DRAFT REPORT ON ACCEPTED PRACTICES GUIDELINES FOR GROUNDFISH STOCK ASSESSMENTS

The following guidelines are intended to provide STATs with default approaches they should use for dealing with certain stock assessment data and modeling issues. The STATs may diverge from the guidelines if they provide adequate justification for doing so. These guidelines are not intended to provide a comprehensive treatment of all potential issues, which are too numerous to list. Rather the guidelines focus on a limited number of specific issues that the SSC has so far considered. The guidelines are subject to change as the SSC evaluates additional data sources and modeling approaches. STATs should consult with Council staff to obtain the most recent set of guidelines, which the SSC will finalize by March 2017 for use with 2017 stock assessments.

Biomass indices from bottom trawl surveys

The geostatistical delta-GLMM software developed and maintained by Dr. Jim Thorson (NWFSC) should be considered as the first choice for developing biomass indices from bottom trawl survey data, though exploration of other methods is encouraged. Assessment documents should include a comparison of the delta-GLMM based biomass estimates with design-based estimates to gauge the uncertainty associated with the choice of methodology.

DBS: The delta GLMM software has many different options. The SSC may need to modify the above wording to clarify what parts of the delta-GLMM software are accepted for use and which are not.

Spatial stock structure for nearshore groundfish species

STATs conducting assessments of nearshore groundfish species should explore state-specific or finer-scale stratifications for the assessment models to account for regional differences in exploitation and management history. STATs conducting assessments of any groundfish species (not just nearshore ones) should also explore regional differences in biology (or the underlying environmental conditions that influence biology) when defining stock structure in assessments. If there are separate regional models for a species the models should use consistent approaches for modeling productivity and for data weighting.

Prior distributions for natural mortality (*M*)

Assessments for groundfish species should report the prior probability distribution for natural mortality (*M*) based on the meta-analytical approach developed by Dr. Owen Hamel (NWFSC) and STATs should explore using the prior to inform the assessment models.

If a prior for *M* is used to provide a fixed value for *M*, the fixed value should be set equal to the mean value of the prior.

DBS: Here are several issues that the SSC may want to provide guidance on:

- *Is it acceptable for STATs to use a prior based on von Bertalanffy growth coefficients? Is the prior based on maximum age the preferred approach?*

- *The SSC may want to provide guidance regarding the data included in meta-analyses. For example, is it acceptable to use maximum age values from fish caught in Alaska? Or, given that it is common to assume that selection is length based, is it acceptable to use von Bertalanffy growth coefficients derived directly from observations of length-at-age?*
- *Does the SSC want to provide any guidance regarding values for M (based on an M prior) that differ by gender? Differences in M by gender will distort the sex ratio from 50:50.*
- *Is it acceptable for STATs to use age-dependent M, such as Lorenzen or other? Are there circumstances where it would be unacceptable to do so?*

Weighting of compositional data

STATs by default should use the appropriate Francis method for weighting age- and length-compositional data. (*The SSC should clarify which method should be used for each type of compositional data.*) The assessment document should include a sensitivity run that uses the harmonic mean weighting approach to gauge the uncertainty associated with the choice of methodology.

DBS: Here are several issues that the SSC may want to provide guidance on:

- *Calculation of the weighting coefficients for compositional data is done iteratively. Starting values are used and updated after each iteration. Is it acceptable to stop the process after a single iteration? If it is not acceptable the SSC may want to specify a minimum number of iterations or a rule for stopping the iterative process.*
- *The initial values used for the weighting coefficients could either be the actual number of fish on which each composition is based or the number of bottom trawl survey tows or fishing trips contributing fish to the composition. The SSC may wish to specify an accepted practice that the STATs should use to derive the initial values.*

Data Extractions

- The STATs should record and report the versions of any databases they use and the dates of any database queries and data extractions so there can be verification that the most up-to-date data were used.

Landings Data

- STATs should either (a) verify that the relevant unidentified fish category (e.g., URCK, UFLT) in PacFIN and RecFIN has no appreciable quantities of the species being assessed or (b) develop and apply an appropriate species proportion to the landings of unidentified fish to estimate corresponding landings of the species being assessed.

Discard Data

- The STATs should check in with the NWFSC Groundfish Observer program to obtain estimates of discards and summaries of any available biological information for discarded fish. The STATs should include an analysis to evaluate whether there is evidence of size-based discarding and determine if the assessment model should include size-based

retention for either commercial or recreational catch.

Compositional Data

- When combining compositional samples from different geographic strata, the composition proportions should be weighted by some appropriate measure of the numerical abundance in each stratum. Catch weights would not be appropriate if the average weights of the fish vary appreciably among the regions.
- A software package is available from the NWFSC to process biological sample data (BDS) stored in PacFIN and to generate time series of compositional data that are formatted for use with Stock Synthesis. The STATs should use this software. If a STAT uses other software, they should verify that the other software produces equivalent results.

Recreational Catch-per-Unit-Effort Data

- If a catch-per-unit-effort index is developed from a multi-species recreational data source that does not report fishing locations at a fine scale (e.g., the data were not collected by at-sea observers), the data should be screened using the Stephens and MacCall method to identify data records that were unlikely to include the species being assessed.

  The SSC has not yet reviewed a new, recently published approach that may provide an alternative to the Stephens and MacCall method: Thorson et al. (2016). "Accounting for spatiotemporal variation and fisher targeting when estimating abundance from multispecies fishery data"; CJFAS.

Modeling - Selectivity

- "Cryptic biomass" is a term used to describe the phenomenon whereby a model predicts biomass that is not directly observed in data from any fleet. Cryptic biomass can only arise if all fleets have selectivity curves that are dome-shaped. An assessment model should preferably include at least one fleet that has asymptotic selectivity. At a minimum an assessment should as a sensitivity run include at least one fleet that has asymptotic selectivity.

Modeling - Fecundity

- Rockfish stock assessments should consider the fecundity relationships from the meta-analysis in Dick et al. (in review) if better species-specific relationships are unavailable. If a size-dependent fecundity relationship is not used in the base model, the model should include a sensitivity run comparing spawning output proportional to mature female biomass versus increasing weight-specific fecundity.

Modeling – Diagnostics

- Every stock assessment document should at a minimum include likelihood profiles across the parameters $\ln(R0)$[1], M and steepness. These profiles should show the normalized likelihood values for each individual component separately. The purpose is to help

[1] Parameter $R0$ is the number of age-0 annual recruits in an unfished stock.

identify which data components are providing information on the estimate of scale and potentially conflict between those components. This diagnostic is an aid to understanding and structuring a model; it may not identify model misspecification.

Modeling – Prior on Steepness

- If an informative prior for steepness is used in an assessment model that makes an internal estimate of steepness, the data used to inform the prior distribution should not include the stock being assessed because doing so would make double-use of the data for this stock.
- If a prior for steepness is used to provide a fixed value for steepness, the fixed value should be set equal to the mean value of the prior.

  (*If appropriate software can be developed, tested and evaluated, a more theoretically defensible approach would be to integrate the assessment results over the prior distribution for steepness.)*