SPR Proxies for the South Atlantic

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Request from SAFMC:

Presentation and supporting references on selecting MSY proxies based on SPR and YPR concepts. Consideration should be given to the risk of recruitment and growth overfishing as well as impacts on stock yield. Include if the references focused on tropical and subtropical species. Discuss other approaches to develop sustainable fisheries for fisheries with a high proportion of recreational catch (>50%).

Outline

- Background stuff

- Brief history and science of SPR proxies

- Use of SPR proxies in the U.S.
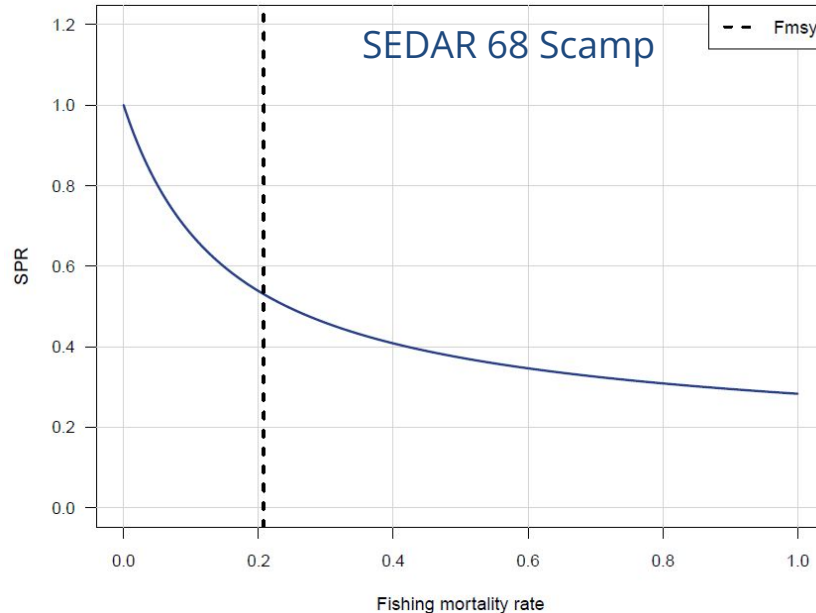
- NS1 recommendations for SPR proxies

Our Mandate:

National Standard 1 of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires preventing overfishing while achieving, on a continuing basis, optimum yield (OY), from managed U.S. fisheries. OY is limited by the biologically feasible maximum sustainable yield (MSY) which in turn serves as the basis for status determination criteria (SDC) by which NOAA determines when a stock is experiencing overfishing or is overfished.

Spawners-Per-Recruit (SPR) Proxy

- %SPR = SPR_F / $SPR_{F=0}$
- %SPR is a proxy for F_{MSY}
- MSY is based on a production function [e.g. Stock-Recruit Relationship (SRR)]

Factors that affect SPR curve

- Fishery selectivity
- Life history parameters (e.g. M, growth, maturity)

Brief history of SPR proxies

- Clark (1991) recommended maintaining SPR between 20-60%, with a ==target of 35%==
- Clark (1993) revised recommendation to ==SPR 40% as a default==
- Mace (1994) ==recommended SPR 40%== when stock-recruit relationship is unknown
- Clark (2002) suggested SPR 40% may be too aggressive for some stocks, ==recommended considering SPR 50% and 60%==
- Dorn (2002) SPR 40% is too high for West Coast rockfishes, ==recommended SPR 50-60%==
- Harford et al (2019) ==40% to 50% SPR== had the highest probabilities of achieving long-term MSY.
- Zhou et al (2020) - next slide

- Legault and Brooks (2013) and Williams and Shertzer (2003) confirmed direct linkage between SPR value and stock recruit relationship (steepness)

Zhou et al. (2020) Results

- Used records from the RAM Legacy Database (RAMLD)

- SPR_{MSY} predicted from life-history parameters and gear selectivity.

- The calculated SPR_{MSY} ranges from about 13% to 95% with a mean of 47%.

- About 64% of the stocks in the RAMLD require $SPR_{MSY} > 40\%$.

- Faster-growing, low-survival, short-lived, and elasmobranch species generally require a higher SPR.

- When F_{MSY} is estimated from fisheries that harvest older fish, increasing the vulnerable age by one year leads to about an 8% increase in SPR_{MSY}.

Use of SPR proxies in the U.S.
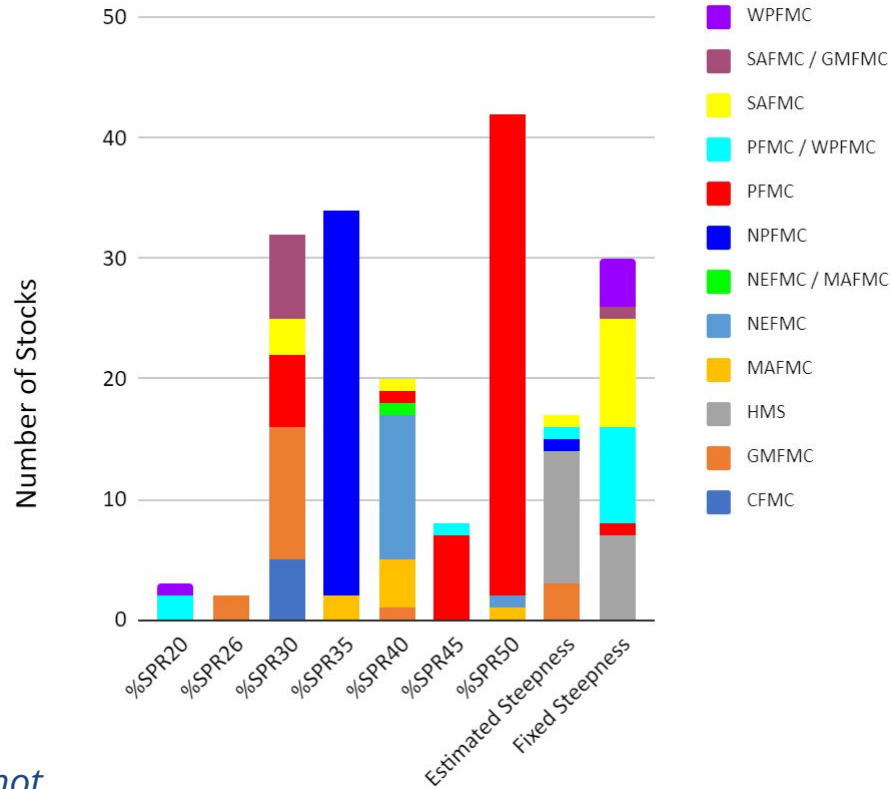
Data provided by Rick Methot

NS1 recommendations for SPR proxies

SSC received presentation at the July 27, 2023 webinar meeting.

Technical Guidance for Estimating Status Determination Reference Points and their Proxies in Accordance with the National Standard 1 Guidelines

Presentation to FMCs and SSCs

Richard Methot

2023

NS1 recommendations for SPR proxies

Direct Estimation (preferred)
- Stock-Recruit Relationship (SRR)
- Choosing the SRR functional form and parameterization
- Estimating parameters of the SRR curve
- Using priors for one or more of the SRR parameters; fixed parameters are ill-advised

MSY-based Proxy (alternative)

Should be re-evaluated with each new stock assessment

From Methot's July 2023 presentation

NS1 recommendations for SPR proxies

Data-moderate MSY-based Proxies

- Proxies for F_{MSY}: recommended %SPR in range of 30-60%, with **default of 40-45%** for most stocks

- Proxies for SSB_{MSY}: Mean Recruitment x SSB/R @ Fproxy; %SSB0

From Methot's July 2023 presentation

NS1 recommendations for SPR proxies

If using a %SPR for the proxy reference points, <mark>re-evaluate the choice of %SPR proxy</mark> used to ensure it is still consistent with the new perception of the stock's productivity

Should be re-evaluated with each new stock assessment

From Methot's July 2023 presentation

Conclusions:

- Estimate MSY directly if possible (e.g. stock-recruit relationship is well estimated).

- If a proxy for MSY is necessary, consider an appropriate level based on stock biology and fishery characteristics.

- A default level would be in the range of 40%-45% SPR.

Questions?