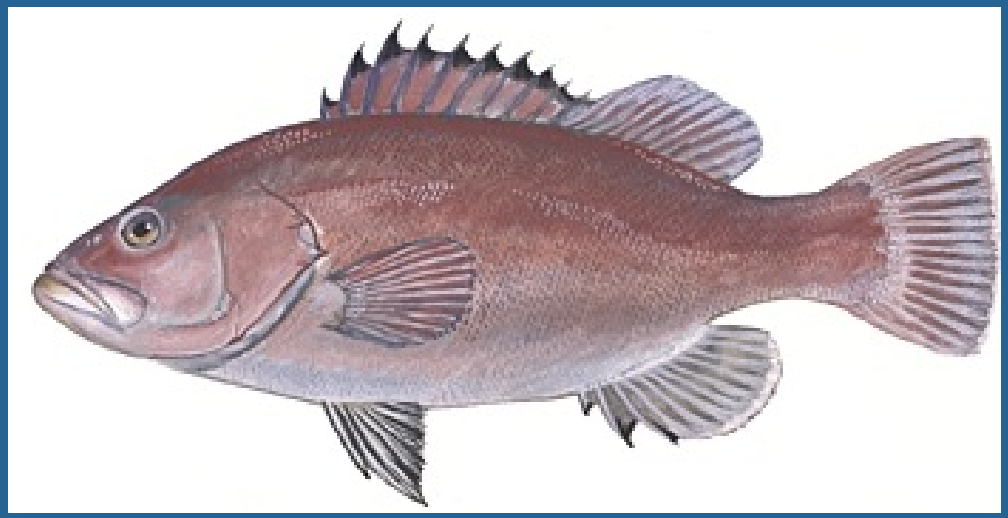
SEDAR 36 U – U.S. Atlantic Snowy Grouper Update Assessment

NOAA FISHERIES

Sustainable Fisheries Branch, Beaufort, NC

SAFMC meeting

March 1 - 5, 2021



Process and Assessment History

- Update assessment with no scheduled data or assessment webinars
  - One meeting with SSC, August 2020
- SSC reviewed the assessment on January 11, 2021

- First assessment, SEDAR 4 (benchmark): catch-age model (BAM) with data through 2004 found that the stock was overfished and undergoing overfishing.
- Last assessment, SEDAR 36 (update): catch-age model (BAM) with data through 2012 found that the stock was overfished and not undergoing overfishing.
- Current assessment SEDAR 36 Update (update): catch-age model (BAM) with data through 2018 found that the stock was overfished and undergoing overfishing.

Terms of Reference

1. "Update the approved SEDAR 36 South Atlantic Snowy Grouper base model with data through 2018."

This presentation will provide you with an overview of the update assessment we completed. The full documentation can be found here:
http://sedarweb.org/docs/suar/2020_SEDAR36U_SAR_November2020.pdf

2. "Document any changes or corrections made to the model and input datasets and provide updated input data tables. Provide commercial and recreational landings and discards in pounds and numbers."

3. Update model parameter estimates and their variances, model uncertainties, and estimates of stock status and management benchmarks. Identify sources of scientific uncertainty that are not already included in the model uncertainties. Explore sensitivities that bracket the corresponding SPR values above and below the 26% estimated from the SEDAR 36 assessment.

See the following slides.

Terms of Reference

4. Provide stock projections, including a probability density function (PDF) for biological reference point estimates and yield, separated for landings and discards, reported in pounds and numbers. Projection outputs shall include relevant population parameters including recruitment, spawning stock biomass, population abundance, exploitation rates and the probability that biomass and exploitation exceed reference values for MFMT and MSST. Projection criteria:
    - To determine OFL: apply an annual probability of overfishing = 50%.
    - To evaluate the existing rebuilding plan: based on fixed exploitation at 75% F_{MSY}. In addition to reporting yield and stock status as described above, for this projection also report the probability that SSB>SSB_{MSY}.
        - Potential Alternative Rebuilding: If results of this projection indicate that the stock is not rebuilt by 2039 (as evidenced by SSB>SSB_{MSY} at 50% probability), provide an additional projection based on a fixed exploitation rate ($F_{Rebuild}$) where $F_{Rebuild}$ is defined as the maximum exploitation rate that provides 0.50 probability of rebuilding (SSB>SSB_{MSY}) by 2039.
5. Develop a stock assessment update report to address these TORS and fully document the input data and results of the stock assessment update.

Data update

1. **Life History – Natural mortality modified based on new maximum age**
2. Commercial removals – trivial changes to values from SEDAR 36
3. **Recreational removals – MRIP methods updated, some significant changes**
4. **Indices – headboat unchanged, improved method and additional years for surveys**
5. Length and age compositions –
    - updated length comps using regional sample size cutoff and additional years, very minor changes
    - Updated age comps – updated using current methods (Chih 2009), very minor changes

Items in bold presented here. All data updates provided in the SEDAR 36 Update Assessment Report.
http://sedarweb.org/docs/suar/2020_SEDAR36U_SAR_November2020.pdf

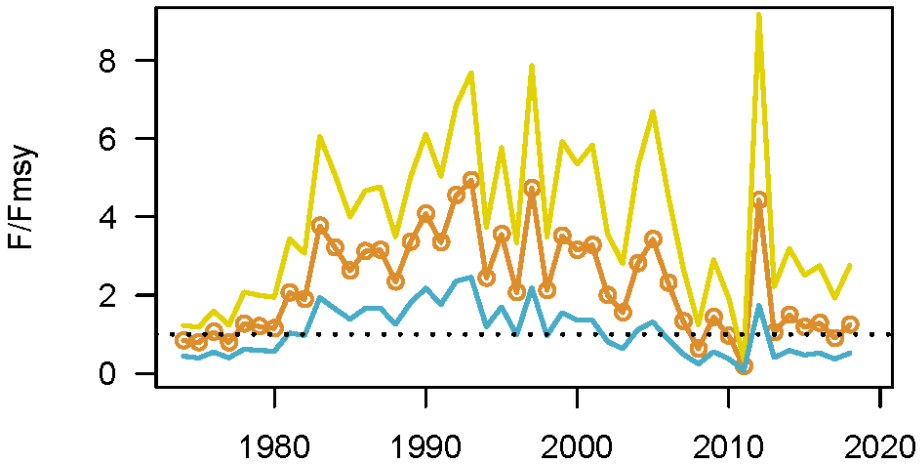
Natural Mortality

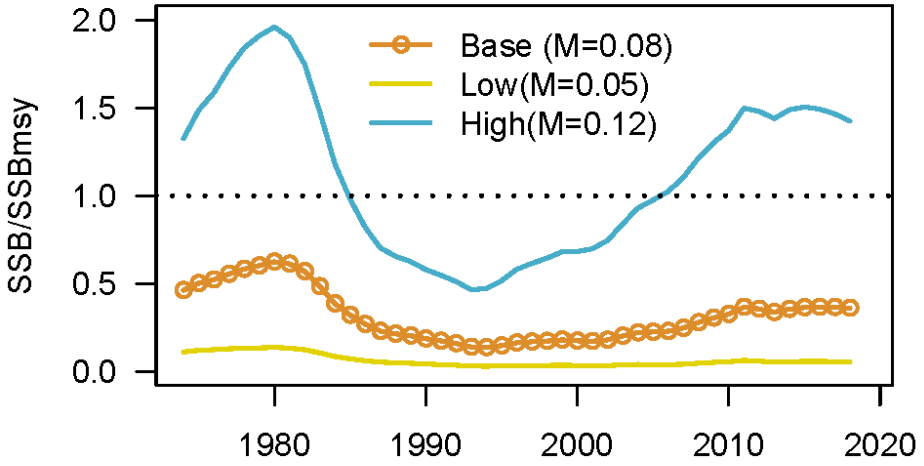
- SEDAR 4 and 36 age-specific natural mortality based on maximum age.
- New information on maximum age
  - SEDAR 36 maximum age of 35
  - SEDAR 36 update >20 fish aged greater than 35 with one fish aged to 80 years
  - Bomb radiocarbon ages to 56
  - S36(2012)- M scalar=0.12
- **August 2020 SSC meeting recommendation:**
  - S36 Update-, M scalar=0.08
  - Range of 0.05 to 0.12 for MCB ensemble
  - No update to growth curve

Assessment team adopted SSC recommendations

Natural mortality sensitivity

- Sensitivity runs over the range of natural mortality scalars used in the MCB ensemble runs (0.05, 0.12)

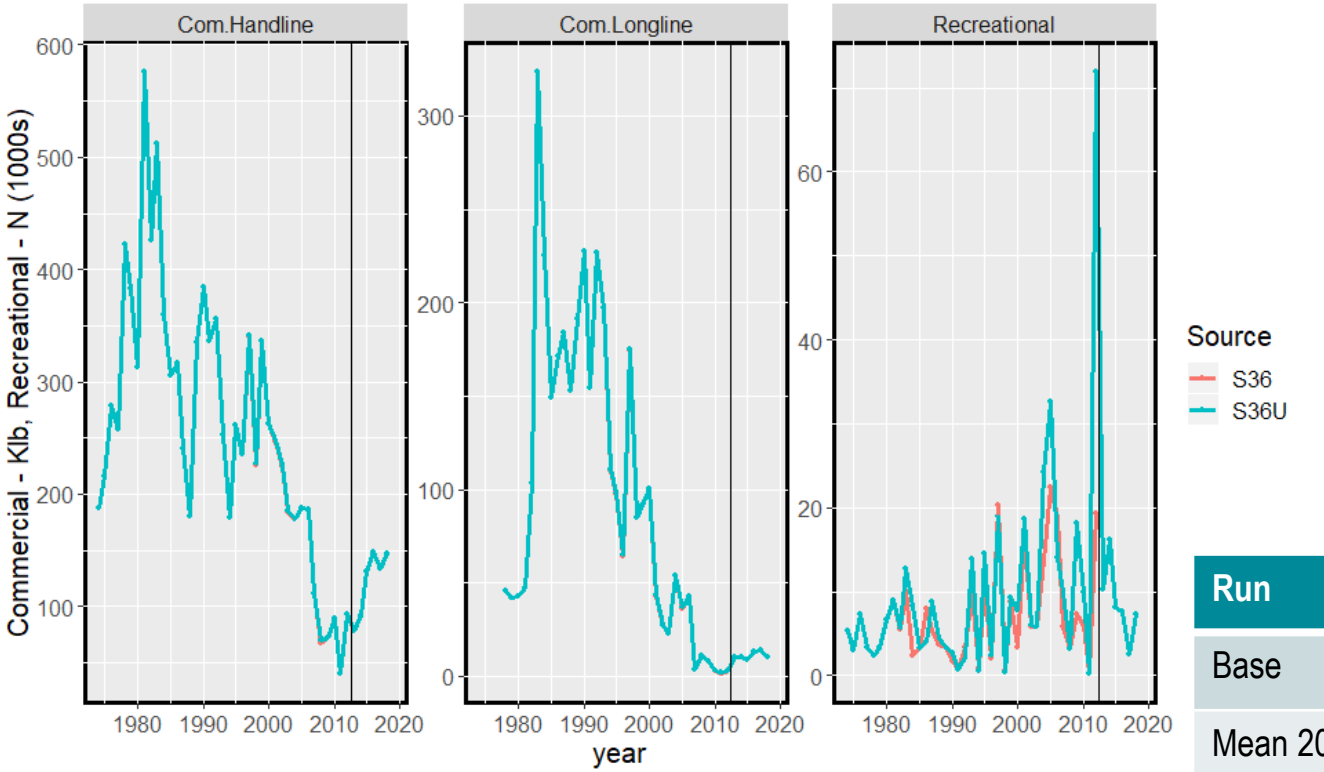




Removals

- Commercial removals nearly identical to SEDAR 36 values through 2012
- Recreational removals comprised of headboat and MRIP
- Headboat landings nearly identical to SEDAR 36 values through 2012
- MRIP removals updated using current best practices
  - Includes new FES estimates
  - 1981 excluded as in SEDAR 36
  - Large change to estimate in 2012 related to small sample size
  - Small sample sizes in years where removals are near zero
  - Common SEDAR approach - accept and evaluate in sensitivity run

Removals update and sensitivity



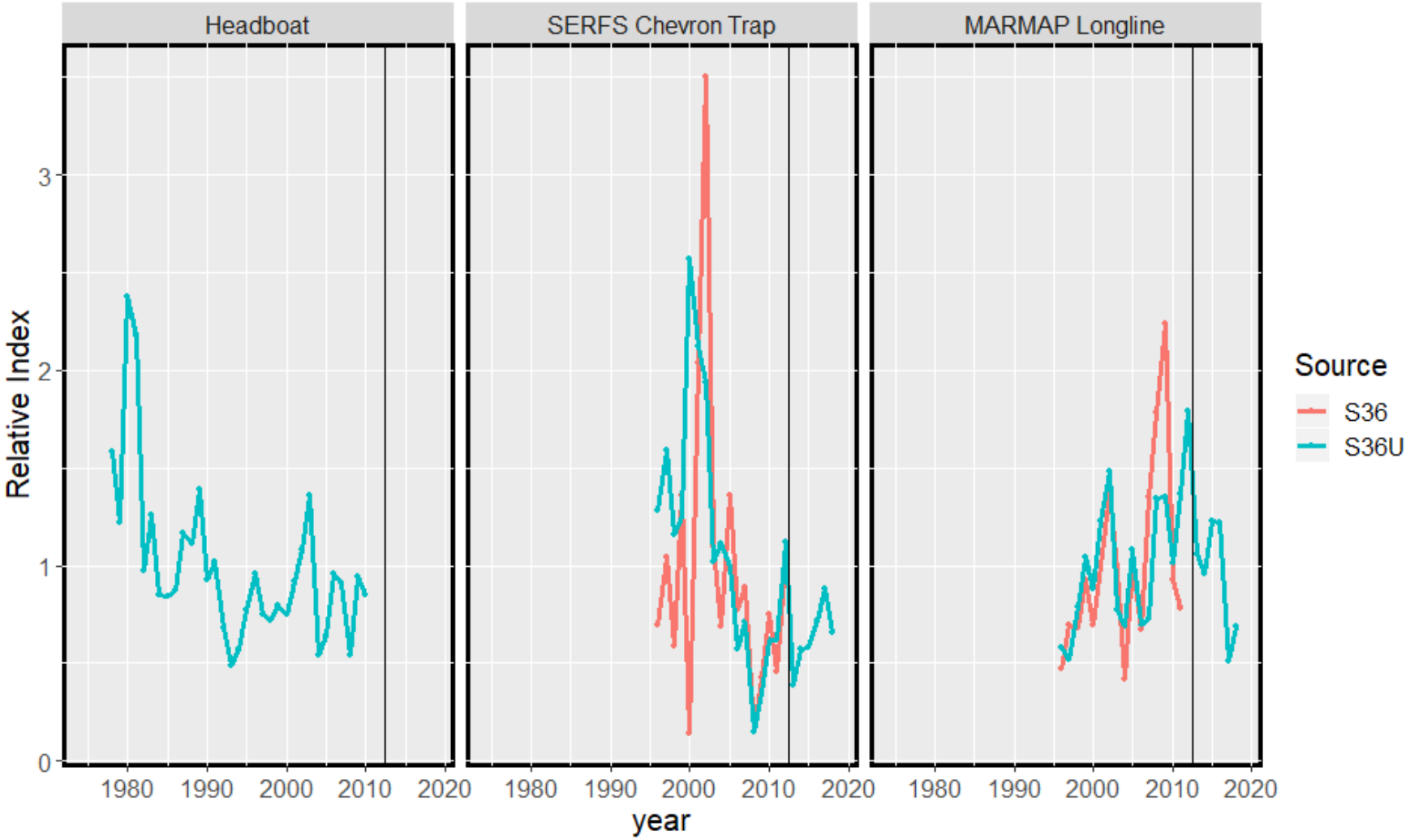
Run	F/Fmsy	SSB/MSST
Base	1.13	0.48
Mean 2012 sensitivity	1.16	0.48

- Relatively small sample sizes for MRIP estimates, 1981 excluded for all SG assessments
- 2012 MRIP estimate changed dramatically, sensitivity run using mean removals of adjacent years (2010, 2011, 2013, and 2014)

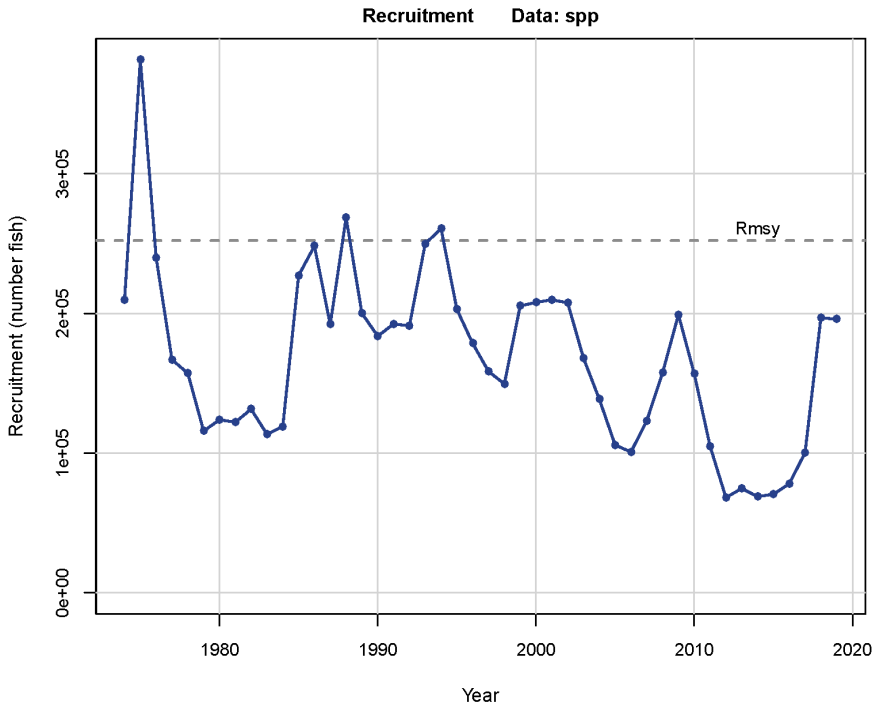
Indices

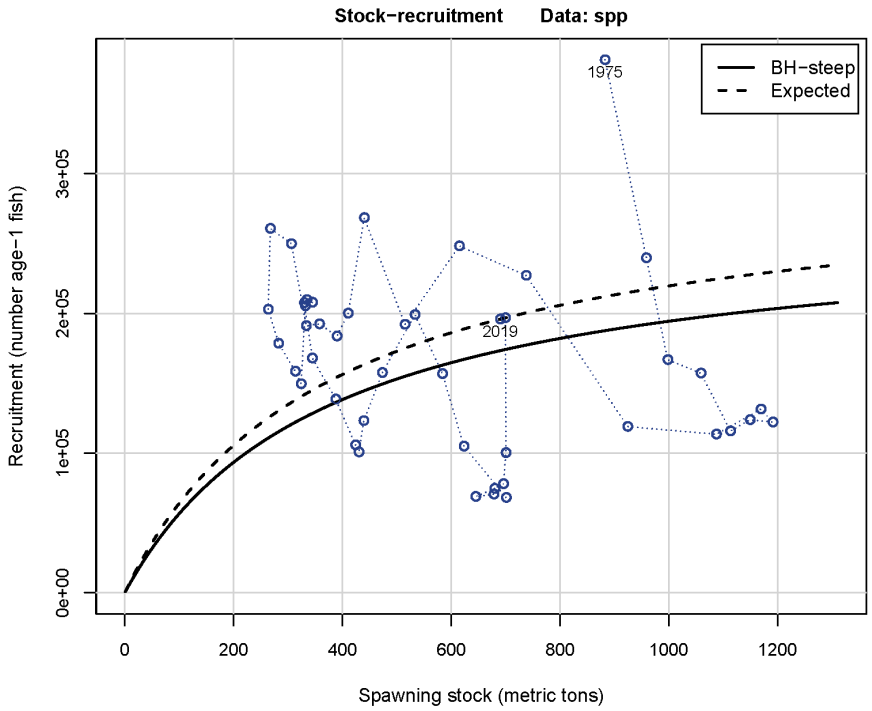
- Headboat index unchanged from SEDAR 36
- Fishery Independent Surveys
  - Modified to zero-inflated negative binomial model
  - Increased QA/QC on data
  - Relatively small sample sizes, only indices covering recent years
  - Large CVs
  - Longline index is spatially limited in 2012
    - not included in SEDAR 36
    - included here after evaluation of coverage, proportion positive

Updates to indices

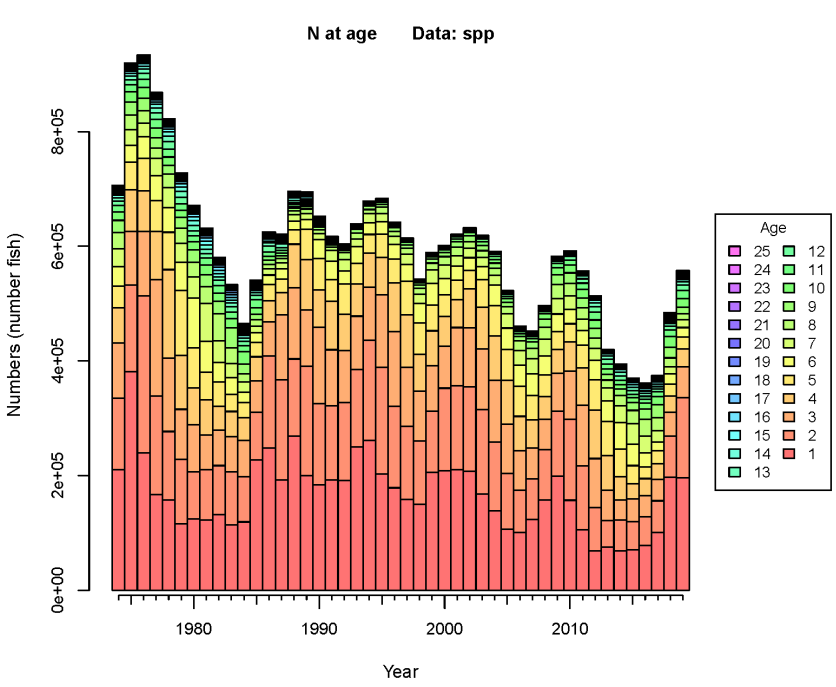


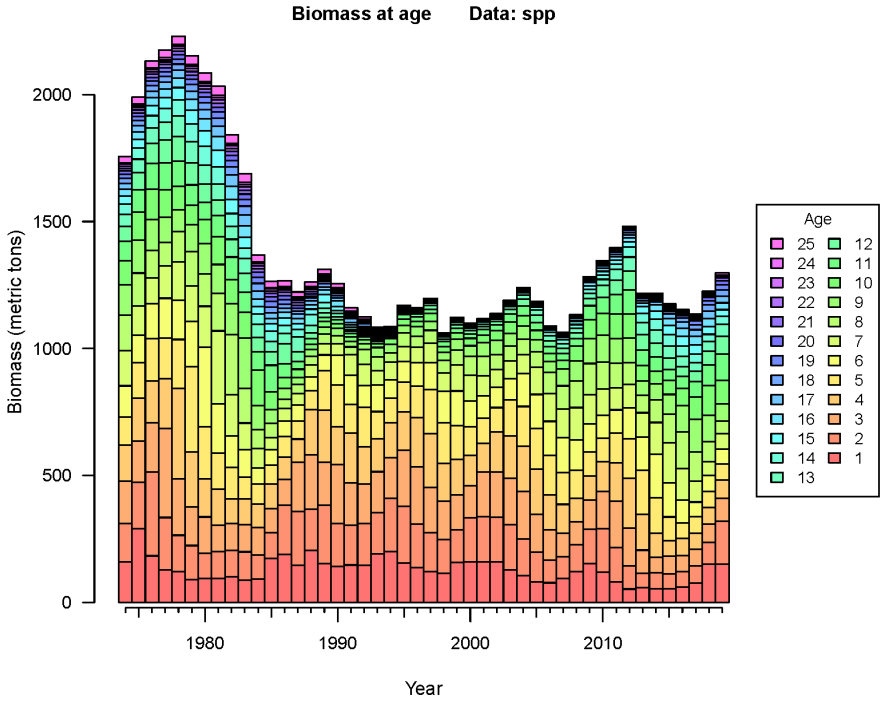
Stock-Recruit relationship



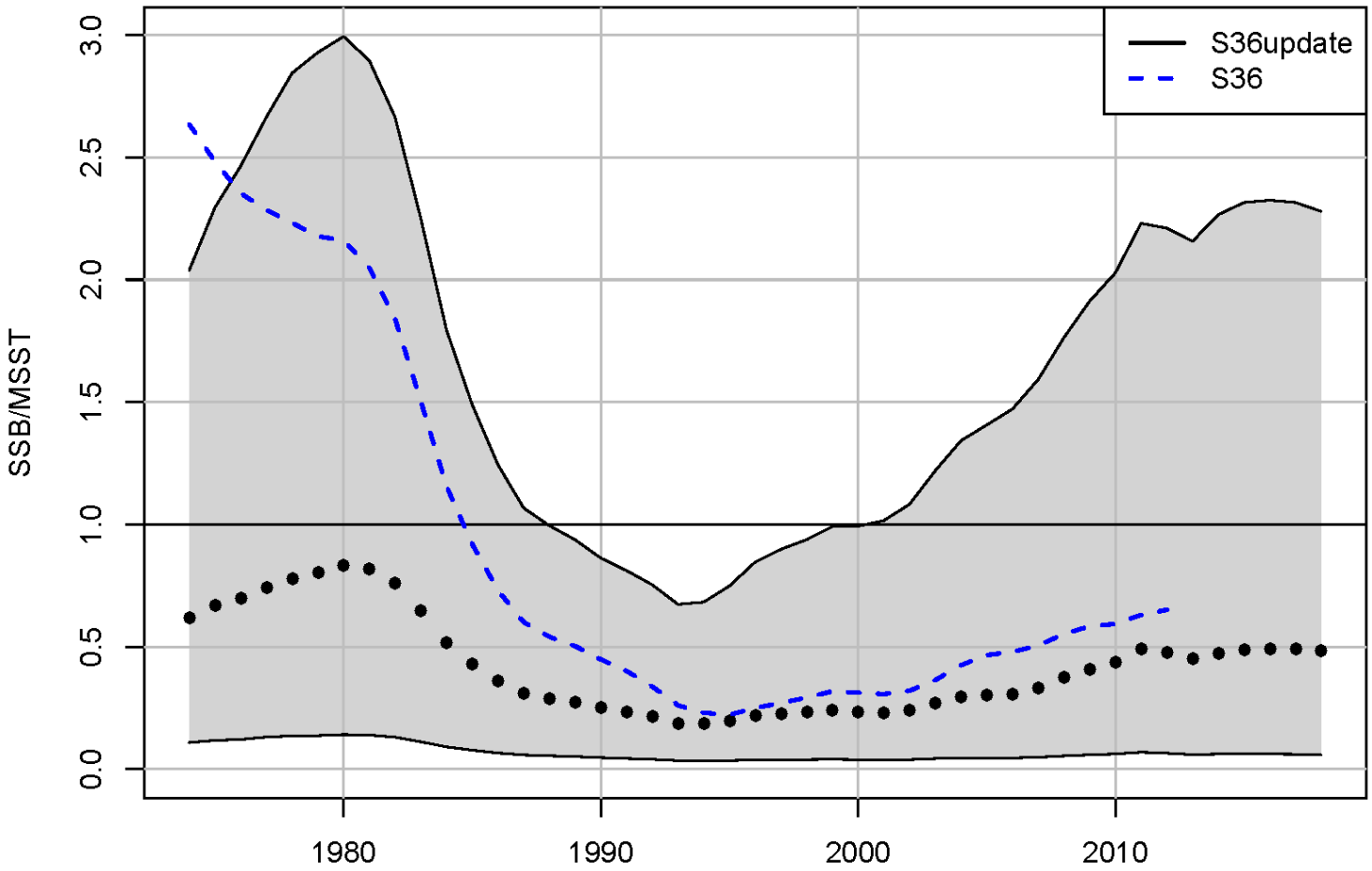


Numbers and Biomass at Age

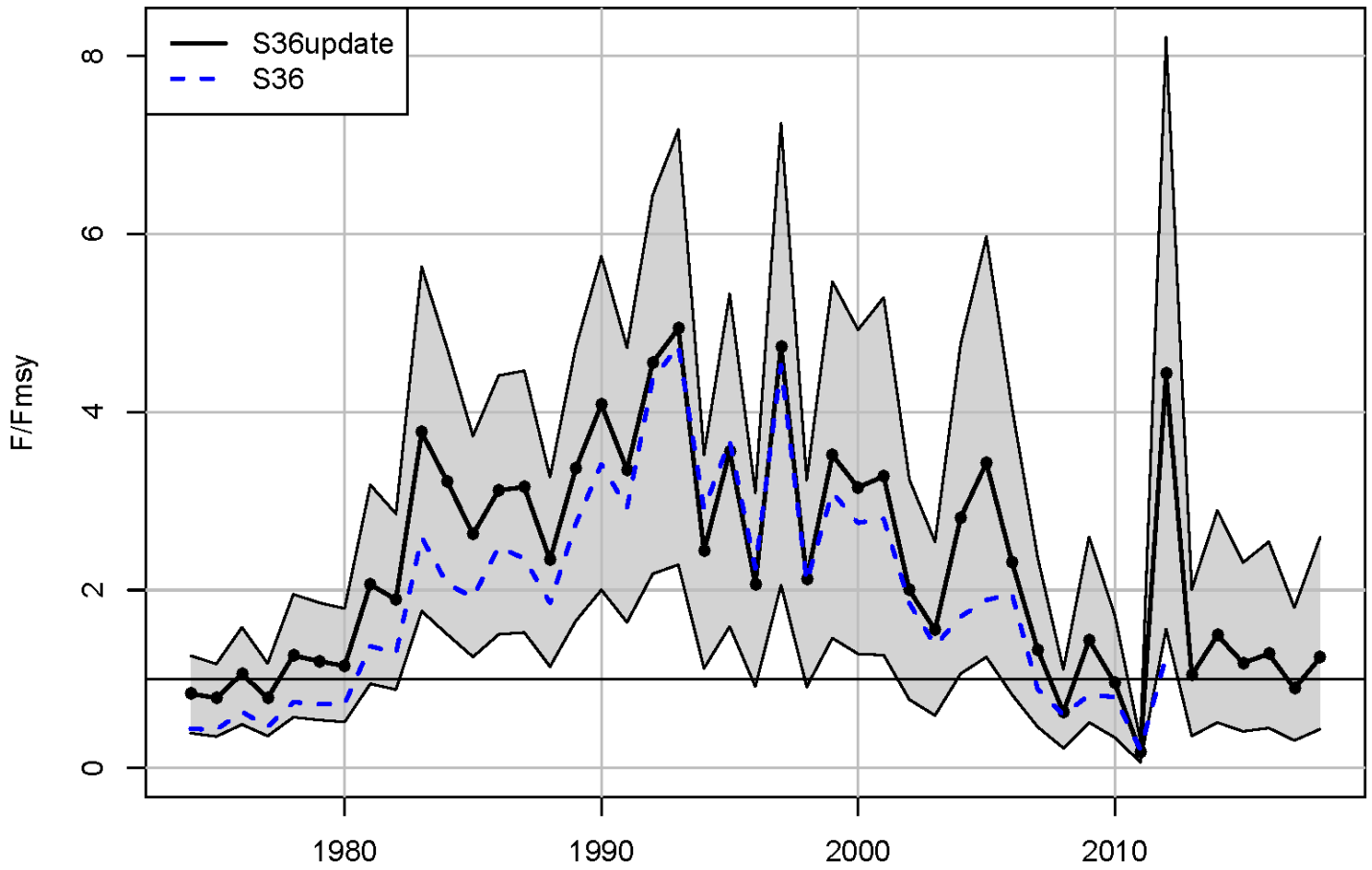




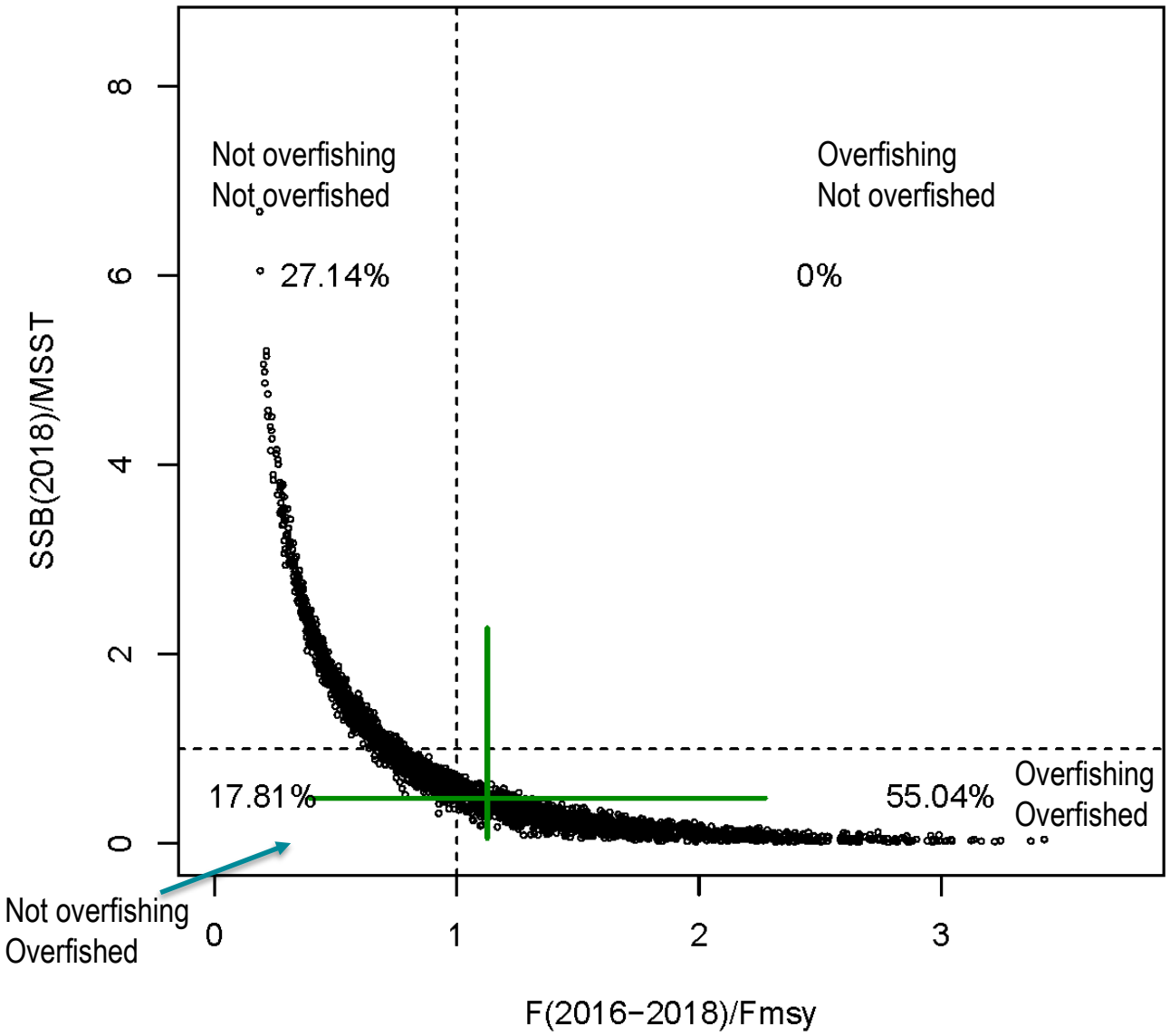
SSB/MSST



F/F_{MSY}



Status uncertainty



- ~73% of the runs indicate that the stock is overfished
- ~55% of the runs indicate the stock is experiencing overfishing and is overfished

Projections

- Eight scenarios with management starting in 2023
  - Predicted stock recruitment relationship through 2039
    - F = F current, F = 0, F = 75% Fmsy, F = 0.08 (rebuilding probability of 0.5)
  - Fix recruitment at recent level (average 2011-2017) through 2039
    - F = 75% Fmsy, F = 0
  - Post-SSC: Fix recruitment at recent level (average 2011-2017) through 2026, P*=27.5% (ABC) and P*=50% (OFL)

Projection tables available for all scenarios

Table 1. Projection results with fishing mortality rate fixed at F = P*27.5 (F=75.3%F_{MSY}) starting in 2023. R = number of age-1 recruits (in 1000s), F = fishing mortality rate (per year), S = spawning stock (mt), L = removals (landings and discards) expressed in numbers (n, in 1000s) or whole weight (w, in 1000 lb). The extension base indicates expected values (deterministic) from the base run; the extension med indicates median values from the stochastic projections. The pr.rebuild indicates the number of runs above the L_{MSY} benchmark.

year	R.base (1000)	R.med (1000)	F.base	F.med	S.base (mt)	S.med (mt)	L.base (1000)	L.med (1000)	L.base (1000 lb)	L.med (1000 lb)	pr.rebuild
2019	80	86	0.11	0.11	673	707	24	25	210	216	0.176
2020	80	86	0.11	0.11	672	699	24	25	210	216	0.174
2021	80	87	0.11	0.11	671	693	23	24	210	216	0.172
2022	80	85	0.11	0.11	677	693	23	23	210	216	0.172
2023	80	86	0.08	0.08	694	704	15	16	146	148	0.168
2024	80	86	0.08	0.08	719	717	15	16	149	150	0.157
2025	80	86	0.08	0.08	737	720	15	16	152	152	0.147
2026	80	86	0.08	0.08	749	715	15	16	153	152	0.135

Thank you to the data providers (SEFSC ageing experts, SEFSC recreational data experts, MARMAP ageing and index development experts), Dr. Phillip Sanchez, SSC, SEFSC assessment experts, and the SEDAR and SAFMC staff!

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Scott Crosson
Tracey Smart
Tracy Yan
Vivian Matter
Wally Bubley
Wilson Laney
Yan Li