ABC below MaxABC

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NOAA
FISHERIES

Alaska Fisheries
Science Center

SSC meeting
Dec. 3, 2018
Anchorage, AK

BSAI and GOA FMP: 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 2018 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.

- 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 abundance.

- The SSC's previous guidance is that setting the ABC below the maximum permissible should be applied sparingly. The tier system should be the primary basis for establishing the ABC.

SSC guidance from October 2018 Minutes

- The risk matrix approach (i.e., Table 1 of the workshop report) is a clear classification of degree and basis for any potential reduction.

- Although assignment to a specific cell in this matrix will be subjective, clearly delineating the categories should improve transparency and help the PTs and SSC structure future decisions.

- The SSC recommends that this approach be used qualitatively (not from the example percentages presented in Table 2) in December if any reductions to the ABC are recommended.
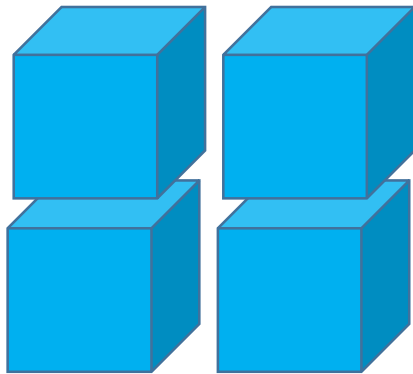
Table 1. Risk classification matrix for assessment, population dynamics, and environmental/ecosystem considerations

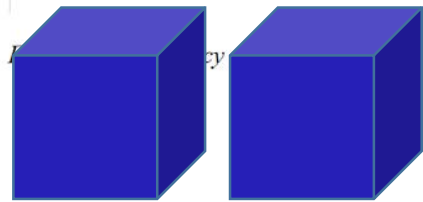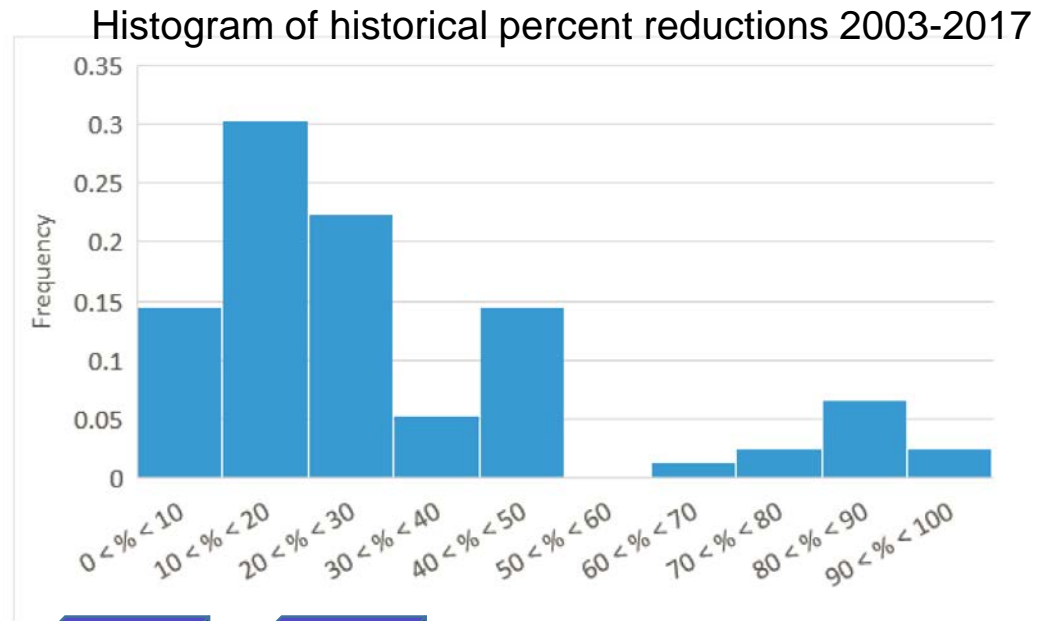|	Assessment-related considerations	Population dynamics considerations	Environmental/ecosystem considerations
Level 1: Normal	Typical to moderately increased uncertainty/minor unresolved issues in assessment	Stock trends are typical for the stock; recent recruitment is within normal range.	No apparent 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

Table 2. Alternative procedures for reducing the ABC from the maximum permissible (which the SSC requested not be used)

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

Grant's idea:

Histogram of historical percent reductions 2003-2017

Category 2: 15% reduction   Category 3: 35% reduction   Category 4: 80% reduction

GOA pollock

Risk Matrix Evaluation

Assessment-related considerations	Population dynamics considerations	Environmental/ecosystem considerations
Contradictory data, very poor model fits to recent survey indices. But model seems robust, no retrospective pattern.	Stock dominated by a single year class. Four years of very weak recruitment. There have been similar patterns in the past, but never this extreme.	Onset of a marine heatwave and projections of a weak El Niño are not conducive for winter survival for age-0 pollock. Zooplankton indicators are mixed. Some suggest prey for adult pollock is abundant, but planktivorous parakeet auklets in the central GOA had poor reproductive success in 2018.
Conclusion: Level 2, substantially increased concerns	**Conclusion: Level 2, substantially increased concerns**	**Conclusion: Level 2, substantially increased concerns**

Overall score is Level 2: Substantially increased concerns. Author's recommended ABC = 85% of maximum permissible (15% reduction) based on mode of historical percent reductions. Plan Team recommends 14.3% reduction using a stairstep approach.

EBS pollock
Risk Matrix Evaluation

Assessment-related considerations	Population dynamics considerations	Environmental/ecosystem considerations
Retrospective analysis indicates no consistent biases in the assessment. The model tracks the available data well including multiple abundance indices. Of minor concern (presently) is the fact that the model estimate of declining abundance is somewhat less than that suggested by the survey data. **Conclusion: Level 1, No increased concerns**	Near term recruitment likely to be below average. Spawning population has low diversity of ages and the mean age of the spawning stock (weighted by spawning output) at relatively low levels. **Conclusion: Level 2, substantially increased concerns**	Unprecedented warm conditions in 2018 resulted in reduced production. Weak, delayed phytoplankton bloom, reduced biomass. Zooplankton prey base reduced. Unprecedented seabird die-off event and broad reproductive failures indicate insufficient prey resources **Conclusion: Level 2, substantially increased concerns**

Overall score is Level 2: Substantially increased concerns. Author's recommended ABC = 70% of maximum permissible (30% reduction) based on a Tier 3 calculation.

Gulf of Alaska cod
Risk Matrix Evaluation

Assessment-related considerations	Population dynamics considerations	Environmental/ecosystem considerations
Early recruitment estimates are uncertain and sensitive to model assumptions, resulting in uncertainty in biomass reference points. However other aspects of the assessment seem relatively robust. **Conclusion: Level 2, substantially increased concerns**	Three years of poor recruitment in 2014-2016. Increased natural mortality during the 2014-2016 GOA marine heat wave. Female spawning biomass is currently estimated to be at its lowest point in the 41-year time series. **Conclusion: Level 4, extreme concern**	Improved foraging conditions for adults and juveniles from 2017 to early 2018. However the onset of a new marine heatwave in October 2018 and projections of a weak El Niño are not conducive for age-0 survival. **Conclusion: Level 2: substantially increased concerns**

Overall score is Level 4: Extreme concern. Author's recommended ABC = catch that will maintain SSB above B20% in 2019 with 50% probability (13.6% reduction).
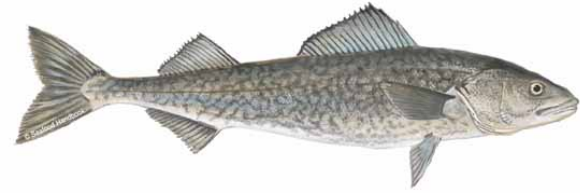
EBS cod
Risk Matrix Evaluation

Assessment-related considerations	Population dynamics considerations	Environmental/ecosystem considerations
Retrospective bias, age data potentially unreliable, wide range of results with different model assumptions, uncertainty in stock structure.	Recent low recruitment, including the lowest observed, strong decline in survey numbers, spatial distribution is unprecedented, with unknown consequences. Potential for increased natural mortality.	Unprecedented lack of sea ice, and absent cold pool. Reduced primary and secondary production, forecasts of continued warm conditons, unprecedented extent and duration of bird die offs with indications of insufficient prey resources.
Conclusion: Level 2-3, substantially increased concerns to major concerns	**Conclusion: Level 2-3, substantially increased concerns to major concerns**	**Conclusion: Level 2-3, substantially increased concerns to major concerns**

Overall score is Level 2-3: Author's recommended ABC = maxABC. Plan Team filled out risk table during meeting, and recommended 20% reduction by referencing the historical distribution of percent reductions.
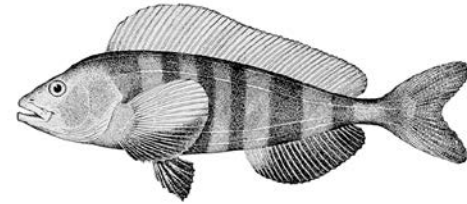
Sablefish
Risk Matrix Evaluation

Assessment-related considerations	Population dynamics considerations	Environmental/ecosystem considerations
Contrasting trends and poor fits to the survey indices add to uncertainty. Substantial decrease in this year's estimate of the very large 2014 year class. However, the model is robust in most situations and there is no retrospective pattern.	Uncertainty in the unprecedented size of the 2014 recruitment. Hollowing out of the older ages. Uncertainty in how quickly the 2014 class will succeed in entering the spawning population.	Trend modeling for sablefish ecosystem indicators reveal average to good conditions for the larval and early juvenile stages of the 2017 year classes but potentially suboptimal foraging conditions for the juvenile maturing stage of the 2014 year class. Condition of maturing fish was at an all-time low in 2017 and remained below average in 2018.
Conclusion: Level 2, substantially increased concerns	**Conclusion: Level 4: Extreme concern**	**Conclusion: Level 2: substantially increased concerns**

Overall score is Level 4: Extreme concern. Author's recommended ABC = last year's ABC (47% reduction).

BSAI Atka Mackerel
Risk Matrix Evaluation

Assessment-related considerations	Population dynamics considerations	Environmental/ecosystem considerations
Moderate retrospective bias is attributed to noisy survey estimates rather than problems with model assumptions and structure. Adequate fits to survey and fishery data.	Very low biomass in Central Aleutians in 2018 survey, but likely due to patchy distribution rather than a true change in abundance. Moderate decline in stock abundance since 2005 peak. Stock trends are typical for the stock and expected given the stock dynamics; recent recruitment is within the lower end of the normal range.	Atka mackerel condition was slightly below average in 2018. CPR data near the Aleutians have shown anomalously small copepod taxa, but average to above average biomass during the recent warm years of 2015-2017. This suggests that foraging conditions for Atka have been stable through the recent warm years, particularly in the Western Aleutians
Conclusion: Level 1, Typical to moderately increased concerns	**Conclusion: Level 1: Normal**	**Conclusion: Level 1: Normal**

Overall score is Level 1: Normal, no elevated concerns. Author's recommended ABC = 100% of maximum permissible.

Some comments on implementation

- Definitely doable. Not a big lift for assessment authors.

- Might be more of a challenge for PTs and SSC to review the scoring.

- Some subjectivity in assigning the concern level, but usually the debate is over which of two levels to use (rather than a broader range of disagreement).

- An unanticipated benefit was improved communication with stakeholders.

- Generally a case-by-case approach was used to obtain a percent reduction rather than a single method applied consistently.

- In most cases percent reduction was not linked to the level of concern .

Some comments on implementation (focusing on the environmental/ecosystem considerations)

- The assistance of the ESR folks, Stephani Zador and Elizabeth Siddon, was essential for summarizing environmental/ecosystem concerns.

- Scoring for this category will be easier when more ESPs (Ecosystem and Socio-economic Profiles) come on line in the coming years.

- All cases where a reduction in ABC was recommended there was an elevated environmental/ecosystem concern.

- But in no case did the environmental/ecosystem score determine the overall score.

Some additional comments on implementation

- Application of the risk table seemed useful even when no reduction was recommended.

- As we enter a period of rapid environmental change in Alaska marine waters, extreme conditions and assessment surprises are likely to occur more often.

- Setting ABC below MaxABC should be regarded as a tool for rapid response, rather than a strategic approach to environmental variation (see ACLIM)

Discussion points-SSC recommendations on the way forward

Application of the risk table is a useful exercise to summarize the assessment strengths and weaknesses, stock trends, and environmental/ecosystem forcing.

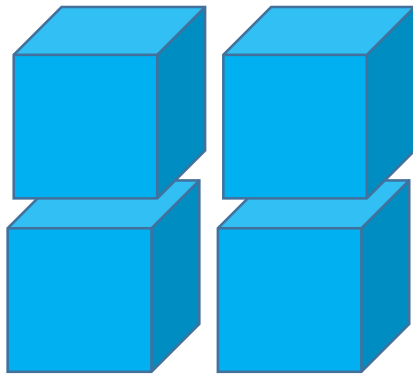In the next assessment cycle, the SSC could recommend that the risk table…

-Not be used.

-Applied whenever there is a recommendation to reduce the ABC below the maximum permissible.

-Applied whenever there is a recommendation to reduce the ABC below the maximum permissible. In addition, it should be applied to a strategic set of additional stocks, for example, one flatfish and one rockfish stock from both the EBS and GOA.
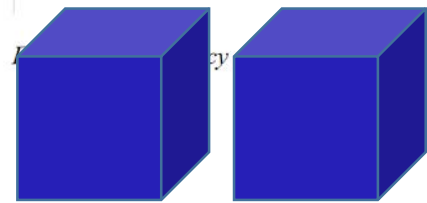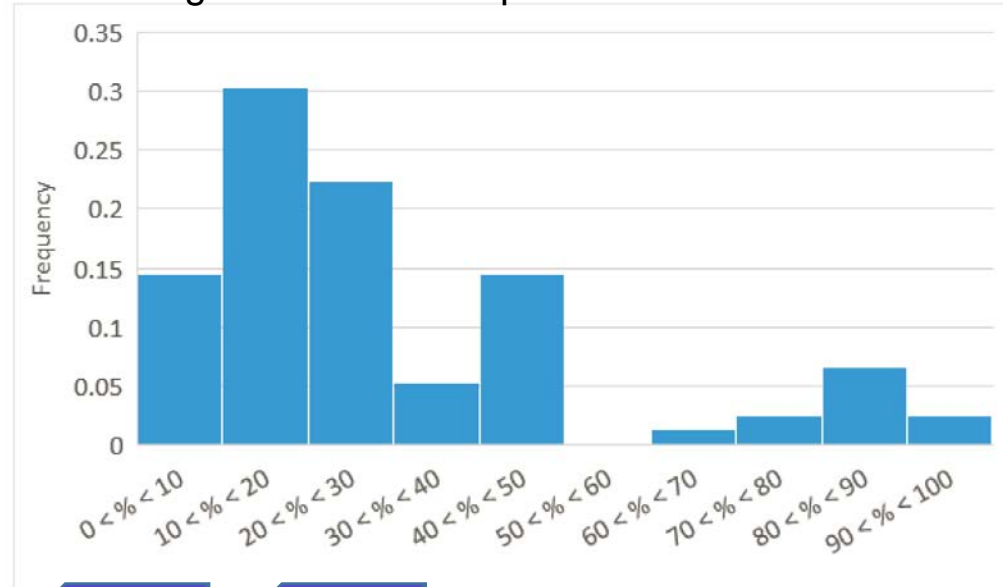
-Used for all Tier 1-3 stocks. (perferred by the ESR folks as a way to document the evaluation process).
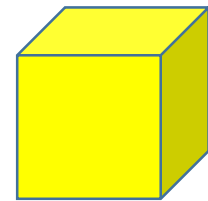
Back to
Grant's idea:

Histogram of historical percent reductions 2003-2017

Category 2: 15% reduction   Category 3: 35% reduction   Category 4: 80% reduction

Discussion points—possible SSC recommendations

The SSC could recommend:

-continuation of present case-by-case approach to determining the appropriate reduction until more suitable approach can be obtained.

or

-use of percent reductions between 5% and 45%, with the higher end of the range generally used for stocks at level 4, and the lower end of the range for stock at level 2, recognizing that stock-specific circumstances may suggest an alternative approach.

-This approach is intended as an interim measure to maintain historical distibution of reductions when making recommendations to reduce ABC below the maximum permissible.

and

-Recommend further evaluation of analytical approaches (but recognize that this will not be possible in all cases).