

List of Functions Needed for MSC

- Switch cases for recruitment options – define phases in which parameters associated with recruitment option are being estimated (second part is probably not needed unless trying to exactly replicate ADMB version – estimates should be very close to ADMB version even without cases or something is wrong with model) – JIM/CHRIS
- (1) Functions for recruitment options (white noise, AR-1, random walk, and Ricker) – CHRIS
 - a. Avg*error
 - i. Error = white noise
 - ii. Error = AR-1
 - 1. Change $\tanh(\text{acor})$ to $\tanh(\text{acor}+1)$ to constrain to be positive?
 - 2. Use logit/inverse logit function?
 - b. Random walk
 - c. Stock-recruit (Ricker)
 - i. Error = white noise
 - d. ALL OF THE ABOVE: How to handle recruitment in the last year or two
 - i. Previous year
 - ii. Previous 2 years
 - iii. Previous few years
- (2) Selectivity – JIM
 - a. Function of length-at-age
 - i. Lognormal
 - 1. 1st SD parameter is time-varying
 - 2. Probably want the option to do both parameters as time-varying
 - ii. Logistic
 - 1. 1st inflection point is time-varying
 - 2. Probably want the option to do both parameters as time-varying
- (3) Initial population options – BEN
- (4) Time-varying plus groups
 - a. Probably want a switch case to turn on/off
- (5) Probably want to control retro adjustments from R side – BEN
- (6) Natural mortality – BEN
 - a. Currently Pauly
 - b. Prior value as piece of data and fixed “known” SD in data file
 - c. Analyses suggest that default M should be lower than Pauly
 - d. Some other life-history estimator (Hoenig)?
- (7) Probably want to move effort adjust and observed CT and CG to R side – BEN
- (8) Growth – BEN
- (9) Population weight-at-age (time = 0.5)
- (10) Weight-at-age spawning time (time = spawning time – 0.5)
- (11) Weight-at-age harvest time (time = 1.0)
- (12) Eggs-per-female

- (13) Weight factor
- (14) Percent mature female
- (15) Catchability
- (16) Mortality
 - a. Keep age and year-specific F and M for convenience in making changes later on
 - b. Need to keep ML for sea lamprey in code for LT and Lake Huron LWF
 - i. Keep sea lamprey adjustments in data file as fixed values
- (17) Survival and annual mortality
- (18) Abundance
- (19) Biomass
- (20) Catch-at-age
- (21) Residuals
 - a. Potentially need to change because multinomial distributions and need to adjust for correlations – there is a built-in R package for this
 - b. Probably needs to be moved to R side
- (22) Projections = REPORT and do the TAC calculations on the R side
- (23) Objective functions
- (24) Look and see if phases matter or not (also see comments above) – would likely be able to not use phases and should be the same as ADMB results with phases if model and parameter estimates are “good” – if not the same, model likely has deeper issues – if want to exactly mirror ADMB models will likely need to use phases – preference would be to go through, fix parameters you think you know, estimate the others, and then go back and estimate all parameters and do this manually in steps for each model
- (25) Likelihood – built-in functions or write functions as needed if don’t already exist
- (26) Code documentation/conversion to .pdf – JACK
- (27) Plug in and test functions as needed – BEN