DRAFT BSAI Crab SAFE Review Checklist

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This draft checklist is intended to be a guide for stock assessment authors and reviewers to reference during the review process of SAFE documents prior to the applicable CPT meeting. This draft checklist includes all *possible* SAFE report elements that might be included in a SAFE document, and is mainly based on the SAFE Guidelines document. Updates will be made on a periodic basis after Crab Plan Team Review. **For more information:** BSAI Crab SAFE Guidelines (Jan 2023). Updated August 31, 2026.

General

- ☐ Values in text match tables throughout document
- ☐ Summary tables for all model options appear in the document
- ☐ Checked for conversion and rounding errors
- ☐ Conclusions consistent with provided results (or discussion included)
- ☐ Checked for major typos or grammatical errors
- ☐ Model numbers are consistent in text, tables, table captions, figures, and with those previously endorsed by SSC and present in the proposed model runs, PPT, and document
- ☐ Tables and figures correctly labeled and ordered in text
- ☐ Page numbers on every page
- ☐ Every section is present (A-K; even if not applicable to the stock)
- ☐ Clarify model type and purpose for all models discussed - i.e., diagnostic, research, for consideration for harvest specs
- ☐ Did you check the last two CPT and SSC reports for comments? Did the stock author include and respond to all of them?
- ☐ Length and readability - streamline where possible, evaluate whether information and figures can be moved to appendices

Title

- ☐ Title, list of preparers, month and year

Executive Summary

- ☐ 1. Stock: species/area
- ☐ 2. Catches: trends and current levels
- ☐ 3. Data sources: provide reference to figure that shows all model data sources and years
- ☐ 4. Stock biomass: trends and current levels, descript. of uncertainty
- ☐ 5. Recruitment: trends and current levels
- ☐ 6. Management performance (see Table 2 of SAFE guidelines): table of year MMB, OFL, MSST, ABC, TAC, and retained catch for the most recent 5 years in both 1000 t and million lbs
- ☐ Current status of the stock table (new Table 3 for SSC Table 1)
- ☐ Statement of overfishing, overfished (status listed in the table above)
- ☐ 7. Basis for the OFL (see Table 3 of SAFE guidelines): table of year, M, tier & subtier, MMB at time of mating, B_{MSY}, basis for calc. of B_{MSY}, MMB/B_{MSY}, for the most recent 5 years. For tier 5 stocks, only tier, M, buffer, basis for calc. avg. catch, and year should be included.
- ☐ 8. Probability density function of the OFL (if applicable), additional uncertainty (if any)
- ☐ 9. Basis for the ABC recommendation (if below maxABC, report recommended *and* maxABC)
- ☐ 10. Summary of any rebuilding analyses: table with year rebuilding is expected to occur, rebuilding time period, catch for next fishing year, and probability of recovery to the proxy for B_{MSY} for range of harvest strategies

A. Summary of Major Changes

- ☐ Changes to management of the fishery (if any)
- ☐ Changes to input data
- ☐ Changes to assessment methodology

B. Responses to SSC and CPT Comments

- ☐ to most recent two sets of comments in general
- ☐ to most recent two sets of comments specific to assessment

C. Introduction

- ☐ Scientific name
- ☐ Description of general distribution
- ☐ Evidence of stock structure, if any
- ☐ Key life history characteristics relevant to stock assessment
- ☐ Summary of management history
- ☐ Annual ADF&G harvest strategy
- ☐ Summary of history of the basis and estimates of B_{MSY} or $B_{MSYPROXY}$

- ☐ History of target fishery for the stock, including a) periods of opening/closures, b) revisions in harvest policy, c) changes in access to fishery

D. Data

- ☐ Summary of new info (same as A.2)
- ☐ Time series data, separately by sex, maturity state and shell condition (where applies; table headers should indicate when data extracted, source for data; years should be 2XXX/yy or calendar year)
  - ☐ Total catch, by strata (if applicable)
  - ☐ Bycatch and discards (SAFE guidelines Table 4)
  - ☐ Catch-at-length for fisheries, bycatch, discards, surveys
  - ☐ Survey biomass estimates (w/ measures of uncertainty)
  - ☐ Survey catch-at-length (w/ sample sizes), as appropriate
  - ☐ CPUE time series, and how data were standardized w/ diagnostics tables/plots (if applicable)
  - ☐ Other data (e.g., predator abundance, fishing effort, tagging data)
- ☐ Aggregated data over time
  - ☐ Growth-per-molt; frequency of molting, etc (by sex and maturity state, if avail)
  - ☐ Weight-at-length or weight-at-age by sex
- ☐ Information on data sources that were available but excluded

E. Analytic approach

History of Modeling Approaches for this Stock

- ☐ Summarize CIE review comments, sequentially address how comments have been taken into account
- ☐ Brief summary (table or bullets) of model changes over time

Model Description, unless otherwise noted, refers to base model

- ☐ Description of approach (have equations been published? If not, include in Appendix). If there is a technical Appendix, include all sub-bullets below and only include a short description in this section
- ☐ Software used and version (see recent CPT Report for GMACS version to reference)
- ☐ Description of likelihood components
- ☐ Description of how population is initialized at the beginning of the population & size-range model covers
- ☐ Parameter estimation framework
  - ☐ List of all parameters outside assessment and how they were estimated for the base model
  - ☐ Constraints imposed on parameters (including penalties on recruitment and selectivity)
- ☐ Definition of model outputs
  - ☐ Biomass measures, assumed time of mating, timing of fishery
  - ☐ Recruitment
  - ☐ Fishing mortality, if exploitation or instantaneous rate
- ☐ Critical assumptions and consequences of assumption failures
- ☐ Changes to any of the above since previous assessment
- ☐ Methods used to validate model code, and where code is available, including model input files

Model Selection and Evaluation

- ☐ Description of alternative model configurations (if any). Must include model from previous assessment and should document any changes to the model description above for alternate models.
- ☐ Show progression of results from previous to new model. Clearly identify each model used. If changes in model results occur, provide sufficient info to understand the cause
- ☐ Model numbering: If major changes, then "Model *yy.j*", where *yy* is the year, and *j* is an integer distinguishing this particular major change model. If minor, then "Model *yy.jx*" where *x* is a letter distinguishing from other minor change models.
- ☐ Evidence of search for balance between realistic and simpler models
- ☐ Convergence status and criteria for all models considered
- ☐ Table (or plot) of sample sizes assumed for compositional data.
- ☐ Basis for data weighting, including whether the input effective sample sizes are tuned and the survey CV adjusted.
- ☐ Ensure parameter estimates for all models make sense and are credible
- ☐ Describe criteria used to evaluate the model or to choose among alternative models, including the role of uncertainty (if any)
- ☐ Show residual analyses

Results (best models)

- ☐ Results provided for **all** model runs that could form the basis for management advice
- ☐ Tables, figures labeled in numerical order, numbered pages
- ☐ List effective sample sizes, weighting factors applied when fitting indices, and weighting factors applied to any penalties
- ☐ Table of differences in likelihood
- ☐ Tables of estimates and estimates from previous SAFEs
  - ☐ All parameters
  - ☐ Abundance and biomass time series (spawning biomass, MMB, estimates used for PSC bycatch calculations)
  - ☐ Recruitment time series (including average recruitment)
  - ☐ Time series of estimated total (retained?) catch mortality divided by spawning biomass
- ☐ Graphs of estimates
  - ☐ Fishery and survey selectivities, molting probabilities, and other schedules
  - ☐ Estimated male, female, mature male, total and effective mature biomass time series (indicate proxy for B_{MSY})
  - ☐ Estimated full-selection F over time
  - ☐ Estimated fishing mortality vs estimated spawning stock biomass, including OFL
  - ☐ Fit of stock-recruitment relationship, if feasible
- ☐ Evaluation of fit to the data (model solid line, population dotted line, confidence intervals). All models plotted together.
  - ☐ Graphs of fits to observed and model-predicted catches, including model-predicted catches and discards for all years
  - ☐ Graphs of model fits to survey numbers with confidence intervals for data and model predictions
  - ☐ Graphs of model fits to catch proportions by length
  - ☐ Graphs of model fits to survey proportions by length
  - ☐ Marginal distributions for fits to compositional and tagging data
  - ☐ Plots of implied vs input effective sample sizes and time-series of implied effective sample sizes
  - ☐ Tables of RMSEs for indices and a comparison with the assumed values for the coefficients of variation assumed for the indices
  - ☐ Q-Q plots and histograms of residuals to the indices and compositional data
- ☐ Include both retrospective and historical analyses
  - ☐ Retrospective analysis of key management parameter (MMB)
  - ☐ Historical analysis
- ☐ Uncertainty and sensitivity analyses - highlight unresolved problems and major uncertainties
  - ☐ Possible approaches for uncertainty analysis - sensitivity analyses, likelihood profiles, CVs for biomass or OFL estimated by bootstrap, delta method, or Bayesian methods, subjective appraisal of the magnitude and sources of uncertainty, retrospective and historical analyses, comparison of alternate models or assumptions
  - ☐ State qualitative or quantitative information on relative probability if a range of model runs is used to depict uncertainty
  - ☐ Simulation results
- ☐ Squid plots of retrospective patterns in estimation of recruitment deviations (do not include last year in average recruitment calculations)
- ☐ Jitter analysis that involves randomly adjusting all of the initial values, re-running model fitting process, and recording resulting likelihood and OFLS or terminal MMB

Stock projections

- ☐ Table of 5-year projections of stock abundance and fishery yields for author's recommended model run, based on average fishing mortality from last 5 years

F. Calculation of the OFL

- ☐ Specification of Tier level, stock status level, basis for the selection. Specify rationale for time period used to define proxy B_{MSY} (Tier 4) and average retained catch used to compute the OFL (Tier 5). Justification and comparative results provided for both alternatives.
- ☐ Parameter and stock size estimates required by limit and target controls rules in FMP
- ☐ Specification of total catch OFL, including
  - ☐ Equations on which OFL is to be based, equations used to project discard and bycatch by sex, documentation on how fishery selectivity is determined for the OFL projection
  - ☐ Basis for projecting MMB to the time of mating (documented in peer-review publication or technical appendix)

- ☐ Specification of F_{OFL}, OFL, and other applicable measures relevant to determining whether stock is overfished or if overfishing is occurring, including estimates from all assessments in the most recent 5 years.
- ☐ Specification of retained catch portion of the total catch OFL, including equations on which the recommendation for the retained portion of the total catch OFL is to be based
- ☐ Recommendations for F_{OFL}, and OFL
- ☐ Table summarizing management quantities for each proposed model: ending year MMB, $B_{35\%}$, $F_{35\%}$, F_{OFL}, OFL, M, Average Recruitment, and stock status relative to B_{MSY}

G. Calculation of the ABC

- ☐ Specification of the probability distribution of OFL used in ABC control rule
- ☐ List variables related to scientific uncertainty considered in the OFL probability distribution
- ☐ List additional uncertainties relative to setting ABC and include calculation methods for an alternative ABC
- ☐ Include author recommended ABC and, if less than maxABC, provide rationale for establishing less than maximum permissible
- ☐ Include maxABC value regardless of author's recommendation and describe calculation
- ☐ When SSC-recommended ABCs have been lower than the maxABC, provide summary of buffers applied to OFL to obtain recommended ABC for previous three assessments and factors considered by the SSC in developing those ABC recommendations

H. Rebuilding Analyses

Rebuilding analyses should be provided for stocks in a rebuilding plan on the required reporting cycle. In years where reporting is not required, keep the section heading and indicate when the next analysis will occur.

- ☐ Definition of recovery, definition of proxy for B_{MSY} and number of years biomass needs to exceed the proxy for B_{MSY} for the stock to be recovered
- ☐ Year rebuilding started, year by which stock should be recovered
- ☐ Specification of approach used to project the model forward
- ☐ Projections under different levels of fishing mortality on mature males to evaluate probability of recovery to proxy for B_{MSY} over time. Levels: a) no targeted fishing, b) bycatch only, c) probabilities of recovery of 0.5, 0.6, 0.7, 0.8, d) harvest strategy corresponding to 75% of the F_{OFL}
- ☐ Tables of total catch, retained catch, probability of recovery against time for the projections of levels of fishing mortality
- ☐ Graph of annual status of the stock relative to B_{MSY} and MSST from the start of the rebuilding period to the present.

I. Data Gaps and Research Priorities

- ☐ Identify information which could feasibly be collected and analyses which should be undertaken, listed in priority order

J. Ecosystem Considerations

- ☐ Statement that an ESP (with link) is provided for the stock (if applicable, rest of section can be omitted)

Ecosystem Effects on the Stock

- ☐ Include where applicable prey availability/ abundance trends, predator population trends, changes in habitat quality, changes in physical environment

Fishery Effects on the Ecosystem

- ☐ Include where applicable fishery-specific contribution to bycatch, target catch, effects on amount of large-sized target crab, discards, size at maturity and fecundity of target species, EFH non-living substrate

K. Literature Cited

- ☐ References relevant to understanding the stock and its status, but are not cited in the report in a special "extra references" section

Appendices

Appendices may include:

- Technical appendix - equations, GMACS version, data files
- Ecosystem and Socioeconomic Profile (EBS snow crab, BBRKC, EBS Tanner crab)
- Buffer history - 5 years and Risk table (EBS snow crab, BBRKC, EBS Tanner crab, AIGKC, NSRKC) - see May 2026 CPT Report for risk table formatting
- Additional appendices as needed

Note to Stock Authors on Updates to the SAFE document
For crab stocks that are not assessed annually, as well as crab stocks that are assessed annually but prior to fishery completion, an update to the SAFE chapter should be provided at the September CPT meeting.

Only catches that were missing, incomplete, or incorrect when an assessment was accepted by the CPT, SSC, and the Council should be updated in the summary tables provided in the SAFE introduction section. In contrast, the record of specified management reference points are not updated in those tables since they were the basis for SSC and Council decision-making.

Executive Summary Table Formatting
** Draft template tables for SSC tables - link*

- ☐ Standardized format across all tables (see examples below)
- ☐ All table captions - include units and model number
- ☐ Ensure Tier designation includes subtiers (a, b, or c)
- ☐ Consistency in rounding and decimal places reported - at minimum, consistent year-to-year within the stock
- ☐ In new table (see draft template *here*), report B_{MSY} and MSST from models in different year
- ☐ Basis for the OFL table(s)
  - ☐ B_{MSY} is the current season projection minus 1 (t - 1), where t is defined as the current crab year
  - ☐ Change column label from 'Current MMB' to 'Projected MMB'
  - ☐ Include last 5 years
- ☐ Table of projected MMB at realistic catch values to address catch projections at levels of the OFL

Table 2. Examples of summary tables of management performance by Tier level (the table is structured for an assessment conducted in September 2020). Biomass and MSST are from the assessment completed in that year. For stocks with multi-year assessment cycles, specification tables should provide OFLs and ABCs for each year until the next scheduled assessment for the stock.

(a) Stocks in Tiers 1-4.

Status and catch specifications (1000). Shaded values are new estimates or projections based on the current assessment. Other table entries are based on historical assessments and are not updated except for total and retained catch.

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2017/18	12.74	24.86	2.99	3.09	3.48	5.60	5.04
2018/19	10.62	16.92	1.95	2.03	2.65	5.34	4.27
2019/20	12.72	14.24	1.72	1.78	2.22	3.40	2.72
2020/21	12.12	13.96	1.20	1.26	1.57	2.14	1.61
2021/22		14.95				2.23	1.78

Status and catch specifications (million lb). Shaded values are new estimates or projections based on the current assessment. Other table entries are based on historical assessments and are not updated except for total and retained catch.

Table 3. Examples of tables that summarize how the OFL was calculated (the table is structured for an assessment conducted in September 2020). The rows for 2021/22 were agreed by the Crab Plan Team in September 2020.

(a) Stocks in Tiers 1-4.

Basis for the OFL: Vvalues in 1,000 t

Year	Tier	B_{MSY}	Current MMB	B/B_{MSY} (MMB)	F_{OFL}	Years to define B_{MSY}	Natural Mortality
2017/18	3b	25.1	21.3	0.85	0.24	1984-2017	0.18
2018/19	3b	25.5	20.8	0.82	0.25	1984-2017	0.18
2019/20	3b	21.2	16.0	0.75	0.22	1984-2018	0.18
2020/21	3b	25.4	14.9	0.59	0.16	1984-2019	0.18
2021/22	3b	24.2	14.9	0.62	0.17	1984-2020	0.18

Basis for the OFL: Vvalues in million lb

Year	Tier	B_{MSY}	Current MMB	B/B_{MSY} (MMB)	F_{OFL}	Years to define B_{MSY}	Natural Mortality
2017/18	3b	55.2	47.0	0.85	0.24	1984-2017	0.18
2018/19	3b	56.2	45.9	0.82	0.25	1984-2017	0.18
2019/20	3b	46.8	35.2	0.75	0.22	1984-2018	0.18
2020/21	3b	56.1	32.9	0.59	0.16	1984-2019	0.18
2021/22	3b	53.4	33.0	0.62	0.17	1984-2020	0.18

Additional questions

- [ ] Where to report # of vessels and # of processors (from SSC comments, Oct 2025) - Section J. Ecosystem Considerations? - for three stocks (BBRKC, snow, Tanner), located in ESP
- [ ] Model numbering for GMACS updates? Model number ex: if just GMACS update and no model updates, include in parentheses but do not change model number, e.g., 26.0 (v34.0) vs 26.0 (v44.0)
- [ ] Proposed model document guidelines - will prepare for January Modelling Workshop
- [ ] Guidelines for documents on multi-year schedules - will prepare for January Modelling Workshop or May CPT meeting
- [ ] Buffer history for all stocks together - SAFE Intro - will plan to include in Sept
- [ ] Mention appendices in Executive summary