SEDAR 68: Scamp and Yellowmouth Research Track assessment

NOAA FISHERIES
Southeast Fisheries Science Center

Final LHG Recommendations

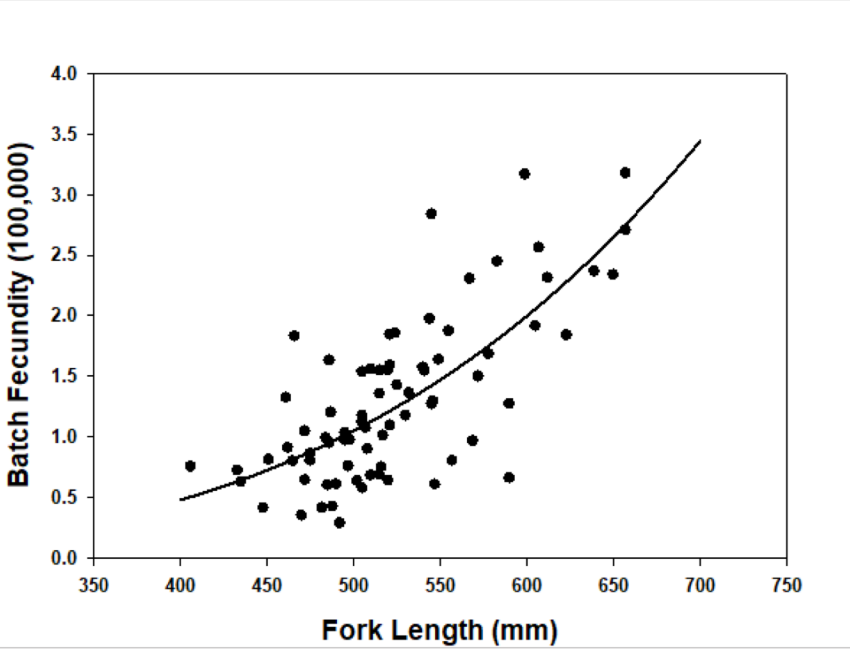
September 24th, 2020

Last Life History Topics

1. **South Atlantic Reproduction:**
   a) Batch Fecundity and Spawning Frequency
   b) Sperm Limitation
   c) Other measure of reproductive potential

2. **Natural mortality**
   a) South Atlantic
   b) Gulf of Mexico

Scamp – batch fecundity at FL, S. Atlantic

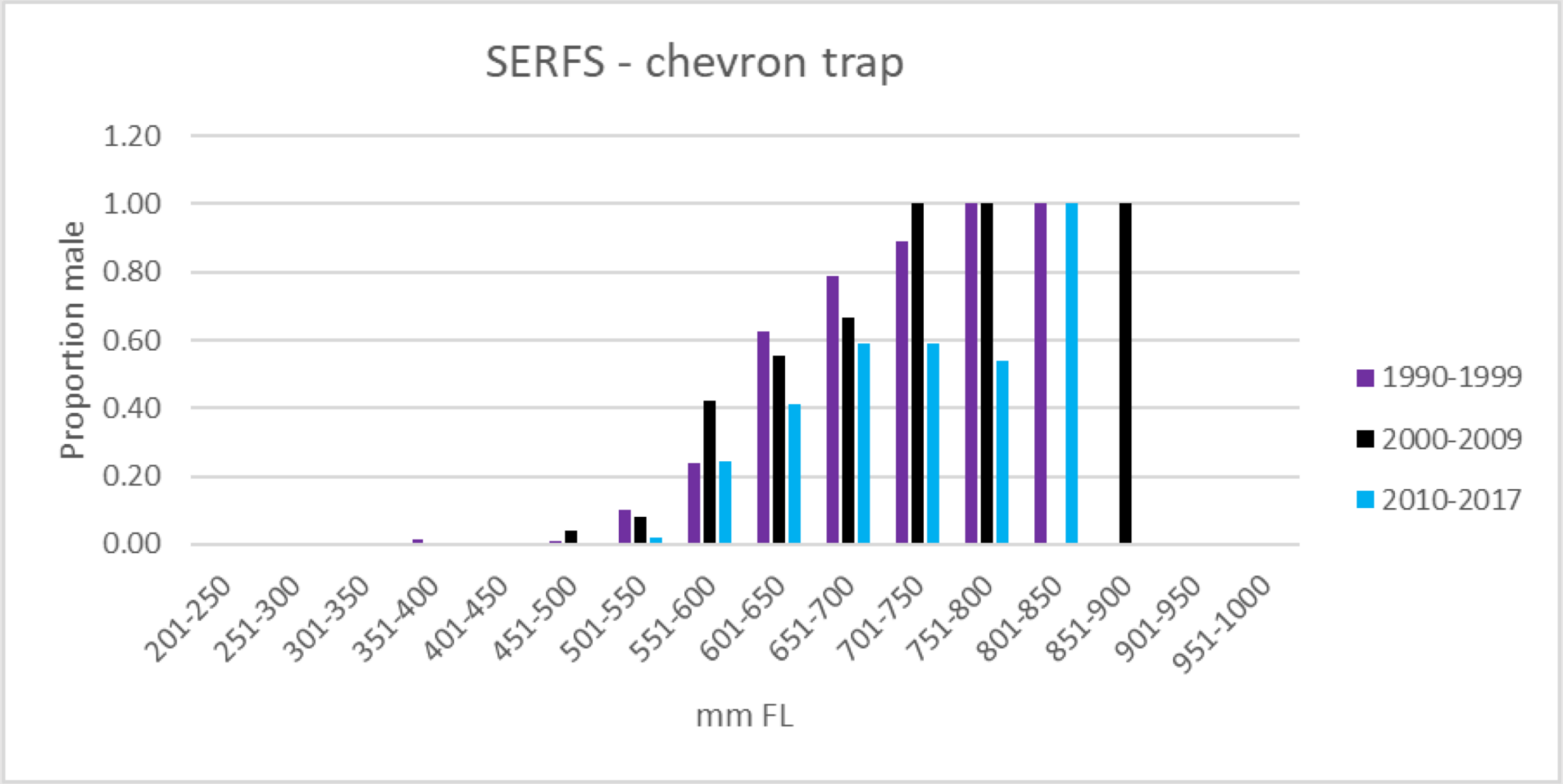


- Data from Harris et al. (2002)
- Yr=1996 (n=72) and 1998 (n=4)
- Batch fecundity = b * FL^z
    - b= 3.16 E^{-5} (SE 7.30 E^{-5}) and z= 3.53 (SE 0.36)
    - Range of FL = 406-657 mm
        - L_{50} for sex transition (647 mm) similar to upper limit
    - 9.1% of adult females (n=341) in SERFS 2010-2017 chevron trap samples were 651-783 mm
        - Unable to confidently estimate BF of larger females for assessment
    - **New recommendation:** Use total spawning biomass as metric for reproductive potential in base model

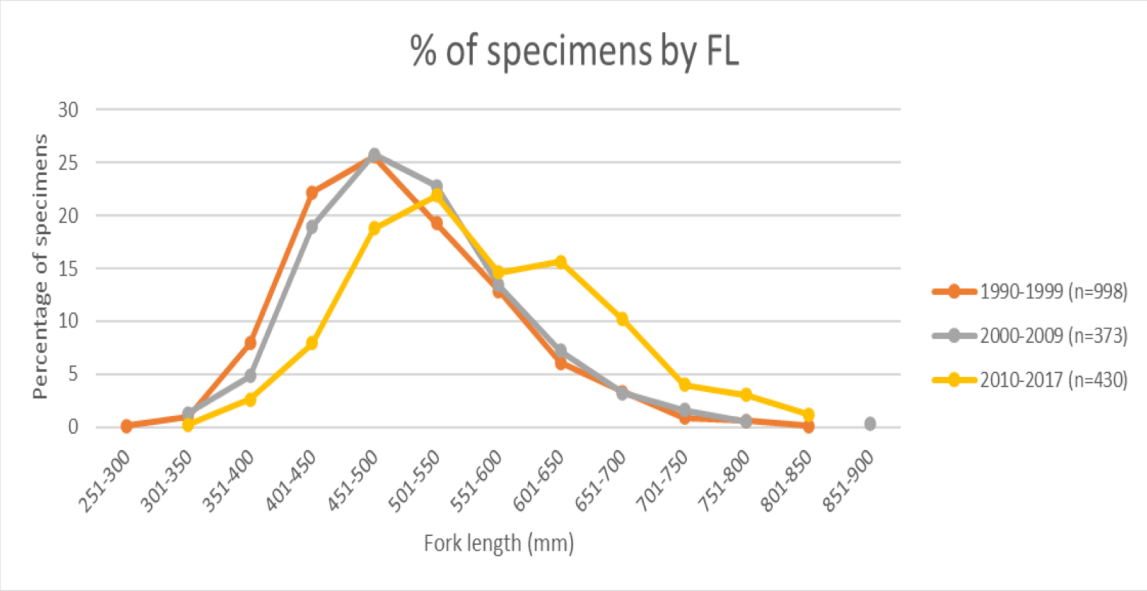
Scamp spawning frequency – S. Atlantic

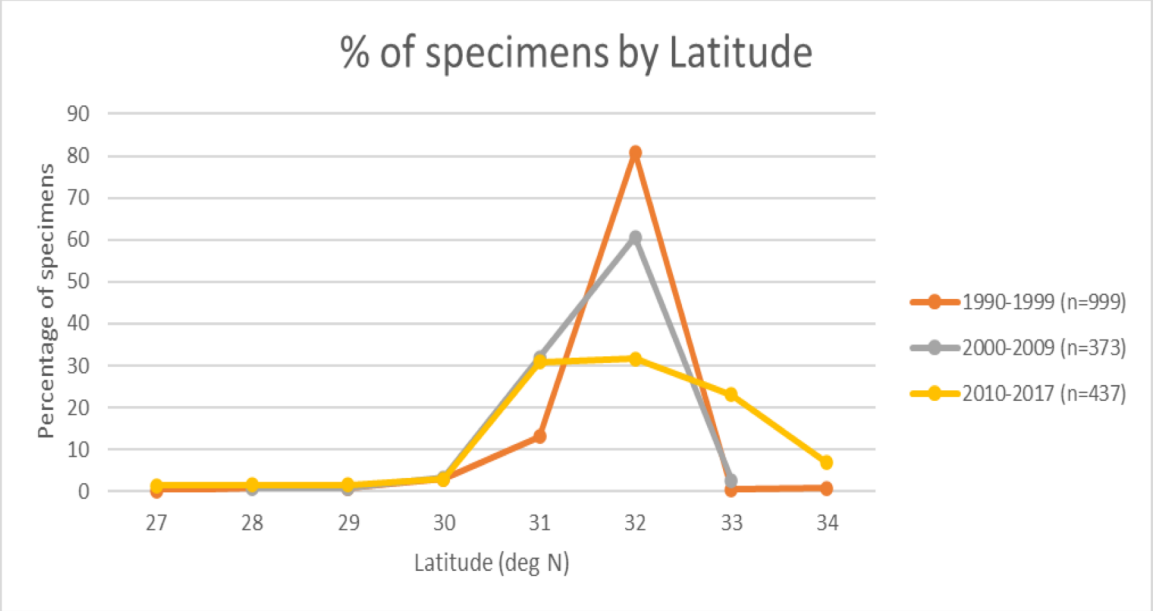
- In Plenary #2, discussed idea of estimating spawning duration via modeling as done for GOM data and re-calculating spawning frequency
- Recommendation: Not necessary if batch fecundity data not used in assessment model

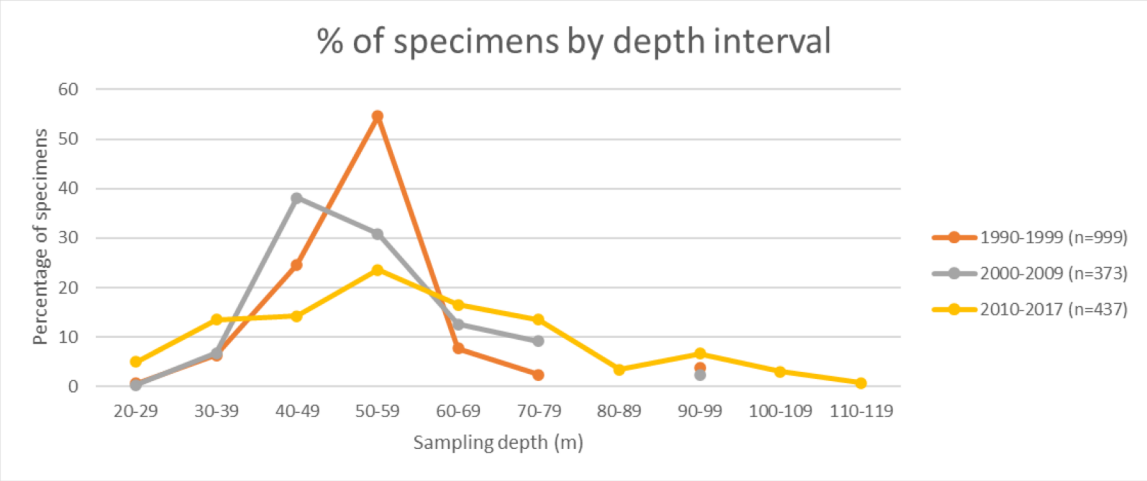
Sperm limitation in Scamp: Any conclusive evidence of in SERFS 2010-2017 chevron trap data?



Adult Scamp – SERFS chevron trap







- Smaller sample sizes at 651-800 mm in 1990s and 2000s compared to 2010s
- 2010s data – better representation of population
  - Improved sampling coverage relative to depth & latitude due to SEAMAP-SA and SEFIS

Recommendation: No conclusive evidence of sperm limitation

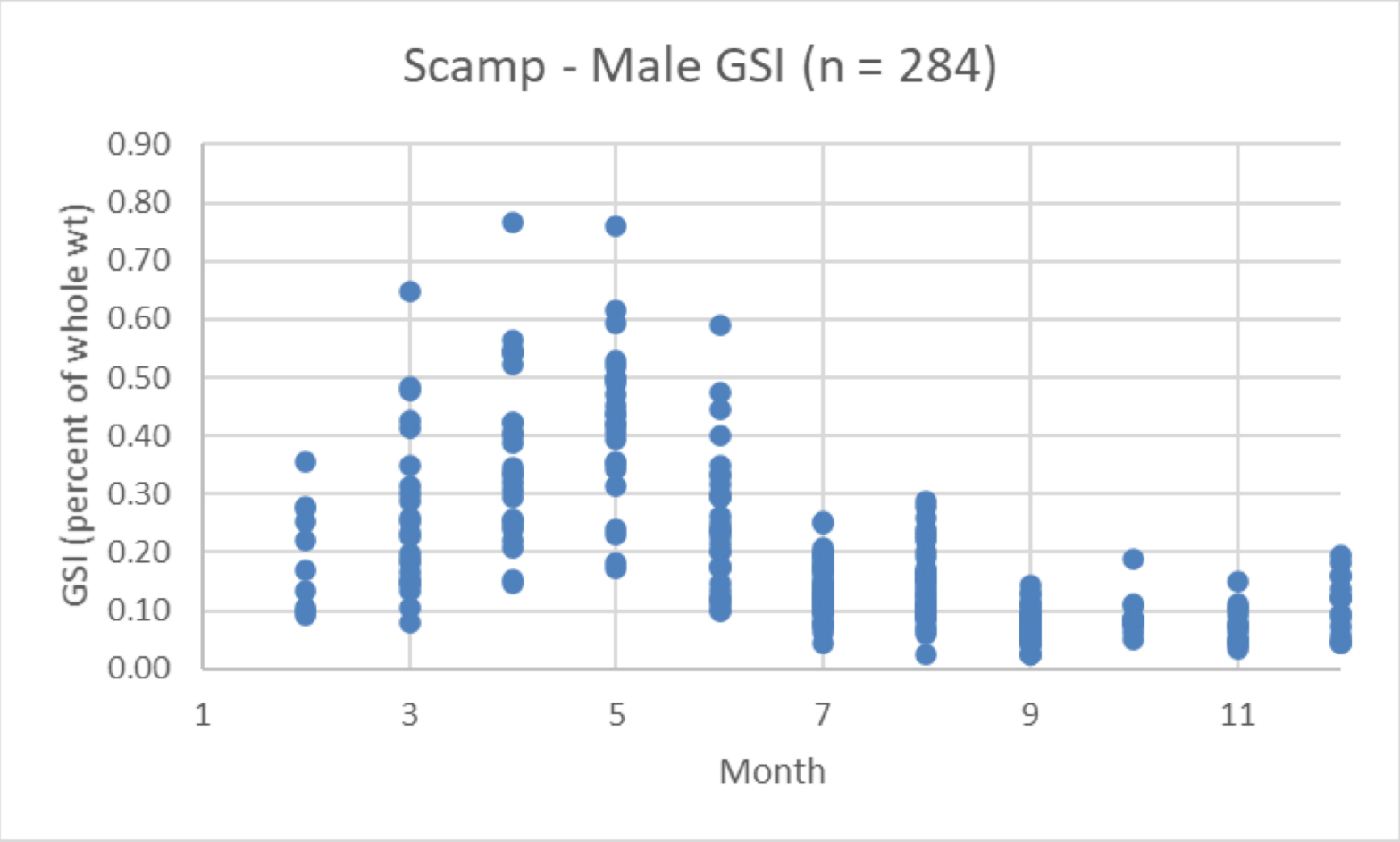
S. Atlantic – reproductive potential

- LH workgroup shifted to recommendation of using total spawning biomass vs TEP (total egg production) in base model
    - Use of TEP would omit reproductive value of males
    - Precedence for use of total spawning biomass in previous SAtl assessments of grouper (Gag, Red Grouper, Snowy)
    - Brooks et al. (2008) – recommendation of total biomass for protogynous species
    - Limitations of batch fecundity data (lack of data for largest females)

How to weight male relative to female biomass – a starting point

- From Gilmore and Jones (1992), Bull. Mar. Sci. 51:83-103
  - "Individual courtship displays and pairings were most often observed between a single grey-head scamp and one or two individuals from a group of smaller cat's paw or brown phase individuals. This suggests that spawning occurs most frequently in pairs or small groups following elaborate courtship displays."
  - In the same paragraph, the authors later say:
    - "Detailed review of video recordings made of grey-heads paired with brown phase individuals in the water column failed to reveal release of gametes." They go on to note that the various behaviors of these paired scamp "are characteristic of spawning behavior seen in other species of epinepheline serranids (Thresher, 1984)."

S. Atlantic – SERFS data



- Indicative of “pair” spawning
- Similar to GOM data (S. Lowerre-Barbieri): range = 0.07-0.55 (n = 60)

Reproduction: South Atlantic

Recommendations:

1. Reproductive Potential: Use total, females and males, spawning biomass in base model
2. Spawning Frequency: Not necessary if batch fecundity data not used in assessment model
3. Sperm Limitation: No conclusive evidence of sperm limitation

Research recommendation: Research the importance of Males in terms of mating strategy

Reproduction: South Atlantic

Sensitivity runs:

Explore the potential of male contribution to spawning, or sperm limitation, by either down-weighting or up-weighting the ratio of male to female biomass in model.

	Female Only	Male biomass at 50%	Female biomass at 50%	Male Only
Female	1	1	0.5	0
Male	0	0.5	1	1

Natural mortality: Both stocks

Lorenzen re-evaluated his original size at age varying model of *M* using original data sets and data from Charnov et al. (2012)

- **New analyses suggests that Lorenzen's original equation is most correct, due to data at population level. Charnov et al. data based more at a community level.**
- **Use Lorenzen (1996) model, but scale to Then et al. (2015) point estimate based on max age, because survivorship using Lorenzen alone might be too low.**
- **Suggested recalculating the Then et al. (2015) max age regression on a subset of species with more similar life history strategies (i.e., exclude tunas).**

Natural mortality: Both stocks

Then et al. (2015) "…maximum age-based estimators are superior to estimators based on the von Bertalanffy growth parameters and water temperature."

Review of data used in Then et al. (2015)

- Selected data for reef fish (Serranidae, Sparidae, Pomacanthidae, Pomacentridae, Scaridae, Malacanthidae, Labridae, Lutjanidae, Haemulidae, Carangidae, Acanthuridae) (n=67)
- Reviewed publications of input data.

Natural mortality: Both stocks

Subsetting Then et al. (2015) data:

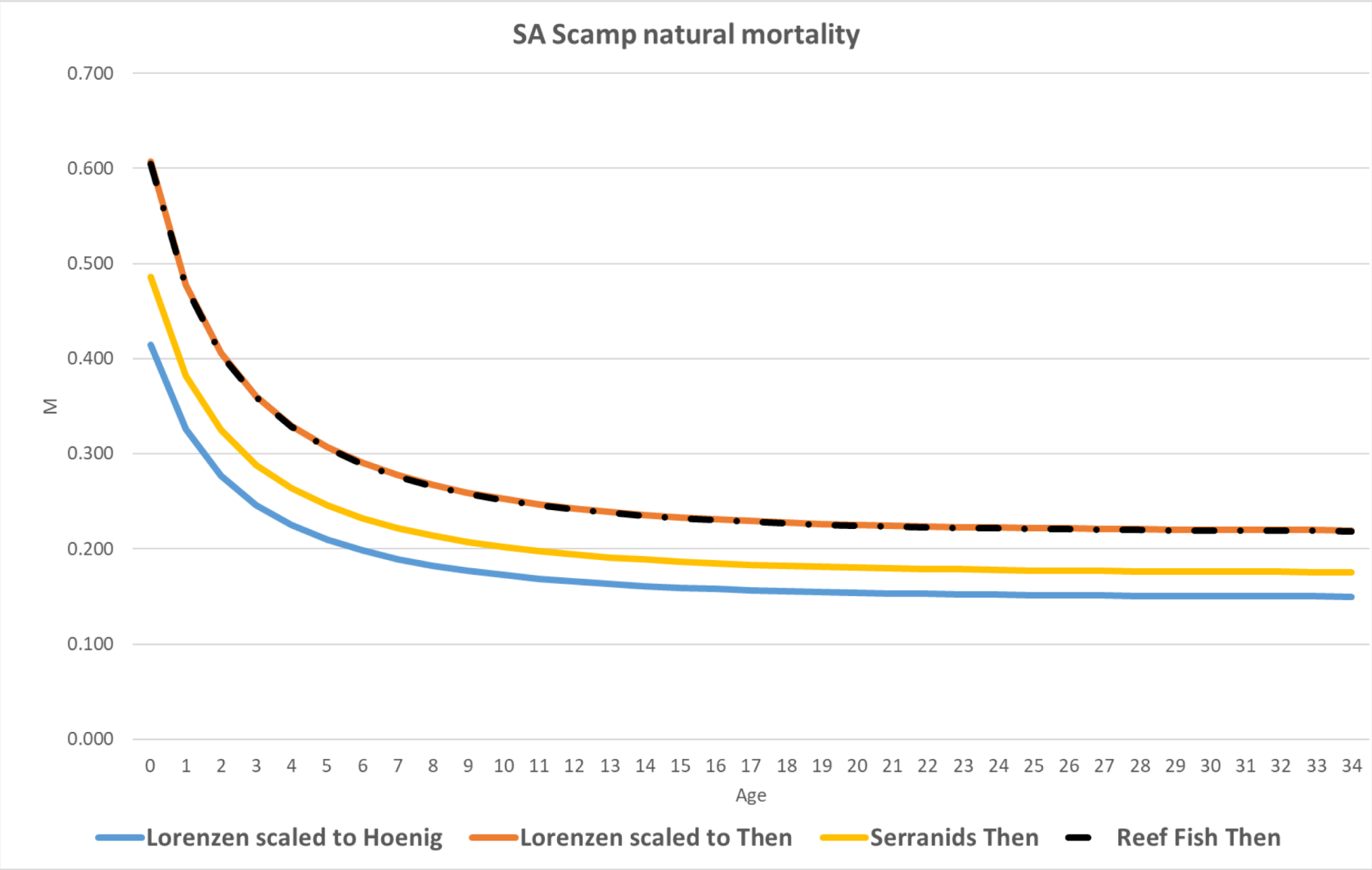
- Considerations:
  - Similar habitat – Reef Fish
  - Similar life history strategies
  - Range of maximum ages
  - Similar trophic level

Selection	Natural Mortality	# of data points
Published equation: All species	0.1938	>200
Reef Fish	0.193	67
Serranids only	0.155	12

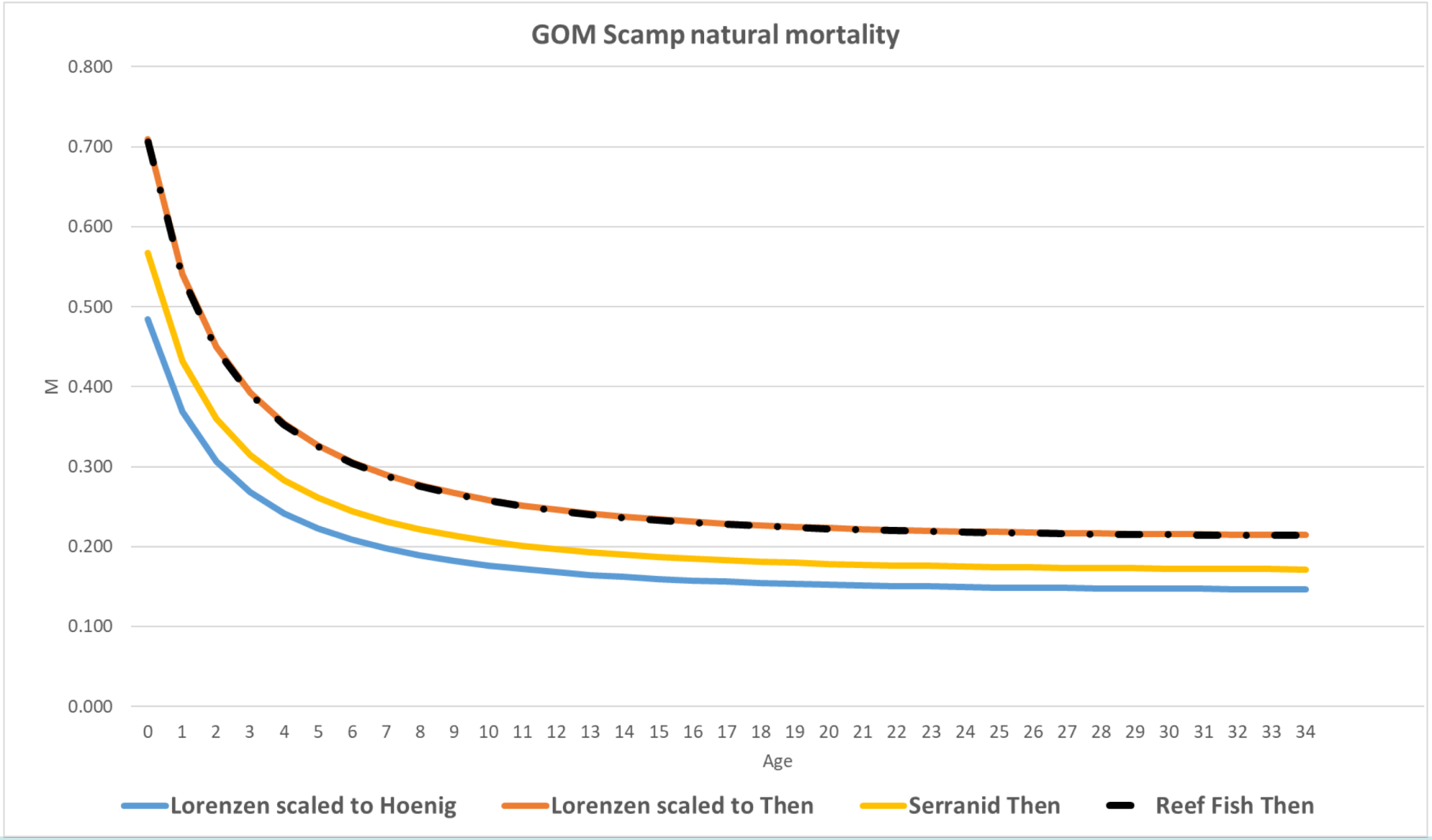
Natural Mortality

- Discussed use of Serranids only versus all Reef fish families
  - Concerned with the range of t_{max} (7-85 years)
    - Felt it encompassed the range of Scamp
  - Concerned with the number of samples (n=12)
    - The point estimates of M fell along the graph well enough, especially around the max age of Scamp (34)
    - Important to note that this was discussed as an important caveat– must be taken in consideration for every species in future assessments
  - All similar trophic levels (predators)
  - Similar life histories compared to other reef species

Natural Mortality-South Atlantic



Natural Mortality-GOM



Natural Mortality

Recommendation: Use Then et al. (2015) data for Serranids only to update regression. Resulting *M* used to scale Lorenzen age-mortality vector.

Research recommendation: Create a separate working group, outside of this assessment but within SEDAR, that will thoroughly review the Then et al. manuscripts to create filtering criteria needed for future assessments, while providing guidance on flow chart for when criteria are appropriate to use/omit. The proposed group would meet multiple times, if necessary, and contain members throughout the Southeast and conclude with a best practices outline