**Classes for Stock Synthesis**

* observation
  + year (int)
  + season (int)
  + fleet (int)
  + gender (int)
  + partition (int)
  + num\_samples (int)
  + low\_bin\_min (int)
  + low\_bin\_max (int)
  + age\_err (int)
  + fm\_data (float list)
  + fm\_sample\_size (float list)
  + ml\_data (float list)
  + ml\_sample\_size (float list)
* short parameter
  + lo (float)
  + hi (float)
  + init (float)
  + prior (float)
  + pr\_type (int)
  + sd (float)
  + phase (int)
  + sp\_text (string)
* long parameter
  + lo (float)
  + hi (float)
  + init (float)
  + prior (float)
  + prType (int)
  + sd (float)
  + phase (int)
  + envVar (float)
  + useDev (int)
  + devMinyr (int)
  + devMaxyr (int)
  + devStddev (float)
  + useBlock (int)
  + blockType (int)
  + lpText (string)
* Files
  + Input files (starter.ss, forecast.ss, runnumber.ss, etc.) – (QFile)
    - Comments
  + Data file name (string)
  + Control file name (string)
  + Read from ss3.par (bool)
  + Display detail (int)
  + Detailed age-structured reports (bool)
  + Detailed checkup.sso (bool)
  + What to write to parmtrace.sso (int)
  + What to write to cumretport.sso (int)
  + Number of datafiles (int)
  + Min year for sd report (int)
  + Max year for sd report (int)
  + Vector of sd year values (int list)
  + Retrospect year (int)
  + SPR report basis (int)
  + F report units (int)
  + F report basis (int)
  + EOF check value (int)
* Model
  + Include priors (bool)
  + Use softbounds (bool)
  + Last estimation phase (int)
  + MC eval burn interval (float)
  + MC eval thin interval (float)
  + Jitter value (float)
  + Convergence criteria (float)
  + Min age for calc summary biomass (int)
  + Depletion basis (int)
  + Fraction for depletion denom (float)
  + Min and Max age for calc F (int, int)
  + Allocation fraction for each group (float list)
  + Start year (int)
  + End year (int)
  + Num fishery fleets (int)
  + Num surveys (int)
  + Num areas (int)
  + Num genders (int)
  + Num ages (int)
  + Num discard fleets (int)
  + Mean body wt df (float)
  + Mean body wt (observation list)
  + Block patterns (block pattern list)
  + Variance adjustment (bool)
  + Max lambda phase (int)
  + Std dev offset (float)
  + Num\_lambda\_changes (int)
  + Like comp
    - Code (int)
    - Fleet (int)
    - Init equil catch (int)
    - Phase (int)
    - Sizefreq method (int)
  + Lambdas (settings list)
  + Add\_stdv\_reporting
    - Selex (int)
    - Len/age (float)
    - Year (int)
    - Num selex bins (int)
    - Growth\_pattern (int)
    - Num growth ages (int)
    - NatAge area (int)
    - NatAge yr (int)
    - Num natages (int)
    - Vector selex\_std (float list)
    - Vector growth\_std (float list)
    - Vector NatAge\_std (float list)
  + Seasons
    - Num months (int)
    - Spawning (bool)
  + Fleets
    - Type (fishing, bycatch, survey) – (int)
    - Name (string)
    - Timing in season (float)
    - Area (int)
    - Units of catch (fisheries only) (int)
    - Se of log catch (fisheries only) (float)
    - Initial equilibrium catch (fisheries only) (float)
    - Catch by year/season (fisheries only) (float list)
    - Abundance units (int)
    - Abundance error type (int)
    - Abundance (observation list)
    - Discard units (int)
    - Discard error type (int)
    - Discard (observation list)
    - Rel F per season (double)
    - Max total catch (double)
    - Allocation group (int)
    - Observed Catch (or F) per season per year (double list)
    - Q
      * Method (int)
      * Settings (int list)
      * Parameters (short parameter list)
    - Size Selectivity
      * Settings (int list)
    - Age Selectivity
      * Settings (int list)
      * Parameters (long parameter list)
      * Custom (bool)
      * Environ function (short parameter)
      * Custom block (bool)
      * Block usage (short parameter)
      * Deviation phase (int)
      * Deviation method (int)
    - Tag (bool)
    - Tag parameters (long parameter list)
    - Variance add to survey (float)
    - Variance add to discard (float)
    - Variance add to bodywt (float)
    - Variance mult by lencomp (float)
    - Variance mult by agecomp (float)
    - Variance mult by size-at-age (float)
    - Like\_comp
      * Code
      * Phase
      * Value
      * Size\_freq method
  + Population
    - Fraction female (float)
    - Growth patterns (list growth patterns)
      * Num morphs (int)
      * Morph in stdev (int)
      * Morph distribution (float list)
    - Recruitment designs (recruitment list)
      * Method (int)
      * Parameters (short parameter list)
      * Environ link (int)
      * Environ target (float)
      * Recruit deviations (bool)
      * Deviations
        + First year (int)
        + Last year (int)
        + Phase (int)
        + Advanced options (bool)
        + Early start (int)
        + Max (float)
        + Min (float)
        + Cycle parameters (long parameter list)
        + Yearly values (float list)
        + Deviations (float list)
      * Forecast phase (int)
      * Forecast lambda (float)
      * MPD nobias early year (int)
      * MPD fullbias first year (int)
      * MPD fullbias last year (int)
      * MPD nobias first year (int)
      * MPD max bias adjustment (float)
      * MPD num cycles (int)
    - Movement (movement def list)
    - Mortality
      * type (int)
      * ballpark tuning (float)
      * ballpark year (int)
      * method (int)
      * num inputs (int)
      * num iterations (int)
      * parameters (short parameter list)
    - Growth
      * model (int)
      * age l1 (float)
      * age l2 (float)
      * cv growth pattern (int)
      * maturity option (int)
      * maturity age (float)
      * parameters (long parameter list)
      * environ params (short parameter list)
    - fecundity
      * type (int)
      * hermaphroditism (int)
    - param offset approach (int)
    - adjustment method (int)
  + Forecast
    - Calculate Benchmarks (bool)
    - MSY method (int)
    - SPR target (float)
    - Biomass target (float)
    - Benchmark years (int list)
    - Benchmark rel F basis (int)
    - Forecast method (int)
    - Num Forecast years (int)
    - F scalar (float)
    - Forecast years (int list)
    - Control rule method (int)
    - Control rule bmass level const F (float)
    - Control rule bmass level no F (float)
    - Control rule target fraction Flimit (float)
    - Num Forecast loops (int)
    - First Forecast loop with stochastic R (int)
    - Forecast loop control 3, 4, and 5 (int for each)
    - First year for caps and allocs (int)
    - Std dev of Forecast log (float)
    - Do West Coast rebuilder (bool)
    - Rebuilder first year zero catch (int)
    - Rebuilder year current age struct (int)
    - Fleet rel F (int or int list(by season and fleet))
    - Forecast catch tuning and alloc basis (int)
    - Num Forecast levels (int)
    - Forecast catch basis (int)
  + Area
    - Max total catch (double)
  + Allocation groups (int)
    - Fraction (double)
  + Length composition
    - Bin method (int)
    - Bin width (float)
    - Bin min (float)
    - Bin max (float)
    - Bins (float list)
    - Tail compress (float)
    - Add to (float)
    - Combine genders (int)
    - Observations (observation list)
  + Age composition
    - Bin method (int)
    - Bin width (float)
    - Bin min (float)
    - Bin max (float)
    - Bins (float list)
    - Combine genders (int)
    - Observations (observation list)
    - Error observations (error vector list)
    - SAA (observation list)
  + Size composition
    - Bin method (int)
    - Bin width (float)
    - Bin min (float)
    - Bin max (float)
    - Bins (float list)
    - Combine genders (int)
    - Observations (observation list)
  + Environment vars (double list)
  + Environment observations (observation list)
  + Tag recapture data (observation list)
  + Morph composition
    - Method (int)
    - Morphs (float list)
    - Observations (observation list)