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

Council Coordination Committee

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Status Update

Draft has been shared and is ready for Council comments!

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

Prepared for the

National Marine Fisheries Service

By

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U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

NOAA Technical Memorandum NMFS-F/SPO-###

Overview of Document

- Approaches to calculating MSY-related quantities and SDCs
    - Tier 1: Age- or Length structured Assessment Models
        - Direct Estimation of FMSY, MSY, andBMSY
        - Proxies
    - Tier 2: Biomass Dynamics/Surplus Production Models
    - Tier 3: Data-limited Approaches
        - Biological Composition Method
        - Abundance-based Method
        - Catch-only Methods
    - Additional Special Considerations

- Multi-year approach to determine overfishing status

- Overfished and approaching an overfished condition

- Overfished Determination from %SPR approach

- Updating reference points and SDCs for changing conditions

- Multispecies Considerations

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SDC Concepts

SDC Reference Points for overfishing and overfished conditions work together with Con
Rules to provide science-based fishery management

- Fishing mortality (F) ~ slope of line relating catch to biomass
- Higher F causes lower average stock BIOMASS
- Intermediate F gives MSY
- Overfishing occurs when F > Maximum Fishing Mortality Threshold (MFMT)
  - or when catch > Overfishing Limit (OFL)
- Stock is overfished when B < Minimum Stock Size Threshold (MSST)
- There is a F corresponding to MSST
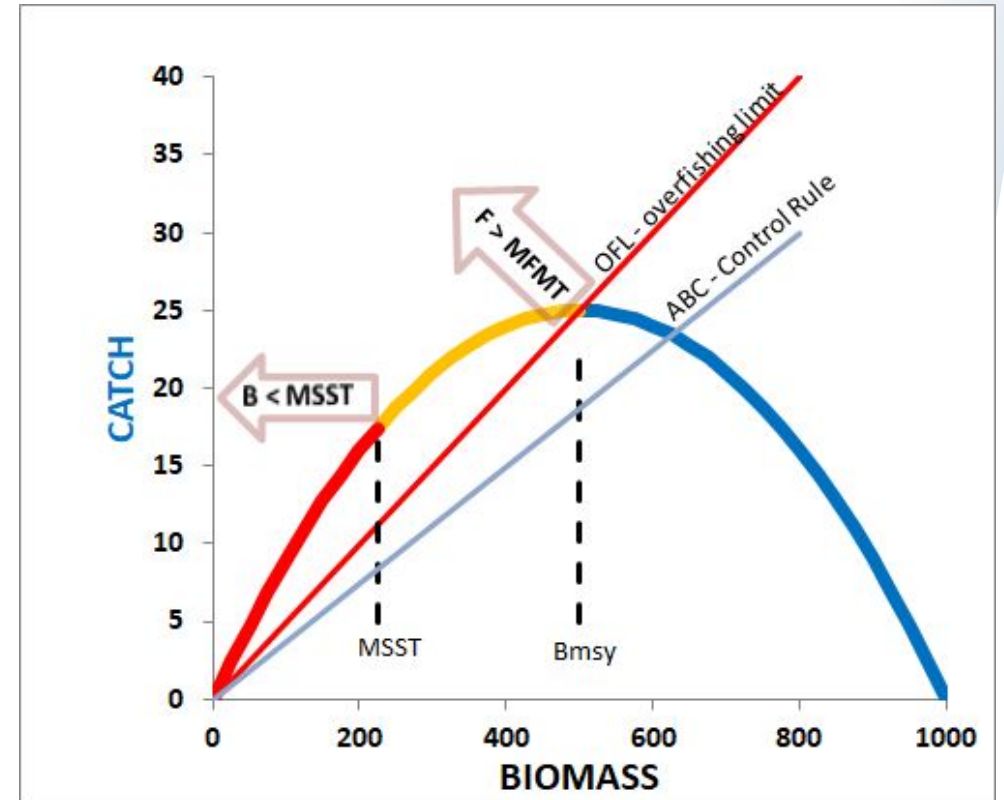
Approaches to calculating MSY-related quantities and SDCs: Age-structured methods

Direct Estimation

- Choosing the SRR functional form and parameterization

- Estimating parameters of the SRR curve

- Using priors for one or more of the SRR parameters

- Regional differences have evolved - tailored to local data and situation

Data-moderate MSY-based Proxies

- Proxies for Fmsy: recommended %SPR in range of 30-60%, with default of 40-45% for most stocks

- Proxies for Bmsy: Mean Recruitment x SSB/R @ Fproxy; %B0

Approaches to calculating MSY-related quantities and SDCs: Biomass Dynamics

Can be employed when there is:

(1)   time series of total catch

(2)   at least one time series of relative abundance data

Pros

- minimal data requirements
- simple to implement and to communicate
- straightforward connection to MSY quantities

Cons

- cannot account for age-specific fisheries
- Ignores lag effect of recruitment contributing to the spawning biomass
- Cannot project recent recruitments into OFL and ABC

Approaches to calculating MSY-related quantities and SDCs: Data-limited Methods

- Data-limited approaches include: catch-only, absolute abundance, abundance trend, and biological composition (e.g. %SPR) as data categories
- All rely on structural assumptions in order to infer some aspect of status determination; none can do it all
- Previously NMFS has disallowed MSST status determinations from only %SPR calcs

- Now: demonstrate how assumption of quasi-stable stock and fishery provides logical basis by which %SPR, which is a measure of the impact of historical F on current stock's relative biomass, can be used to make MSST determinations
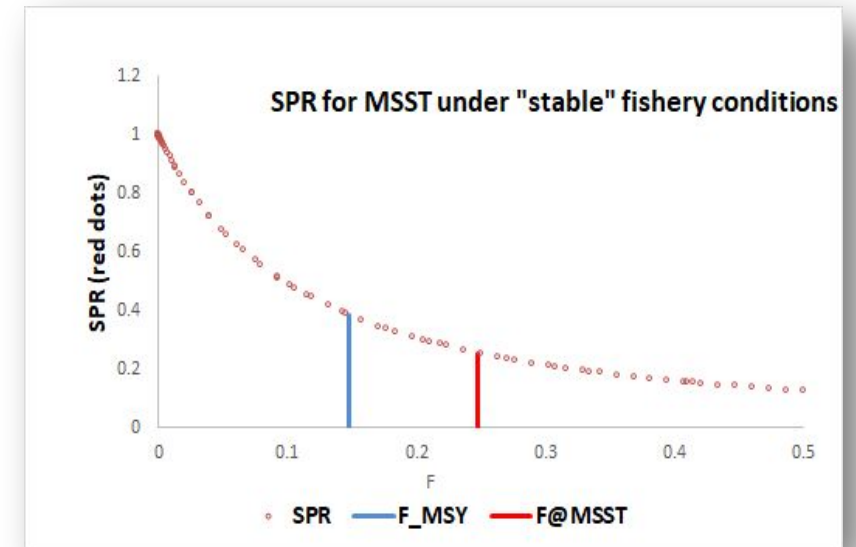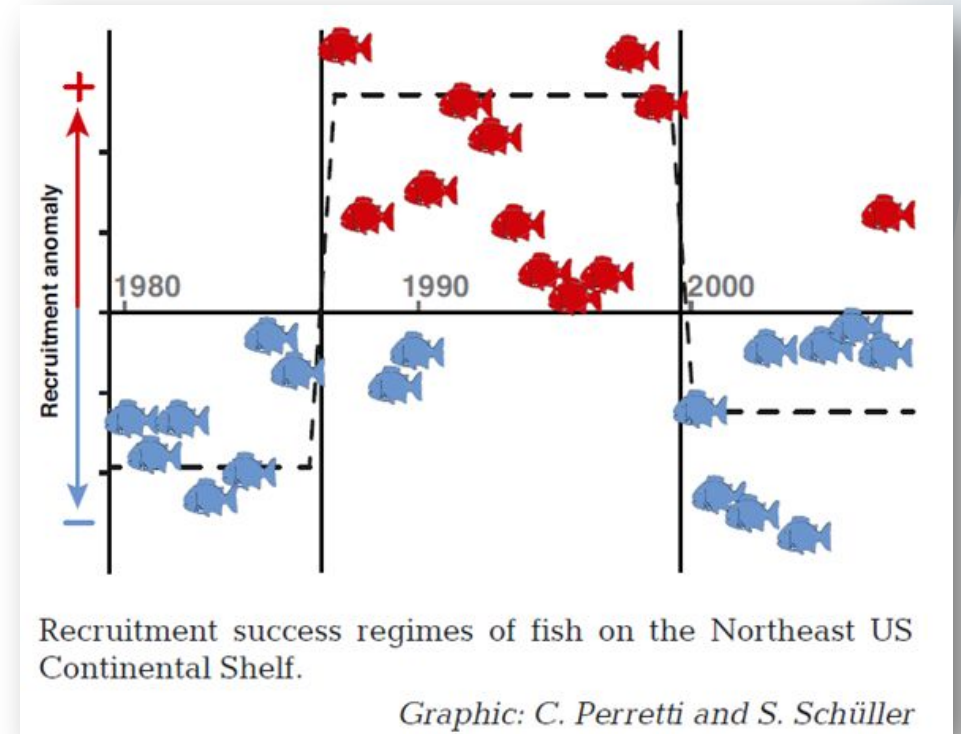
Additional Considerations for Reference Point Calculations

- Fleet dynamics
- Spatial complexity
- Size-selective fishing
- Density-dependence in other life-history factors beyond stock-recruitment
- Age-truncation
- Units of reproductive potential

Updating Ref Pts for Prevailing Conditions

- Track changes with empirical trailing averages

  - already routinely done for fishery conditions and fish biology

  - recommend extending that logic to recruitment also

- If environmental drivers are identified, explore ways to directly incorporate them in the assessment model and resultant SDC ref point updates

- Invoke regime shifts, when demonstrably necessary, as exceptions to that trailing average approach; with high bar to avoid explaining away fishing effects on SSB

- Highlight and investigate changing conditions that would lead to maintaining high F on a declining stock.

- Consider setting control rule inflection biomass based on long-term perspective, and setting FMSY, BMSY, MSY, and rebuilding target on the basis of more recently prevailing conditions. Such an approach needs simulation testing before being used.

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

Recruitment success regimes of fish on the Northeast US Continental Shelf.

Graphic: C. Perretti and S. Schüller

Multispecies Considerations

- **Should be doing best analysis possible to understand status of each species**
- **Technical interactions (e.g., mixed-stock fisheries)**
  - System wide multispecies MSY (MMSY)
  - Calculate F associated with F_{MSST}, to ensure no stock is fished at level that would result in dropping below MSST in long-term
- **Biological (ecological) interactions**
  - Estimating predation mortality (M2)
  - Simultaneously estimating targets for multiple species
- **Explore use of MSEs to evaluate tradeoffs**
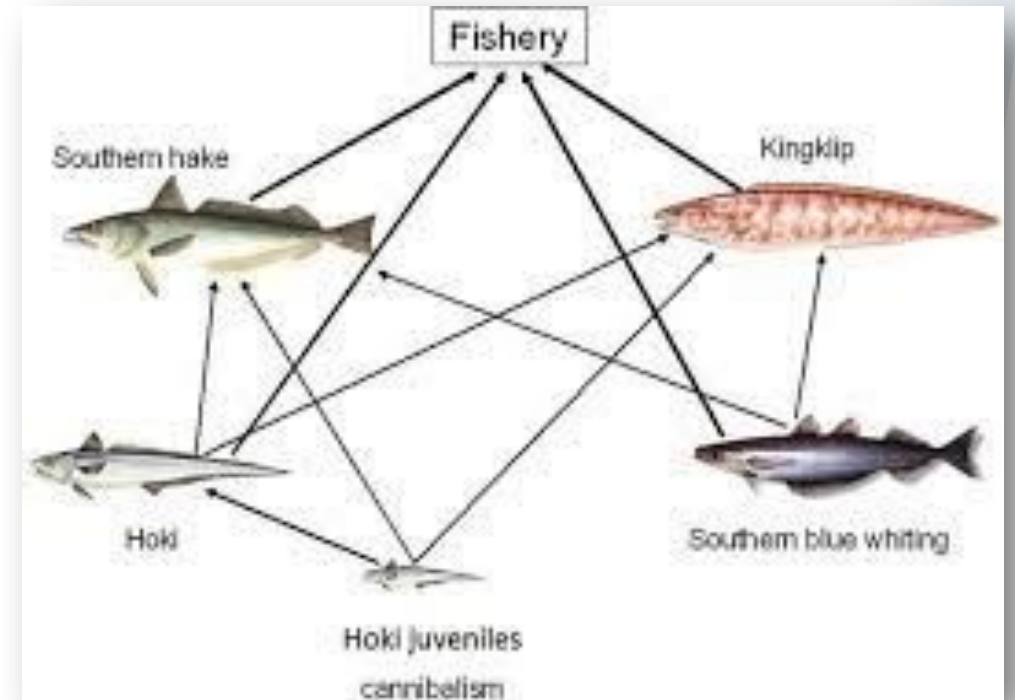
Conclusions

- This document strives to update technical guidance for implementation of reference points and status determinations under NS1

- Based on deliberations among knowledgeable experts that spanned several years

- It addresses some old and some new issues

- Highlight that despite the challenges and differences, the NS1G system of reference points has been highly effective in providing a scientific approach to implementation of the Magnuson-Stevens Act's mandate to prevent overfishing and rebuild overfished fisheries

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