MSE framework: Stock assessment methods

Simulated survey and catch data inform a stock assessment method used to estimate stock and fishery metrics. Stock assessment methods determine stock status. The analytical models available in the framework are statistical catch-at-age models, which analyze data on the age of fish captured in surveys and in the fishery. These models require at least one stock size index and observations of total catch from the fishery or fisheries. However, some data can be missing.

documentation/mprocOptions.md
-documentation on the options for management procedures, which include the stock assessment methods

functions/managementProc/get_advice.R
-function that runs the management procedure, which includes running the stock assessment method

modelParameters/stockParameters
-waa_mis- if set to true, then there is a weight-at-age misspecification in the stock assessment model
-M_mis- if set to true, then there is a natural mortality misspecification
-M_mis_val- the misspecified natural mortality assumption used in the stock assessment model
*Note misspecifications are currently only parameterized for the ASAP model
-ncaayear- number of years in the assessment model
-boundRGLev- expansion range for setting limits on parameter bounds- currently only used in the generalized statistical catch-at-age model
-startCV- CV starting values for the assessment model

modelParameters/mproc.csv
-options chosen for the management procedure, which includes the stock assessment options
-ASSESSCLASS- assessment method
-AssessFreq- frequency of assessment
-rhoadjust- whether rho-adjustments are applied to the SSB estimate
-Lag- whether there is a lag in information to the stock assessment

Stock assessment method options:

1. Age Structured Assessment Program (ASAP)

ASAP uses forward computations that assumes separability of fishing mortality into year and age components to estimate stock size given observed catch, catch proportions at age, and abundance indices. Discards can be explicitly considered. ASAP allows for fleet-specific computations and for selectivity at age to vary over time.

documentation/ASAPdesc.md
-documentation on the ASAP model

assessment/ASAP
-contains all the .dat files for initiating ASAP stock assessments for each of the stocks available in the framework

-can edit directly to change lambdas, phases, or CVs (these impact the likelihood functions), otherwise the .dat files are modified through functions in the framework

functions/assessment/get_ASAP.R
-function to run the ASAP stock assessment model
-modifies .dat file, runs model, and produces a result object

2. Generalized statistical catch at age model

documentation/CAAModelTMB.md
-documentation on the catch-at-age model

assessment/caa.cpp
-file for the statistical catch at age model

functions/assessment/get_caa.R
-function to run the statistical catch at age model

functions/assessment/get_svNoise.R
-function to help provide starting values for the statistical catch at age model
-adds noise to starting values

3. Index-based approach

documentation/planBdesc.md
-documentation on the plan B method

functions/assessment/get_planB.R
-function to set up and apply the plan B method
-calls upon apply_planBsmooth.R

functions/assessment/apply_PlanBsmooth.R
-function to apply the plan B method
-smooths data using loess, applies log linear regression to most recent three years, and retransforms back to estimate multiplier for catch advice