**Refined ORCS approach**

Estimates stock status (i.e., under, fully, or overexploited) from 12 stock- and fishery-related predictors using the refined ORCS approach from Free et al. 2017. Stock status categories are defined as follows: (1) B/BMSY>1.5 = underexploited; (2) 0.5<B/BMSY<1.5 = fully exploited; and (3) B/BMSY<0.5 = overexploited.

The refined ORCS approach (rORCS) uses a boosted classification tree model trained on the RAM Legacy Database to estimate stock status (i.e., under, fully, or overexploited) from twelve stock- and fishery-related predictors, the most important of which are the value of the taxa, status of the assessed stocks in the fishery, targeting intensity, discard rate, and occurrence in the catch (Free et al. 2017). The approach also includes a step for estimating the overfishing limit (OFL) as the product of a historical catch statistic and scalar based on stock status and risk policy.

**Zhou-BRT model**

Estimates saturation (B/K) and stock status (B/BMSY) time series from a time series of catch using the boosted regression tree (BRT) model from Zhou et al. 2017. Note: B/BMSY is equal to saturation times two.

Zhou et al. 2017 use boosted regression tree models (Zhou-BRT) trained on the RAM Legacy Database to estimate saturation (i.e., 1 - depletion = 0.5\*B/BMSY) from 56 catch history statistics, the most important of which are linear regression coefficients for the whole catch time series, the subseries before and after the maximum catch, and in recent years. Ultimately, saturation is estimated as the average of the saturation values predicted by two reduced and bias-corrected BRT models (8 and 38 predictors each). B/BMSY is estimated as saturation doubled.

**Optimized catch only model**

Estimates biomass, saturation (B/K), and stock status (B/BMSY) time series and biological/management quantities (i.e., r, k, MSY, BMSY, FMSY) from a time series of catch and a natural mortality (M) estimate using the optimized catch-only model (OCOM) from Zhou et al. 2017.

The "optimized catch-only model" (OCOM) developed by Zhou et al. 2017 employs a stock reduction analysis (SRA) using priors for r and stock depletion derived from natural mortality and saturation estimated using the Zhou-BRT method, respectively. The SRA employs a Schaefer biomass dynamics model and an algorithm for identifying feasible parameter combinations to estimate biomass, saturation, and status time series and biological/management quantities such as r, K, MSY, BMSY, and FMSY

**CMSY**

Estimates biomass, fishing mortality, and stock status (B/BMSY and F/FMSY) time series and biological/management quantities (e.g., r, K, MSY, BMSY, FMSY) from a time series of catch and a resilience estimate using CMSY from Froese et al. 2017.

The CMSY model developed by Froese et al. 2017 employs a stock reduction analysis using priors for r based on resilience, K based on maximum catch and the r priors, and start, intermediate, and final year saturation based on a set of simple rules. It also allows users to revise the default priors based on expert knowledge. The SRA employs a Schaefer biomass dynamics model and an algorithm for identifying feasible parameter combinations to estimate biological quantities such as B0, r, annual biomass, and exploitation rate as well as management quantities such as MSY, BMSY, and FMSY.

**Bayesian state-space surplus production model**

Estimates B/BMSY time series and other biological quantities (e.g., r, k, MSY) from a time series of catch and a resilience estimate using the Bayesian surplus production model from Froese et al. 2017.

The Bayesian state-space surplus production model (BSM) developed by Froese et al. 2017 is fitted using a catch time series and any available (i.e., doesn’t have to be complete) biomass or catch-per-unit-effort (CPUE) data. It extends the algorithms used to set bounds for r, K, and start, intermediate, and final year saturation in CMSY by deriving density distributions from these originally uniform bounds and by adding a prior for catchability, q. BSM estimates biological quantities (e.g. r, K), reference points (e.g., MSY, BMSY, FMSY), and time series of biomass and fishing mortality.