MSE Framework: Fishery and Survey

Observation models are designed to simulate collection of fishery dependent and fishery independent data with the characteristics and quality (i.e., uncertainty) that typically inform groundfish haddock stock assessments. The fishery-dependent data generated included total catch and catch-at-age information. Fishery independent survey data included a survey index of abundance and an index of abundance-at-age.

We simulate data to emulate the Northeast Fisheries Science Center (NEFSC) bottom trawl survey. We model the survey index of abundance-at-age and an aggregated index of abundance (summed across ages) as a function of the total abundance available to the survey (i.e., resource abundance in the OM), catchability of the survey, survey selectivity-at-age, and observation error. We assume lognormal error for the index of abundance and multinomial error for the index of abundance-at-age.

We model the fishery catch in number and calculate catch and catch-at-age in weight. We assume lognormal observation error on total catch and multinomial errors on catch-at-age.

- If the historical assessment information is used to create historical trajectories, F from the assessment history data (data/data_raw/AssessmentHistory) will be used in the historical period.
- Harvest is modeled as a single fleet (i.e. recreational and commercial combined) consistent with the current stock assessments.
- Fishing mortality is not permitted to go over 2.

Functions:

get_indexData- function in functions/managementProc folder- gets survey index and proportions at age and observed catch and proportions at age

get_F- function in functions/popdy folder- estimates fishing mortality based on catch

get_J1Updates- function in functions/popdy folder- bulk of the operating model, which includes the fishery components

get_catch- function in functions/popdy folder- calculates catch with Baranov catch equation

get_error_idx- function in functions/popdy folder- returns a survey index or catch observation with observation error applied

get_error_paa- function in functions/popdy folder- returns observed proportions at age for the survey or catch with observation error applied

get_implementationF- function in functions/popdy folder- applies implementation error to F

get_slx- function in functions/popdy folder- returns selectivity at age given parameters

get_survey- function in functions/popdy folder- returns survey index

get_burnF- function in functions folder- calculates F used for the burn in period, proportional to Fmsy