



Report from the June BSAI Team workshop

**NOAA
FISHERIES**

Alaska Fisheries
Science Center

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Overview

- What: “Assessment Methods” workshop
 - Topic #1: Ensemble modeling
 - Topic #2: ABC adjustments
- Who:
 - Convened by BSAI Team
 - Co-chaired by A. Haynie, A. Hicks, D. Stram, G. Thompson
 - D. Stram also served as rapporteur
 - D. Hanselman also played a major role before moving to SSC
 - At least 46 participants
- When: June 27-28, 2018
- Where: AFSC Seattle lab
- Purpose: To develop recommendations for the two topics, to be considered by the Joint Teams at their September meeting

Over 20 presentations (see link in document)

3. ENSEMBLE MODELING

3.1. Brief descriptions of ensemble modeling and model averaging	Thompson
3.2. The dividing line between statistics and machine learning	Thompson
3.3. Examples of ensemble modeling in fisheries stock assessment: the American experience	Hicks
3.4. Examples of ensemble modeling in fisheries stock assessment: the ICES experience	Johnson
3.5. Examples of ensemble modeling in other disciplines	Bond
3.6. Lessons from the 1998 NRC study	Thompson
3.7. Review the 2017 SSC ensemble modeling workshop	Hicks
3.8. Review the NSAW on ensemble modeling	Hanselman
3.9. Choosing models in an ensemble	Thompson
3.10. Combining models and assigning weights	Thompson
3.11. Calculating statistics and uncertainty	Thompson
3.12. Pros and cons of implementation in NPFMC system	Ianelli/Thompson
3.13. Communicating and using results	Co-chairs
3.14. Workload and logistics for assessment authors	Thompson
3.15. Identifying assessments amenable to ensemble modeling	Co-chairs

4. DETERMINING ABC

4.1. Review how maxABC and ABC are determined in NPFMC system	Stram
4.2. Examples of reductions from maxABC in the past	Hanselman
4.3. How can ensemble modeling inform maxABC and ABC	Hicks
4.4. Other methods of accounting for uncertainty when determining ABC	Thompson/Hanselman
4.5. Potential tools/metrics for guiding reductions	Haynie
4.6. The role of ecosystem or socio-economic considerations in reductions from maxABC	Haynie

Ensemble modeling recommendations (1 of 3)

1. Assuming that some sort of model averaging is involved, an ensemble model should be treated the same as any other model (i.e., an ensemble is a “model” and should be treated as such in reference to the existing language in the FMP and SAFE report guidelines)
2. Continue efforts on ensemble modeling, including approaches that could be used in this year’s assessment cycle
3. Resolve the following critical issues:
 1. Choosing and justifying members of the ensemble model
 2. Choosing among a number of available weighting schemes
 3. Justify the benefits of the added complexity resulting from moving to an ensemble model
4. Identify criteria for stocks amenable to ensemble modeling (e.g., fully-exploited, high model result variability)

Ensemble modeling recommendations (2 of 3)

5. BS Pacific cod and northern rock sole and/or yellowfin sole assessments should move forward with ensemble modeling options in the upcoming assessment cycle
6. Ensemble modeling seems appropriate for consideration in some NPFMC assessments but not necessarily for all assessments
7. For example, a good use of an ensemble model (at high levels of inclusion and complexity) would be to test current assessment methods and harvest control rules, which would help with:
 - a) supporting a simple model for management purposes by showing that it compares favorably with the ensemble and
 - b) improving transparency and alleviating review and model selection process at the Plan Team/SSC meetings

Ensemble modeling recommendations (3 of 3)

8. Candidate stocks for an ensemble model should be chosen judiciously because it will add significant workload to both assessment authors and reviewers
9. The process may need to be modified to allow for adequate review of model selections and weighting schemes (e.g, a CIE review may be required or additional Plan Team meeting for model selection)
10. Selection of models for the ensemble should be made no later than the September/October time frame and preferably earlier
11. If the SSC wishes to entertain ensemble models, they may need to devote more time for model review (e.g., during the February meeting)

ABC < maxABC recommendations (1 of 3)

1. Include a section in the Introduction to the SAFE report outlining extraordinary circumstances and major uncertainties which should feature discussion of:
 - Who will be impacted by choosing an ABC below the maxABC?
 - What are the current hypotheses related to how this extraordinary circumstance has impacted the stock and what are the current research priorities?
 - What data can be collected to evaluate these hypotheses?
2. Any reductions of ABC should be transparent and clearly described
3. Clarify, with the SSC, the issue of the extremely high bar set for reducing the ABC for EBS Pacific cod
 - “unequivocal information justifying a further reduction”

ABC<maxABC recommendations (2 of 3)

4. The committee charged with developing rules for setting ABC<maxABC (chaired by Martin Dorn) should consider:
 - Elements to include (e.g., ecosystem indicators, uncertainty in data, trend in stock status, missing surveys)
 - Specific reductions (defining % reduction)
 - Setting ABC by using the maxABC from a Tier other than that used for setting OFL
 - Using a different model than the chosen assessment model to justify a reduction (may be an alternative single-species model, an ensemble model, or a multispecies model)

ABC < maxABC recommendations (3 of 3)

5. The Joint Teams should recommend that AFSC task staff to continue to work on P^* and decision theory approaches to develop uncertainty-based buffers, for example:
 - Update the previous analysis using survey uncertainty to define the uncertainty to consider in a P^* approach
 - Determine the P^* implied by a single “best model” approach and determine how different the buffer would be when using that P^* with an ensemble approach.
6. Biologists, economists, and other social scientists should spend more time together discussing how socioeconomic factors are relevant to stock assessment and how changes in abundance, size, and distribution impact fishers, communities, and consumers
7. Further investigate the impact of TAC reductions from ABC for different species; for example, when pollock TAC is lower, this can lead to a significant increase in flatfish species TAC and catch