Report of the ABC Below Max Working Group

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Sept 18, 2018

New language in Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006:

Each Council shall, in accordance with the provisions of this Act—…

develop annual catch limits for each of its managed fisheries that may not exceed the fishing level recommendations of its scientific and statistical committee or the peer review process established under subsection (g);

BSAI and GOA Fisheries Management Plan: Acceptable Biological Catch

"Specification of ABC is similar to specification of OFL, in that both involve harvest control rules with six tiers relating to various levels of information availability. However, somewhat more flexibility is allowed in specifying ABC, in that the control rule prescribes only an upper bound."

The fourth step in specifying ABC:

"Determine whether conditions exist that warrant setting ABC at a value lower than the maximum permissible value (such conditions may include—but are not limited to—data uncertainty, recruitment variability, and declining population trend) and, if so:

a. document those conditions,

b. recommend an ABC lower than the maximum permissible value, and

c. explain why the recommended value is appropriate.

The above steps are undertaken first by the assessment authors in the individual chapters of the SAFE report. The Plan Team then reviews the SAFE report and makes its own recommendation. The SSC then reviews the SAFE report and Plan Team recommendation, and makes its own recommendation to the Council. The Council then reviews the SAFE report, Plan Team recommendation, and SSC recommendation; then makes its own recommendation to the Secretary, with the constraint that the Council's recommended ABC cannot exceed the SSC's recommended ABC."

SSC assignment for the June workshop

- The workshop will also address the topic of adjustments made from the maximum permissible ABC to the recommended ABC.

- The SSC recommends identification of clear and transparent rules for defining the specific criteria to be used when adjusting the recommended ABC.

- Stock assessment uncertainty relative to levels upon which the tier system was constructed, atypical data availability or usage (e.g., reliance on only catch-per-unit-effort vs. a survey index), ecosystem considerations, and other factors are potential candidates.

- It may be helpful for one or more scientists involved with the Ecosystem Considerations report to participate in the workshop.

A few observations

- The NPFMC tier system implements precautionary management in which there is a buffer between the OFL and maximum permissible ABC.

- Therefore the rationale for a reduction from the maximum permissible ABC should be that there is either additional uncertainty in the assessment and/or additional risks (probability of something bad happening) to the stock that are not adequately taken into account by the default precautionary settings.

- The risks generally relate to a loss of fishery sustainability or inability of the stock to perform its role in the ecosystem, such as might occur due to severe decline in stock

Three possible approaches to making reductions from the maximum permissible ABC

- Making reductions on a case-by-case basis as deemed appropriate with rationale provided concurrently (this is the status quo situation).

- Establishing a framework with guidelines and criteria. Reductions are based on applying the criteria and guidelines in the framework.

- Use of an analytical approach that produces a reduction in the ABC. A simple example is the P* method, in which an increase in uncertainty results in a larger buffer being applied.

Design criteria for a framework

- The framework should document the criteria that can be used making reductions in ABC.
- ABC reductions should be calibrated, so that a more extreme situation results in a stronger response.
- ABC reductions should be consistent, so that similar situations result in a similar response across different stock assessments.
- Framework should provide a set of guidelines or defaults (rather than inflexible rules.

Three types of considerations that could be used to support a recommended reduction

1. Assessment-related considerations—

   a. Data-inputs: biased ages, skipped surveys, lack of fishery-independent trend data

   b. Model fits: poor fits to fits to fishery or survey data, inability to simultaneously fit multiple data inputs.

   c. Model performance: poor model convergence, multiple minima in the likelihood surface, parameters hitting bounds, retrospective bias.

   d. Estimation uncertainty: poorly-estimated but influential year classes.

2. Population dynamics considerations—decreasing biomass trend, poor recent recruitment, inability of the stock to rebuild, abrupt increase or decrease in stock abundance.

3. Environmental/ecosystem considerations—adverse trends in environmental/ecosystem indicators, ecosystem model results, decreases in ecosystem productivity, decreases in prey abundance or availability, increases or increases in predator abundance or productivity.

Risk classification matrix for assessment, population dynamics, and environmental/ecosystem considerations

	Assessment-related considerations	Population dynamics considerations	Environmental/ecosystem considerations
Level 1: Normal 	Typical to moderately increased uncertainty/minor unresolved issues in assessment	Stock trends are typical for the stock; recent recruitment is within normal range.	No apparent environmental/ecosystem concerns
Level 2: Substantially increased concerns 	Substantially increased assessment uncertainty/ unresolved issues.	Stock trends are unusual; abundance increasing or decreasing faster than has been seen recently, or recruitment pattern is atypical.	Some indicators showing an adverse signals but the pattern is not consistent across all indicators.
Level 3: Major Concern 	Major problems with the stock assessment, very poor fits to data, high level of uncertainty, strong retrospective bias.	Stock trends are highly unusual; very rapid changes in stock abundance, or highly atypical recruitment patterns.	Multiple indicators showing consistent adverse signals a) across the same trophic level, and/or b) up or down trophic levels (i.e., predators and prey of stock)
Level 4: Extreme concern 	Severe problems with the stock assessment, severe retrospective bias. Assessment considered unreliable.	Stock trends are unprecedented. More rapid changes in stock abundance than have ever been seen previously, or a very long stretch of poor recruitment compared to previous patterns.	Extreme anomalies in multiple ecosystem indicators that are highly likely to impact the stock. Potential for cascading effects on other ecosystem components

Alternative procedures for reducing the ABC from the maximum permissible

	Specified buffer, restrained response	Specified buffer, robust response	Suggested ranges for buffer	Increase SPR in HCR	Change the tier level
Level 1: Normal	No buffer	No buffer	No buffer	F40%	Tier 3
Level 2: Substantially increased concerns	5%	10%	5%-10%	F45%	Tier 4
Level 3: Major concerns	10%	20%	10%-25%	F50%	Tier 5
Level 4: Extreme concerns	15%	30%	15%-40%	F60%	Tier 6

August 31 meeting of the ABC below Max working group

Attendees:

Seattle: Martin Dorn (chair), Kerim Aydin, Steve Barbeaux, Sandra Lowe, Elizabeth Siddon, Stephani Zador.

Remote: James Armstrong, Dana Hanselman, Alan Haynie, Lisa Hillier, Grant Thompson, Kalei Shotwell, and Diana Stram.

Meeting agenda:

A. SSC assignment and FMP background.

B. Review of historical practice.

C. Reverse-engineering ABC reductions.

D. Risk classification matrix for ABC reductions.

E. Follow-up work needed before Sept PT meeting.

Comments on the review of historical practice and the reverse engineering analysis

- There are some differences in interpretation of plan team historical practice:
  - Grant: Success of the model in predicting the buffer indicates consistency in past recommendations.
  - Dana: Grab bag of rationales with little consistency.
- The analysis considers only instances when a reduction was recommended, and does not account for instances when the same conditions pertained and no buffer was applied (demersal shelf rockfish example). Adopting the approach might increase the frequency that buffers are applied.
- If this approach were to be adopted, certain reasons probably should be dropped. Others could be added if deemed important.
- The approach would not be useful for situations that have not occurred previously.

Economic considerations for reducing ABC below the Max

- The ABC concept is generally intended to account for scientific uncertainty rather than economic considerations.
- Probably not the right framework for MEY considerations.
- There may be a role for consideration of transient economic factors, such as:
  - Delaying harvest to allow a year class grow to a more valuable size or weight.
  - Delaying harvest to even out variation in annual ABCs.
  - Supply and demand dynamics. For example, reducing harvest during a period of over-supply to allow demand to rebound.
  - Considering the bio-economic interaction may lead to higher long-term benefits than only considering annual TAC reductions from ABC.
- In some cases, the assessment author is ideally positioned to make a recommendation based on economic considerations (but not always).
- The group agreed that this was a promising avenue to continue exploring.

Comments on the risk matrix approach

- The recommended range for buffers is intended as a guideline that can be deviated from if a rationale is provided. Specifying a range for the buffer would allow the life history of the stock to be considered (flatfish vs rockfish example).
- If the assessment indicates a severe decline in abundance, resulting in a large reduction in ABC, it may not make sense to apply an additional buffer (re GOA cod).
- Additional clarity is needed in the descriptions of risk for population dynamics considerations. Risk increases when the observed pattern is outside the bounds of normal variation. Stock with highly variable recruitment will normally show periods of sustained population decline.
- It was noted that there no direct link between the buffer that is applied and a reduction in the risk that prompted use of the buffer. This is also a shortcoming of the present ad hoc approach.
- While analytical approaches are preferred, they will not be possible in all situations (particularly for environmental/ecosystem considerations), given the current state of the science.

Some examples

Stock/Year	Assessment-related considerations	Population dynamics considerations	Environmental/ ecosystem considerations	SSC recommended ABC < Max buffer
EBS pollock 2006	No concern	Level 2	Level 2	7.8%
EBS pollock 2007	No concern	Level 3	Level 3	14.5%
GOA cod 2018	Level 2	Level 4	Level 4	7.2%