ABC Control Rule Modifications Decision Document

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I. Background

- The initial ABC Control Rule (CR) was developed in 2008. It includes "Dimensions" that address uncertainty parameters, and within each dimension are "tiers" that provide scores based on assessment information such as uncertainty, stock status, and risk. The CR was intended to be comprehensive and applicable to all stocks, including those assessed and those not assessed.
- In 2010 the CR was modified, by addenda to the CR, to include a higher level "Tier" system, with the first Tier addressing assessed stocks (for which the initial rule applies), two intermediate Tiers addressing data limited evaluations developed at the time (DCAC and DBSRA), and a final Tier addressing stocks for which only catch information is available. Note that the word "tier" is used differently in 2 places in the CR. For now, lower case "tier" will be used to refer to the categories of Dimensions in the original CR, and the upper case "Tier" to refer to the higher level divisions created in 2010.
- In April 2011 the fourth Tier (catch only) was modified by another addenda adding a decision tree approach intended to provide a consistent and objective means to evaluate data and stock conditions. At this time, the Tiers created through the 2010 modification began to be called "Levels" in some circumstances, to reduce confusion caused by the use of the term tier in two different ways in the CR.
- In November 2011 the SSC proposed a process for including the ORCS (Only Reliable Catch Stocks) workgroup recommendations for addressing unassessed stocks. The ORCS approach was added as another option for evaluating Tier 4 (or Level 4) stocks, initially categorized as "catch only".
- In October 2014 the SSC held an ABC Control Rule Workshop to evaluate performance and application of the CR. Objective evaluation of performance was hindered by a lack of assessments that provide status determinations during times when fishing levels based on the CR were in effect.
- In April 2015 the SSC reviewed the report of the October 2014 Workshop. The SSC did not recommend any CR modifications at the time, although suggestions were made to add flexibility that would allow consideration of individual stock situations. An ABC Control Rule Workgroup (Workgroup) including a subset of SSC members was formed to pursue the topic.
- The Workgroup was formed to update the evaluations and consider if changes were necessary. The Workgroup reported preliminary findings to the SSC in May 2016, noting limited progress in evaluation information. The group recommended removing the stock status dimension from the assessed stocks Tier (Level) because

status determination is made by the agency. Because the agency determination is not made until the SSC makes its recommendations on an assessment, the final status determination is not available when the SSC reviews the assessment and applies the CR.

- In June 2016 the Council recommended that the SSC consider removing status from consideration in the CR. The Council cited two considerations in support of this request. The first is the fact that status determinations are made by the agency, not the SSC, as noted. The second is because status is an assessment output and not a characteristic of the assessment approach or data that contributes to the underlying assessment uncertainty that is supposed to be addressed by the CR. The Council considers that stock status is more appropriately considered when it, the Council, considers its risk tolerance for a stock.

II. ABC Control Rule Alternatives and Issues for Consideration

1. Revise Tier/Level 1 for assessed stocks to remove Dimension 3: Stock Status.
    - The Council requested that the SSC consider this change, given that status determinations are made by the agency following consideration of SSC recommendations regarding an assessment and that status is more relevant to risk considerations than uncertainty considerations.
    - Making this change will require revising scoring for the remaining dimensions. The initial scoring was developed to provide a maximum 40 point adjustment in the probability of overfishing provided by a P* analysis.
2. Revise Tier/Level 1 for assessed stocks to remove or modify Dimension 4: Productivity and Susceptibility Risk Analysis (PSA).
    - Values for this Dimension are based on an MRAG report that evaluated many South Atlantic stocks.
    - The outcomes of this analysis have been questioned by the SSC during prior assessment reviews, with concerns raised about the data used and lack of details on how some decisions were made
    - Another concern voiced during the initial CR development and in application is that the PSA addresses risk rather than the uncertainty of a particular assessment. Therefore it is better considered by the Council, as should also be done for stock status.
    - Making this change will also require reconsideration of scoring
3. Revise Dimension 1 of Tier/Level 1 for assessed stocks to remove the tiers relating to catch adequacy.
    - The original CR was intended to be comprehensive and address both assessed and unassessed stocks.

- Subsequent revisions (tiers, decision tree, ORCS) removed unassessed stocks from consideration through the initial CR (Tier 1) and its 4 Dimensions. Therefore, including tiers related to catch record availability or reliability is inappropriate for the stocks that will be evaluated through Dimension 1.
- The SSC should consider revising Tier/Level 1, Dimension 1, to address traits of the types of assessment prepared currently.
- Making this change will also require consideration of overall scoring.

4. Revise Tier 1 of the August 2010 Addendum to accommodate situations where an assessment may be available that does not include a P* analysis.

    - The original CR was built around the presumption that a quantitative evaluation of overfishing would be available for all stocks, and leaned heavily toward the P* approach developed by the SEFSC Beaufort Laboratory.
    - This can create issues when assessments are prepared by other organizations, such as FL FWC or an outside scientist as was the case with Wreckfish, which may not use the P* approach.
    - This can also create issues when the Council wishes to consider using some direct adjustment of the fishing mortality target from MFMT to establish stable catch levels. For example, the Council may consider setting catch levels based on 75% of MFMT for some stocks.
    - The NS1 guidelines allow SSC's flexibility to deviate from CRs. However, if approaches other than P* become common, making this change in the CR could avoid the need for the SSC to provide justification for CR deviations. It would also clarify that the 75% of MFMT is a standard approach rather than an exception.

5. Revise August 2010 Tiers (Levels) to accommodate developments in data limited assessment methods, and rename Tiers to Levels to reduce confusion.

    - Few data limited methods were available when the Tiers approach was developed in August 2010. Since then, many new approaches have been developed and more may be developed in the future.
    - Proposed modification including 3 Levels and removal of the word "Tier":
        - Level 1: Comprehensive catch-based assessments including ancillary data such as length, age, and survey information. Examples of model categories for this tier are catch-age, catch-length and surplus production.
        - Level 2: General data limited approaches: Models that consider a range of information available for a stock that is evaluated through some type of quantitative framework which provides a proxy for ABC or OFL. DCAC, DBSRA, and the DLM toolbox approaches would fall under this Level.
        - Level 3: Data poor approaches: May be based on catches, survey, or life history characteristics. Quantitative evaluations as envisioned in Level 2

cannot be prepared for these stocks and stock condition is based on expert judgement of the SSC. The ORCS and decision tree approach would both fall here under Level 3.

6. Clarify application to rebuilding stocks

    - CR factors are typically used by the SSC to recommend the final rebuilding probability that the Council may consider when deriving a plan to rebuild overfished stocks. The Council can choose the SSC recommendation or an alternative value that provides at least a 50% chance of rebuilding.
    - There has been discussion at past SSC meetings about applying an annual overfishing probability, or P*, to the catches during each year of a rebuilding period in addition to the overall rebuilding evaluation. This approach is likely to be much more computationally intensive and could even make long term rebuilding schedules impossible to evaluate. Further, because even stocks under a rebuilding plan are assessed every 3-5 years, there should be additional opportunities to evaluate rebuilding progress and adjust probabilities of rebuilding.
    - Rebuilding schedules are primarily defined by the final probability of success and the rebuilding period, both of which are selected by the Council. Therefore, in practice, annual ABC values for rebuilding stocks are based on the rebuilding schedule chosen by the Council, and OFL values are based on projections from fishing at MFMT (Fmsy or proxy.) However, the CR does not clearly state that this is the basis for ABCs under rebuilding plans.
    - Recommend: Add language to the CR stating that "ABC values for rebuilding stock are based on the rebuilding schedule chosen by the Council. OFL values for rebuilding stocks are based on the annual yield at MFMT".

7. Revise ABC Control Rule Scoring

    - Some of the changes suggested here will affect the overall scoring of CR adjustment factors.
    - The initial CR, included under Tier 1 of the August 2010 addenda, was designed to provide a maximum adjustment of 40 points. This resulted in probability of overfishing values ranging from 50% (for no uncertainty adjustment) to 10% (maximum adjustment).
    - Each Dimension contributes equally (10 points each). Removing Dimensions 3 and 4 therefore reduces the maximum adjustment to 20 points. Unless the scoring is changed, the lowest probability of overfishing will move from 10 to 30. Most stocks receive an adjustment of 5 or 10 points based on the PSA dimension (4) alone, so dropping this will tend to raise overfishing tolerance across the board.

- Removing some tiers within Dimension 1 will affect the scoring. Scoring for remaining tiers will need to be modified to retain a 10 point adjustment for Dimension 1.
- Options
    - Adjust values for the Dimensions 1 and 2 to restore a total range of 40 points
    - Retain existing scoring and allow the probability of overfishing endpoints to shift
    - Develop alternative scoring within the assessment and uncertainty dimensions. These could be based on the criteria that affect assessment uncertainty in recent assessments.
        - Consider a check list of uncertainty issues, with a score applied for each item. Examples include level of catch uncertainty, reliability of stock-recruitment relationship, availability of fishery independent abundance information, quantity and quality of life history and age information, precision of estimates, changes in key parameters between subsequent assessments.
    - Retain existing scoring, and shift stock status and PSA consideration to a separate Council risk evaluation, similar to the ORCS approach. In its simplest form with minimal deviation from current values, this could allow a 20 point adjustment applied by the SSC for assessment uncertainty (Dimensions 1 and 2) and a further 20 point adjustment applied by the Council through its risk evaluation (Dimensions 3 and 4).
        - One issue with this approach is it would add an SSC meeting the ABC recommendation process. The SSC first needs to review the assessment to allow the agency to provide status, then the Council will develop its risk tolerance, then the SSC would recommend an ABC based on combining scores for the SSC-derived uncertainty evaluation and the Council-derived risk tolerance.

III. Draft Revised ABC Control Rule – Alternative Scoring Approach Example

Level 1: Quantitatively Assessed Stocks

Comprehensive catch-based assessments including ancillary data such as length, age, and survey information. Examples of model categories for this tier are catch-age, catch-length and surplus production.

The following are lists of criteria the SSC could consider to provide a more robust evaluation of the assessment approach, input data, and uncertainty evaluation. This is provided to generate SSC discussion. Each item relating to some aspect of the assessment and its input data could be applied a score or ranking that would be used in developing the overall adjustment factor.

1.1 Assessment Information Criteria

1. Quantitative assessment provides reliable estimates of exploitation and biomass, including a stock-recruit relationship and MSY benchmarks, and fishery dependent surveys (other expectations?), freely estimated parameters – no adjustment.
2. MSY or SRR concerns
    a. Proxy reference points required
    b. Estimates unstable, uncertain, sensitive, retrospective
3. Only relative measures of exploitation, biomass, and status
4. Catch History Evaluation
    a. Incomplete – may not cover entire fishery period
    b. Reliability concerns – e.g., ID or reporting, uncertainty
5. Catch Characteristics Evaluation
    a. Length and age sampling of each fishery - adequacy
6. Surveys/Indices – multiple entries or range
    a. None available
    b. All fishery dependent
    c. Fishery independent with coverage concerns – time or space
7. Life History Evaluation
    a. Reproductive info concerns e.g. coverage, timeliness, N
    b. Age/growth concerns
    c. Movements/migrations/stock ID concerns
8. Model Parameters & Performance
    a. Consideration of parameters fixed
    b. Signs of instability, lack of robustness in base configuration
    c. Wide swings between assessments/new data additions
9. Model type, category, or approach
    a. Statistical catch at age
    b. Production model
    c. Other categories?

1.2 Uncertainty Characterization Criteria

1. Uncertainty in both assessment inputs and environmental conditions included, carried through projections, model specification uncertainty considered, results of sensitivities incorporated in overall uncertainty evaluation, distributions of benchmarks based on statistical calculation. (0%)
2. Distributions of benchmarks lacking (Fmsy, MSY) or *ad hoc*

3. Point estimates only, no quantitative uncertainty evaluation
4. Limited to no uncertainty carried through to projections
5. Sensitivities provided, but results not included in quantified uncertainty
6. Model specification or (misspecification) uncertainty not considered
7. Key uncertainties not included in quantitative evaluation (ie bootstrap)
8. Uncertainty in inputs lacking, incomplete or inadequate

1.3 Rebuilding Plans

For stocks determined to be overfished and require a rebuilding plan, the adjustment provided by the CR application will be used to provide an alternative rebuilding probability for Council consideration. The Council will choose the rebuilding approach and probability of rebuilding plan success. Annual ABC values will be determined by stock projections of the Council's chosen rebuilding plan and OFL values will be determined by projections at the MFMT.

Level 2: **General data limited approaches**

Broad category encompassing models that consider a range of information available for a stock, evaluated through some type of quantitative framework, that provide a proxy for ABC or OFL. DCAC, DBSRA, and the DLM toolbox approaches would all fall under this Level.

- Should there be an overall penalty for this level?
  - For example, if Level 1, the assessed stocks, allows an overfishing range of 10 to 50 per PDF, should Level 2 reduce the maximum to 40%?
  - Is this practical for analyses likely to fall in this Level?
- Note that Tiers 2 and 3 in the existing rule (DCAC and DBSRA) do not provide an explicit, detailed adjustment and evaluation framework as included for Level 1.
- Evaluation and criteria may depend on the specific analyses conducted and outputs provided.

Level 3: Data poor approaches

Approaches that do not rely on formal quantitative techniques. May be based on catches, survey, or life history characteristics. Quantitative evaluations as envisioned in Level 2 cannot be prepared for these stocks, therefore stock condition is based on expert judgement of the SSC.

The ORCS approach should be used where possible, followed by the Decision Tree when necessary (all the other methods addressed through ORCS and in Levels 1 and 2 are not applicable).

3.1 ORCS Working Group Approach

Requires reliable catch information

1. Develop a catch statistic appropriate for the stock.
2. Evaluate Attributes of stocks based on ORCS Table 4.
3. Apply the exploitation ranking from the attributes table to the catch statistic to develop an OFL (ORCS Table 5).
4. Council chooses a risk tolerance level.
5. SSC applies the risk tolerance level to the OFL to derive the ABC (ORCS Table 6).

3.2 Decision Tree

1. Are current catches likely to impact the stock?
   NO: Recommend move stock to ecosystem species category
   YES: Go to #2
2. Is it expected that increased catch (beyond current range, considering observed variability) will lead to decline or other stock concerns?
   NO: ABC = 3rd highest point in the 99-08 time series.
   YES: Go to #3
3. Is the stock part of a directed fishery or is it primarily bycatch with other species?

   DIRECTED: ABC = Median 99-08

   BYCATCH/INCIDNETAL: Go to #4.
4. Bycatch, Incidental Catches.

   Evaluate the situation and information.

   The SSC's intent is to evaluate the situation and provide guidance to Council on possible catch levels, risk, and actions to consider for bycatch and directed components.

   If the species is bycatch in a fishery targeting other species, issues that should be considered include: trends in that fishery, the current regulations, and the effort outlook.

   If the directed fishery is increasing, and bycatch of the stock of concern is also increasing, the Council may need to find a means to reduce interactions or bycatch mortality. If that is not feasible, the Council will need to impact the directed fishery.