

DRAFT – for comment by FMC’s

not addressed in this document, but some aspects are addressed in other recent technical guidance documents (e.g. control rule phase-in³; data-limited ACLs⁴).

APPROACHES TO CALCULATING MSY-RELATED QUANTITIES

The calculation and evaluation of MSY-related reference points depend upon the types of data that are available, the length of the time series of data availability, and the history of fishing. We organize the various approaches into three “Tiers” based on the types of data available and types of reference points and SDCs the approach supports. The three Tiers are (1) stocks for which there is an age- or length-structured assessment model (e.g., Statistical Catch at Age type models) that provides usable estimates of current and historical abundance and fishing mortality, (2) stocks for which there is a biomass dynamics model (also known as surplus-production or stock-production model) or an empirical approach based on catch and relative abundance data, and (3) stocks for which there is insufficient data to apply a population dynamics model. Within each Tier we describe the approach taken to estimate MSY reference points (or their proxies) and translate them to their associated SDCs, as well as discuss key considerations for applying each approach.

The SDC are defined in terms of fishing mortality rate (F), and reproductive potential (spawning biomass, SSB). Our surveys and fishery monitoring programs do not measure F and SSB directly, they measure catch, age composition, survey trends, etc. which are affected by F and SSB. The challenge is to translate the observed quantities into units that are informative about F and SSB. The link happens in the population (aka stock assessment) models. The models are a simplified “digital twin” of the population. In the stock assessment process, parameters in the model are set or estimated to produce a reasonable match to the observed data. Then the output of the model includes F and SSB which can be compared to the SDC. This two-stage process allows for a wide range of data-rich to data-limited situations to all produce outputs suitable for comparison to SDC and has enabled great growth of data-limited approaches as will be described here.

The approaches and considerations outlined in the following sections reflect a snapshot of a dynamic and evolving field of research and should not preclude application of any new or modified developments post-publication that are well tested for the situation to which they are proposed. An important consideration for whichever reference point method is proposed is that it should be tested in conjunction with proposed management strategies that involve these reference points, prior to implementation in the FMP to make sure that management objectives are achieved with a desired probability. Such investigations were called for in Restrepo et al. (1998) and today are commonly referred to as Management Strategy Evaluation (MSE). Stock assessment methodologies, fisheries management

³ Holland, D., D. Lambert, E. Schnettler, R. Methot, M. Karp, K. Brewster-Geisz, J. Brodziak, S. Crosson, N. Farmer, K. Frens, J. Gasper, J. Hastie, P. Lynch, S. Matson, and E. Thunberg. 2020. National Standard 1 Technical Guidance for Designing, Evaluating, and Implementing Carryover and Phase-in Provisions. NOAA Tech. Memo. NMFS-F/SPO-203, 41 p.

⁴ Macpherson, M., J. Cope, P. Lynch, A. Furnish, M. Karp, J. Berkson, D. Lambert, L. Brooks, S. Sagarese, K. Siegfried, E. Dick, C. Tribuzio, and D. Kobayashi. 2022. National Standard 1 Technical Guidance on Managing with ACLs for Data-Limited Stocks: Review and Recommendations for Implementing 50 CFR 600.310(h)(2) Flexibilities for Certain Data Limited Stocks. NOAA Tech. Memo. NMFS-F/SPO-237, 33 p

