SCIENTIFIC AND STATISTICAL COMMITTEE
FINAL REPORT TO THE
NORTH PACIFIC FISHERY MANAGEMENT COUNCIL
June 1st – 3rd, 2026

The SSC met from June 1st - 3rd, 2026 in Vancouver, WA. Members present in Vancouver were:

Ian Stewart, Co-Chair *Intl. Pacific Halibut Commission*	Sherri Dressel, Co-Chair *Alaska Dept. of Fish and Game*	Jason Gasper, Co-Chair *NOAA Fisheries—AKRO*
Alison Whitman, Vice Chair *Oregon Dept. of Fish and Wildlife*	Chris Anderson *University of Washington*	Fabio Caltabellotta *Washington Dept. of Fish and Wildlife*
Curry Cunningham *University of Alaska Fairbanks*	Martin Dorn *University of Washington*	Robert Foy *NOAA Fisheries—AFSC*
Dana Hanselman *NOAA Fisheries—AFSC*	Brad Harris *Alaska Pacific University*	Kailin Kroetz *Arizona State University*
Franz Mueter *University of Alaska Fairbanks*	Andrew Munro *Alaska Dept. of Fish and Game*	Robert Suryan *NOAA Fisheries—AFSC*
Sarah Wise *NOAA Fisheries—AFSC*		

SSC members who attended remotely were:

Jennifer Burns
Texas Tech University

SSC members who were absent were:

Chris Siddon
Alaska Dept. of Fish and Game

SSC Administrative Discussion

The SSC received a report from Anna Henry (NPFMC) that included NPFMC announcements. These announcements included updates from the Council Coordination Committee, a summary on the timing of individual groundfish stock assessments in October and December in response to the 2025 government shutdown, and a note that the SSC will have a four-day meeting in December. Ms. Henry highlighted that

the SSC will be recommending some groundfish harvest specifications at both the October and December meetings, but the Council will take final action on groundfish specifications only at the December meeting.

Ms. Henry also announced the retirement of long-time Council staff member Maria Davis after this June meeting and the return of Sarah LaBelle to the Council staff. The SSC expresses deep gratitude to Ms. Davis for her many years of work and assistance to the SSC and wishes her the best in her retirement. The SSC looks forward to upcoming work with Ms. LaBelle.

SSC Membership

During its executive session, the SSC had a discussion of anticipated upcoming membership changes and expertise gaps that these will create. The SSC is currently at 18 members with two vacant spots. One SSC member was uncertain about continuing membership in 2027 and a second member will be stepping down at the beginning of 2028. The SSC notes that its workload is currently heavily composed of stock assessment review for both crab and groundfish. In order to provide continuity and maintain the ability to effectively review all topics, **the SSC requests that the Council consider filling at least one SSC position for 2027, and possibly two.** Should the Council extend a call for SSC nominations and choose to identify specific expertise in the call, the SSC recommends prioritizing the following:

1. An expert in the fields of stock assessment, statistical design, and the use of modern statistical modelling methods.
2. Either:
    a. an expert social scientist with a background in anthropology, sociology, human geography, or a related field, or
    b. an expert with experience in climate, ecosystem and integrated thinking.

C2 BSAI Crab Harvest Specifications

The SSC received a report on the May 2026 Crab Plan Team (CPT) meeting from Anita Kroska (NPFMC) and the CPT co-chairs, Katie Palof (ADF&G) and Mike Litzow (NOAA-AFSC). The SSC appreciates the CPT's efforts to streamline their presentation to the SSC. Not all CPT agenda items were presented to the SSC, though they are detailed in the CPT report. Items on which the SSC provided comments are below. The SSC appreciates the oral public testimony provided on CPT report agenda items by Cory Lescher (Alaska Bering Sea Crabbers). There was no other public testimony. Table 1 includes the stock status determination criteria and Table 2 includes the June 2026 SSC recommended harvest specifications

Table 1. Stock status in relation to status determination criteria for 2025/2026 as estimated by the most recent assessment. Hatched areas indicate parameters not applicable for that tier. Values are in thousands of metric tons (kt). Status determination recommendations made by the SSC are based on the best scientific information available and final status determination will be made by NMFS Headquarters following SAFE review.

Ch.	Stock	Tier	MSST	B_{MSY} or B_{MSY} proxy	2025/26[1] MMB	2025/26 MMB/ MMB_{MSY}	2025/26 OFL	2025/26 Total Catch	Rebuilding Status
1	EBS snow crab	4					20.11		
2	BB red king crab	3					5.85		
3	EBS Tanner crab	3					51.02		
4	Pribilof Islands red king crab	4	0.64	1.283	2.586	2.02	0.4899		
5	Pribilof Islands blue king crab	4	2.07	4.15	0.162	0.039	0.00116		**overfished**
6	St. Matthew Island blue king crab	4					0.129		
7	Norton Sound red king crab	4	0.98	1.96[2]	2.15	1.10	0.284	0.17	
8	AI golden king crab	3	5.579	11.264	10.86	0.96	3.166	2.341[3]	
9	Pribilof Islands golden king crab[4]	5					0.114	Conf.	
10	Western AI red king crab	5					0.056		

[1]MMB on 2/1/2025 for Norton Sound red king crab as estimated in the 2025 assessment and on 2/15/2026 for all other Tier 1-4 stocks using the 2026 assessments.

[2] B_{MSY} proxy basis years for NSRKC are 1980 - 2025.

[3] AIGKC total catch is preliminary; total amounts will be reported at the October Council meeting. Does not include confidential state water fishery catch in 2025/26.

[4] PIGKC specifications are set on a calendar year basis.

Table 2. SSC recommendations for Eastern Bering Sea crab stocks. Stocks for which specifications are rolled over between assessments (Pribilof Island red king crab and Pribilof Islands blue king crab) are also included. Biomass values are in thousand metric tons (kt). Tier designations in this table are based on the projected stock status in 2026/2027. Stocks for which the SSC recommended different harvest specifications from the CPT are bolded. Harvest specifications for SAFE Chapters 1 – 6 are set in October and Chapters 8 – 10 are set in June, in the year according to the assessment frequency cycle (see current SAFE Introduction for assessment cycle). Chapter 7 was set in December 2025.

Ch.	Stock	Tier	F_{OFL}	B_{MSY} or B_{MSY} proxy	B_{MSY} basis years[1]	2026/27[2] MMB	2026/27 MMB / B_{MSY}	Natural Mortality (M)	2026/27 OFL	2026/27 ABC	ABC Buffer
1	E. Bering Sea snow crab										
2	Bristol Bay red king crab										
3	E. Bering Sea Tanner crab										
4	Pribilof Is. red king crab	4a	0.21	1.283	2000-2024	2.586	2.02	0.21	0.4899	0.3674	25%
5	Pribilof Is. blue king crab	4c	0[3]	4.15	1980/81-1984/85; 1990/91-1997/98	0.162	0.04	0.18	0.00116	0.00087	25%
6	St. Matthew blue king crab										
7	Norton Sound red king crab	4b	0.17	2.00	1980-2025	1.56	0.78	0.23	0.193	0.135	30%
8	Aleutian Is. golden king crab [4]	3b	0.49	11.157	1987 - 2022	10.67	0.96	0.22	3.493	2.620	25%
9	Pribilof Is. golden king crab	5[5]	-	-	-	-	-	-	0.113	0.0788	30%
10	W. Aleutian Is. red king crab		-	-	-	-	-	-			

[1] For Tiers 3, 4 where BMSY proxy is estimable, the years refer to the time period over which the estimate is made.
[2] MMB is estimated on 2/1/2026 for Norton Sound red king crab and on 2/15/2027 for all other Tier 1-4 stocks, using the current assessments.

[3] The F_{OFL} of 0 for PIBKC is indicative of a closed directed fishery due to stock status per the crab FMP guidelines.

[4] AIGKC MMB and B_{MSY} are calculated by combining two separate assessment models for the EAG and WAG, as presented in the current assessment. Specifications are determined using the combined MMB and status resulting in a single OFL.

[5] PIGKC uses a groundfish tier 5 style assessment in which the OFL is based on average MMB for a set of survey years and natural mortality. PIGKC specifications are set on a calendar year basis.

General Crab Comments

The SSC thanks outgoing CPT co-chair Dr. Litzow for his work and congratulates him on his upcoming retirement.

While acknowledging staffing capacity issues, the SSC supports filling the CPT co-chair position as quickly as possible to provide the necessary support to the current CPT co-chair. The SSC acknowledges that if a co-chair can't be found in a timely manner, it will significantly impact the CPT's capacity, as noted by the CPT in their report.

The SSC supports the CPT and the Scallop Plan Team (SPT) working together to provide quantitative review of the scallop stock assessment. The SSC would support various approaches to facilitate review as suggested in the CPT report in a structure deemed practicable by Council staff and Plan Team members (also see C3 Scallop Harvest Specifications for additional comments).

The SSC notes that the WAIRKC assessment has been postponed until 2027 due to ADF&G capacity constraints.

Aleutian Islands Golden King Crab

The SSC received a presentation on the 2026 Aleutian Islands Golden King Crab (AIGKC) stock assessment. The SSC sincerely thanks the author for the substantial progress during this assessment cycle, including the development and implementation of a spatiotemporal GLMM (ST-GLMM) for fishery-dependent CPUE standardization. The SSC also commends the author for addressing previous CPT and SSC comments.

The author presented four models for each of the two areas (EAG and WAG). Relative to the previous assessment, the 2026 assessment was updated to GMACS version 2.20.34b, and the average recruitment reference period used to calculate $B_{35\%}$ was updated to 1987–2022.

The models compared in the SAFE report are:

- Model 23.1c: 2024 base model with updated time-series data and an alternative bias correction for recruitment deviations from 1960-1981;
- Model 26.0: Model 23.1c with a spatiotemporal standardized CPUE index and catchability time blocks for 1995-2004 and 2005-2024;
- Model 26.0a: Model 26.0 with non-equilibrium initial conditions starting in 1981 and equal emphasis factors (lambda = 1) on all likelihood components;
- Model 26.1: Model 26.0a with additional subdistrict-specific time blocks for directed fishery selectivity.

The author-preferred model for both areas was Model 26.0a. All four models produced very similar spawning biomass and recruitment trends, with only minor differences in fits to catch, index, and size-composition data. Although the spatiotemporal GLMM approach used in models 26.0, 26.0a, and 26.1 provided more refined standardization of observer CPUE data and better characterization of spatial variability, these changes did not substantially improve model performance relative to the base model. Model 26.1 reduced retrospective patterns compared to Model 26.0a, but additional complexity in fishery selectivity did not result in meaningful improvements in overall fit. Compared to Model 23.1c, Model 26.0a incorporates an improved model structure and input CPUE data, while providing a more practical foundation for future development of combined-area models and time-varying selectivity. The jitter analysis offered limited reassurance and raised some concerns. The EAG models showed at most one off-maximum likelihood estimate (MLE) minimum, several EAG jitter runs failed to converge, and, for the WAG, Models 26.0, 26.0a, and 26.1 returned an MLE that was not a viable outcome.

The SSC supports the author's and CPT's recommendation to use Model 26.0a as the basis for status determination and harvest specifications for both the EAG and WAG. AIGKC has been managed as a Tier 3

stock since 2017. For the 2026 assessment, the Tier 3b designation applies to both the EAG and WAG. **The stock is not overfished.** Directed fishing for AIGKC was complete at the time of the assessment, and bycatch from the groundfish fisheries is ongoing. **Therefore, the overfishing determination for AIGKC, based on the final total catch, will be made at the October meeting**.

The SSC agrees with the CPT recommendations for OFL, continuing to use the 25% buffer for this assessment, and supports the resulting ABC. The SSC notes that this buffer is unchanged from the previous assessment cycle. The SSC agrees that the factors supporting retention of the 25% buffer remain largely unchanged, including the absence of a fishery-independent index, reliance on fishery CPUE as the sole abundance index, the persistent EAG retrospective pattern, and limited spatial coverage of the fishery relative to the stock distribution. The SSC further notes concerns identified this cycle regarding the WAG convergence issue and residual spatial autocorrelation in the ST-GLMM index and agrees that these factors support maintaining the current buffer.

The SSC recognizes the new State of Alaska open-access commercial fishery for AIGKC in state waters and recommends developing a long-term monitoring program to ensure that removals from this fishery can be incorporated into future assessments.

The SSC supports CPT's specific recommendations for additional research and development of upcoming assessments. In addition, the SSC recommends the following:

- The author should continue developing a combined EAG/WAG model framework, including a diagnostic evaluation of whether natural mortality M is expected to be similar across the two subdistricts, as recommended by the SSC in December 2025.
- The SSC recommends using direct CPUE reliability diagnostics and covariates, including vessel effects, spatial contraction, soak time, fishing-ground shifts, and post-rationalization behavior, as an alternative to fishery selectivity time blocks for addressing retrospective bias.
- The SSC recommends developing a clearer area-specific risk accounting framework for EAG and WAG, even if ABC remains specified at the stock level (i.e., is a larger buffer appropriate for an area that has more uncertainty, like the retrospective bias in EAG)
- The SSC recommends exploring whether inverse EAG and WAG CPUE trends support development of a two-area model with movement, as time and data allow.
- Continue investigating the EAG retrospective pattern using objective, data-driven criteria for selectivity time-block placement.
- Evaluate whether depth is necessary as a fixed effect in the ST-GLMM and assess sensitivity to mesh resolution and soak-time assumptions.
- Exploration of a spatially-varying soak time effect within the ST-GLMM.
- Investigate and report the source of the WAG convergence failure and evaluate alternative model parameterizations to resolve convergence issues.
- Continue developing the draft risk table framework.
- Resolve editorial inconsistencies identified by the CPT and SSC.

Pribilof Islands Golden King Crab

The SSC received a presentation on the Pribilof Islands golden king crab (PIGKC) SAFE report. The SSC thanks the assessment authors and the CPT for their work on this assessment and commends the authors for their progress

in addressing previous recommendations from the CPT and the SSC. This is a Tier 4/5 stock, using elements from crab tiers 4 and 5, and groundfish Tier 5, that is managed on a calendar-year basis. PIGKC is assessed triennially. The last assessment was conducted in 2023.

The fishery was managed with an ADF&G guideline harvest level (GHL) of 59 t from 2015 to 2026. Participation in this fishery is sporadic, with fewer than three vessels participating in the fishery, resulting in total catch being confidential since 2022. Total catch is typically below GHL, which is approximately 70% of ABC.

In 2023, the SSC recommended a Tier 5 groundfish-style assessment for the harvest specifications used in this 2026 assessment, in which the exploitation rate on MMB is set equal to natural mortality (M) to produce an OFL. Natural mortality is assumed to be 0.22 yr^{-1} , borrowed from the Aleutian Islands stock of golden king crab. This exploitation rate is applied to the average MMB estimated from the 2002 – 2016 NOAA EBS bottom trawl slope survey to determine the OFL. Updates to the data used in the 2026 assessment included retained and discarded catch in the directed fishery and bycatch in the non-directed fishery through 2025, and a correction to the EBS slope survey georeferencing polygon for the Pribilof District that caused a slight change in station selection and a small change in MMB. Bycatch in multiple trawl and fixed-gear fisheries is low, estimated at 0-5 tons annually. The CPT proposed increasing the buffer from 25% to 30% for several reasons; it has been ten years since the last survey data collection; one-third of the MMB data used are interpolated values because crab in the early part of the time series were not measured; and to provide consistency with other stocks that have richer data streams, such as the AIGKC, where a 25% buffer was applied.

The SSC concurs with the CPT and authors' recommendations for harvest specifications, including the OFL, the 30% buffer and associated justification, and the resulting ABC. Though confidential, direct and non-directed mortality did not exceed OFL in 2023-2025, indicating that **overfishing of this stock did not occur**. **There is not enough information to determine whether the stock is overfished.** The SSC looks forward to EBS bottom trawl survey modernization efforts to include stations on the upper continental slope which may overlap golden king crab habitat in the ADF&G Pribilof District Management Area.

Snow Crab Model Runs

The SSC received a presentation on proposed assessment model runs for the fall 2026 Eastern Bering Sea (EBS) snow crab assessment. The SSC welcomes Grant Adams as the new lead author and appreciates the substantial effort to explore options to address convergence, model stability, and other emerging and persistent issues in the snow crab assessment. The SSC also thanks Cody Szuwalski for his many years of hard work as the lead author for this assessment.

EBS snow crab have historically been assessed on an annual schedule under Tier 3 using a GMACS model. In 2025, the SSC used the Tier 4 model to set specifications due to continued convergence issues in the Tier 3 size-structured model. The preliminary 2026 document presented 14 candidate models exploring three primary areas of uncertainty: treatment of hybrids, an updated maturity workflow, and attempts to improve convergence and jitter behavior by correcting the total-male composition input, expanding the plus group, and/or using an immature survey index. Candidate Tier 3 directed OFLs ranged from approximately 36–60 kt, and no author-preferred model was recommended at this preliminary stage. Convergence issues persisted across most models.

The SSC supports bringing forward the composition correction and the expanded plus group in future models, as these appear to be clear technical improvements and corrections to the treatment of size compositions (>135 mm carapace width) that were previously ignored. The SSC agrees with the CPT that the immature survey index should not be treated as a convergence fix by itself. Although it may remove the visible bimodality in jitters, it also appears to shift the model toward higher natural mortality among mature males and unstable reference point behavior. Importantly, there is a clear question of whether this represents a duplicative use of the same survey data within the model.

The SSC notes that, with a new lead author, this may be an opportunity to strip the model down to a minimal parameter set that avoids convergence issues and then add back biological or process features as needed while maintaining model stability. This sequential approach to increasing model complexity by unfixing (estimating) parameters can be informed by the existing correlations among parameters in Model 25.2c. Convergence issues have been persistent with this model and a more fundamental model simplification effort may be warranted.

The SSC appreciates that the model runs were provided on GitHub, which allowed additional review of the model structure and diagnostics. The current base model estimates on the order of four hundred parameters, many of which are highly correlated. These strong correlations are consistent with overparameterization and may contribute to convergence issues and bimodal jitter results. For potential new Tier 3 models brought forward in 2027, the **SSC recommends that the assessment include a focused convergence section that identifies which parameters separate the jitter clouds, including correlation diagnostics, likelihood profiles for terminal MMB, recent recruitment, M, and OFL, and targeted model simplification runs.**

Those simplifications should be targeted rather than broad. Examples include fixing the recruitment sex ratio at 50:50, and reducing confounding among growth, M, and selectivity. Other possibilities include reducing the number of selectivity parameters, estimating parameters such as growth externally, and considering whether the model could begin in an equilibrium state at an earlier starting year to reduce the number of initialization parameters. The SSC prioritizes developing a simplified future model over additional iterations of the current base model, given that the existing structure is likely to continue to face convergence issues without simplification, and that a Tier 4 model will likely be needed for specifications until convergence issues are satisfactorily addressed.

The SSC recommends that the author only bring the Tier 4 model forward in October, to allow more time for development of a simpler, viable Tier 3 model.

The SSC continues to request a yield-per-recruit analysis that could be used to inform development of an alternative harvest control rule.

The SSC recommends that future snow crab SAFEs include a "Rebuilding Analysis and Update" section as appropriate, given the stock's 2021 overfished determination.

Tanner Crab Model Runs

The SSC received a presentation on proposed model runs for the EBS Tanner crab assessment. EBS Tanner crab is assessed on an annual cycle under Tier 3, with the most recent full assessment conducted in September 2025. The current assessment is implemented in the length-structured Tanner Crab Stock Assessment Model V.2 (TCSAM02) framework, and the author is continuing development of an equivalent model in GMACS. The accepted 2025 model was Model 22.03d5, and the proposed 2026 base model would update that model with new 2026 data. The proposed alternative model is an equivalent GMACS implementation.

The SSC concurs with the CPT and author recommendation to bring forward both an updated TCSAM02 model and a matching GMACS model for the September 2026 final assessment, both using the new male maturity workflow. The SSC agrees that the new maturity workflow is an improvement over the previous workflow and supports its use in the 2026 and future Tanner crab assessments, provided that remaining data-handling issues identified by the CPT are resolved and documented before the final assessment.

The SSC supports continued progress toward transitioning the Tanner crab assessment from TCSAM02 to GMACS. The May 2026 bridging analysis showed substantial progress, with highly similar predicted values, derived quantities, and reference points when comparing bridging versions of TCSAM02 and GMACS. Remaining issues include alignment of priors and penalties, treatment of extended size compositions, and reconciliation of OFL calculations. The SSC does not expect exact numerical identity between frameworks, but requests that the

September assessment clearly demonstrate whether any remaining differences affect stock status, OFL, ABC, or buffer recommendations.

The SSC notes that the GMACS–TCSAM02 bridge produced very similar reference points for most quantities, including F_{MSY} and F_{OFL}, but that the GMACS OFL was approximately 7% higher than the TCSAM02 OFL. The CPT report indicates that this difference likely reflects different OFL estimation approaches in the two frameworks, with TCSAM02 using an analytical calculation and GMACS using a 200-year projection to estimate equilibrium. However, this remains a decision-relevant unresolved issue if GMACS is to be used for October 2026 specifications. **The SSC requests a technical reconciliation of the TCSAM02 and GMACS Tier 3 OFL calculations, developed in coordination with GMACS developers and other crab assessment authors as appropriate.**

The SSC appreciates the hybrid sensitivity analyses and does not recommend including hybrids in the Tanner crab base model at this time. The analyses indicated relatively small effects of hybrid inclusion on Tanner crab assessment outputs, and the CPT recommended that hybrids from survey or total catch data streams not be included in either the snow crab or Tanner crab assessment models at this time. The SSC supports continued tracking of hybrid abundance and consideration of hybrid-related uncertainty through the risk table, the ABC buffer discussion, or the TAC-setting process as appropriate.

For the September final assessment, the SSC requests:

- an updated TCSAM02 model using the new maturity workflow and updated survey and fishery data;
- a matching GMACS model configured as closely as possible to the updated TCSAM02 model;
- a concise TCSAM02–GMACS bridge table comparing convergence, likelihood components, priors and penalties, derived biomass and abundance estimates, reference points, and OFL calculations;
- a technical reconciliation of the TCSAM02 and GMACS Tier 3 OFL calculations, including side-by-side documentation of the algorithms, decomposition of the observed OFL difference, and identification of the OFL calculation recommended for use in October 2026 specifications if GMACS is brought forward for management;
- confirmation that the missing-year issue in the maturity workflow has been resolved;
- confirmation that the updated fishery catch time series is used in the final assessment;
- retention of a Tier 4 fallback/context calculation; and
- a concise summary of relevant CIE recommendations and author responses, if available in time for the September CPT and October SSC review. The CIE reports should also be made available, if possible.

The SSC also supports the CPT recommendation that differences in how maturity ogives are used in the Tanner crab and snow crab assessments be discussed at a future January modeling workshop. The SSC looks forward to reviewing both the updated TCSAM02 model and the GMACS alternative in October, to determine whether GMACS is sufficiently developed for use in harvest specifications.

Bristol Bay Red King Crab Model Runs

The SSC received a presentation on Bristol Bay red king crab (BBRKC) model runs. The SSC thanks the stock assessment author for being responsive to previous requests for model development, including: the incorporation of One-Step-Ahead residuals in GMACS output figures, for providing uncertainty intervals for biomass/abundance time series, and developing additional size bins for the larger females across the entire time series. The SSC thanks the CPT for considering a coordinated approach to analyzing the Bering Sea Fisheries Research Foundation

(BSFRF) data for two *Chionoecetes* crab and BBRKC stocks. The SSC reiterates a previous recommendation from October 2025 to consider developing the BSFRF results as a prior on selectivity for use in these models.

Three new model runs were based on GMACS:

- 24.0c.2: base model (fall 2005, GMACS v2.20.20), M for males estimated in the model, molt time block removed, no shell condition
- 24.0c.2_v34a: + updated GMACS (version 2.20.34a). This run also included additional updates to the groundfish trawl and fixed gear bycatch and the size composition of bycatch in the directed Tanner crab fishery for years prior to 2021, due to database updates.
- 26.0: 24.0c.2 (updated GMACS) + extended size bins for all size composition data sets, including updated bycatch size composition data. Growth and molting for these extended size bins were the same as the "plus group" size bins in the base model.
- 26.0a: 24.0c.2 using updated size composition data for bycatch series only prior to extending the size bins

There were no changes to the MLE and likelihood components when bridging the base model to the new GMACS version (v20.20.20 to v2.20.34.a), and the SSC highlights its appreciation for the direct comparison to ensure consistency.

For Model 26.0, the author explored the bottom trawl survey size composition data to justify expanding size bins, increasing the number of male size bins from 20 to 23 and the number of female size bins from 16 to 18. **In expanding the size bin structure, the SSC recommends reconsidering the molting probability matrix, building on the CPT recommendation to consider all available growth data.** The CPT should consider rationale for any continued expansion of size bins for any size composition data.

Expanded size bins appeared to better capture the accumulation of large crabs in recent years and improved fits to most size composition datasets, particularly for the directed fishery and NMFS trawl survey compositions, with no major changes to estimates of mature male biomass, recruitment, and fishing mortality.

The SSC concurred with the CPT and author recommendation to bring forward models 26.0, 24.0c.2, and a Tier 4 REMA fallback model for final specification in September 2026. In addition, the CPT co-chair noted that a GMACS base code error in the Tanner crab bycatch will also be updated in the new GMACS base code in October.

The SSC looks forward to future effort on:

- Development of model-based indices using sdmTMB to consider the abundance of Northern District crab.
- Consideration of differences observed between survey and fishery CPUE metrics.
- Further work on selectivity and catchability for future assessment cycles.
- Refinement of model-based indices, retrospective analyses, and continued development of a management strategy evaluation (MSE) framework for BBRKC.
- Developing a common framework for using BSFRF data for snow crab, Tanner crab, and BBRKC.

Norton Sound Red King Crab Model Runs

The SSC received a presentation on the Norton Sound Red King Crab (NSRKC) model runs. The SSC commends the author for the exceptionally detailed, well-written, and thorough document. The SSC particularly appreciates the substantial progress on the long-standing recommendation to develop a model-based index of abundance (MBI), as presented and documented in Appendix D.

NSRKC is a Tier 4 stock. Model 25.0a2 on GMACS version 2.20.20 was the accepted model last year. The author presented a base model, four alternative models, and one diagnostic model. The base model, Model 26.0, is the 2025 accepted model (Model 25.0a2) bridged to a newer GMACS version (2.20.34a). The alternative model runs replace the separate design-based ADF&G and NOAA Northern Bering Sea (NBS) trawl survey indices (design-based index, DBI) with a single spatiotemporal MBI that combines the two ongoing surveys (as developed in Appendix D). They differ in how index catchability and survey selectivity are treated:

- Model 26.1 sets the MBI catchability to 1;
- Model 26.2 estimates MBI catchability;
- Model 26.3 additionally estimates selectivity for all three surveys;
- Model 26.4 is Model 26.2 with survey selectivity fixed.

A diagnostic model (Model 26.5) with catchability and selectivity estimated for all three DBI surveys, but without MBI, was run to separate the effects of estimating those parameters from adding the index. The diagnostic model produced results nearly identical to those of the base model.

The bridging analysis in the assessment shows the model fits, the recruitment and mature male biomass trajectories, and the management quantities remain essentially unchanged, with only two minor adjustments. The recruitment-size-distribution alpha parameter was moved to a later estimation phase (from phase 3 to 5) to aid convergence, and the upper bound on the growth increment parameter was reduced (from 20 to 1) to prevent negative growth estimates.

The SSC concurs with the CPT and the author that the base model (Model 26.0) and two alternatives, models 26.1 and 26.2, come forward for the fall 2026 assessment. The SSC also concurs with the CPT's request that the author revisit the MBI and present two versions, one including survey-station depth as a covariate and one excluding it, so the influence of depth on the index scale and the resulting reference points can be evaluated in the assessment. In future MBI iterations, the authors should consider additional data available through ADF&G and NOAA, including survey data previously dropped in survey estimates and tagging data. In addition, size composition data should be incorporated into the MBI such that the previous issues with abundance in the largest size bin can be assessed. Incorporating the MBI and estimating its catchability (Model 26.2) substantially reduced the retrospective pattern in mature male biomass relative to the base model. The SSC notes and concurs with the CPT that all candidate models produced very similar trends in recruitment and mature male biomass, so differences among them are matters of scale and how the index information is incorporated, rather than of the estimated stock trajectory.

The SSC supports CPT’s recommendations for the continued development of the NSRKC assessment and offers the following additional recommendations to guide the models presented before the fall 2026 assessment:

- The MBI is predicted within the NBS survey stratum, but the survey observations extend beyond that stratum (Appendix D, Fig. 9); the author should report how sensitive the index and reference points are to the choice of prediction area.
- The author should assess whether depth and survey identity are correlated in the combined dataset (for example, by comparing the depth distributions of the NBS and ADF&G stations, or by estimating the depth effect within each survey separately) to determine whether the depth covariate captures real bathymetric structure or partly absorbs a difference in scale between the two surveys.
- The selected delta-gamma index model with depth had the smallest cross-validation out-of-sample negative log-likelihood but ranked only second-smallest in root mean square error (RMSE) and mean absolute error (MAE), whereas the delta-gamma model without depth had smaller values for those two metrics. The author

should reconcile which selection criterion governs and justifies the inclusion of depth on more than the negative log-likelihood result alone.

St. Matthew Blue King Crab Model Runs

The SSC thanks the assessment authors and the CPT for their work on this assessment and commends the authors for their progress in addressing previous recommendations from the CPT and the SSC. St. Matthew blue king crab (SMBKC) is a Tier 4 biennial assessment, with the previous full assessment completed in 2024. The stock has been under a rebuilding plan since 2020. Estimated CPUE from the EBS trawl and the ADF&G pot surveys remains low, and as discussed in both the rebuilding plan and the assessment document, the limiting factor to stock recovery is environmental conditions that affect recruitment. The SSC notes that a rebuilding plan update will be presented in October, with the new required assessment section on rebuilding that was discussed at the CPT under SAFE Guidelines. The authors brought forward five models but only three that should be considered for harvest specifications and two models for bridging purposes.

The models presented include:

- Model 24.1 – the accepted model from 2024 harvest specifications
- Model 26.0 - Model 24.1 transitioned to the most recent GMACS version (2.20.34a)
- Model 26.1 – Model 26.0 with updated data, which include updated 2025 EBS trawl survey biomass and size composition data, 2025 ADF&G pot survey biomass and size composition data, 2024/2025 groundfish fishery bycatch data (the new base model)
- Model 26. 2 – Model 26.1 with a model-based index of the EBS trawl survey biomass in place of the design-based estimates and the EBS trawl survey catchability fixed at 1
- Model 26.3 – Model 26.2 with the EBS trawl survey catchability estimated

The SSC concurs with the CPT and authors' recommended models for setting harvest specifications in October. These include models 26.1, the new base model, and 26.2. Model 26.3 was not recommended at this time, and the SSC notes that this model exhibits a degraded retrospective pattern compared to models 26.1 and 26.2, and an anomalous spike in early 1980s estimated recruitment. The SSC agrees that excluding Model 26.3 for final harvest specifications is appropriate but recommends continued exploration of estimating catchability in future models, at the author's discretion. **The SSC also recommends more detailed information on the new model-based index be provided in the main assessment document in October, which will inform model selection for final specifications.**

Finally, the SSC supports the research priorities listed by the CPT, including further understanding of molting as a function of size and continued exploration of survey selectivity and catchability. Regarding previous recommendations to integrate the EBS bottom trawl survey and the ADF&G pot survey, the SSC acknowledges the difficulties in aligning an area-swept survey with a discrete pot survey and recommends exploring alternative methodologies, such as developing separate model-based indices for each survey and using ensemble models or model averaging, to continue progress toward creating a comprehensive index of abundance for this stock.

SAFE Guidelines

The SSC appreciates the review of the SAFE guidelines and the work to streamline the information provided by assessment authors that is required to populate the SSC harvest specification tables. The SSC looks forward to continuing to work with assessment authors, the CPT and Council staff to improve transparency and consistency in the harvest specifications process.

General ESP Updates

The SSC supports the development of dynamic structural equation modeling (DSEM) applications for integrating relevant ESP indicators into a causal analytical framework and commends the analysts on an excellent example analysis. The SSC had the following recommendations for this work.

Regarding how shorter time series are evaluated, the SSC recommends looking at multiple approaches to evaluate the biases or inconsistencies rather than defaulting to contextual use of those data. Furthermore, multivariate statistical approaches (e.g., Non-Metric Multidimensional Scaling, Principal Component Analysis) could be used to evaluate how a given year compares to other years overall.

The SSC recommends development of tools that allow for evaluation and incorporation of new metrics within a reasonable timeframe without the need for a long-term time series for the metric to be evaluated or used quantitatively.

Moving towards DSEM analyses provides a more structured approach to integrate multiple types of information provided in the Ecosystem and Socioeconomic Profile (ESP); however, the SSC notes that this doesn't preclude the use of other tools to analyze these data. The SSC looks forward to future DSEM applications.

Research Updates: Changes in Snow Crab Size at Maturity

The SSC appreciates the research updates on changes in snow crab size at maturity. The SSC highlights that high exploitation rates for large males in directed fisheries may create a feedback loop that results in a declining male size at maturity. The SSC recommends the CPT consider the parallels with snow crab in eastern Canada, where a structured approach is used to account for this feedback loop.

Risk Tables

The SSC thanks the CPT and other supporting staff from the AFSC for their work in advancing the risk table process for BSAI crab stocks. The CPT devoted a significant amount of meeting time to this topic to finalize recommendations for assessment authors prior to the September CPT meeting. Previous SSC comments have centered on developing risk tables for crab stocks in a manner as consistent as possible with the risk table process for groundfish stocks, while acknowledging the structural differences in buffer setting processes that necessitate a more tailored approach for crab stocks. The SSC suggests that crab risk considerations are not fundamentally different from those for groundfish, although the harvest control rules reflect different levels of risk tolerance as specified by the Council, with a minimal buffer between the default maximum allowable ABC and the OFL for crab stocks (P*=0.49) compared with a larger default buffer in groundfish. However, because length-based crab assessment models have considerably more structural uncertainty, the CPT and SSC have routinely specified additional buffers for crab stocks that reflect this large uncertainty in the true OFL. The SSC appreciates the clarifying discussion of this topic in the CPT report, and reiterates that the goal of the risk table process is to provide greater transparency, and consistency across assessment cycles, in the application of precautionary buffers.

After considerable discussion, the CPT recommended a tiered approach to delineate risk that includes both persistent sources of uncertainty that change infrequently and those that are specific to the assessment year. It would be primarily this second category where risk table scores would inform any additional and temporary increase from a base or historical ABC buffer that is reflective of the long-term uncertainty in the assessment. The SSC notes the FMP constraints to formalizing a definition of a historical buffer or baseline buffer given the current P* approach. The CPT report suggests the historical buffer could initially be set at the average buffer from the previous five assessments, which the SSC supports as a reasonable starting point that is reflective of the current process for determining appropriate ABC buffers. The SSC supports the inclusion of a summary table in the SAFE introduction that details a stock-specific recent history of buffers. The risk table categories and the scoring system would remain consistent with groundfish.

The SSC supports the proposed guidelines for the implementation of risk tables for BSAI crab stocks. The tiered approach provides for differentiation of types of risk, increases transparency in communication of reductions

below maximum ABC and has the potential to improve consistency across crab stocks in the buffer setting process. **The SSC further notes that refinements may be needed after initial implementation and considers the application of risk tables to be an iterative process that may take multiple cycles to be most informative.** The SSC clarifies that long-term considerations for the historical buffer only apply to the assessment and population dynamics categories within the risk table. The SSC highlights the importance of providing a solid rationale for this first tier of risk to justify why a base buffer has been applied and to ensure consistency in its application among stocks. Further, the SSC suggests the Tier 1 of the risk table (i.e. the long-term sources of uncertainty) should be reviewed regularly and modified as necessary, while the annual-level second risk tier should be used in the rare circumstances where an additional buffer may be needed to reflect uncertainty not captured in either the assessment or the Tier 1 buffer.

Acknowledging ongoing workload issues, the SSC recommends that all crab assessments produce a draft risk table on the typical assessment cycle for each stock. The SSC notes that assessments already contain justifications for existing buffers that would populate Tier 1 of the risk table. Authors should coordinate with both Ecosystem Status Report and ESP staff to populate the risk table. The SSC looks forward to reviewing the initial implementation of draft risk tables this fall.

Hybrid Crab

The CPT received a number of presentations on topics associated with hybrid crab data collection and management. These included state data collection and TAC setting considerations from ADF&G, hybrid identification on the EBS bottom trawl survey, results from sensitivity runs of the snow and Tanner crab assessment models that include hybrid crab data, and research on hybrid crab being conducted at the AFSC Kodiak lab.

The SSC highlights the following information from these presentations:

- The ADF&G observer program classifies hybrid crab into three categories using two external characteristics and hybrids are included in retained catch data, but the majority are landed as snow crab.
- Historically, data from the state fishery observer program shows that most hybrids are classified as non-specific but the hybrid-opilio type now dominates recent fishery observations.
- Retention of hybrids is allowed in either "parent" fishery, though incidental regulations have changed over time. Snow crab TACs were increased in 2025/26 to provide additional opportunities for harvest of hybrids, though minimal amounts have been harvested to date. Public testimony indicated there are varied levels of interest from crabbers to harvest hybrids.
- In contrast to ADF&G, the EBS bottom trawl survey uses seven morphological characteristics to identify hybrids, though they acknowledge these characteristics operate more on a gradient rather than a black-and-white key.
- Smaller hybrids are much more difficult to properly categorize. However, there were some indications of increases in smaller hybrids in survey years prior to the 2025 spike in male hybrid abundance, suggesting that the pulses appear to be biologically real.
- The snow and Tanner crab assessment authors explored including hybrids in each of their respective models and found minor impacts to assessment results when including hybrid catch and survey data.
- Assessment authors also noted informational gaps in how hybrids could impact population dynamics for each of these species and a lack of hybrid-specific growth or maturity information, which could have downstream effects on the accuracy of the assessments for either parent species.

- Finally, research at the NOAA-AFSC Kodiak lab suggests that the decline of snow crab overall abundance, rather than an increase in the overlap between snow and Tanner crab, resulted in the increase in hybrid abundance.

- Additional research also noted changes in center of gravity for hybrids associated with heatwave events but are otherwise generally stable outside of those events.

Given all the information provided, the CPT had several recommendations. First, that hybrid catch data should not be included in either the snow or Tanner crab assessment models at this time, though they acknowledged that this may need to be re-evaluated and more work may be requested of assessment authors in the future. The CPT noted this is inconsistent with the current structure of catch data streams but didn't have any formal recommendations for ADF&G on this topic. It was noted in the staff presentation to the SSC that ADF&G could potentially address this. The CPT also recommends tracking hybrid abundance in the NOAA survey technical memo and didn't see a need to modify the Tanner crab ESP to include this information, as suggested by the SSC in October 2025. Finally, the CPT recommended that increases in hybrid abundance leading to hybrids in the combined data streams should be handled using the existing flexibility in the FMP, which allows for these types of uncertainties to be incorporated into the ABC buffer setting process. The SSC appreciates all of the information provided to clarify how hybrids currently fit into the relevant data collection and management processes and thanks the presenters and the CPT for their work and discussion on this topic. The information provided is very responsive to SSC comments and questions regarding the 2025 spike in hybrid abundance from the EBS bottom trawl survey.

The SSC supports the CPT recommendations on hybrids with several additions, noting that capacity at the various agencies and at the CPT may limit progress on these. First, the SSC recognizes that including hybrid crab in removals for parent populations, primarily snow crab, creates internal inconsistencies in the assessment models and agrees with the CPT that it is premature to include hybrid catch data in the snow and Tanner crab assessment models. The SSC highlights the need for genetic identification methods, in agreement with the CPT, noting the trawl survey team's pilot study to improve morphological classification of hybrids using genetically confirmed identifications. Development of improved techniques and information to identify hybrids would be beneficial for improved fishery and survey monitoring. Formally tracking hybrid abundance and distribution trends in the NOAA survey technical memo aligns with an existing mechanism to bring information forward to the SSC, as those results are reviewed as a part of the typical harvest specification process in October. As the CPT suggests, in the short term, the SSC supports the idea that uncertainties associated with hybrids can be accounted for in existing buffer setting processes for Tanner and snow crab, though the SSC cautions against a predetermined direction in modifying any buffer, recognizing this uncertainty could go either way.

To begin to address long-term fishery and management complications associated with periodic high hybrid crab abundance, the SSC has two generalized recommendations. First, similar to the CPT recommendation, continued research into population dynamics and genetic information among hybrids and their parent populations is needed. Life history information and habitat characterization or preferences specific to hybrids would also be valuable. The SSC notes this could be included in Research Priorities. Together, these will inform a long-term approach that may necessitate pursuing potential regulatory actions or changes to assessments.

Second, alignment of how hybrid crab are defined is needed among the multiple data sources and management processes. Currently, catch, observer and survey data all categorize hybrids differently, making it challenging to link the data sources for analyses. **The SSC encourages continued communication on this subject between the partner agencies that jointly manage BSAI crab such that the respective data streams can be made more consistent and their potential future utility improved.**

Regarding its October 2025 recommendation to develop a predetermined response to large increases in hybrid survey abundance, the SSC notes the progress made with the assessment model explorations, the clarifications on the data collection protocols and management practices, and a mechanism to continue to monitor hybrid survey

distribution and abundance. **However, the SSC notes that if hybrid abundance continues to be elevated, this existing approach may need to be reconsidered.**

C3 Scallop Harvest Specifications

The SSC received a presentation on the 2026 SAFE report from SPT co-chairs Anita Kroska (NPFMC) and Tyler Jackson (ADF&G). There was no public testimony.

The last full assessment for the scallop stock was in 2024, and the 2026 SAFE report included updates to the fishery and survey data as well as a brief socioeconomic update. The assessment methods for this stock did not change in 2026. The authors have been working on a size-structured model-based assessment that was not reviewed by the SSC at this meeting because it has not been through a technical review by the SPT. The SSC appreciates the authors' efforts to address the SSC's recommendations from previous reviews.

The ADF&G conducts dredge surveys that annually rotate among core scallop areas. These surveys are used to inform State guideline harvest limits and the size-structured assessment model that the authors have been developing. Survey data are not used to set harvest specifications. There were no surveys in 2024. The 2025 dredge surveys included scallop beds in Cook Inlet (Kamishak Bay) and Kodiak (Shelikof and Northeast District) areas. Results indicated that overall biomass of exploitable scallops (≥ 100 mm SH) increased in Kamishak Bay but declined in Kodiak Northeastern District and Shelikof. However, biomass of recruit-sized (< 100 mm SH) scallops increased in the Kodiak Northeastern District and Shelikof but decreased in Kamishak Bay.

In 2024/25 total catch (retained catch and discard mortality) was 285,696 lb (130 t) shucked meats, about 22% of the 1.284 million lb (582 t) OFL. In 2025/26 total catch was 327,377 lb (148 t) shucked meats, about 25% of the OFL. **Therefore, overfishing did not occur in 2024/25 or 2025/26**. **The overfished status of the scallop stock is unknown**.

Amendment 18 to the Scallop FMP allows for setting harvest specifications up to three years and the SPT recommended switching to a triennial cycle citing recent progress on a model-based assessment. **The SSC concurs with the SPT's recommendation to switch to a triennial cycle for the scallop stock for the next assessment.** The harvest specification method is unchanged, and an additional year would provide more time for new survey data, model development and technical review, and development of harvest control rules (HCRs). **The SSC suggests that if a new model becomes a potential basis for specifications in the future, the assessment frequency should be reconsidered at that time.** A more frequent (biennially or annually) review may be needed initially until the model, HCR, and diagnostics are stable.

The SSC agrees with the SPT to recommend a 1.284 million lb (582 t) OFL for 2026/27, 2027/28 and 2028/29, the default OFL specified in the Scallop FMP based on average total catch from 1990-1997 (excluding 1995). **The SSC recommends the maxABC of 1.156 million lb (524 t) for 2026/27, 2027/28, and 2028/29,** based on 90% of the OFL, as described in the Scallop FMP.

The SPT and the CPT discussed the possibility of integrating scallop topics into the CPT review process given the declining SPT membership, limited technical review expertise, similarities in shellfish assessment approaches, and co-management structures. The SSC agreed with both plan teams that this proposal is a logical and practical solution. **The SSC supports a joint or nested CPT/SPT technical review process that would be responsive to the limited SPT capacity and provide additional quantitative review expertise to support a new model-based assessment.** However, while crustaceans and mollusks have some important life history overlaps, they also differ substantially. **Ensuring that people with scallop expertise are included in the review process will be an important consideration if a more formal integration of the two Plan Teams is considered. In addition, the SSC suggested that the SPT might consider exploring the potential to draw assistance from the experience and expertise of the New England Fisheries Management Council's SPT.**

Although the SSC did not review or endorse a model-based assessment for specifications at this meeting, the assessment authors requested guidance from the SSC on the information necessary to implement a model-based

assessment that only covers a portion of the stock. **While the status quo method for setting OFL and ABC for the scallop stock using historical fishery data is the appropriate method, the SSC supports continued development of the model-based approach as resources allow**. If a model-based approach is considered for setting specifications, the SSC provides the following guidance:

- A model-based assessment that only covers part of the stock needs an explicit framework for combining methods across areas. For example, the surveyed and regularly fished "core" harvest areas could have model-based biomass/reference points and an HCR, while un-surveyed or irregularly fished areas could remain under a catch-based/data-limited approach. The federal OFL, which applies across Alaska, could then be built up from component OFLs, rather than assuming that production estimated in the modeled areas applies to the unmodeled areas.

- Spatial accounting will be important. Survey footprints, catch, discard mortality, GHLs, and reference points need to line up by area.

- It will be important to consider the population structure and ecosystem information on larval drift as well as linkages between scallop beds. Most species of scallops exhibit strong meta-population dynamics with oceanographically linked "source" areas that produce and receive recruits and "sink" areas that only receive sporadic recruitment but produce viable CPUE for a while – if the fleet finds them.

- Be cautious about allowing surplus from modeled core beds to justify catch in unmodeled beds, since that could mask source area depletion producing an outsized stock level effect.

For the modeled areas, future review should focus on the following key areas: candidate HCRs, natural mortality assumptions, survey catchability, survey selectivity, CPUE standardization/hyperstability, growth, shell-height-to-meat-weight conversion, retrospective patterns, and how survey timing/gonad condition affects meat-weight biomass.

Additional suggestions and recommendations for future work include:

- Examining the historical footprint of the scallop fishery in comparison with scaling up the smaller areas informed by the surveys.

- Providing a description of where and how a model-based approach could benefit the entire process. Specifically, exploration of the available survey data and identifying the information that would be needed to represent the entire stock.

- Initially running the model in parallel with the current approach before adopting it to be used for setting harvest specifications.

C5 GOA Tanner Crab Protection Measures

The SSC received a presentation from Anita Kroska (NPFMC) and Taylor Holman (NPFMC) on the draft Regulatory Impact Review (RIR)/Environmental Assessment (EA) for GOA Tanner Crab Protection Measures. Oral public testimony was provided by Theresa Peterson (self), Julie Kavanaugh (self), Alexus Kwachka (self), Rebecca Skinner (Alaska Whitefish Trawlers Association), Patrick O'Donnell (self), and Sarah Webster (Alaska Seafood Cooperative and Groundfish Forum).

The SSC appreciates the analysts' presentation of the considerable information relating to the crab and groundfish fisheries on the east side of Kodiak and organizing it in a clear and approachable way. The analysis describes the distribution of crab and groundfish fishing effort and captures the broader social and economic importance of the resource to Kodiak communities across harvesting and processing sectors as well as subsistence. While offering a

good start, **the SSC finds this initial review analysis is not sufficient to inform Council for final action at this time.**

This portion of the Tanner crab stock may be persistently linked to static bathymetric features, which may make fixed closures an appropriate conservation tool, even in a highly dynamic environment. However, the SSC recommends clarification of the objectives of the Alternative 2 closures, especially with respect to Tanner crab. The stated goal of the analysis is to evaluate measures to reduce interactions between federal groundfish fisheries and Tanner crab, particularly during vulnerable life stages on the east side of the Kodiak Archipelago. The analysts identified reducing Tanner crab PSC as one potential measurable objective. However, it is unclear if an area closure is the preferred measure in order to achieve other potential objectives, such as preserving structure and function of habitat or reducing observed or unobserved mortality, especially at vulnerable life stages. Specifically, the SSC discussed whether the anticipated outcome from the action is to improve habitat or to reduce crab mortality such that it may lead to an increase in future crab harvest opportunities. Further, the SSC discussed whether the action was anticipated to improve GOA Tanner stocks overall or specifically in the localized action area.

The SSC recommends that the RIR further disaggregate the engagement and dependence by the vessels and processors from, or landing at, Kodiak to better understand distributional benefits of area fisheries and possible costs of the closure. The current analysis aggregates catch of all non-pelagic trawl (NPT) vessels, including some catcher-processors, indicating that average dependence on catch in the proposed closures is relatively small. However, this misses key information such as the critical role of the shoulder season for shallow-water flatfish harvesting in the proposed closure area for Kodiak-based catcher vessels and for Kodiak processing plants who must maintain year-round employment to retain labor.

The SSC appreciated the work to identify the human and ecological components most likely to experience impacts and recommends that all components of the analysis related to these components identify when in time costs and benefits are likely to accrue as well as clearly and consistently discuss uncertainty in the direction and/or magnitude of costs or benefits.

Incorporating input from Tribal consortia can provide information on household-level dependence, sharing networks, and food security benefits associated with Tanner crab. Given the natural volatility in Tanner crab recruitment and major disruptions to GOA fishing, including the collapse of the GOA Pacific cod stock and COVID, the analysts should consider including data back to crab rationalization to better characterize baseline engagement and dependence.

The analysis assumes that NPT effort will shift to other areas of historical activity in closure months, especially the April and May shoulder season, to achieve observed catch or revenue. However, whether groundfish CPUE is different in these areas, such that replacing catch or revenue would require more tow time, and the associated PSC rates, is not considered. One way to do this would be with an econometric location choice model, methods for which have been developed at AFSC. If that is not practicable, **the SSC recommends developing quantitative effort displacement scenarios in order to bracket likely net effects on Tanner crab PSC and other performance metrics**. Scenarios can be developed based on observed past fishing effort and, given the broad range of diverse users in this case, local and Traditional Knowledge could inform development of plausible scenarios of effort displacement. This information may also provide useful context regarding observed changes in Tanner crab abundance, habitat use, environmental conditions, and harvest opportunities over time.

Using these displacement scenarios, the SSC recommends the analysts consider a retrospective analysis to quantify how Tanner crab PSC might have changed had the closure been in effect during recent years (similar to recent Council analyses of the impacts of BBRKC closures). The SSC suggests at least two effort displacement scenarios be developed for analysis, including a "worst case" scenario in which effort is displaced to immediately adjacent areas with similar (area 525630) or higher (area 535632) reported PSC rates, which could lead to increases in Tanner crab PSC, and a "most plausible" scenario based on the historical distribution of fishing

effort, possibly weighted by proximity to Kodiak or other factors. To evaluate seasonal closures, effort could be assumed to be displaced to other seasons and/or other areas. The analysis could be conducted at an aggregate level by gear type, or by fleet to the extent practicable.

For each scenario, the historical PSC rates in different State statistical areas could be applied to the displaced effort (or catch) to estimate expected Tanner crab PSC with the closure to compare to the Tanner crab PSC that has occurred under the status quo. Such analyses should include some discussion of the sensitivity of estimated outcomes to various assumptions, including assumptions about fleet behavior. While the resulting estimates would be highly uncertain, they may provide the Council with a clearer indication of the range of expected outcomes. It should also be noted that these scenarios would represent lower bounds on the magnitude of the effects on Tanner crab as they would not account for any unobserved fishing mortality. Potential impacts on other PSC species (Chinook salmon, halibut) and on the groundfish fisheries could be analyzed under the same displacement scenarios.

The EA focuses on the prospective benefits to the Tanner crab stock within the proposed closures. **The SSC recommends several ways to more clearly frame the potential benefits of Alternative 2 to the Tanner crab stock:**

- Be consistent with the spatial scale of costs and benefits, aligning environmental effects with the economic and social effects, preferably at the scale of the entire stock, fleets and communities used in the RIR. Specifically, should the analysts develop scenarios as discussed above, the SSC suggests that environmental impacts be estimated to align with the social and economic impacts.

- Since Barnabas Gully does not represent a separate Tanner crab stock, the SSC recommends contextualizing Tanner crab abundance and annual or seasonal Tanner crab PSC within the proposed closures relative to the overall Tanner crab abundance or biomass and relative to total commercial removals of Tanner crab.

- An important driver of variability in PSC is likely to be the natural variability in crab recruitment and abundance. The SSC recommends exploring the relationship between PSC and Tanner crab abundance-at-size, including the distribution of haul-level PSC rates or encounters during the relevant fishing activity, to better characterize the interaction between NPT gear and crabs.

- The SSC recommends summarizing the size composition of Tanner crab PSC for additional context to assess which size classes are most frequently encountered, whether juveniles or mature crab are disproportionately represented, and how sizes may differ among gear types. These results would improve understanding of the biological mechanism through which the closure might benefit the Tanner crab stock.

In addition to characterizing PSC and PSC rates, the EA provides information on the association of Tanner crab with bathymetric structure, and presents it alongside fishing activity, especially by NPT, to suggest the possible extent of unobserved mortality. As no direct evidence of unobserved mortality is available, it is important to be clear about the limitations of these maps. **The SSC recommends incorporating the following points about the effort distribution data**:

- The SSC recommends a discussion of the reliability of the observer data in representing the distribution of overall fishing effort, due to different coverage rates for NPT fleets.

- The area swept analysis shows cumulative bottom contact area trawled by fishing vessels, but it is unclear if this is primarily intended to reflect potential encounters with crab or potential habitat impacts or both.

- The cumulative bottom contact area exceeds the total size of the closed area because some areas are trawled repeatedly. The SSC recommends emphasizing the proportion of the total area trawled at least once in a given year as a better way to characterize habitat impacts. Alternatively, the Fishing Effects Model could be used to estimate the magnitude of habitat disturbance.

- Discuss the effectiveness of recent gear modifications, the addition of sweeps to footropes in the shallow water flatfish fishery, in reducing habitat impacts or observed or unobserved crab mortality.

Ideally, any type of spatial closure would include a plan for evaluating the efficacy of the closure relative to its intended objectives. **Under Alternative 2, the SSC recommends developing a specific set of performance metrics, a monitoring framework, and identifying the data streams necessary to evaluate the effectiveness of the spatial closure.** Developing this was beyond what the SSC could delineate independently at this meeting. The SSC highlights that some process that allows for iterative conversation between SSC members, Council members, and analysts may be necessary to accomplish this goal.

The analysis incorporates an Alternative 3, the evaluation of existing closed areas to protect red king crab or Tanner crab. The SSC shares the intuition that existing closures should contain information about the efficacy of protecting crab with fixed trawling time-area closures, especially if Tanner crab in particular are strongly associated with areas and do not migrate widely. The SSC appreciates the focus on evaluating the efficacy of area closures included in Alternatives 2 and 3. While it was not possible for the SSC to recommend specific performance metrics for Alternative 3 without knowing the objectives the Council wishes to evaluate, the SSC recognized that further back-and-forth conversation about what objectives and performance metrics may be possible and of interest may be beneficial. Possible performance metrics could make use of overall Tanner crab stock indicators, PSC levels, PSC levels standardized by fishing effort, survey abundance trends, measures of distribution of juveniles or vulnerable life stages, directed fishery performance indicators (Tanner crab CPUE); groundfish fishery indicators such as redistribution of effort and catches, TAC utilization, changes in halibut or Chinook PSC; and habitat indicators like total area disturbed or the spatial distribution of bottom contact. The SSC recognizes that there are limitations to assessing potential benefits based on observational rather than experimental data. Experimental data are preferrable, but more difficult to collect and take time to generate. The SSC highlights that continued monitoring and/or more extensive sampling of closure areas may be needed to ensure the data streams are available to support evaluation of closure areas and potential changes to the existing closures.

Finally, the SSC commends the work analysts put in to make the document organized and approachable and discussed ways to continue to improve the clarity of the document for the future. First, the SSC appreciates the inclusion of an executive summary and noted the importance of clarity and accessibility of the executive summary as many readers may not read the entire document. The SSC has some suggestions for how to make this document, as well as future documents analyzing spatial management policies, easier to navigate and evaluate. Specifically:

- The SSC recommends that all potentially impacted human and ecological components of the analysis (units) be clearly identified, as well as how the proposed action could result in changes due to linkages across components (e.g. bycatch impacting stock, catch and landing sites impacting processors). The SSC notes a strength of this analysis was identifying and discussing units unlikely to be integral to the analysis and justifying the choice to leave them out for the empirical analysis.

- The SSC expresses support for clearer articulation in the executive summary and some synthesis in the main text regarding how each focal unit is likely to be impacted, with the summary including the direction, magnitude, uncertainties in the direction and magnitude, and timeline/intertemporal occurrence of outcomes.

- The SSC encourages work to identify the net effect (including local and stock-wide/spillover) for each potentially impacted unit and the sum across units.

- Finally, the SSC expresses support for a clear and concise summary of the methods used to analyze the impacts for each component of the system in the executive summary and main paper.

D2 GOA Trawl Survey

The SSC received a presentation from Pete Hulson (NOAA-AFSC) on analyses exploring potential impacts of the GOA bottom trawl survey (GOA BTS) redesign, which was first implemented in 2025 following an extensive peer-reviewed analysis. The redesign was implemented in recognition that the old 59-strata design was inflexible in the face of unavoidable reductions in survey effort, and to address a misalignment with NMFS statistical areas, leverage a more appropriate spatial projection, and potentially improve the accuracy and precision of indices for several species.

The current analysis was precipitated by results from the 2025 GOA BTS, the first year under the new design, which appeared to show guild-level differences in biomass indices with increases in flatfish and gadids, and decreases in rockfishes. **The SSC highlights that in conjunction with the survey strata redesign and associated effort allocation process, there was a 17% reduction in the number of stations sampled between 2023 and 2025.**

In response to October 2025 SSC comments, the authors address the following specific questions:

1. Did the 2025 survey sample different depths or habitat types, compared with previous surveys?
2. What is the correlation year-over-year percent changes in survey indices among species within species guilds, and were 2025 observations inconsistent with these patterns?
3. Would the past annual survey biomass estimates be different if samples are post-stratified under the new design?
4. What is the impact of effort reduction on the potential bias and precision of biomass indices, under the old and new stratification designs, across species groups?
5. Were the observed changes in biomass indices for the species groups distinctly different from what was observed in the past?

Sampling Consistency

Comparison of 2025 with past surveys indicates the overall range of depths covered in the 2025 design did not differ from previous years, despite a 17% reduction in stations sampled overall and some reduction in effort allocation to the 501-700m and 1-100m strata. In terms of the habitats sampled, while there was a slight reduction in the proportion of samples from within rocky habitats in 2023 and 2025, the distribution of samples among habitat types overall was largely consistent with past surveys. This observation was substantiated by the number of damaged or torn survey nets in 2025 compared to previous years.

Correlations among Biomass Estimates

The survey estimates show positive correlations within flatfish, gadid, and rockfish groups, and negative correlations between flatfish and rockfish groups, in terms of percent change in biomass estimates between the 1996-2023 and 1996-2025 periods. The SSC highlights that adding a single data point is unlikely to alter these correlations, so comparing the two correlation matrices likely does not provide a robust test of the null hypothesis of no change in correlation structure. However, the overall correlation structure suggests similar directionality and magnitude of changes within species guilds historically.

Impact of New Survey Design

Based on the post-stratification analysis, a comparison of past biomass estimates with those expected under the new survey design indicated that annual biomass estimates for Tier 3 and Tier 4/5 species are not expected to differ significantly under the new design. The SSC questioned how the post-stratification was conducted for deep species, given the lack of historical sampling >700 m over many years. However, there are few deep groundfish and rockfish species in the GOA, and the SSC concluded that regardless of how the post-stratification was conducted, the methodology would not have been responsible for the guild-level changes that originally prompted this analysis.

The SSC appreciates the link provided to Dr. Hulson's Shiny application (https://pete-hulson.shinyapps.io/survey_comp_app/), which further demonstrates that the trend in time series of abundance or biomass indices do not differ appreciably, though some minor and consistent differences in index scale may be expected for some species.

Bias in Biomass Estimates

Simulations quantified the impact of reducing effort (from 500 to 200 stations) on biomass estimate bias and precision under the survey design in place each year. Across species groups, reduced survey effort increased variability in biomass estimates, with rockfish showing greater variability and a faster increase in variability than gadids and flatfish. Biomass estimates remained median unbiased for gadids and flatfish across a wider range of effort reduction levels, whereas rockfishes showed a moderate negative bias when fewer than 400 stations were sampled.

Year-over-Year Biomass Changes

When comparing the year-over-year changes in biomass estimates and differences in survey means, the divergent trajectories between flatfish and rockfish are not unprecedented. The changes in biomass estimates for these two species guilds are often of different magnitudes and, in some prior years, have been in different directions. While the 2025 survey is the most extreme case in the time series with respect to within-guild consistency and separation among guilds in the 2023 to 2025 percent change, there is no reason to believe this is an emergent property of the survey redesign itself.

Recommendations

The SSC thanks the authors for their thoughtful consideration and response and notes that this author team includes members of both the survey and assessment teams. Overall, based on empirical, post-stratification, and simulation analyses, there appears to be no theoretical or practical basis for assuming that the new design, or the number of stations sampled in 2025, has led to bias in survey estimates. Although any change in survey design should be treated with appropriate skepticism and continued exploration of the impact of the new survey design on deep-dwelling species will be important in individual operational assessments, **the SSC has confidence in the 2025 survey results and finds no reason to dismiss or avoid using the survey estimates.**

The SSC recommends that the survey team continue to report the number of stations sampled in different combinations of depth strata and rockiness grades (habitats), similar to Figure 6 in future GPT and SSC presentations, and survey reports. These summaries provide a useful diagnostic for evaluating whether changes in survey design or realized station effort alter the depth or habitat composition of sampled stations.

The SSC recommends that the survey team identify a broader range of static habitat metrics, the distribution of which can be compared across survey years. These might include slope (change in depth) and Bathymetric Position Index (BPI). The SSC notes that these static habit descriptors, and others, have been used for past GOA Essential Fish Habitat modeling efforts and should be available across the survey domain.

The SSC recommends that any future analyses quantifying the impact of survey effort reductions should consider both resampling under the design used in past years and using the post-stratification procedure to evaluate these effects under the new design. This would provide information on the relationship between survey effort and the bias and precision in the survey estimator. The SSC further highlights that this type of analysis, exploring the impact of survey effort reduction, should be expanded to consider impacts on age and length composition data.

SSC discussion focused on potential differences in impacts of the GOA survey redesign for deep-dwelling species whose core habitat has been inconsistently sampled in the past, and where random effects (e.g., REMA) models have been used to address gaps in survey coverage at depth. Two important changes have occurred over the history of this survey that relate to the depths sampled. First, for the historical survey, in years with two, rather than three,

survey charter vessels, the deepest 701-1,000m strata could not be sampled. Second, the redesigned survey strata as utilized in the 2025 survey combined the deep strata. In the current analysis, documentation of how the current poststratification methods treated past years with limited sampling in deep strata was unclear. Similarly, how postratified estimates compared with those used in assessments where index standardization methodology is used was also unclear. For instance, historical survey estimates in the Dover sole assessment include the use of a random effects model to fill in missing depth and area strata for biomass and apportionment. **The SSC requests that during the next operational assessment for deep species such as Dover sole, authors specifically examine and describe how the historical survey estimation methodology and estimates compare with those under the new survey design and highlight impacts to the assessment.** The SSC also requests specific clarification on the maximum depth of the survey and which of the former deep strata have been combined under the new design.

The SSC highlights that with any change in survey methodology, including both the GOA survey redesign discussed here and upcoming changes in the design and gear utilized in the EBS BTS, understanding potential impacts on survey data products will require consideration of not only indices of abundance, but also composition and other biological samples, and acknowledges that implications may be species-specific.

The SSC recommends that stock assessment authors, particularly for stocks for which disentangling detection probability from depletion (e.g., sparsely sampled rockfish species), continue to consider whether survey changes are likely to impact their species of interest, and comment within SAFE documents about any notable discontinuities in survey index or composition observations.

E2 Climate Workplan / Harvest Control Rules

The SSC received a presentation from Diana Stram (NPFMC) and Kirstin Holsman (NOAA-AFSC) that provided an update on the climate change workplan and discussed ongoing planning for Council-supported research to evaluate potential changes to the current harvest control rules (HCRs) for crab and groundfish. The SSC received public comment on this agenda item from Jacqueline Muehlbauer (self), Linda Behnken (Alaska Longline Fishermen's Association) and Jim Armstrong (Freezer Longline Coalition). The task for the Council at this meeting is to establish a set of objectives and goals for the proposed research. The HCRs research is responsive to the December 2024 Council motion on a climate workplan. The fourth element of the workplan was to review tier systems, consider climate-informed biomass targets and limits, and climate-robust or forecast-informed harvest control rules.

Climate Workplan Update

The update on the climate workplan introduces a tracking spreadsheet organized by each of the four elements of the workplan. Projects that support each of the four elements are listed and categorized by status, i.e., existing/operational, modification to existing, new/in development, and completed. The SSC found the tracking spreadsheet useful and looks forward to receiving updates on the projects. Consideration should be given to how the research products can be introduced into the Council process, whether by workshops, informational presentations, or adding to existing Council products, such as the ESRs and ESPs. Finally, the SSC notes that the GOA-CLIM project has produced evaluations of the ecosystem cap in GOA and is engaged in work to evaluate harvest control rules in partnership with ACLIM, and could be added to the tracking spreadsheet.

Discussion Paper on Development of Alternative Harvest Control Rules (HCRs)

The SSC appreciated the detailed description of the existing harvest control rules for groundfish and crab, the discussion of how uncertainty and risk are addressed in the existing framework, and the documentation of risk table use. The current management system has, on the whole, been robust and highly successful. The discussion paper did identify a number of stocks for which there are concerns with the current management approach. These included stocks with chronic low abundance, such as BBRKC and Greenland turbot, stocks that have recently experienced

mortality events, such as snow crab and GOA Pacific cod, and stocks with long-term dynamics that are difficult to accommodate under the current system, such as sablefish, pollock, and Pacific ocean perch.

The SSC sees benefits in having a broader suite of potential harvest control rules that could address the need to be responsive to long-term changes in stock productivity, increase resilience of the management system under potential climate change, and improve the response to shocks to the system. **However, given the overall success of the current system, the SSC recommends that any potential changes to harvest control rules be initially considered only on a stock-by-stock basis, rather than a wholesale change for all stocks.** However, when stocks share similar biological and assessment characteristics, for example, rockfish stocks, it may be feasible in the future to evaluate HCR alternatives for groups of stocks.

A careful well-designed process for HCR evaluation should be explicit about what problem a control rule is trying to solve, how it would be implemented, and what tradeoffs it creates among conservation risk, yield, stability, and accountability. The SSC also had an extensive discussion on the delineation of uncertainty versus risk and how to characterize risk tolerance as it relates to establishing the TAC and ABC. The SSC recommends that future analyses describe the relationships among uncertainty, risk, and risk tolerance, and how these concepts are incorporated into harvest-setting decisions.

Comments on Harvest Control Rules

The SSC notes that it has previously reviewed and commented on the harvest control rule workplan in the minutes for the June 2025 Harvest Control Rule Workshop, and the February 2026 agenda item on Progress on Developing Harvest Control Rules. Recommendations from those minutes are still germane to the proposed research and are forwarded for consideration. The SSC also requests that as this effort develops through future iterations, documents include a description of where the analysts have responded to previous SSC comments.

The workplan has previously identified a set of harvest control rules for evaluation, including HCR1, the status quo, and HCR5 and HCR10, which reduce fishing morality at high stock size to accumulate biomass to potentially reduce the severity and duration of subsequent episodes of low biomass. These HCRs would increase biomass on average, but do not really "maximize ecosystem biomass," as stated in the discussion paper. HCR7 allows the fixed points in the harvest control rule to vary as informed by an environmental variable. The shapes of all of these harvest control rules are governed by a choice of one or more parameters that remain to be determined. For example, for HCR5, the choice of the gamma parameter determines how rapidly the fishing mortality declines above the $B_{40\%}$ level.

Concerning HCR5 and HCR10, the SSC notes that they are similar in both shape and intent, so there does not seem to be benefit in analyzing both, rather than one or the other. **The SSC recommends that these HCRs be combined into a single HCR by using one parameter for the offset from $B_{40\%}$ (as in HCR10), and another parameter for the exponential slope of the decline in fishing mortality above the offset (as in HCR5).** This parameter setup would generalize HCR5 and HCR10 and would allow testing of HCRs that approximate constant catch above the $B_{40\%}$ level or some higher level (for example the catch at $B_{50\%}$).

Concerning HCR7, the SSC notes that this is a very general formulation that allows a high degree of flexibility in the shape of the HCR. HCR7 uses three parameters, one each to modify the 1) target fishing mortality rate, 2) the biomass target, and 3) the biomass limit. A methodology for choosing or estimating those parameters is not yet available for SSC review. Unlike HCR5 and HCR10, HCR7 would allow the fishing mortality rate to be both lower or higher than the current maximum permissible fishing mortality rate. There may be several options to consider to reduce the parameter space. First, it may be reasonable to fix the parameter that controls the lower biomass limit of $B_{20\%}$. However, the $B_{20\%}$ rule was implemented as part of the Steller sea lion protection measures, and consequently there is a relatively high bar for changing its value and it only applies to directed fishing for certain species. Furthermore, B_{MSY} and F_{MSY} tend to be inversely correlated, so that it may be possible to make the parameter for

modifying the target fishing mortality a function of the parameter for the biomass target (or the reverse), thus further reducing the parameter space.

The SSC notes that framing alternative control rules only around climate indicators, as with HCR7, may be too narrow a focus. While environmental conditions were the original impetus of this research, management concern may also be driven by assessment uncertainty, spatial distribution, fishery performance, or ABC and TAC instability. The focus on environmental conditions addresses only the ecosystem column of the risk table. **The HCR framework should be flexible enough to incorporate climate indicators, but also TAC trends, biomass trajectories, recruitment signals, risk-table concerns, and socioeconomic consequences, so that the rule responds to management risk rather than a single class of covariates such as HCR7 suggests**.

An appealing feature of HCR7 is that it would allow an increase in fishing mortality in good conditions, but the value of this approach may be limited if the scope of action is constrained by the maximum permissible ABC and OFL as defined in the FMP. There may be more applicability of HCR7 for BSAI crab stocks since maximum permissible ABC is very close to the OFL. Alternatively, direct incorporation in the stock assessment of an environmental covariate that affects OFL/ABC would avoid the FMP constraints and/or the necessity of FMP amendments.

The SSC noted option 3 for drafting alternatives, the use of trigger points to switch between existing and climate-based HCRs. The SSC suggests caution in using this approach, noting that identifying when to engage such rules is non-trivial and prone to error resulting in asymmetric consequences. The SSC recommends that potential HCRs that are robust to a range of environmental conditions and could be used for longer time periods would be preferable to switching more specific rules on and off chasing uncertain conditions.

Performance metrics

The SSC also was asked to comment on performance metrics, and on ways to manage the scope of the work given resource limitations. Recording multiple performance metrics costs nothing in the simulation runs, and may help to better understand the alternatives, so it may be reasonable to begin with an extensive list, including ecosystem, biological, catch, and socioeconomic performance metrics, with the understanding that the list will be culled for reporting results. If HCR evaluations use multi-model ensembles, performance metrics that are available for all models should be selected, recognizing that this will not always be possible, i.e., ecosystem models will be the only ones that can produce ecosystem performance metrics. **For the purposes of reporting results to the public, the Council, and its advisory bodies, the SSC recommends that performance metrics be restricted to relatively few metrics carefully selected to characterize critical elements and to highlight tradeoffs.** The sablefish MSE is a good example of this approach, in which only six performance metrics were used: economic value, percent of years above the biomass reference point, average age, average biomass, catch variability, and average catch. The SSC notes that explicit measures of diversity are available and may be more suitable to quantify age diversity than mean age, as in the sablefish example.

The SSC discussed challenges of including social indicators when evaluating HCRs. While the SSC agrees that these are important, they are inherently complex and do not lend themselves to consolidation into one or two simple performance metrics. A considerable development process would be needed to identify and develop suitable indicators, which require suitable models for projections to evaluate social outcomes. **The SSC encourages further exploration of the possibility of adding social indicators to HCR evaluations**, and consideration of methods to communicate these metrics in a way that supports decision-making.

The SSC also notes that general issues regarding performance metrics were discussed in the SSC minutes on the February 2026 agenda item on Progress on Developing Harvest Control Rules.

Scope of Analysis and Next Steps

The SSC recommends that work on HCRs proceed for both GOA and the EBS, since the modeling capacity in the GOA is now available from the GOA-CLIM project, and the researchers involved in the GOA-CLIM project are a different group than the ACLIM modelers.

The CPT noted there are some implementation details to be worked out when evaluating HCRs for EBS crab, since the federal OFL and ABC is an upper bound to the HCR used by the State for setting the ABC. Evaluation of changes to the State's HCR would require ADF&G participation. Without discounting the importance of evaluating HCRs for crab, it may be worthwhile to consider whether crab should have its own timeline for HCR evaluation to allow time for additional development and coordination between HCR development in the federal process and GHL-setting in the State process, and to focus the research initially on groundfish rather than crab. **The SSC agreed that another way to reduce scope of the HCR evaluations would be to focus on pollock, Pacific cod, and sablefish, and to postpone work on Pacific ocean perch.**

It may also be beneficial to initially focus on HCR1 and HCR 5/HCR 10 (when generalized as proposed above) as being relatively straightforward to implement and would only involve a reduction from the maximum permissible ABC. This research also would be parallel to the recently completed MSE for sablefish. There are additional details to be worked out in implementing HCR7, hence it may be difficult to make progress at the same rate.

If possible, the SSC would like the opportunity to review the experimental design before the modeling work begins. This would include 1) which models will be used for which species, 2) what forcing scenarios will be used, and 3) how the influence of the environment on stock biology and dynamics will be modeled. If possible, the timetable for HCR evaluation should allow for all initial and final analyses to go through both Plan Team and SSC review.

E3 Economic and Community Indicators

The SSC received a presentation from Anna Henry (NPFMC), Russel Dame (NOAA-AFSC) and Sarah Wise (NOAA-AFSC). Public testimony was provided by Mateo Paz-Soldan (City of St. Paul) and Heather McCarty (Central Bering Sea Fishermen's Association).

The SSC appreciates the Economic and Social Science Research (ESSR) team's continuing efforts to advance work on how to holistically improve integration of economic, social, and community information into the management process. The SSC recognizes the team's turnover and capacity constraints and supports flexibility in timing of development and advancement of products. This agenda item builds on previous SSC comments related to social and economic data products. The December 2023 SSC minutes reflect broad recommendations related to the SSC's thinking about improved integration of economic, social, and community information into the management process. The information presented provided a recent overview of groundfish economic trends and connections to social impacts on communities.

This agenda item's focus was on the Economic SAFE and ACEPO reports and the plan for these documents to better inform the Council process. Specifically, the products are oriented towards providing contextual information for the Council's TAC-setting process. **The SSC endorses the goal of presenting social and economic products from these reports relevant to TAC setting at the December 2026 meeting. Furthermore, the SSC also supports ongoing efforts to improve the socio-economic information used for the ESPs.**

The SSC noted that National Standards require social and economic data and information be available during the TAC-setting process, and the SSC's role is to review the process and outputs relative to the best scientific information available (BSIA) benchmark. The SSC appreciated the focus of the analysts' presentation on the structure of the information presented and its utility to TAC setting. **Regarding timing of future SSC reviews, the SSC recommends reviewing the content of the reports relative to the BSIA standard in December and reviewing structure, utility and development of products at a meeting with a less constrained schedule.** The SSC did not comment on whether the Plan Teams should be part of the BSIA review process, but notes that the

current Groundfish Plan Team does not contain economic or social expertise should this avenue be explored in the future.

The SSC appreciates the attention paid by analysts to policy and management needs as key drivers of this effort while recognizing the diverse audience for these data to inform TAC-setting processes. Given the substantial diversity, the SSC supports continued work to anticipate how current and potential stakeholders, including Council bodies and members of the public, who may not be specialized in social or economic sciences, could benefit from the information within these documents.

The SSC discussed how synthesizing the social and economic data and information in these and other documents can help identify the status and vulnerabilities of different entities across scales: community, FMPs, fishery, and fleet. More specifically, the SSC noted that, particularly when there is an ecosystem cap, different allocations of TACs across species can have implications for entity outcomes and changes in vulnerability. The eventual goal will be to evaluate social and economic dependencies in the context of coming-year catch limits, to identify where communities or fleets are vulnerable to changes in the combination of TACs on which they depend. The SSC found it useful to consider the social and economic status information analogous to the Ecosystem Status Report (ESR). Specifically, each year the ESR provides updated data on key ecosystem indicators, along with a synthesis of current-year implications for decision-making. The SSC views the Economic Brief as moving towards a synthesis similar to that provided by the ESR process. With this goal in mind, **the SSC supports prioritizing work that identifies substantial changes in fisheries and dependent communities and provides scientific information that can inform TAC setting or highlight longer-term programmatic changes.**

The SSC supports improving the timeliness of the Economic Brief as proposed by the authors. As described by the authors, finalizing of economic data prevents the use of current year information in some cases, such as from the Commercial Operator's Annual Reports. However, the SSC suggests the authors explore whether there are sources of current-year information (even preliminary) that could be used to augment trend information and track ongoing issues. For example, the SSC discussed potential synergies between the in-season management information presented by NMFS (e.g., in-season management reports) and the Economic Brief. Incorporating such information could help capture current-season management actions and fishing outcomes, providing context for following year TAC decisions and contrast to longer-term trends, such as changes in fishing patterns and TAC utilization. The SSC notes that a retrospective analysis of the margin of error of preliminary versus final data could be useful in assessing whether the preliminary data could serve as BSIA. The SSC notes that previously the Economic SAFE included "nowcasts" that attempted to forecast in year and forward projections of pricing data. The SSC requests, as time allows, that the authors utilize in-season information and other factors to model current and future conditions, caveated by the appropriate uncertainties. These could also be included in ESPs for stocks that have them for future TAC considerations.

ACEPO

The SSC notes that ACEPO provides important community-level context for informing management decisions and identifies some pathways that could expand the utility of ACEPO for use in the Council process. In particular, the SSC observes that ACEPO provides critical broad context of how communities depend on a portfolio of fisheries, in contrast to ESPs, which provide detail on a particular stock.

The SSC supports efforts for greater automation of ACEPO that could enable use of more current data and a more synthetic approach. The SSC discussed the need to make decisions in the near-term and the extent to which the ACEPO could, in addition to providing historical context, support a more current status update of community trends. The SSC notes that being able to develop statistics with preliminary data, for example preliminary community participation indices, could be used to identify communities to target for further exploration to provide a closer to real-time status.

The SSC also discussed the potential to close the gap between ACEPO's longer-run retrospective framing and the potential implications of TACs on communities and recent changes in processing activities. The SSC discussed the potential for Plan Team recommended stock assessment models to be used along with past community harvest data to consider how, for the current year, different communities (or fleets) may be impacted by projected TACs based on projected ABCs.

The SSC also supports analyst suggestions for expansions and refinements, and proposes several areas of further exploration, including:

- Efforts to refine profiles to account for disasters and past legacy;
- Refinement of the framing of the dependence trends in a way that ensures reflection of the potential importance of fisheries to communities that have experienced disasters;
- Development of measures of investment and ownership engagement in fisheries, including using data from CDQ group websites;
- Descriptions of geographical changes in processing activity;
- Efforts to better describe trends in landing locations versus processing locations, noting processors may serve many communities while landing locations offer different community benefits (e.g., tax revenue); and
- Development of species-level summary statistics relative to the community or region. The SSC notes work on the West coast that has used network analysis to demonstrate community participation in fisheries may be worth considering for this report (2024-2025 California Current Ecosystem Status Report, Appendix S).

Economic SAFE

The SSC finds the Economic Brief to be a valuable addition to the SAFE to synthesize social and economic information and provide coming-year information for use in TAC decisions. The SSC supports flexibility for the analyst to continue to apply their expertise in developing this product. The SSC notes that the ex-vessel share of the first wholesale indicator and days-at-sea indicator were examples of how flexibility in what to include and discuss provided a richer picture of the fishery. The SSC encourages the team to consider the title of the document (i.e., "Brief") and, where possible, to use similar terminology (e.g., "Report card") across documents.

The SSC supports work that is synergistic between the Economic SAFE products and ACEPO. The SSC notes that such a socioeconomic perspective could break down analyses in the Economic SAFE to different scales (e.g., community). **The SSC notes that such a collaboration could tighten the link between the TAC decisions and implications for communities.**

The SSC supports efforts to develop the catch share metrics. The SSC recommends the ACL terminology be changed or clarified so it does not get confused with ABC limits, which is the ACL under NS1 guidelines. The SSC also recommends broadly reviewing the information to be sure it correctly represents management considerations such as reallocations.

SSC Member Associations

At the beginning of each meeting, members of the SSC publicly acknowledge any direct associations with SSC agenda items. If an SSC member has a financial conflict of interest (defined in the 2003 Policy of the National Academies and discussed in Section 3) with an SSC agenda item, the member should recuse themselves from participating in SSC discussions on that subject, and such recusal should be documented in the SSC report. In cases where an SSC member is an author or coauthor of a report considered by the SSC, that individual should recuse

themselves from discussion about SSC recommendations on that agenda item. However, that SSC member may provide clarifications about the report to the SSC as necessary. If, on the other hand, a report is prepared by individuals under the immediate line of supervision by an SSC member, then that member should recuse themselves from leading the SSC recommendations for that agenda item, though they may otherwise participate fully in the SSC discussion after disclosing their associations with the authors. The SSC notes that there are no financial conflicts of interest between any SSC members and items on this meeting's agenda.

At this June 2026 meeting, a number of SSC members acknowledged associations with specific agenda items under SSC review. Robert Foy is the third or greater level supervisor for the following: Mike Litzow and AFSC members of the CPT (C2 BSAI Crab); Pete Hulson and AFSC authors of the Gulf of Alaska Resource Assessment Survey Redesign and Optimization: Evaluation of 2025 Survey Results white paper (D2 GOA Survey Report); Kirstin Holsman and AFSC contributors to Risk and the Uncertainty in the Groundfish and Crab Harvest Specifications Process and Development of Alternative Harvest Control Rules white paper (E2 Climate Work Plan Update and Harvest Control Rules); Rusty Dame, Sarah Wise and AFSC authors of the Economic SAFE report and Annual Community Engagement and Participation Overview (ACEPO) (E3 Economics/Community Reports). Curry Cunningham has a minor contribution to the sablefish case study in the harvest control rule discussion paper (E2 Climate Workplan Update and Harvest Control Rules). Martin Dorn is affiliated with the GOACLIM project (E2 Climate Work Plan Update and Harvest Control Rules) but not involved with the preparation of the current report. Brad Harris supervises the FAST Lab staff who contributed the Fishing Effects model output used in the C5 GOA Tanner Crab Protections. Franz Mueter supervises Sean Hardison, a contributor to the CPT meeting (C2 BSAI Crab). Jason Gasper provided a review of C5 GOA Tanner Crab Protections. Dana Hanselman is a second level supervisor for Dan Goethel (E2 Climate Work Plan Update and Harvest Control Rules), and first and third level supervisor, respectively, for Chris Lunsford and Pete Hulson (D2 GOA Survey Report). Finally, Sarah Wise was a primary co-author of E3 Economic/Community Reports.