Risk Table Discussion

May 2025 Crab Plan Team Meeting

Where we're at:

Oct 2023 Council motion:

"The Council supports developing the risk table approach for crab stocks to provide a more comprehensive, transparent, and defensible justification for recommendations on ABC buffers...

September/October 2024:

- Draft risk tables produced for Tanner, snow and BBRKC stocks
- Initial CPT discussion on risk tables with continued discussion planned for May 2025 CPT meeting
- Oct 2024 SSC recommendation:

"….to the extent possible, the implementation of and process used to develop BSAI crab risk tables should mirror that of groundfish to maintain consistency among managed stocks and Council's goals for risk tables…."

Goals for today:

Develop a set of crab risk table SOPs to facilitate documenting uncertainty not already addressed in the stock assessment, the tier system, or harvest control rules

1) Helpful context: Groundfish risk table development

2) How to standardize buffer reductions and risk table scoring among crab assessments?

3) Which information sources should be used to inform crab risk tables?
   How should that information be used?

4) Logistics/timing for crab risk table development

Proposed Risk Table Levels of Concern for 2024				
	Assessment-related considerations	**Population dynamics considerations**	**Ecosystem considerations**	**Fishery Performance**
Level 1: Normal	Typical to moderately increased uncertainty/minor unresolved issues in assessment.	Stock population dynamics (e.g., recruitment, growth, natural mortality) are typical for the stock and recent trends are within normal range.	No apparent ecosystem concerns related to biological status (e.g., environment, prey, competition, predation), or minor concerns with uncertain impacts on the stock.	No apparent concerns related to biological status (e.g., stock abundance, distribution, fish condition), or few minor concerns with uncertain impacts on the stock.
Level 2: Increased concern	Substantially increased assessment uncertainty/ unresolved issues, such as residual patterns and substantial retrospective patterns, especially positive ones.	Stock population dynamics (e.g., recruitment, growth, natural mortality) are unusual; trends increasing or decreasing faster than has been seen recently, or patterns are atypical.	Indicator(s) with adverse signals related to biological status (e.g., environment, prey, competition, predation).	Several indicators with adverse signals related to biological status (e.g., stock abundance, distribution, fish condition).
Level 3: Extreme Concern	Severe assessment problems; very poor fits to important data; high level of uncertainty; very strong retrospective patterns, especially positive ones.	Stock population dynamics (e.g., recruitment, growth, natural mortality) are extremely unusual; very rapid changes in trends, or highly atypical patterns compared to previous patterns.	Indicator(s) showing a combined frequency (low/high) and magnitude(low/high) to cause severe adverse signals a) across the same trophic level as the stock, and/or b) up or down trophic levels (i.e., predators and prey of the stock) that are likely to impact the stock.	Multiple indicators with strong adverse signals related to biological status (e.g., stock abundance, distribution, fish condition), a) across different sectors, and/or b) different gear types.

Groundfish risk table development:

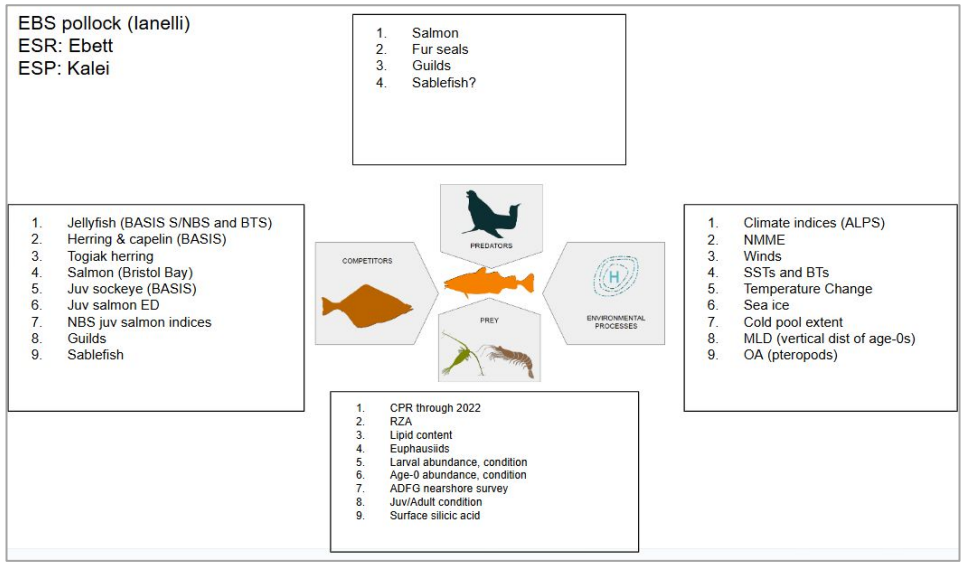
- Living repository of risk table scores documented in Google Drive spreadsheet
  - Serves as a reference for stock assessment authors
  - Characterizes proposed and final ABC reductions following Plan Team and SSC review

Region	Stock	Year	Assessment related considerations	Ecosystem considerations	Fishery informed stock consideration	Population dynamics considerations	Max score	Author suggested reduction	SSC recommended reduction	Method used to derive the buffer	Reason for buffer adjustment by PT or SSC
GOA	Sablefish	2018	2	2		4	4	0.45	0.45	Lots of reasons for uncertainty; ABC equal to previous year ABC = 45% reduction from maxABC	
GOA	Sablefish	2019	2	2	3	3	3	0.57	0.5	Still lots of uncertainty; 25% increase from previous year ABC was the largest increase since 1996, and a 25% increases = 57% reduction from maxABC	SSC recommends calculating the ABC based on a 25% stairstep whereby the 2019 ABC is increased by 25% of the projected step between the 2019 ABC and the 2020 maxABC, and then that estimate is corrected for whale depredation to provide the final 2020 ABC. This process was repeated to estimate the 2021 ABC. The 2020 ABC represented a 50% reduction from the 2020 maxABC.

- The process of adjusting the ABC is slightly different for groundfish stocks : maxABC is determined by ABC control rules within the tier system (i.e. maxABC is already < OFL), so reductions from maxABC are intended to be infrequent for groundfish stocks

Groundfish risk table development workflow:

1) Stock assessment author meets with lead ESR and ESP authors (if ESP is available) and subject matter experts to deliberate on ecosystem concerns.



2) ESR and ESP leads write up a summary document to recommend ecosystem Level 1-3 risk table score (standard framework: oceanography, prey, competitors, and predators categories)

3) Assessment author completes risk table scores

Variety of methods used to develop the recommended % reduction from maxABC

Groundfish risk table annual workflow:

Quick discussion on background of what has/hasn't worked well with groundfish risk tables:

ESR Team (Stephani Zador, Ebett Siddon, Bridget Ferriss, Ivonne Ortiz)
GPT co-chairs (Kalei Shotwell, Chris Lunsford)

How to standardize risk table scoring among crab assessments?

Start by standardizing baseline buffers by tier to incorporate varying levels of uncertainty/data availability within the tier system?

Use risk tables to document uncertainty beyond that considered in the stock assessment or tier system

-Risk tables used as rationale to a) keep buffer at baseline, or b) increase the buffer to account for additional uncertainty

-Because risk table scoring and ABC adjustments are conducted on a stock-by-stock basis, no standardization of scoring needed across stocks?

SSC Risk Table Workshop Recommendation:

The SSC does not support trying to prescribe a common reduction from maxABC for a given risk score across species because the processes underlying the score may differ among stocks.

SSC Risk Table Workshop Recommendation:

Previous reductions to maxABC should not be the basis for reducing maxABC unless relevant risk factors for a stock continue to be present.

Stock	Tier	Assessment Frequency	Buffer for past 3 assessments	Examples of concerns
BBRKC	3	Annual	20%, 20%, 20%	Lack of recruitment, retrospective patterns, poor environmental conditions
EBS Snow Crab	3	Annual	65%, 50%, 25%	Model uncertainty, uncertainty in mating dynamics and B35%/F35% proxies
EBS Tanner Crab	3	Annual	20%, 20%, 20%	Model uncertainty, uncertainty in B35%/F35% proxies, uncertainty in recent recruitment events
AIGKC	3	Annual	25%, 25%, 25%	Fishery CPUE as index of abundance, # of vessels on which CPUE is based, retrospective pattern (EAG)
NSRKC	4	Annual	30%, 30%, 40%	Uncertainty regarding biological characteristics, discrepancies between surveys, shortage of discard data
SMBKC	4	Biennial	25%, 25%, 25%	Retrospective patterns, limited LH information, corner stations dropped on NMFS trawl survey
PIBKC	4	Biennial	25%, 25%, 25%	Low stock status
PIRKC	4	Triennial	25%, 25%, 25%	None given
PIGKC	5	Triennial	25%, 25%, 25%	None given
WAIRKC	5	Triennial	75%, 75%, 75%	None given

	Range of buffers applied in past 3 cycles	Proposed baseline buffer
Tier 3	20% - 65%	10%
Tier 4	25% - 40%	15%
Tier 5	25% - 75%	20%

Uncertainties already accounted for in Tier system:

Tier 3 - No reliable estimates of stock-recruit relationship
Tier 4 - No reliable estimates of stock-recruit relationship, insufficient LH and recruitment information
Tier 5 – No reliable estimates of stock-recruit relationship or biomass, insufficient LH and recruitment information

Which information sources should be used to inform crab risk tables, and how should they be used?

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Level 3: Extreme Concern	Severe assessment problems; very poor fits to important data; high level of uncertainty; very strong retrospective patterns, especially positive ones.	Stock population dynamics (e.g., recruitment, growth, natural mortality) are outside of unusual; very rapid changes in trends, or highly atypical patterns compared to previous patterns.	Indicator(s) showing a combined frequency (low/high) and magnitude of severe adverse signals a) across the same trophic level as the stock, and/or b) up or down trophic levels (i.e., predators and prey of the stock) likely to impact the stock.	Multiple indicators with strong adverse signals related to biological status (e.g., stock abundance, distribution, fish condition) a) across different areas and/or b) different gear types.

Survey Results

Stock Assessment

Ecosystem & Socioeconomic Profile

Stock Assessment

Ecosystem Status Report

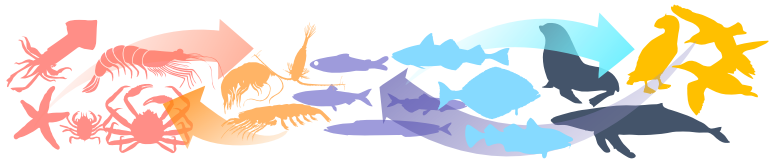
Ecosystem & Socioeconomic Profile

ABSC Skipper Surveys

Ecosystem considerations can also inform population dynamics (e.g. recruitment)

Which information sources should be used to inform crab risk tables, and how should they be used?

Picking up our September conversation, how should ESPs and ESRs be used to inform risk tables?



Ecosystem Status Reports

- Contextual ecosystem information at LME and stock scale
- Considers the impact of novel/more diverse ecosystem information
- Useful for highlighting potential future ecosystem risks
- Produced annually for Bering Sea, Gulf of Alaska and Aleutian Islands

Ecosystem and Socioeconomic Profiles

- Stock-specific ecosystem considerations (predictive and contextual indicator categories) and socioeconomic considerations (fishery performance indicator category)
- ABSC Skipper Surveys for interpreting fishery performance considerations
- Produced annually for BBRKC, snow crab and Tanner crab

Logistics/timing for crab risk tables:

Which stocks? And at what frequency are risk tables produced?

All crab stocks, during year of full assessment

Other participants beyond just assessment author?

ESR/ESP communication with assessment author: Meet with/provide a summary to assessment author prior to final assessment (e.g. mid-August for crab stocks with ESPs)?

What does the risk table process look like for crab stocks that don't currently have ESPs?

Proposed SOPs for crab risk tables (to be finalized during discussion):

Baseline buffers set at the tier level of a given stock:

- Tier 3 baseline buffer: 10%
- Tier 4 baseline buffer: 15%
- Tier 5 baseline buffer: 20%

The risk table evaluates additional uncertainty on a stock-by-stock basis that is not already incorporated in the assessment model, tier level or harvest control rules

If there are no additional concerns documented in the risk table, the buffer should be at or near the baseline buffer for the tier level of a given stock

No prescriptive formula to adjust risk table scores or buffers across stocks

- -Identified concern may not warrant an increase in risk table score
- -Increase in risk table scores doesn't require an increase in buffer
- -Final discretion given to author, CPT and SSC

Risk tables conducted for all crab stocks, during the year of the full assessment. A full risk table is contained as an appendix in each individual SAFE chapter and brief summaries are included in the SAFE introduction.

Development of CPT summary table to track buffers, risk table scores/concerns, and justification for buffers

Ecosystem and fishery performance concerns from ESPs/ESRs communicated to stock assessment author via high level summary document

Proposed SOPs for crab risk tables continued…..(to be finalized during discussion):

Examples of considerations for crab risk tables:

Assessment considerations—

- Data-inputs: incomplete/cancelled surveys, lack of fishery-independent trend data
- Model fits: poor fits to fits to fishery or survey data, inability to simultaneously fit multiple data inputs
- Model performance: poor model convergence, multiple minima in the likelihood surface, parameters hitting bounds
- Estimation uncertainty: poorly-estimated but influential year classes, retrospective bias in biomass estimates

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

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

Fishery performance— Fishery CPUE exhibits a contrasting pattern to the stock biomass trend, unusual spatial patterns of fishing, changes in the percent of TAC taken, poor body condition of catch