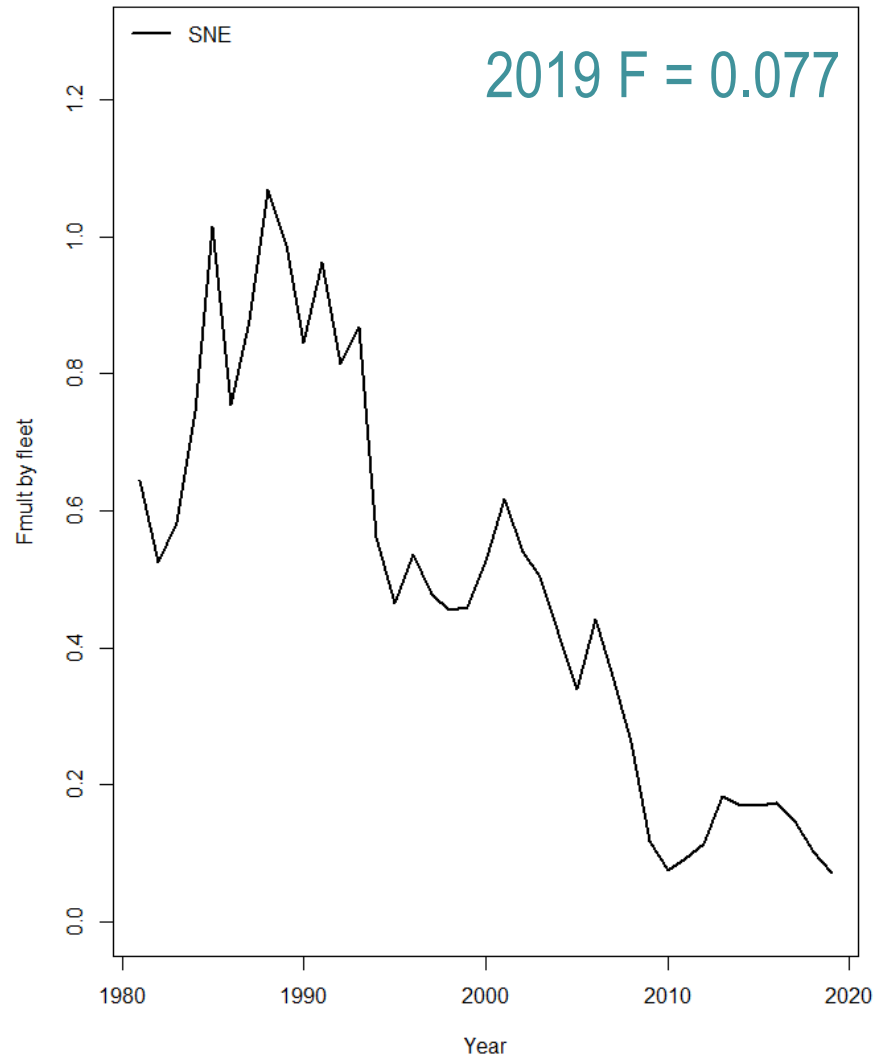
2019 Biomass Estimates

Total = 5,189 MT

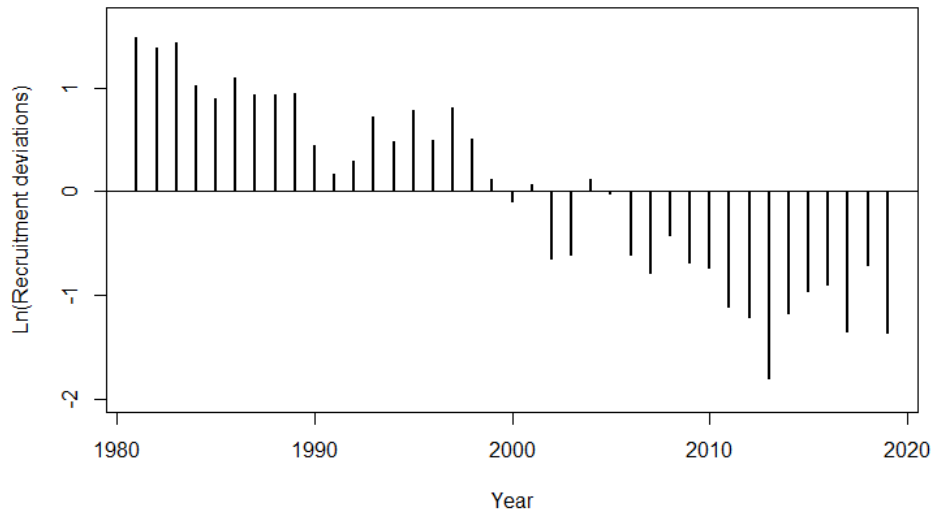
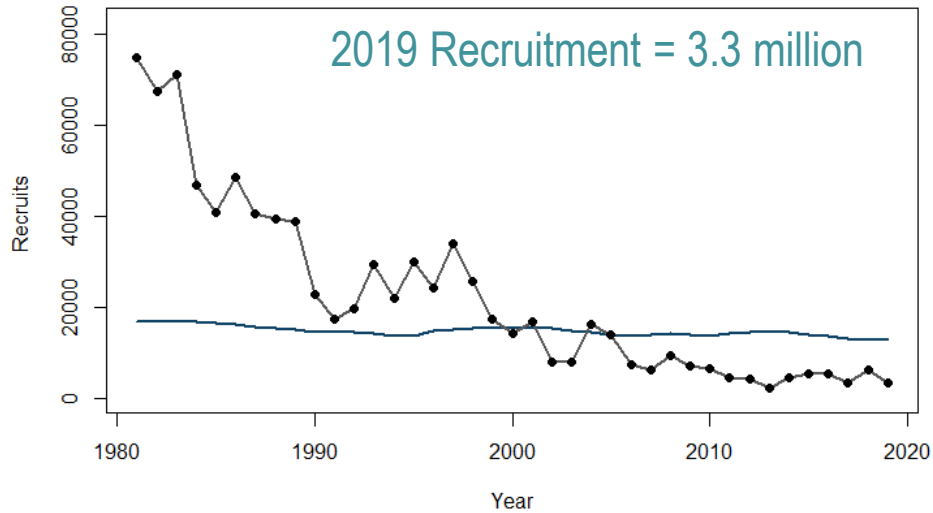
SSB = 3,638 MT

Exploitable = 4,862 MT

Results: Fmult

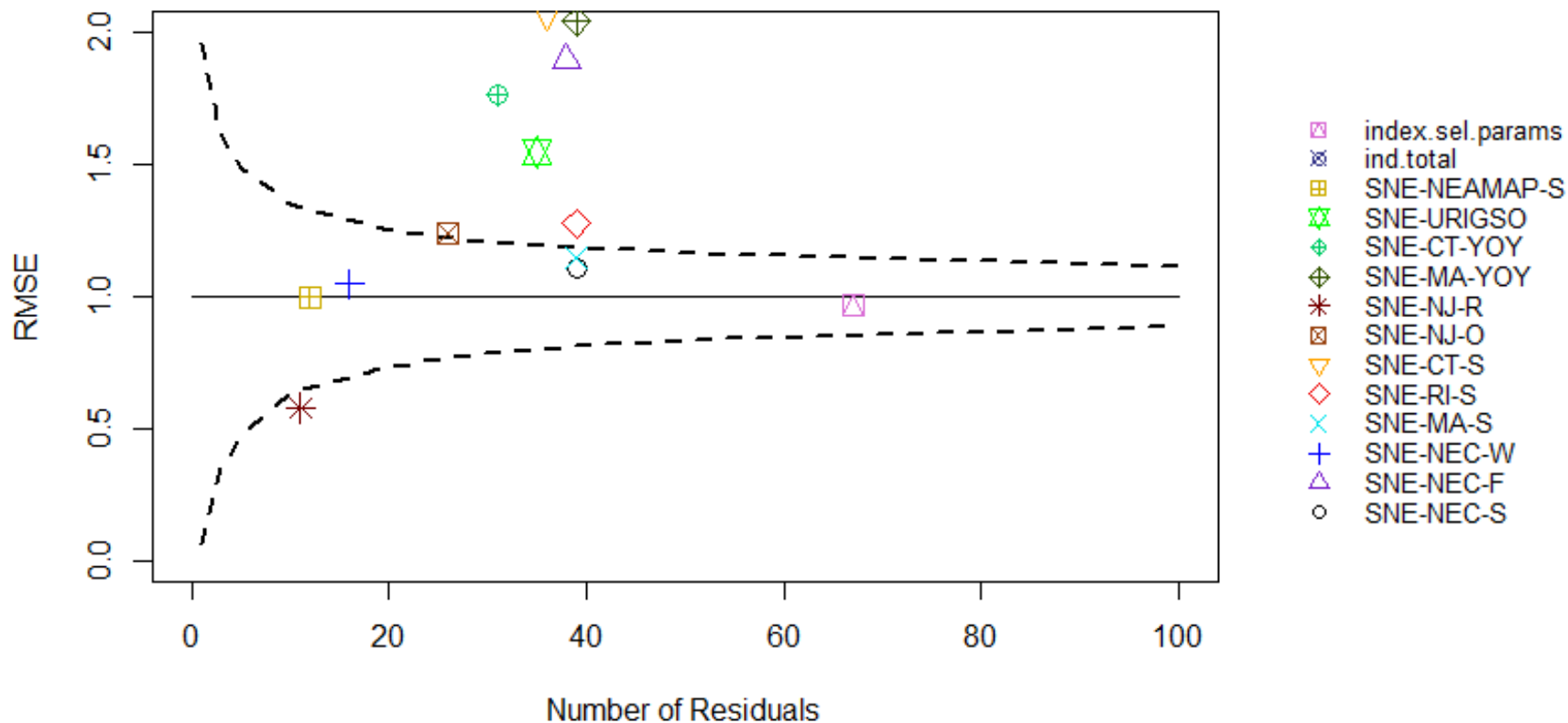


Results: Recruitment



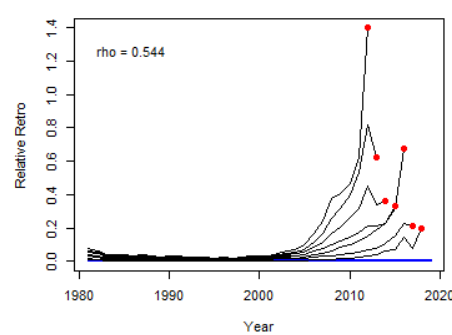
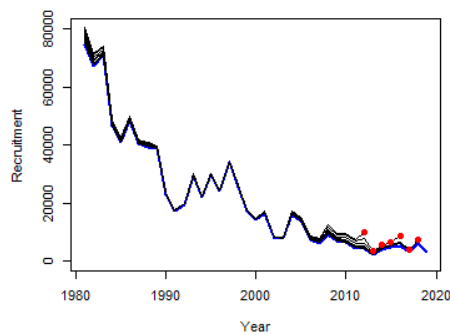
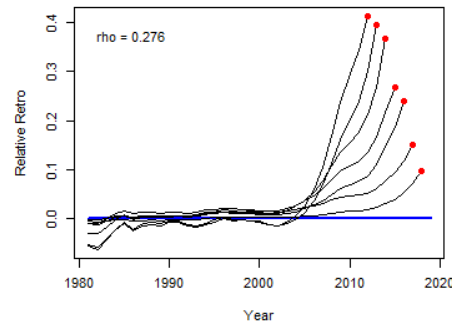
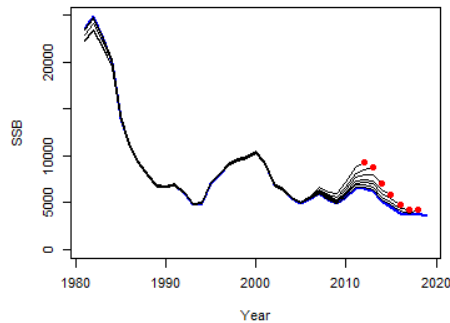
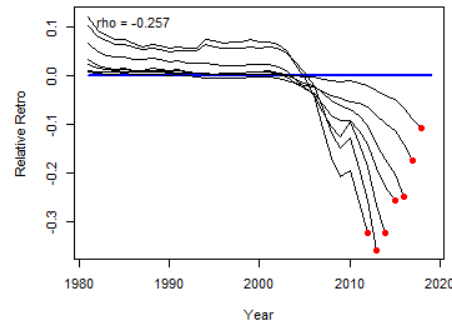
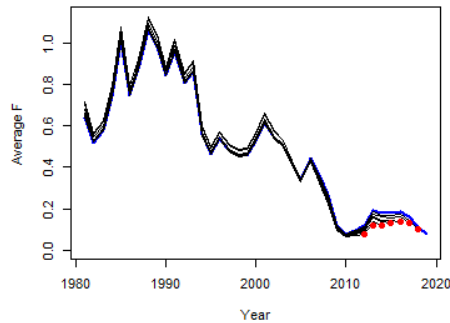
Results: Indices

Root Mean Square Error for Indices



Results: Retrospective bias

F, SSB, R



Retrospective bias has increased in F, SSB, and R since 2017 OA

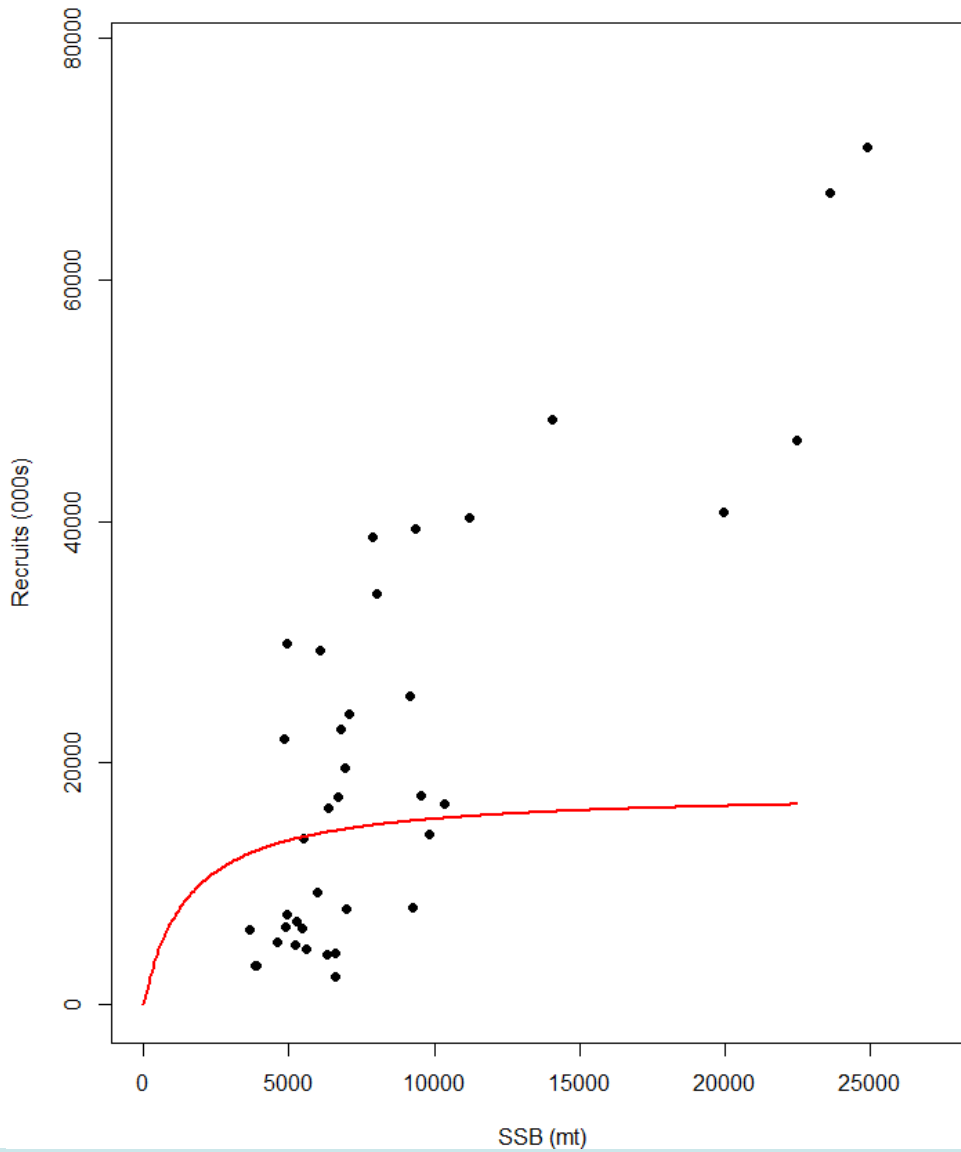
Still considered minor

TOR 4: Re-estimate or update the BRP's as defined by the management track level and recommend stock status. Also, provide qualitative descriptions of stock status based on simple indicators/metrics (e.g., age- and size-structure, temporal trends in population size or recruitment indices, etc.).

2017 update Reference Points: Beverton-Holt SR

- $F_{2016} = 0.21$, $SSB_{2016} = 4,360$ mt
- $F_{MSY} = 0.34$ ($F_{threshold}$)
- $SSB_{MSY} = 24,687$ mt (B_{target})
- $\frac{1}{2} SSB_{MSY} = 12,344$ mt ($B_{threshold}$)
- $MSY = 7,532$ mt
- $F_{2016}/F_{threshold} = 62\%$, $SSB_{2016}/SSB_{target} = 18\%$,
 $SSB_{2016}/SSB_{threshold} = 36\%$

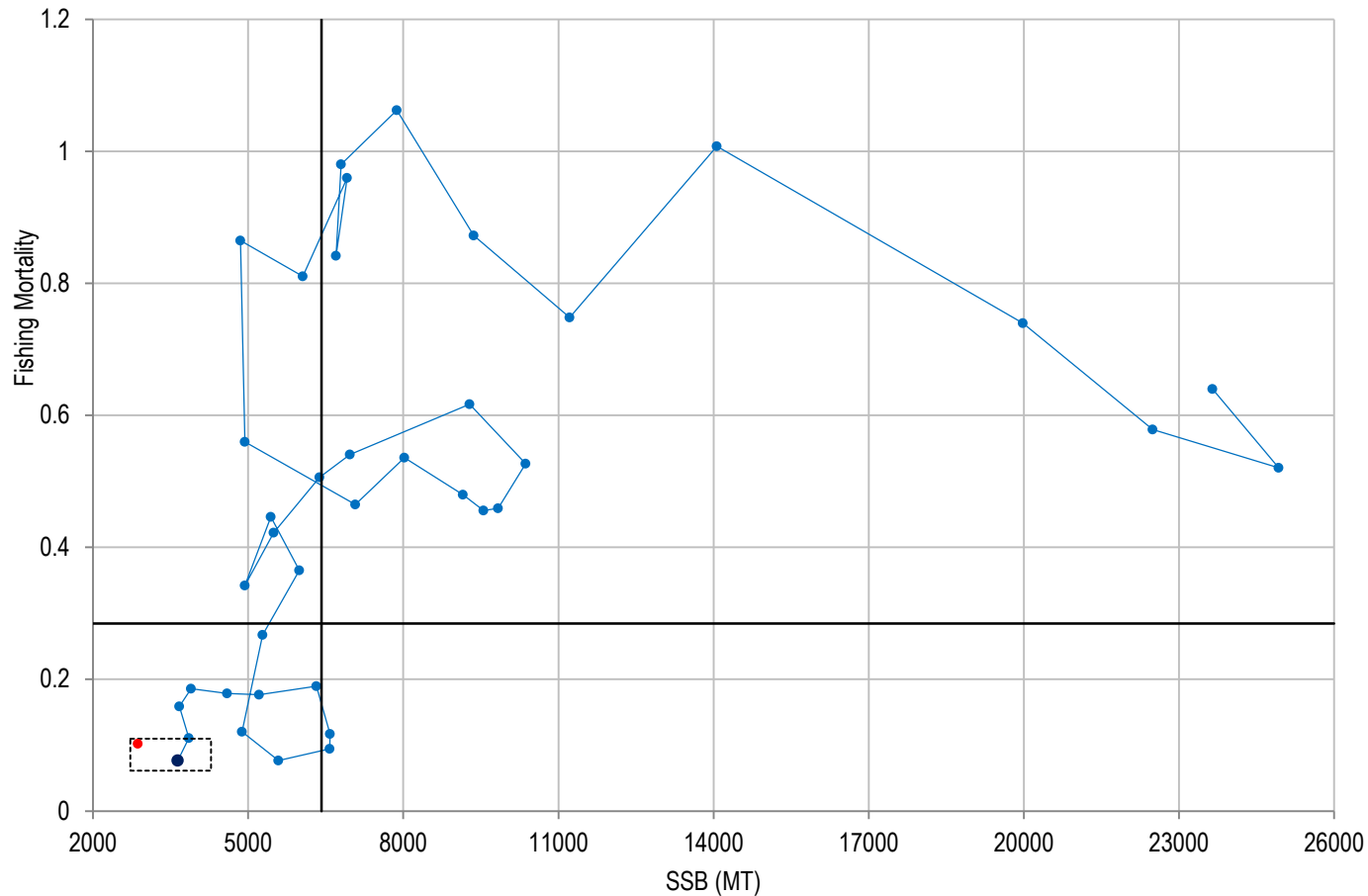
S/R



2020 update Reference Points

- $F_{2019} = 0.077$, $SSB_{2019} = 3,638$ mt
- $F_{40\%} = F_{MSY} = 0.284$ ($F_{threshold}$)
 - Old way $F_{MSY} = 0.26$
- $SSB_{MSY} = 12,322$ mt (B_{target})
 - Old way $SSB_{MSY} = 31,567$ MT
- $\frac{1}{2} SSB_{MSY} = 6,161$ mt ($B_{threshold}$)
- $MSY = 3,906$ mt
- $F_{2019}/F_{threshold} = 27\%$, $SSB_{2019}/SSB_{target} = 30\%$,
 $SSB_{2019}/SSB_{threshold} = 60\%$

Current Stock Status



- Status unchanged: Overfished, overfishing not occurring
- Minor retrospective bias, no adjustment made (barely)

Sources of Uncertainty

- Fixed natural mortality which is based on uncertain estimates of longevity (t_{max})
- Length distribution of the recreational discards. Very few samples in recent years however very small component of total catch
- Retrospective bias (F and SSB) is minor, however very close to being outside of confidence bounds and needing adjustment

Research Needs

- Additional studies on maximum age
- Additional sources for maturity information
- Update and investigate migration rates between stock and movement patterns. The most recent comprehensive tagging study was completed in the 1960s
- Further investigate localized structure/genetics
- Incorporate environmental influence on S-R recruitment relationship and survey catchability

Questions?

