NORTH PACIFIC FISHERY MANAGEMENT COUNCIL
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Crab Plan Team

REPORT

Sept. 8-12, 2025, VIRTUAL

Plan Team Members in attendance:

Katie Palof, **Co-Chair** (ADF&G-Juneau)
Mike Litzow, **Co-Chair** (AFSC-Kodiak)
Anita Kroska, **Coordinator** (NPFMC)
Andrew Olson (NMFS-Juneau)
Ben Daly (ADF&G-Kodiak)
Brian Garber-Yonts (AFSC-Portland)
Caitlin Stern (ADF&G-Juneau)
Cody Szuwalski (AFSC–Seattle)
Erin Fedewa (AFSC-Kodiak)
Ethan Nichols (ADF&G- Dutch Harbor)
Ginny Eckert (UAF/CFOS-Juneau)
Tyler Jackson (ADF&G-Kodiak)
William Stockhausen (AFSC-Seattle)
William Bechtol (UAF-Homer)
Vacant, quantitative expert

Plan Team Members not in attendance: André Punt (Univ. of Washington)

Council Updates

Anita Kroska (NPFMC) gave an update on Council and SSC issues and activities of importance to the CPT. She began with guidance regarding responses to SSC recommendations, citing a statement in the October 2024 SSC minutes reiterating the request that the CPT develop a process to ensure that responses to all SSC recommendations (including, at minimum, on the last assessment) are captured and tracked over time. General reminders included considering the SSC prioritization language (suggestions, recommendations, strong endorsements), whether specific recommendations have been recurring, and to include overarching comments (e.g., those addressed to the CPT or authors generally). Responses should capture how the SSC's recommendation was addressed in the current assessment, and if not addressed, provide an explanation and timeline for addressing it in the future. The CPT discussed the logistics of how to systematically track responses, including to SSC comments directed to the CPT or authors generally rather than to individual assessments. Anita acknowledged that the guidance applies in all cases, but noted that, while the CPT has attempted to maintain a comprehensive table of comments and responses (which was last updated in May 2025), this has proved unwieldy. Both CPT co-chairs commented, agreeing that the tracking table has proved impractical, and clarifying that **the strategy going forward is for assessment authors to follow the guidelines and track SSC comments and their responses at the beginning of assessment reports and in presentations, while both assessment reviewers and minute-takers should review previous SSC or CPT minutes on assigned topics and, if needed, raise issues regarding responses to SSC comments in their reviews and/or during presentations, and ensuring that anything not addressed in the associated document(s) be captured and addressed in the minutes.**

Anita then reviewed CPT guidance to minute-takers, beyond the attention to previous SSC and CPT recommendations outlined above. Minutes should be concise summaries, noting any recommendations or requests with details on what is requested, when it should be addressed, and the rationale for why the request is helpful to the CPT, and **highlighting consensus recommendations in bold text**. In response to the SSC request that minutes include links to documents associated with the agenda topic, **the CPT agreed that documents on the CPT eAgenda should be linked by reference to the eAgenda itself rather than to individual document links**, which are prone to breakage. Anita also referenced the Council's Plan Team Handbook as a resource for minutes guidelines.

Anita reviewed general SSC recommendations from the June 2025 report directed to the CPT, the first of which questions the value of defining "full" and "updated" assessments, which she noted was a topic for discussion during the CPT meeting. The second addressed historical retrospectives versus within-model retrospectives, requesting that crab assessments include a plot comparing current and past (10 previous assessments) model estimated time series of mature male biomass. The third concerned GMACS version updates, with the SSC requesting clarity on versions and changes to help track models used in SAFE reports followed by a recommendation for each SAFE chapter to clearly describe the buffers used in harvest specifications over the most recent five years (also a topic for CPT discussion during the risk table agenda item).The CPT discussed how to efficiently track and reference GMACS changes, and it was suggested that a short report on GMACS changes be presented at CPT meetings, which authors could reference in their SAFE documents to identify the specific version and relevant changes and other details, rather than repeating this information in multiple assessment documents. **It was agreed that a "GMACS updates" report will be included in the May, 2026 CPT agenda, covering updates between now and May, with an updated report produced for the September, 2026 CPT meeting**.

An additional item from the June SSC report regarding the snow crab assessment, which Anita noted applied to crab assessments generally, recommends that "any model change resulting in substantive differences in model estimates for harvest recommendations requires a clear description of the model structure, data, or likelihood definition changes that produced the difference". It was noted that authors already do this as part of the annual assessment process, despite the challenge of capturing step-by-step details when models are changed substantially, and the SSC recommendation should be regarded as a reminder to document changes as well as reasonably possible. Anita presented a slide on jittering guidelines that were finalized in the May CPT meeting and apply as of this meeting, followed by a brief review of assessment timing changes. CPT review of proposed model runs for AIGKC, previously in September, will now move to the November meeting (at which the Final SAFE for Norton Sound King Crab will still be presented), with the Final AIGKC SAFE scheduled for June. Anita concluded with a brief review of recent and upcoming Council actions and activity relevant to the CPT, including pending reconstitution of the Ecosystem Committee, action following the Council's June motion on pelagic trawl gear innovation, including a pollock fishery-BBRKC avoidance plan, and GOA Tanner crab protections Initial Review scheduled for Dec. 2025.

Summer Trawl Survey Results

Mike Litzow presented 2025 NOAA summer trawl survey results for eastern Bering Sea (EBS) crab stocks including survey effort, bottom temperatures, abundance estimates, and spatial distribution data for the following stocks: red king crab (Bristol Bay, Northern, and Pribilof Districts), blue king crab (Saint Matthew Island and Pribilof District), Tanner crab, snow crab, and *Chionoecetes* hybrids. The survey was conducted between May and July with all 349 standard survey stations sampled in the EBS; corner stations around the Pribilof Islands and Saint Matthew Island were not surveyed in 2025. The Northern Bering Sea (NBS) trawl survey was also conducted in 2025, but survey results were not presented as they were still being summarized and undergoing final QA/QC.

The cold pool was reduced in size and extent relative to 2024 and categorized as intermediate in 2025. Mean bottom temperature in 2025 was 0.7°C above the time series average from 1975–2024 (approximately 3.4°C in 2025).

Mature male and female Bristol Bay red king crab (BBRKC) were more broadly distributed than in the previous four years, with survey catches for mature females in particular being less concentrated in the southern portion of the survey grid along the Alaska Peninsula. Legal male distribution in 2025 continued the trend seen in recent years of broad distribution across the eastern portion of the Bristol Bay survey area. Relative to 2024 survey results, mature female abundance increased 28%, legal male abundance decreased 7%, and immature male and female abundance were relatively unchanged. Despite positive trends in distribution and abundance, overall BBRKC abundance remains near historic lows in 2025. The center of distribution for both mature females and legal males was at or near the time series average in 2025. The percentage of mature females in the survey catch that had not yet completed the molt-mate cycle was at 4%, which was well below the threshold for resampling Bristol Bay stations.

Northern District red king crab mature female abundance in 2025 decreased 64% relative to 2024 and mature male abundance increased 25%. Pribilof District red king crab survey catch showed continued low abundance with mature female abundance decreasing by 59% and mature male abundance decreasing by 2% relative to 2024.

Saint Matthew Island blue king crab survey catch in 2025 showed a continued stable low abundance of both mature and legal male abundance. Immature female abundance was relatively high, with the 2025 survey abundance estimate the highest since the 1990s. However, 74% of the immature females were caught in a single station, and therefore, the precision of the abundance estimate is low. Pribilof District blue king crab survey catch in 2025 showed continued very low abundance across all sex-size classes with only two legal males and three mature females caught; no immature females were caught.

Eastern Bering Sea Tanner crab survey abundance varies in the eastern and western regions, with a shift of the population northwest compared to the historical range. Tanner crab abundance in the eastern management area (east of 166° W longitude) decreased in 2025, with

mature females down 10% and industry preferred males (≥125 mm) down 28% from 2024. The abundances of small males and immature females in the eastern area were low in 2025. In contrast, the western management area (west of 166° W longitude) showed unprecedented levels of Tanner crab abundance. The recruitment pulse in the west seen a few years ago has propagated and is evident in both male and female size distributions. Mature female abundance was up 14% from 2024 and has reached the highest estimate in the survey timeseries. The abundance of industry-preferred males (≥125 mm) is up 112% from 2024. Tanner crab abundance west of 166° W longitude is expected to remain high for the immediate future given the high numbers of immature females and small males currently observed in the population. This shift in distribution is a change compared to the historic pattern of Tanner crab abundance being roughly equal between eastern and western management areas. The western management area now shows higher abundance of both industry-preferred males (≥125 mm) and mature females than the eastern management area. Shell condition for mature females west of 166° W longitude was dominated by new shell crab that are entering the reproductive phase of their lives. This pattern is quite different east of 166° W longitude, which is dominated by old and very old shell females, which are likely approaching senescence. Scott Goodman (BSFRF) posed the question of whether a metric could be introduced to the survey results publication showing the center of Tanner crab abundance relative to the 166° W longitude boundary dividing the eastern and western management areas. Mike welcomed discussing this idea further ahead of next year's summarization of survey results.

Eastern Bering Sea snow crab survey results in 2025 showed a continued pattern from 2024 of high abundance of immature females north of the Pribilof Islands along 170° W longitude and high abundance of mature females concentrated in the same general area between the Pribilof Islands and Saint Matthew Island. The center of distribution of mature females shifted south in 2025, a change from the notably northern centers of distribution seen in 2022 and 2023. The distribution of small males (<95 mm) in 2025 was similar to 2024 and was concentrated between the Pribilof Islands and Saint Matthew Island, resembling the distribution of immature females. Large males (≥95 mm) and industry-preferred males (≥101 mm) were more evenly distributed along the shelf in a pattern similar to what was seen in 2024. The 2025 distribution of industry preferred males showed a return to a more traditional pattern, with the center of distribution shifted south relative to the exceptional northern distribution observed in 2021–2023. Mature female abundance in 2025 increased 175% from 2024 and is currently near the timeseries average following precipitous declines in recent years. The abundance of industry-preferred males increased 30% from 2024 but remains near the timeseries low; the nine most recent survey estimates are the nine lowest estimates for the abundance of industry-preferred males. Immature female abundance continued to be very high in 2025 and small male (<95 mm) abundance is trending upwards. Overall, there are positive signs for the trajectory of the snow crab population based on the 2025 survey results. Of note is the continued trend of unusually high abundance of large immature females in the population. Clutch fullness of mature females remained high in 2025, with no indication of declining clutch fullness. This year, NOAA presented a new figure showing a decreasing trend in the proportion of snow and Tanner crab males that make the terminal molt to maturity at the industry-preferred size. In 2025, 4% of snow crab males matured at industry-preferred size, 28% of Tanner crab

males east of 166° W longitude matured at industry-preferred size, and 13% of Tanner crab males west of 166° W longitude matured at industry-preferred size. Because of the terminal molt, individuals maturing at small sizes will never grow large enough to be targeted by the fishery.

Hybrid *Chionoecetes* survey results were notable, with unprecedentedly high abundance for all size-sex categories. In 2025, 20% of all *Chionoecetes* males ≥101 mm captured in the survey were hybrids. Hybrid status was assessed visually on the survey based on several well-established traits. There is high confidence that the unprecedented hybrid abundance observed in 2025 represents a real biological event, rather than a data artefact. This conclusion is supported by the observation of increasing hybrid abundance in recent years, the propagation from smaller to larger size classes over recent years, and spatial coherence in the hybrid distribution in recent years. The hotspot of abundance for all hybrid sex-size classes was N/NE of the Pribilof Islands in 2025. Interestingly, mature female hybrids showed a bimodal distribution of clutch fullness, with most smaller females having clutches 3/4 full to full, while larger females were more likely to have clutches ½ full or less. Clutch fullness of 3/4 and full are atypical for hybrid females in the survey time series. Discussion among CPT members and the public focused on developing a metric to quantify the overlap in spatial distribution and abundance between snow and Tanner crab stocks as a way to better understand increases in hybrids, mating dynamics, and potential causes of increased hybridization. ADF&G members on CPT clarified that state regulation defines Tanner crab as having two red eyes and an m-shaped mouth, while any other *Chionoecetes* crabs are defined as snow crab, which means that hybrids fall into the legal definition of snow crab when caught in the fishery. This disconnect between how hybrids are defined in the survey and in the fishery warrants further discussion, which was addressed later in the meeting during new business.

Fishery Summary 2024/25 - Directed and Bycatch

Ben Daly (ADF&G-Kodiak) and Andrew Olson (NMFS-Juneau) summarized catch and bycatch (presentation) in the 2024–2025 EBS crab fisheries starting with a review of mandatory State regulatory observer coverage in the directed BSAI crab fisheries. Observer coverage varied by crab fishery with all catcher-processor vessels having 100% coverage and catcher vessels ranging from 20–100%, but being discretionary for NSRKC. Observed trips were randomly selected for partially-observed fisheries, and coverage for the 9-month AIGKC fishery is based on 50% coverage of catch during each trimester. Observer coverage requirements have generally been met since 2005. Across directed crab fisheries, 1 to 5% of all potlifts had observer coverage. Observer coverage for the groundfish fisheries ranged from no to full coverage depending on the fishery and vessel type. The observed rates for partial coverage were revised in 2024 so sampling strata are by FMP with the intent of increasing the proportion of trips sampled. Incidental crab mortality in groundfish fisheries was derived from AKFIN and observer/electronic monitoring (EM), with an applied discard mortality of 50% for fixed gear (pot, hook-and-line, and jig) and 80% for trawl gear (pelagic and non-pelagic).

The WAIRKC directed fishery has been closed since 2004/05 due to depressed stock status. Bycatch mortality of WAIRKC has been relatively low in recent years, generally <1,000 lb in the

AIGKC fishery but with no bycatch observed in 2024/25. The groundfish fisheries have also had limited WAIRKC bycatch, mainly in trawl fisheries that historically targeted Atka mackerel but shifted to rockfish, primarily Pacific ocean perch, in recent years. Reduced recent trawl bycatch may be related to the groundfish fishery prosecuting the fishery earlier in the year.

Recent low level BBRKC harvests follow closures in 2021 and 2022. Legal male CPUE in both observed pots and retained catch has trended upward since 2019 (note that CPUEs in 2021 and 2022 are from cost recovery fisheries). While industry comments before and during the meeting noted good fishing conditions, it was also recognized that harvesters are good at what they do and localized high CPUE might not be indicative of the entire population. A plot of weighted catch centers showed the 2024/25 fishery to be on the southern side of centers going back to the mid-1980s, although all centers were clustered fairly tightly. Cumulative weekly catch composition showed most of the 2024/25 harvest occurred in the first few weeks of the fishery. Discard mortality in the directed BBRKC fishery has generally declined since 2014, but also scales somewhat with the directed fishery magnitude. Discard mortality rates generally ranged from 5 to 20%, excluding a higher rate observed in the 2021 cost recovery fishery. The CPT suggested more clearly identifying the years with cost-recovery fisheries only on the CPUE side. There continues to be little BBRKC bycatch in the Tanner crab fisheries (near 0 in 2024/25). Bycatch in the groundfish fisheries has generally declined since 2018. Most of the fixed gear bycatch is in the Pacific cod pot fishery and in the fall, whereas most of the trawl bycatch is in the yellowfin sole fishery occurring throughout the year except in the spring when rock sole are targeted. The highest bycatch rates by non-pelagic trawl in 2024/25 occurred northwest of the Red King Crab Savings Area.

Snow crab retained catch has declined over time beginning in 2011/12 and the fishery was closed in 2022/23 and 2023/24; the 2024/25 TAC was near the lowest on record. However, directed fishery CPUE in 2024/25, based on both observer and fish ticket data, was the highest seen since the early 2010s. The largest component of the directed catch occurred farther north than in recent years, with the highest CPUE near the US-Russia maritime boundary and weighted catch centers moving northward since 2014/15. Cumulative weekly catch in the directed fishery progressed steadily after December. The fraction of fishery-related mortality due to discards in the directed fishery has generally increased since 2011/12, but 2024/25 (~20%) represented a slight decrease from 2021/22. Most of the harvest occurs just east and west of the 166^{o} W longitude management boundary. Snow crab bycatch mortality in the Tanner fishery scales to the Tanner west fishery and was around 100,000 pounds in 2024/25. Pot and hook-and-line gear in the Pacific cod fishery account for most of the fixed gear groundfish bycatch with most of the bycatch occurring north of Unimak but hook-and-line throughout the stock area. Trawl bycatch is primarily from the yellowfin sole fishery north of the Pribilof Islands and mainly during the winter.

Tanner crab is managed by the State using separate TACs east and west of 166^{o} W longitude, with the total 2024/25 retained catch up from recent years and the retained catch in the western area approximately four times that of the east. Weighted catch centers have been shifting toward the 166^{o} W longitude boundary (note that weighted catch centers show averages in the Pribilof Islands Habitat Conservation Zone even though fishing did not occur there). Retained

CPUE has been around 30-70 post-rationalization with the west higher than the east in 2024/25. Cumulative weekly catch in 2024/25 showed most of the eastern harvest occurred in early November while the western catch was largely delayed until the beginning of the calendar year. The fraction of discard mortality in the directed fishery has usually been 5-20% and has trended downward in recent years. Groundfish bycatch of Tanner crab in western area is largely from trawl targeting yellowfin, rock, and flathead sole with less bycatch from pot and hook-and-line targeting Pacific cod.

In 2024/25, only two vessels participated in each of the EAG and WAG AIGKC fisheries (four vessels combined). Not all participants signed confidentiality waivers, therefore EAG- or WAG-specific data are confidential. Retained catch between both east and west management areas has generally declined since 2019/20, but the combined CPUE has increased since 2021/22. Groundfish bycatch of AIGKC in the eastern area has declined since 2020 and largely occurs in the Pacific cod pot fishery; note that there is no observer program for the State Pacific cod fishery so bycatch rates are extrapolated from rates in the stock area. Groundfish bycatch of AIGKC in the western area has been relatively stable and low over time, and again with fixed gear bycatch extrapolated from adjacent federal waters.

Only two vessels participated in the 2024 PIGKC fishery for a 59 t GHL; catch data are confidential but catch was much less than the GHL; 65% of the catch and 95% of observed pots are historically in the Pribilof Canyon area, with some catch from the Saint Matthew Island Section. Most groundfish bycatch has been from a variety of trawl fisheries, but particularly for rockfish, and with some limited bycatch from hook-and-line Pacific cod fishery. In 2025, NMFS implemented a final rule authorizing the use of longline pot gear for the Greenland turbot fishery by hook-and-line catcher/processors and expected to see an increase in bycatch of PIGKC in this fishery. However, there has been minimal participation in the Greenland turbot pot fishery to-date and no bycatch of PIGKC occurred.

St. Matthew Island blue king crab is overfished and under a rebuilding plan. The directed fishery is closed with little bycatch in other crab fisheries. There is little trawl bycatch due to trawl closure areas and bycatch in the fixed gear groundfish fisheries has been relatively low since 2022.

The Pribilof Islands blue king crab and red king crab fisheries are closed; the former is overfished and under a rebuilding plan, the latter is not overfished but the fishery is closed to avoid blue king crab bycatch. Groundfish bycatch mainly occurs in trawl fisheries, particularly in the yellowfin sole target fishery, and exhibited a large decrease in 2024. Groundfish pot and trawl gear vessels are prohibited from fishing within the Pribilof Islands Habitat Conservation Zone; however, bycatch does occur from hook-and-line fixed gear targeting Pacific cod in and around the Pribilof Islands Habitat Conservation Zone.

There has been no or very little bycatch of Norton Sound red king crab in groundfish fisheries since 2009, with this bycatch occurring in Pacific cod fishery.

Responding to a suggestion to display confidence intervals for bycatch data, the author noted that can be explored for the next fishery presentation. For a similar suggestion to display CIs for total catch, the author could provide intervals around observer data, but was uncertain about how to incorporate retained catch into total catch estimates. The CPT noted that a ratio estimator was explored in 2014, and the authors have looked at CIs for total catch but ran into issues of large sample sizes resulting in very small CVs.

Finally, in response to questions from the public concerning *Chionoecetes* hybrids, CPT members discussed the incidence of these hybrid crab in fisheries landings. Historically, spikes in hybrid abundance in the survey have not corresponded to spikes in the incidence of hybrids in the snow crab fishery. In last year's snow crab fishery, 1.85% of the retained catch was hybrids, based on observer and dockside retained catch sampling. The post-rationalization average is 1.76%. The peak retained catch was 8.23% in the 2017/18 fishery. However, it was noted that the 2025 survey estimate for hybrid abundance was well outside the range of previous observations, which may mean that historical patterns have limited utility for understanding the current situation.

Ecosystem Status Report - EBS

Elizabeth Siddon (NOAA - Juneau) reviewed the Ecosystem Status Report (ESR) for the Eastern Bering Sea (EBS; presentation). She described that the ESRs are complementary with the Ecosystem and Socioeconomic Profiles (ESPs). ESRs are at the large marine ecosystem scale, while ESPs are stock specific. ESRs and ESPs jointly inform risk tables and the TAC setting process.

The ESR includes information relevant to pelagic and benthic crab stages, including environmental processes, predators, prey, and competitors. The first environmental processes reviewed were time series of atmospheric indices, including the North Pacific and Aleutian Low indices. These indices indicate that the Bering Sea in the last year was generally warm, stormy, and had less sea ice. Sea Surface Temperature (SST) was cooler than average in fall 2024 because of a deep mixed layer, then warm in the winter and spring, and average in summer 2025. Sea ice formed late; the maximum sea ice extent occurred at 60°N in March/April 2025. Sea ice extent was below average for most of winter/spring and is expected to arrive later in winter 2025/26 because of low sea ice extent in the Chukchi Sea. The SST projections for 2025/26 suggest ENSO-neutral conditions with warm SST anomalies in the Bering Sea. Winter 2024/25 had a moderate heatwave in the southern Bering Sea. The summer 2025 Northern Bering Sea trawl survey found cooler SST and the bottom temperatures were the coldest since 2017. The cold pool extent was below average in 2025, with a 29% decrease from 2024. Model-based indices of ocean acidification (pH and aragonite saturation state) have continued to decline and may reach critical levels in some regions. The inner and middle domain and Bristol Bay are relatively well-buffered with pH > 7.8. However, slope waters, the southeastern outer shelf, and Norton Sound all had estimated pH values < 7.8. Corrosive bottom waters could impact growth and survival of red king crab, but snow crab appear to be resilient to ocean acidification based on laboratory studies published to date. It was noted that model hindcasts of bottom water pH are still poorly validated for areas that are important to Bering Sea crab stocks,

including Bristol Bay. Carbonate chemistry sampling is currently being conducted through a collaborative effort by UAF, BSFRF, ADF&G, and NOAA in order to improve model validation.

Biological indices in the pelagic zone include diatoms, which were above average in 2023 and 2024. Benthic foragers increased from 2023 to 2024 but were below the long-term mean. Sponges remained low in 2024. Small copepods were above average during spring, with low abundance of large copepods over the shelf, and it was noted that zooplankton abundances are strongly driven by dynamics near Unimak Pass. Epibenthic fauna increased in 2024 and remained above the long-term mean. Echinoderm biomass was above average, while crab biomass was below average. Predation pressure by pelagic fish foragers was average, while jellyfish were above average in the Northern Bering Sea and average in the Southern Bering Sea. The Bristol Bay sockeye forecast is below the 10-year average. Apex predator biomass remained average and Pacific cod condition decreased from 2022 to 2024. The 2025 borealization index (0.6) was calculated for the core snow crab range, and indicated a more boreal system, but was around the long-term mean during 2022 to 2025. The borealization index outperforms bottom temperature for predicting annual snow crab abundance.

Discussion following the presentation addressed how the pelagic indices influence crab since the larval stages occur several years before model recruitment. Thought should be given to which range of years are focused on for assessments and related management decisions. The ecosystem group is happy to provide information with different time lags, which could help integrate information across the ESRs and ESPs. Discussion noted that temperatures in Norton Sound are warm, likely due to generally elevated NBS temperatures, later survey timing, shallow depths, and possibly terrestrial run-off. The public asked about impacts of budget cuts and staffing shortages on the ESR process; so far, there have not been substantial disruptions in the ability to receive information. Public comment noted that 2014 was an anomalous year for low abundance of some benthic species, as it marked the start of a warm period, which could have broad implications for survey results.

The CPT thanked the ESR team for providing crab-specific information on the ecosystem and valuable input on risk tables. The team responded that they are available for additional questions and welcome input on what information is needed.

Risk table - Review SSC Minutes & Wrap up

The CPT had an initial discussion on the development of risk tables (presentation 1), as well as a follow-up discussion after reviewing risk tables brought forward for BBRKC, snow crab, Tanner crab, PIRKC, and PIBKC. Anita Kroska (NPFMC) reviewed SSC guidance on implementing risk tables for BSAI crab stocks, how risk table scoring categories and concerns are documented for groundfish (BSAI SAFE Introduction, Dec. 2024; presentation), and revisited the risk table Standard Operating Procedures (SOP) proposed by the CPT at the May 2025 meeting, with one minor proposed edit to number 4 (wrap-up presentation). There was a general consensus among the CPT that the “normal/increased concern/extreme concern” language used in risk table scoring does not adequately allow for documenting minor concerns that may not warrant an increase in risk scoring, but may warrant an increase in the buffer. Furthermore, this scoring

method does not allow for a mechanism to clarify whether concerns are new or ongoing. The existing scoring language, instead, implies that a concern is increasing relative to the previous year rather than communicating a general concern for shifting baselines/ecosystem conditions that have occurred over a longer duration, as is the case for many BSAI crab stocks. Because the approach of increasing/decreasing/maintaining buffers to adjust the ABC for crab stocks differs fundamentally from the approach used by groundfish stocks (i.e., maxABC is already < OFL so reductions from maxABC are intended to be infrequent for groundfish stocks), there was agreement that crab risk tables need a way to track minor concerns or improvements that may warrant reducing the buffer. **The CPT proposed that using "minimal to moderate concern", "substantial concern", and "extreme concern" to correspond with levels 1, 2, and 3 in the risk table would more effectively describe concern levels and allow them to be tracked year to year.**

There was also extensive discussion about risk table and buffer tracking, and how the two processes should interact. The CPT agreed that while the risk table is important for transparently documenting concerns, it is unclear how the CPT should use the risk table concerns and scoring to inform buffer setting. While the risk table encompasses a range of concerns, many do not warrant buffer adjustments, and there is a need to convey which risk table concerns were used for buffer adjustments each year. While the SSC recommended that tier-level concerns be listed separately in the risk table, the CPT noted that many tier-level concerns fall under the existing risk table categories. However, listing tier-level concerns that remain year after year in the risk table is likely unnecessary, and the addition of text in the SAFE introduction that lists concerns by tier level and considerations that are included in the buffer setting process may be more appropriate. A draft template to track risk table scoring, concerns, and buffer rationale, as well as separate tables to track buffers for the past five years were discussed. **The CPT will revisit implementing this tracker following guidance from the SSC and a follow up discussion at the May 2026 CPT meeting.** The CPT acknowledged that while this tracker is redundant to the SSC request that each crab SAFE include a description of buffers and rationale over the most recent five years, it is important to include documentation in each SAFE.

The CPT concluded the discussion with a list of potential questions that warrant further CPT discussion, scheduled for the May 2026 meeting:

1) What is the overarching goal/objective of the crab risk table? The CPT continues to acknowledge that this is different from the groundfish use of risk tables and feel that a better definition of the goal/objective would help guide future discussion and decisions.
2) Can we utilize risk tables to encompass buffer concerns but NOT include all risk table concerns in our buffer rationale?
3) How should we track and document conservation concerns (e.g., continued low recruitment) vs. concerns that are only relevant to the risk of exceeding the true OFL?
4) How do we record ongoing vs. new concerns, and how do we distinguish between the two in risk tables and buffer tracking?
5) Should we record positive trends/reduced concern (i.e., since the buffer can be reduced for crab)?

6) What constitutes “double dipping” in risk tables and buffer considerations?
7) What constitutes a tier-related concern and how do we distinguish these from other concerns? Should these be listed each year in the risk table? Or should they be included in a “general crab uncertainty” statement in the SAFE intro where the Tier system is detailed?
8) Risk table scoring
    a. Do we need more than 3 scores?
    b. How do we develop the “baseline” levels for where we are currently?
    c. Do/should scores translate across stocks?

Update vs Full Assessment Guidelines

Anita Kroska (NPFMC) provided information on AFSC Groundfish Stock Assessment Definitions (document from March 2025), with a general overview of the product types produced for the NPFMC region (operational full assessment, operational update assessment, research assessment, harvest projection, catch report), listed by tier-level. The CPT discussed the SSC recommendation to consider whether there is value in defining different assessment types in the CPT process, as have been defined in the groundfish plan team process. These assessment types could include operational full and update assessments. **The CPT consensus was that CPT members are satisfied with the status quo approach, which is to produce a full assessment for each stock according to its assessment cycle.** Reasons brought up by CPT members in support of the status quo approach included the value of having a full SAFE document every time a stock is assessed for easy access to the historical and most up-to-date information about the stock, and the success of using assessment frequency as a way to address workload concerns for assessment authors. **The CPT recommended that, when the CPT requests that only one model, essentially the last accepted model with updated data, be brought forward for a final SAFE, the final SAFE should be a complete document, but the associated presentation to the CPT need not provide a detailed description and evaluation of the model.**

Tanner crab ESP

Mike Litzow (AFSC-Kodiak; sitting in for lead ESP author Shannon Hennessey (AFSC-Kodiak)) presented the ecosystem component and Brian Garber-Yonts (AFSC-Portland) presented the socio-economic component of the Ecosystem and Socioeconomic Profile (ESP) for EBS Tanner crab. This represented the first full development of the Tanner ESP following extensive CPT and SSC review and discussion of the draft Tanner crab ESP presented in May 2025.

The ESP focuses on developing indicators that encompass ecosystem processes affecting Tanner crab life stages of: (1) pelagic larvae (<20 m depth), (2) benthic juvenile (>100 m depth), and (3) benthic adult (50–200 m depth), and analyzing those indicators with a survey-estimated pre-recruit abundance response variable. The suite of ecosystem indicators are then divided into predictive and contextual indicators. The intent is that predictive indicators show a demonstrated, quantitative relationship with response variables (e.g., future recruitment) given an appropriate lag. In contrast, contextual indicators might be informative for the current year of

fishery management for OFL/ABC or TAC setting. A collection of two larval, six juvenile, and five adult ecosystem indicators, with hypothesized directional impacts were proposed, including 2 indicators added since the May 2025 draft ESP. The larval indicators (lagged 5 years) were along-shelf wind and sea surface temperature. Juvenile benthic indicators included in the analysis were: initially chlorophyll-a, which was ultimately dropped due to a short time series; juvenile occupancy temperature (lagged 1 year); benthic predator density, Pacific cod consumption, and juvenile disease prevalence (each lagged 3 years), and benthic invertebrate prey density lagged 2 years. Following an indicator importance analysis using Bayesian Adaptive Sampling (BAS), three predictive indicators had strong inclusion probabilities, with benthic predator density and juvenile temperature occupied having negative impacts on Tanner crab recruitment, and along-shelf wind having a positive effect. The CPTcommented that the juvenile observed temperature seemed to have an opposite expected effect to what as expected; this was potentially due to correlation and not a causal effect; it was also noted that there are other possible mechanisms in operation, such as colder temperatures associated with ice-associated plankton blooms that may lead to increased Tanner crab survival and condition. A stronger relationship between disease and recruitment was also expected, but disease prevalence might also be associated with higher crab densities and, thus, not a great predictor of future recruitment. This situation is similar for Pacific cod consumption in which consumption rates increase proportionally at higher juvenile crab levels.

Overall, the BAS model suggested a fairly strong predictive relationship between recruitment of 70–85 mm CW Tanner crab into the EBS trawl survey and several ESP indicators. Though not specifically identified as strong linkages at this time, the suite of contextual indicators will continue to be evaluated as options for informing fishery management recommendations. In addition, a group of monitoring indicators will continue to be monitored in the ESP document and assessed for predictive relationships each year in an indicator importance analysis. In reviewing the potential influence of predictive indicators, the author provided a series of slides showing the long-term Tanner crab recruitment compared to the time series of predictive indicators, with the corresponding lag to the year of recruitment. Temperature occupancy increased substantially in the late 2010s but declined recently to near the long-term mean with a slight increase in 2025. Summer benthic predator density was low during 2018–2021, but was higher during 2022–2024 and while lower than the long-term mean, may be a concern given the Tanner crab stock status.

Trends and current-year trends of contextual indicators were then reviewed. The prevalence of bitter crab syndrome (BCS) in juvenile Tanner crab in 2025 was the 2nd highest ever observed and may indicate reduced juvenile crab survival, particularly since the prevalence based on visual observations severely underestimate true population infection rates by about 90% compared to molecular methods. Discussion noted that 2-4% of the Tanner crab were visually observed to be infected, and that mortality typically occurs within several weeks following the development of visual symptoms. Crabs that are determined to be infected via molecular diagnostic methods but do not display visual symptoms are thought to have been infected in the spring. **The CPT recommended exploring infection rates between the eastern and western components of the Tanner crab stock, particularly given increased crab abundance in the west.** Visual disease prevalence exhibits a strong seasonal pattern at established research

sites, with greater infection rates in the northwest as both the disease and the survey progress. The CPT agreed that it would ultimately be ideal to incorporate disease prevalence into the assessment, but we currently lack quantification of the effects of the disease at the population level, and the annual changes in infection rates may be more important than the actual magnitudes. The CPT noted that some herring modeling includes a disease component that may be useful to explore, and the snow crab analysis has looked at time-varying mortality which may set a useful template to explore for disease correlates.

Under contextual indicators, the Tanner crab survey center of abundance shifted north with an expansion in the area occupied in the early 2020s. This may have increased competition with snow crab, but the center had subsequently shifted south, with the area occupied now close to the long-term average. Male size at morphometric maturity and female size at maturity both increased in 2025, and the proportion of empty clutches remained low, all suggesting a high reproductive potential for the stock. The CPT suggested it may be useful to caveat the empty clutch metric with considerations of eggs that are extruded, but not fertilized, which would reproductively be equivalent to an empty clutch.

The ESP provided a traffic light table showing indicator scores relative to the long-term mean (high, low, and neutral) from 2021 to 2025 for predictive, contextual, and monitoring indicators. This table includes several indicators that are not yet available for 2025. Italics in blue were used to emphasize indicators at low levels and bolding in red for high levels.

Recognizing that the ESP is a living document, future planned work on ecosystem indicators will focus on juvenile cohort progression, stock spatial patchiness, the spatial overlap of Tanner and snow crab with interest in potential for hybridization, and effects of temperature and size at maturity. The CPT and public comments on spatial distribution suggested looking at both large males and pre-recruit crab, and also distance from the 166°W management line. The author's continued review of ecosystem indicator analyses will evaluate lag and time-integrated effects on recruitment, and also the use of Dynamic Structural Equation Models to better explore causal effects.

Brian Garber-Yonts presented the Socioeconomic component of the Tanner crab ESP. A set of 14 socioeconomic indicators, divided into (1) fishery performance; (2) economic; and (3) community, were provided in the Tanner ESP; but these are really potential indicators with the authors awaiting further guidance.

The seven fishery performance indicators, each reported separately for east and west management areas, included: number of active vessels, fishery CPUE, total potlifts, latitude of fishery centroids, longitude of fishery centroids, incidental catch in groundfish fisheries, and TAC utilization. Brian noted a substantial overlap between this presentation and the fishery summary presentation, and questioned the need to duplicate the information in the ESP. Vessel participation in the fishery has been low in both eastern and western areas following the implementation of the Crab Rationalization Program (CR) with the Tanner crab participation declining more than for snow crab. Following a question on the use of pre-CR data for active vessels, Brian noted that many economic indicators are not available before CR and pre- and

post-CR could be displayed with different scales, or the data could be censored if appropriate. **The CPT discussed that pre-CR data for fishery indicators are difficult to interpret due to Tanner and snow crab being harvested together and therefore recommended that only post-CR effort data should be included in the ESP.** Fishery CPUEs and pot lifts were near average in the eastern areas and up in the western area. Regarding the spatial centroids, the CPT suggested it may be useful to compare the fishery spatial centroid to the trawl survey centroids. The TAC was fully utilized in both management areas in 2024, and bycatch of Tanner crab in the groundfish fisheries was down in the east and near average in the west.

The economic indicators included ex-vessel value, ex-vessel price/lb, ex-vessel revenue share, and the recently added quota lease cost share, defined as aggregate fleet lease costs as a proportion of total ex-vessel value. Economic indicators are only available through 2023. Ex-vessel value, price, and revenue share have increased in recent years due to declines in snow and red king crab. Notably, revenue share and quota lease cost share have increased dramatically with fleet consolidation.

The community indicators reported are the number of active processors, processor labor hours, and local quotient of Tanner landings at Dutch Harbor. The number of processors was, critically, down to 2 in 2023 and will likely be similar in 2024 and 2025, complicating reporting of some data due to confidentiality requirements. The number of processors is deemed critically low.

The socioeconomic outlook seems to be strong for ex-vessel price, although the limited processing capacity remains a concern. The author is seeking guidance from the SSC and Council on how best to provide the socioeconomic context in the ESPs. The economist's section is losing some analytical staffing capacity in terms of producing the crab economic data report. It would be useful for the CPT to consider the relative indicators presented in the ESP versus in the annual economic summary provided to the CPT.

The CPT commented that economic data are retrospective and it may be useful to look at predictive aspects. The CPT expressed their appreciation for the author's efforts, recognizing that ESP preparation takes up time, and staff reductions have exacerbated this concern; and that prioritization is a major need. The plan is to transition the Tanner crab ESP to a report card for next year.

Tanner Crab final SAFE

William "Buck" Stockhausen (AFSC-Seattle) presented the final assessment for Bering Sea Tanner crab for 2025 (SAFE; eAgenda for App. A-D). The 2024/25 fishery was open in the two State management areas (east and west of 166°W longitude). The TAC was 803 t in the eastern area and 2,041 t in the western area (2,844 t combined). The combined retained catch was 2,852 t and total fishing mortality in directed and bycatch fisheries was 3,093 t. Total mortality was less than the 2024/25 OFL (41,290 t) and ABC (33,030 t), so overfishing did not occur.

In May 2025, the CPT and SSC recommended only a single model for the final assessment to allow the author more time to make progress on a GMACS bridging analysis. Model 22.03d5, implemented within the bespoke TCSAM02 framework, was the 2024 accepted model updated with current data from 2024/25 fisheries and 2025 NMFS trawl survey data. Following CPT recommendations, Buck made updates to GMACS to accommodate a GMACS bridging model using parameter values estimated using TCSAM02; results were shown for the GMACS model after a single function call as well as after optimization, (i.e., estimating its own parameter values after being initialized at values equivalent to TCSAM02 estimates). Results of this analysis were not included in the assessment document due to difficulties encountered during the process and ensuing time constraints, although Buck did present several promising figures in his presentation. A more thorough presentation of this analysis is planned for May 2026.

Model 22.03d5 (2025) differed very little from the 2024 version. Convergence diagnostics provided ample evidence for successful convergence to the MLE, and no parameters were estimated at bounds. Fits to data components were nearly identical to the 2024 version, with only minor, if any, differences in 2025. Attention was brought to the inability of model 22.03d5 to fit the peaks and valleys of the NMFS trawl survey data and the overprediction of post-molt size in males >60 mm CW, which likely influences fits to size compositions and contributes to the overestimation of industry-preferred male abundance by the model. Estimated biomass in all sex/maturity categories continued to increase in 2025. Recruitment to the 25-45 mm CW size range decreased for a third consecutive year, coming down from the 2022/23 recruitment event that was the strongest pulse observed since the 1990s.

The MMB was projected to be 176% of $B_{35\%}$ (43.22 t), thus the stock is not overfished, and the OFL estimated to be 51.02 t. Buck presented likelihood and management quantity profiles for several population scaling parameters: mean recruitment, NMFS survey catchability for males, and male natural mortality. The profiles generally appeared reasonable. Buck also briefly presented the Tier 4 “fallback” assessment requested by the SSC that utilizes the NMFS trawl survey data and the *rema* model, although the CPT agreed that using the Tier 4 approach was not warranted for this cycle. The author recommended a 20% ABC buffer (33.03 t), as in 2024. The risk table largely indicated uncertainties that carried over from last cycle. The only category scored as substantial concern (i.e., level 2, formerly “increased concern”) was assessment-related considerations, largely owing to concerns regarding the use of $F_{35\%}$ and $B_{35\%}$ as MSY proxies for *Chionoecetes* crabs, as well as the model’s overestimation of abundance in the largest male size classes.**The CPT recommended adopting the specifications for the Tier 3 model (22.03d5), which resulted in an OFL of 51.02 mt, and endorsed the 20% buffer that was used the past few years for many of the same reasons.**

Buck laid out his priorities for progress during the next cycle. He plans to complete the GMACS bridging analysis to the point where transition to GMACS is expected during the next cycle. He also plans to continue work on an RTMB version of GMACS and to complete the BSFRF/NMFS selectivity analysis. Lastly, the Tanner crab assessment is slated to undergo a CIE review in 2026, which he noted may include models implemented in both TCSAM02 and GMACS.

Comments from stakeholders included questions about the ways in which *Chionoecetes* hybrids are included or excluded from the Tanner crab OFL calculation, as well as the need for rapid action on developing a plan for incorporating hybrids into assessments and regulations such that harvesters can take advantage of the increasing abundance of hybrid males of the industry-preferred size. Currently hybrid *Chionocetes* are not included in either the Tanner or snow crab assessments and therefore do not contribute to the OFL recommendations. CPT members recognized the importance and urgency of these concerns, and noted that the State TAC-setting process has the leeway to incorporate the abundance of hybrids in decision-making. The CPT added agenda items on *Chionoecetes* hybrids to the May 2026 CPT agenda (see "New Business").

Skipper Surveys

Cory Lescher of Alaska Bering Sea Crabbers (ABSC) presented results from the ABSC Skipper Surveys for 2024/25 Bristol Bay red king and Bering Sea snow crab fisheries. The surveys consist of seven static questions specific to the directed crab fisheries and seek to build a time series of annual skipper observations regarding perceived changes in legal male, female, and juvenile crab abundance, with emphasis on legal/industry-preferred males; additional questions vary over time and are intended to address industry questions, and were not covered in the presentation. Cory provided a timeline showing the development of the ABSC skipper surveys beginning in 2020 and discussed some of the challenges in conducting the surveys, with one of the major challenges being contacting all the skippers post-season. He noted the assistance and cooperation in contacting skippers provided by staff in the Dutch Harbor ADF&G office.

The 2024/25 Bering Sea snow crab skipper survey had participation from 21 skippers out of 27 total vessels that participated in the fishery; names of vessels that participated in the survey are considered confidential and were not disclosed. Cory was encouraged with the level of survey participation and hopes that post-season participation will become more routine for skippers moving forward. Survey question #1 asked skippers how the amount of industry preferred males encountered during the fishery compared to the previous season, with the most frequent response (8 of 21 skippers) being "increased a lot (more than 25%)". The second most frequent response (6 of 21 skippers) was "increased a little (10% to 25%)". Another snow crab survey question summarized by Cory asked skippers about why they chose to fish where they fished, with the most frequent response (7 of 21 skippers) indicating that they went to the closest fishing grounds with decent catch. The second most frequent response (6 of 21 skippers) was "other" which included a variety of answers indicating that vessels targeted areas that previously produced high catches, areas that had high survey abundance, areas that had new-shell crab, and areas of colder water.

The 2024/25 Bristol Bay red king crab skipper survey had participation from 27 skippers out of 34 total vessels that participated in the fishery; names of vessels that participated in the survey are considered confidential and were not disclosed. Survey question #1 asked skippers how the number of legal males encountered during the fishery compared to the previous season, with most frequent response (17 of 27 skippers) stating that it had "increased a lot (more than 25%)", followed by "increased a little (10% to 25%; 7 of 27 skippers)". Cory noted that the skipper

survey answers regarding increased legal male abundance generally align with increases seen in NMFS trawl survey abundance in recent years. Another red king crab survey question summarized by Cory asked skippers about how much quota they had to catch in the 2024/25 fishery, with responses from all 27 participating skippers indicating a wide range of individual vessel quota sizes in the fishery (9,000 pounds to 100,000 pounds and greater). Cory highlighted this question as an example of the types of questions that can be asked to better understand current fleet dynamics.

Cory requested feedback from CPT members regarding the utility of expanding the skipper surveys to the Bering Sea Tanner crab and Aleutians Islands golden king crab fisheries, and how and when skipper survey results are most useful for CPT to receive. **CPT consensus was that the skippers survey results are valuable for contextual interpretation of fishery-dependent data, future Tanner crab and golden king skipper surveys would be most informative if separated by fishery management area (east/west), and suggested that moving forward, methods could be reviewed at the next May CPT meeting, and results be presented on an annual basis alongside the fishery catch presentation at the September CPT meeting.** CPT members suggested future skipper survey questions could include those relating to hybrids and retention size in the snow and Tanner crab fisheries, and perception of overall TAC size in the BSAI crab fisheries. Additionally, it was suggested that future skipper survey results could be published in a more formal survey results document.

Bering Sea Fisheries Research Foundation update

Scott Goodman, Executive Director of BSFRF, provided an overview of the foundation's research activities, highlighting both ongoing and planned projects, noting that most current work is funded by disaster relief funding. Key projects include the Bristol Bay Red King Crab CPS surveys (CPS-1 and CPS-2 are complete, with plans for at least three more, noting that CPS-3 has been postponed to 2026 due to funding uncertainty); ongoing movement and tagging research focusing on Bristol Bay red king crab, which has collected seven years of tagging data to-date; and the Opilio pot sampling (OPS) study. The OPS-1 survey has been postponed to 2026, and Scott reviewed the spatial coverage of the initial sampling plan was largely based on the 2024 NOAA trawl survey, but that plan may be revised based on the 2025 survey and additional technical input, including from CPT members. Scott reviewed the recently completed CAMSLED2 project, which involved two charters to deploy and recover larval collectors in Bristol Bay, reporting promising early results. Scott discussed a potential Tanner Crab MSE (Management Strategy Evaluation) initiative in development (a high priority for stakeholders), which is expected to involve a steering committee including ADF&G and NOAA, with stakeholder input, following the general approach employed in the Tanner crab MSE performed in 2020. Scott introduced the BSFRF science team, including Madison Heller-Shipley, Corey Lescher, Gordon Kruse, Tim Loher, and Gary Stauffer, and noted the foundation's interest in expanding the team.

Dr. Gordon Kruse then provided a detailed overview of the two-day 2024 snow crab workshop in St. John's, Newfoundland, co-hosted by BSFRF and the Department of Fisheries and Oceans Canada, noting the recent publication of the workshop report by ADF&G. The organization of

the workshop focused on physical ecosystem dynamics, exploratory population modeling, and applied management, with three main themes emerging: the roles of climate, other ecosystem factors (like predation and bitter crab disease), and fishing effects (particularly on stock reproductive health and size at maturity). Gordon noted the historical co-variation of EBS and Newfoundland snow crab stocks, which broke down in 2020 with collapse of the EBS stock, and also noted contrasting trends in Newfoundland and the southern Gulf of St. Lawrence stocks, tied to the North Atlantic Oscillation (NAO). Regarding other ecological factors, cod predation on crab is common, but most research has not found a population-level effect, and one study suggests it might be a recruitment index. A recent increase in bitter crab syndrome prevalence based on modern sampling methods also raises questions about its potential involvement in the recent stock declines. Gordon summarized a workshop presentation by Ben Daly comparing harvest strategies across management agencies, addressing the need for apples-to-apples comparisons of exploitation rates across different definitions of biomass; several slides demonstrated that historical exploitation rates in the Bering Sea are similar to three North Atlantic regions, but lower than two other regions. Finally, he reviewed the recent history of Newfoundland and Labrador (NL) snow crab management, which employed a Precautionary Approach (PA) beginning in 2019; following implementation, NL snow crab stocks have responded favorably: discards declined, clutch fullness became high, CPUE increased, and, importantly, size at maturity, which had previously declined, increased. Gordon concluded with a summary of research recommendations identified by the workshop. Scott wrapped up the presentation with an overview of the BSFRF Fall Science Symposium that was held after the CPT meeting adjourned on September 12 in Seattle.

BBRKC Report Card

Erin Fedewa (NOAA-Kodiak) and Brian Garber-Yonts (NOAA-Seattle) presented the Ecosystem and Socioeconomic Profile (ESP) Report Card for Bristol Bay red king crab (BBRKC; see also Appendix F). Erin described the new indicator categorization framework (predictive and contextual) and ESP report card infographic templates for 2025. Ecosystem indicators were grouped by larval, juvenile, and adult crab life stages. Larval indicators include Arctic Oscillation, summer wind stress, Chl-a concentration, and Bristol Bay sockeye salmon inshore run size. Juvenile indicators include spring pH, summer bottom temperature, and Pacific cod predator density. Adult indicators include benthic prey density, mature male area occupied, mature female area occupied, fishery catch distance from shore, female reproductive failure, Northern District/Bristol Bay ratio, and protected area proportion. Chl-a indicator source data was obtained from an improved satellite product and spring pH estimates were obtained via the MOM6 oceanographic model (as opposed to ROMS), so these two datasets are not directly comparable to past ESP products.

In the first step in testing the indicators via an indicator importance analysis, some indicators were not included in the Bayesian Adaptive Sampling analysis because they were not drivers of recruitment. Erin described the lags used for each indicator in the Bayesian Adaptive Sampling analysis and noted that survey abundance of male BBRKC 95-120 mm CL was used as a response variable. pH and wind stress stood out in the Bayesian Adaptive Sampling analysis

with inclusion probabilities >0.5 and directional effects on recruitment. Model fits explained a moderate amount of variation in BBRKC recruitment but there is work to be done to improve predictive capacity. Summer wind stress and spring pH were then classified as predictive indicators, while contextual indicators included mature male and mature female area occupied, fishery catch distance from shore, female reproductive failure, Northern District/Bristol Bay ratio, and proportion of mature males in closure areas. Monitoring indicators have more uncertain effects on BBRKC and lag effects, and therefore may be less relevant for current year decisions. Erin noted that the status of predictive indicators are potential red flags given possible negative effects on larval survival (elevated wind stress suggests poor feeding conditions) and recruitment (declines in pH predicted to result in low recruitment due to negative impacts on growth, shell hardening, and survival). The status for contextual indicators is at or near the long-term mean suggesting no concerning red flags. Erin summarized new indicators in development including a refined benthic invert prey indicator (Jonathan Reum NOAA) and a RKC fishing gear spatial overlap indicator (Sean Hardison NOAA-UAF). Erin solicited feedback on the new report card format. Various plan team members voiced support for the updated format.

A question was asked about how often the contextual and monitoring indicators would be evaluated. Erin noted that relationships change and that all indicators will be updated and re-evaluated each year for their importance on BBRKC. There was a question about the inclusion of predictive indicators in stock assessments. Erin responded that indicators with a long track record of being predictive would likely best candidates for inclusion. There was a question about whether lagged indicators may fall out in future years. Noting relationships can change over time, the hope is to move towards a more causal inference approach to indicators. It was suggested that a table to track the importance of the indicators over time may be useful (i.e., predictive vs contextual status may change over time). There was a question about how these indicators could be incorporated into the BBRKC stock enhancement project. For example, how does pH impact the ability to stock cultured juveniles? Erin noted ongoing work to evaluate pH effects across life stages: preliminary results suggest early juveniles are most vulnerable to acidified water, but more refined work is needed to better understand the spatial nuances. There was a question about lags relative to the response variable: crab 95-120 mm CL are 6, 7, or 8 years old, so why not evaluate three different lags for each indicator? This was recognized as something to investigate in the coming year (e.g., sensitivity to lags) but time did not allow for addressing this cycle. There was a question about how reliable recruitment estimates are and whether variability in recruitment estimates should be considered. This analysis has not incorporated variability in recruitment estimates, but future work could do a better job at addressing the variability in recruitment. It was further noted that this analysis did not use recruitment estimates from the stock assessment model, but rather survey abundances of a specific size class.

Brian Garber-Yonts presented BBRKC socioeconomic indicators including 7 fishery performance indicators and 3 economic indicators. Brian pointed out 3 new indicators that were derived from the Alaska Bering Sea Crabbers (ABSC) skipper survey: perceived abundance, changes in fishing practices, and drivers of fishing practices. Brian noted that inclusion of a larger set of economic and community indicators (of which none are reported at this time) was

withheld from the BBRKC and snow crab ESPs, but referenced the Tanner crab ESP for a broader set of socioeconomic indications, noting the need for further guidance from the SSC/Council regarding priorities for socioeconomic information to support Council decision making in light of TAC-setting by ADF&G under terms of crab co-management. Brian reviewed fishery-informed indicator trends. A point was made to label indicator x-axes to help interpret time series duration. Brian summarized the indicators developed from the ABSC skipper survey. 24 out of 27 skippers responded to the survey. Most skippers indicated perceived increases in abundance and minor changes in fishing practices. Overall, fishery-informed indicators are generally consistent with stable or mildly improving stock conditions and skipper observations on fishing conditions in the 2024/25 BBRKC fishery are consistent with high CPUE. Economic performance indicators reflected increased ex-vessel price due to an unprecedented ex-vessel price of $22.60 per lb. King crab is considered a premium seafood product and demand is less sensitive to price variation than other seafood products. The high price is likely to be maintained into next season. BBRKC accounted for 71% of total fishing revenue for the participating fleet. There was a question about whether the ex-vessel price is corrected for inflation so that values are comparable across the timeseries. The prices were adjusted to 2024. Brian reviewed the socioeconomic indicator summary and noted that indicators are not assessed for predictive ability. Next steps include improving workflow, noting duplication with the fishery summary report given by Ben Daly (ADF&G). ABSC survey result indicators are experimental, and Brian asked for input about their utility. The hope is to develop a timeseries representation and interpretation. Brian is awaiting SSC/Council guidance on socioeconomic indicators and information to support Council use of ESPs and/or ADF&G TAC decision-making.

There was a question about what component of the fleet fishes groundfish. A portion of the fleet only targets crab while another portion also targets groundfish such as pot cod. Very little sablefish fishing by the crab fleet in recent years, but salmon tendering is an important component of their portfolio. A comment was made that we hear comments from industry that socioeconomic ESP is important to them to be included in the management process. There was support from the CPT for the inclusion of the ABSC skipper survey. A member of the public asked about how long before we use the skipper survey results in the management process. It was noted that the ABSC survey results were purposely included as indicators in the ESP, and that the results of the survey are also intended to inform the fleet. In terms of general process, it was noted that the CPT/SSC considers how to best utilize the socioeconomic indicators in decisions about ABC, and that the TAC decision process is done by ADF&G outside of the CPT. A CPT member noted that the inclusion of the ABSC skipper survey is an effective way to include these results into the process, and the ESP and associated risk tables are annually reviewed by fishery managers. A CPT member noted the skipper survey provides a level of context to the interpretation of fishery-dependent data streams. The CPT thanked Erin and Brian for their presentations.

BBRKC final SAFE

Katie Palof (ADF&G-Juneau) presented the final SAFE for Bristol Bay red king crab (BBRKC; see eAgenda for App. A-F). This was the second year the fishery was open following a two-year

closure. Overfishing did not occur in 2024/25 because total catch mortality (1.20 kt) did not exceed the 2024/25 OFL (5.02 kt). Katie noted that fishery CPUE was higher this year than in 2023/24 and that female bycatch was substantially reduced from last year. However, recruitment continued to be very small with no indications for change in the near future. The proportion of crab of either sex in the Northern District relative to Bristol Bay continued to decline toward the historical mean from a recent peak in 2021.

Results from two GMACS models were presented, including the accepted model from 2024 (model 24.0c, with 2024 data but updated to GMACS version 2.20.20, 2025-01-30) and model 24.0c2, which differed from 24.0c only in that shell condition was removed as a (previously unused) placeholder and the ADF&G catch time series was updated. Katie presented a bridging analysis from 24.0c to 24.0c.2 using data through 2024. Changes in results from 24.0c to 24.0c.2 were extremely minor. Katie then presented results from model 24.0c.2 fit to 2024/25 data on retained and incidental catch in the directed fishery, BBRKC bycatch in the groundfish fisheries, and data from the 2025 NMFS EBS bottom trawl survey. This was the only Tier 3 model presented for harvest specifications. Changes to model estimates from the addition of the 2024/25 data were minimal and model convergence, fits to data components, patterns of residuals, and retrospective patterns were not considered to warrant rejecting the model. **Consequently, the CPT endorsed 24.0c.2 for use in status determination and specifying the OFL and ABC. Based on the recommended model, the stock was in Tier 3b, stock status was 0.91, and the stock was not overfished.**

Katie justified her recommendation of a 20% buffer for the ABC using a table that described previous buffer considerations going back to 2020 (Appendix E) and a risk table (Appendix D) that encapsulated current considerations based on the assessment, the EBS Ecosystem Status Report, and the stock-specific Ecosystem and Socioeconomic Profile for BBRKC (BBRKC Report Card). A 25% buffer was used in 2020 because the EBS survey was not undertaken that year. In subsequent years, a 20% buffer has been used to reflect concerns regarding lack of recent recruitment, poor environmental conditions, lack of fit to recent female survey biomass results, and retrospective patterns. The CPT noted that non-stationarity in recruitment was a better description of the concern related to recent low recruitment because the assumption used to calculate the OFL and make projections is that recruitment levels are stationary across the time series and interchangeable statistically. It also recommended that emphasis be placed on environmental factors with predictive relationships to stock productivity (wind stress, pH) when these exist rather than contextual factors. Because these continue to be concerns this year, although retrospective patterns were improved somewhat over previous years, **the CPT endorsed the author's recommendation to continue using a 20% buffer. Given these recommendations, the CPT-recommended OFL for BBRKC during 2025/26 is 5.85 kt, with an associated ABC of 4.68 kt.**

The CPT engaged in a substantial but unresolved discussion on the construction and use of the risk table (Appendix D) for documenting the rationale and considerations used to determine the ABC buffer. Katie expressed appreciation for the ESP and ESR groups' work in compiling information for the risk table, making the process of constructing the table relatively "painless."

She also suggested that a shared document in Markdown format might be helpful in the future to reduce copying/pasting of information. While the risk table was valuable for documenting the considerations reflected in the 20% ABC buffer the CPT recommends for this stock, Katie (and others) noted difficulties with determining level designations for the categories in the table; for BBRKC, all categories were designated 'Level 1: Normal' because most of the considerations expressed in the table were the same as those expressed in the ABC buffer discussion last year. The CPT noted that this scoring did not allow any reduction in level designation when buffer considerations improved to the point where a reduction in the buffer would be warranted. Also discussed were the potential effects of normalizing to current stock conditions, given the stock is at historically low abundance levels with little prospect for recruitment and that the mechanisms behind the continued low recruitment are not understood. Long-term concerns in the risk table summary also provide important context for buffer discussions, and many of these concerns (e.g., lack of a stock-recruit relationship) may apply to many, if not all, stocks. The CPT questioned whether the inclusion of conservation concerns in the risk table was appropriate from the perspective that CPT recommendations are supposed to be "risk neutral" and guidance from the SSC is requested in this regard. Further discussion reflected that including conservation concerns within buffer/risk table considerations may indeed be valid because these are related to both the uncertain current and historical productivity of the stock relative to the hypothetical "true" OFL. During the discussion the CPT recommended moving two risk tables categories to “level 2” - population dynamic considerations and ecosystem considerations - and added some additional bullet points to the risk table, which are reflected in the updated risk table found in the SAFE intro.

Katie also presented results from a simple Tier 4 "fallback" model requested by the SSC using the `rema` R package to fit a random effects time-series model to "vulnerable" male survey biomass. For BBRKC, the "vulnerable" males were defined to be mature males >119 mm CL. Crab at the smaller end of the size range are approximately one or more molt increments away from legal size and are therefore likely to be found with legal size male crab and vulnerable to discard mortality. Using this approach would result in an OFL of 4.86 kt. Katie presented two ABC's for the CPT to consider: one using the same buffer as adopted for Tier 3 (20%) and one based on the SSC's recommendation to use the CV of the model-based estimate of terminal survey biomass, rounded to the nearest 5% (15%). The CPT saw no reason to deviate from the SSC's recommendation in the event it would recommend (which it did not) an OFL based on Tier 4 "fallback" results.

Comments from stakeholders touched on issues concerning EFH designation for red king crab, the lack of understanding the reasons behind continued low recruitment, whether Northern District red king crab are derived from Bristol Bay nursery areas, and the relationship between the risk table scores and the ABC buffer. Concern was expressed that recent genetic work distinguished Bristol Bay red king crab as genetically distinct from the Pribilof Islands and St. Matthew Island groups but that this was not reflected in the current EFH designation. Katie noted ongoing genetics and movement work in Bristol Bay that might inform future EFH considerations. Concerns were also expressed regarding the lack of knowledge concerning the continued low recruitment and possible disconnects with the management process. A CPT member pointed out that it was fairly clear that egg production was not a limiting factor and that

the bottlenecks likely occur in the larval or benthic juvenile stages, which were characterized as a "black box", while noting that this was an active area of research. Stakeholders also emphasized the need to avoid “double counting” when allowing concerns regarding uncertainty to inform the risk table and buffer discussion.

The CPT commended the author for her work and had the following requests and **recommendations for future work:**

- **When presenting jittering results, only include results within a few likelihood units of the MLE.**
- **When reporting MCMC results, include MCMC trace plots and other diagnostics to allow evaluation of mixing success.**
- **Provide MCMC projection results for different *fractions* of F_{MSY} in addition, perhaps, to results for different values of F as were presented in the SAFE.**
- **Reserve time at the May 2026 CPT meeting to discuss scoring levels again both within and across stocks.**
- **Use the SSC-recommended cv approach to determine an ABC buffer for a Tier 4 "fallback" model (this recommendation applies to all stocks).**

Model-based indices update - NSRKC

Caitlin Stern (ADF&G) provided an update on developing model-based indices for NSRKC (document). The current assessment uses three separate design-based indices from fishery-independent surveys (NOAA NBS trawl survey, NOAA Norton Sound trawl survey, and ADF&G trawl survey) to estimate abundance of NSRKC, all of which vary in frequency and spatial coverage. At the May CPT meeting, Caitlin presented three survey-specific model-based indices that resulted in stronger positive retrospective patterns and similar to poorer fits when used in place of design-based estimates in the assessment model. As a next step, this update focused on combining data from all three surveys into a single model-based index.

The modeling approach, evaluation methods, and diagnostics used were similar to those presented in May, with models fit using GLMMs in sdmTMB and spatiotemporal random fields estimated as independent and identically distributed (IID). Two sets of predictors were tested (year + survey, or year + survey + depth), and Tweedie, delta-gamma, and delta-lognormal distributions were evaluated. Because initial model runs containing data from all three surveys failed to converge, Caitlin presented results from models that excluded the NOAA Norton Sound trawl survey, and she noted that convergence issues were likely due to the lack of temporal overlap between the NOAA Norton Sound trawl survey and the other two surveys.

Of the models fit and evaluated, diagnostics indicated minor concerns with Q-Q plots and spatial autocorrelation. The model using the delta lognormal distribution with year + survey + depth fixed effects demonstrated the best out-of-sample predictive skill. However, root mean square error (RMSE) values were very similar between delta gamma and delta lognormal models using the same fixed effects, suggesting that model diagnostics did not clearly indicate a best-fit model. Due to much higher RMSE values using the Tweedie distributions, only results from models using the delta gamma and delta lognormal distribution were presented to the CPT.

Caitlin presented results from two different prediction grids: the larger prediction grid covers all of survey observations to date, whereas the small prediction grid encompasses areas where most of the harvest occurs, and where ADF&G survey has occurred in the past few years. Overall, the model-based indices generated using models that did not include depth as a fixed effect generally estimated higher abundance than those including depth, and also showed more year-to-year variability in abundance. In addition, indices calculated using abundance predicted across the smaller prediction grid generally estimated lower abundance than indices calculated across the larger prediction grid. **The CPT recommended that when visually comparing design-based and model-based abundance time series that include point estimates for each survey, comparisons should be made by extracting the conditional effect of a single survey from the survey fixed effect term of the model.** The CPT also suggested plotting the predicted effect of depth to better understand if the range of depths observed in the data align with the depths predicted across the larger prediction grid, and to explore why the inclusion of a depth term reduced interannual variability in abundance estimates. It was also suggested to explore the addition of bottom temperature as a fixed effect given the demonstrated relationships between temperature, depth and BBRKC distributions. The author-preferred model moving forward utilized the delta-gamma distribution with year + survey + depth fixed effects and predictions calculated across the larger prediction grid due to concern about underestimating the scale of the population.

Design-based abundance estimates from the base NSRKC assessment model (24.0b + a prior on F in the winter commercial fishery) were then compared to models that replaced design-based abundance estimates with model-based estimates. Overall, fits to the catch data and size composition data were very similar, and using a model-based index led to less extreme retrospective patterns, which has been a notable concern for this assessment model. While stock status was similar or higher for models using the model-based index, the reduced scale of the population due to lower MMB estimates leads to lower reference points. The CPT noted that it would be informative to evaluate differences in estimated errors for each proposed model (i.e., plot one model only with the associated data and errors, and then plot model predictions). Caitlin emphasized that the current approach used in the proposed models fixes catchability at 1 for the model-based index and estimates catchability for the design-based index. **The CPT recommended a bound set at 1 rather than fixing at 1 in future explorations, and to evaluate the sensitivities associated with this change.**

Caitlin noted that future work includes evaluating methods to include the NOAA Norton Sound trawl survey data, and continuing to explore estimating vs. fixing catchability. The CPT thanks Caitlin for her work, and looks forward to continued development of research track models that utilize model-based indices.

PIBKC Final SAFE

William “Buck” Stockhausen (AFSC-Seattle) presented the final assessment for Pribilof Islands blue king crab for 2025 (see eAgenda for App. A, B). This stock was last assessed on a biennial cycle in 2023, but the CPT had determined that a four-year cycle would be sufficient for

monitoring the stock. The 2025 assessment will serve to set management specifications for 2025/26 – 2028/29, with the next assessment in fall of 2029.

The 2024/25 directed fishery remained closed and there was no bycatch in non-directed crab fisheries. Bycatch mortality in groundfish fisheries consisted of 0.03 t during the pot cod fishery. Handling mortality in non-directed crab fisheries and fixed gear groundfish fisheries present here and in assessments since 2016 has been 20%. The CPT recommended that handling mortality remain at 20% for non-directed crab fisheries for this assessment, but **future assessment should assume 50% for fixed gear groundfish fisheries following other FMP king crab stocks**. Since total fishing mortality was less than the OFL prescribed by the rebuilding plan (1.16 t), overfishing did not occur.

The NMFS survey did not encounter any mature male blue king crab in the Pribilof Island district in 2023 or 2024. The 2025 survey caught two mature males, no sublegal males, three mature females, and no immature females. Following CPT recommendation from May 2025, Buck brought forward a series of spatiotemporal GLMMs implemented in the R package *sdmTMB* to smooth survey MMB, which is detailed in Appendix A to the PIBKC SAFE. A spatiotemporal GLMM was preferred to the previously-used state-space, random effects time series model due to better suitability for data that includes zero catch observations. Model scenarios differed in the resolution of the spatial mesh, random effect structure, and covariate structure. Spatial meshes were constructed using k-means clustering with 40, 60, or 80 knots and with or without barriers to interpolation across uninhabitable areas. Spatial and temporal random effects were either ‘on’ or ‘off’. Temporal random effects followed a first order autoregressive process. An estimated smooth function of log-scale depth was the only covariate evaluated. In total, 18 combinations of model scenarios were evaluated. Due to process time, model selection was performed with survey data up through 2024. Models were evaluated using convergence and residual diagnostics, k-fold cross validation (10 folds), and ranked by predictive likelihood, root mean square error (RMSE), and median absolute error (MAE). The best model included an 80 knots barrier mesh, spatial and temporal random effects, and the smooth function of log-scale depth as a covariate. With this ‘best’ model Buck evaluated results from different high-resolution prediction grids that differed mainly in how the shelf edge and deep (> 500 m) depths were included or excluded. Ultimately, there was only minimal difference in MMB estimates and the grid that extended to the shelf edge was selected.

Projected MMB at mating (Feb 15, 2026) was estimated to be 162 t. B_{MSY} (4,146 t) was the average MMB during the time period 1980/81 – 1984/85 and 1990/91 - 1997/98. The CPT agreed there was no reason to deviate from the reference time period previously determined. The stock is at ~ 4% B_{MSY}, so the stock remains in overfished status, and the directed fishery is closed. **The OFL is 1.16t. The CPT recommended the status-quo 25% ABC buffer (0.87 t)**. The CPT reviewed the draft risk table, but decided not to assign risk levels for this stock because 1) the risk of exceeding the true OFL is minimal given only small amounts of bycatch, and 2) most of the information contained in the risk table is captured in the rebuilding plan. That is, the risk table provides little utility for decision making since the rebuilding plan prescribes management quantities until the stock is rebuilt.

PIBKC will move to an every-four-year assessment schedule and will be assessed next year in 2029. Buck suggested that the assessment in 2029 should review a suite of model scenarios again, and the **CPT recommended bringing forward primarily the 2025 accepted model, with any additional model scenarios left up to the author's discretion, keeping in mind the low prioritization of this stock**. Lastly, Buck mentioned that ADF&G pot survey data have become available, and those data may be worthwhile for incorporation into a model in the future.

Snow Crab Report Card

Erin Fedewa (AFSC-Kodiak) and Brian Garber-Yonts (AFSC-Portland) presented the 2025 Ecosystem and Socioeconomic Profile (ESP) report card for Eastern Bering Sea (EBS) snow crab, an integrated assessment combining environmental, biological, and fishery-informed indicators relevant to management (see also Appendix A). Indicators were grouped into ecosystem (larval, juvenile, adult) and socioeconomic (fishery, economic, and community) categories. New for 2025 was the inclusion of female size at maturity as an ecosystem indicator, along with modifications to several others: sea ice extent now uses ERA5 data, reproductive potential was replaced with a reproductive failure metric, the cold pool indicator now reflects waters < 0°C, and Chlorophyll-*a* data comes from a more refined satellite product. Although these indicators were tested for their predictive value using Bayesian Adaptive Sampling (BAS), none showed significant forecasting ability for snow crab recruitment and all are now treated as contextual and monitoring indicators, useful for tracking ecosystem conditions.

Contextual indicators revealed continued warming, with bottom temperatures rising 0.5°C and sea ice extent declining 18%. However, juvenile snow crab remained in cold waters (<1°C), suggesting suitable habitat persists. Juvenile energetic condition has improved since 2021, supporting favorable conditions for rebuilding. Mortality risks like bitter crab syndrome (BCS) and Pacific cod predation remained below average, although disease prevalence of BCS has been found to be largely underestimated using visual diagnostics alone. Mature male snow crab continue to occupy a shrinking range, correlating with cold pool contraction, and their center of abundance has shifted southward. Biological indicators showed continued declines in male size at morphometric maturity, while female maturity size increased significantly, likely due to a strong cohort of large immature females. This contributed to a skewed sex ratio but did not appear to reduce reproductive success, as few mature females had empty clutches. However, uncertainties remain in measuring reproductive failure, as studies challenge earlier assumptions about female extrusion of unfertilized eggs. Leah Zacher (AFSC-Kodiak) commented on mating studies for red king crab that indicated that females will not extrude a clutch of eggs unless they were able to mate with a male. However, a study conducted by Sainte-Marie et al. (2010) (in Kruse et al 2010 report), referenced during the CPT discussion, found that female snow crab deprived of access to mates for extended periods often extruded unfertilized eggs, with this being the most common outcome when insemination did not occur. CPT members discussed that extruding and reabsorbing unfertilized eggs is energetically costly and more research is needed to further investigate this to improve the reproductive failure metric. Furthermore, the CPT discussed that data on fertilized clutches has caveats given the increase in *Chionoecetes*

hybrids and inability to determine genetic composition of clutches without conducting further research.

The CPT also discussed future inclusion of hybrids in the ESP, noting that better understanding their spatial overlap with snow and Tanner crabs could help inform management decisions. Fishery-informed indicators showed very low fishing effort in 2024/25, with only 25 vessels participating. Despite this, catch per unit effort (CPUE) was the highest since 2011/12, and most skippers reported increased availability of industry-preferred males. Changes in fishing behavior, such as setting pots deeper, reflected efforts to avoid undesirable crab rather than low catch rates. The fishery remained centered in the northern portion of the EBS, consistent with broader distribution shifts. Incidental catch of snow crab in groundfish fisheries also hit historic lows.

From a management standpoint, while no indicators could predict recruitment, the contextual data point to a post-collapse environment conducive to juvenile survival and rebuilding, thanks to stable cold habitat, low predation, and improved condition. However, the ongoing contraction of mature male range and declining size at maturity remain key concerns. The CPT noted the strong CPUE as a positive signal but emphasized the need for cautious interpretation of fishery-dependent data. Future ESP work will focus on refining ecological indicators like predator-prey relationships and bloom types and enhancing socioeconomic metrics, including better integration of in-season fishery data and skipper survey results, to support ABC and TAC decisions and broader Council processes.

Snow Crab final SAFE

Cody Szuwalski (AFSC-Seattle) presented the final assessment for Eastern Bering Sea snow crab for 2025 (see eAgenda for App. A, B). The 2024/25 fishery was open and the TAC was 2.1 kt. The combined retained catch was 2.1 kt and total fishing mortality in directed and bycatch fisheries was 2.81 kt. Total mortality was less than the 2024/25 OFL (19.6 kt) and ABC (6.86 kt), so overfishing did not occur. An important result from the 2025 EBS bottom trawl survey was that the size at which 50% of the male snow crab population had undergone terminal molt declined approximately 3 mm from the 2024 value, to 79.0 mm CW, continuing the concerning decline in size at terminal molt for this stock. The author's analysis of the effects of male density on size at terminal molt in EBS snow crab is currently in review at the Journal of Applied Ecology and suggests that the molt to maturity occurs at smaller sizes when large male density is low.

The author compared last year's accepted model (24.1) with model 25.3 (which was mistakenly labeled as model 25.1 in the presentation and draft SAFE 2025 document). Model 25.3 was model 24.1 with updated data (fishery, survey, and growth data) and GMACS version 2.20.22. Cody compared two scenarios for model 25.3 that differed in the definition of maturity for estimating mature male biomass: the first used morphometric maturity as indicated by the ratio of chela height to carapace width (CW), and the second used ≥ 95 mm CW as the definition of maturity. Cody resolved the model convergence problems exhibited in the May 2025 proposed

models runs by reducing the CVs on female molt increment observations at the largest sizes, which changed estimates of female growth by increasing the weight placed on those data.

While the model the author presented produced Hessian matrices with small gradients, a concerning issue arose during the jittering analysis: jittering produced two clouds of model solutions at or near the MLE with OFLs that differed by 5,000 t. The author explained that the difference in OFLs resulted from differences in the terminal year estimates of MMB, driven by differences in recent recruitment estimates. In order to determine whether the absence of the 2020 survey data point is contributing to this issue, the **CPT requested seeing the results of the jittering analysis from the accepted model but only including data through 2019**. For future work in which results are shown from the same model configuration using different size-at-maturity, the **CPT recommended against running separate jittering analyses for each scenario**. Instead, after jittering is complete for the first scenario and the putative MLE has been identified, the parameter estimates from that run should be used for all comparisons that differ only in the size-at-maturity scenario because the MLE would be the same for all such scenarios (i.e., the size-at-maturity scenario should not affect the parameter estimates). The **CPT further requested that the author investigate whether it is necessary to use the same number of size bins for males and females**, noting that the BBRKC model uses different numbers of bins for the sexes.

Cody presented the Tier 4 “fall back” assessment requested by the SSC and CPT that is based on the NMFS trawl survey data and the rema model, although the CPT did not recommend using the Tier 4 approach for the current cycle. The author-recommended OFL, based on Tier 3 specifications and model 25.3, using mature male biomass defined as ≥ 95 mm CW, was 3.26 kt. Cody recommended a 20% ABC buffer for 2025 to account for scientific uncertainty, reflecting concerns summarized in the risk table, about model instability revealed through jittering analyses as well as population dynamics concerns given the directional downward shift in male snow crab size at terminal molt. Applying the 20% buffer leads to a recommended ABC of 2.6 kt. The projected MMB was 31.05 kt, resulting in a projected stock status of 0.35.

The CPT agreed with the recommendation of model 25.3, but engaged in a long discussion concerning the appropriate definition of male maturity for use with this stock. It was recognized at the outset of this discussion that the SSC has requested that the status quo morphometric definition be retained until new information is available that might support a change to the ≥ 95 mm definition. However, it emerged that there is a strong consensus by the CPT that the best available scientific information supports the conclusion that the status quo definition is not appropriate in terms of conserving the reproductive potential for the stock, or in terms of supporting optimal yield of commercial-sized animals for harvest. **The CPT therefore again recommended a change to the definition of maturity for this stock, from morphometric maturity to ≥ 95 mm CW**. **The CPT also supported the author’s recommended 20% ABC buffer; therefore, the CPT supports the author-recommended OFL of 3.26 kt and ABC of 2.6 kt.** A summary of the information that motivated the recommendation to define maturity as ≥ 95 mm CW follows.

Survey observations show a long-term decline in the biomass of large males in the population along with a decline in the size at which males complete their terminal molt (Zacher et al. 2025; Fedewa et al. 2025). In 2025, 96% of males that underwent terminal molt did so before reaching industry-preferred size, and the size at which 50% of the male snow crab population had undergone terminal molt declined approximately 3 mm from 2024, to 79.0 mm CW. Long-term linear declines that are stronger than expected by chance have been observed for both the proportion of males undergoing terminal molt at industry-preferred size ($p = 0.054$), and size at 50% maturity ($p = 0.0009$). While the abundance of newshell morphometrically-mature males has increased 11-fold from the 2023 low point, the abundance of industry-preferred size crab has only doubled, and the last nine survey years have been the nine lowest estimates of industry-preferred abundance in the time series.

The declines in the biomass of large males and the size at terminal molt raise concern for the reproductive potential of the stock for the reasons that follow. First, smaller adult males have smaller sperm reserves than do larger adult males (Sainte-Marie et al. 1995), suggesting that a population with a reduced proportion of large mature males is at increased risk of sperm limitation (Baker et al. 2022). Second, the size at which males undergo the terminal molt to maturity is density-dependent and inversely related to the abundance of large males in the population (Mullowney and Baker 2021). This suggests that populations with lower densities of large males suffer an increased risk of depressed large male biomass in future years, perpetuating the associated risks of sperm limitation and reduced reproductive potential. Finally, recent work showed that 59% of EBS snow crab females had sperm from only one male in their sperm reserves, indicating that mating opportunities may be limited and females may be at risk of sperm depletion (Slater et al. 2024). The CPT noted that, while additional research on size at functional maturity for male EBS snow crab is needed, using ≥ 95mm CW to define maturity for reference point calculation is the recommended option given concerns about stock reproductive potential and the best scientific evidence available at this time. The CPT also noted that a functional maturity cut line size that is greater than the size at morphometric maturity is currently used for most of the king crab stocks, so this change for snow crab would be consistent with previously accepted practices.

In addition, the CPT discussed the issue that declines in size at terminal molt reduce food production and economic opportunity from this stock, since the fishery only harvests large individuals. This decline in the production of large males is counter to the FMP goal of maximizing economic and social benefits to the nation. In their May 2025 meeting, the CPT previously discussed results from Canada indicating that declining trends in size at maturity can be reversed through reduced exploitation rates on large males (Mullowney et al. 2024). This evidence of reversible declines in the production of large males, in addition to the concerns over biological risk to the reproductive status of the stock laid out in the preceding paragraph, motivated the CPT to continue recommending a ≥ 95mm CW definition of maturity.

In response to a SSC recommendation from the June 2025 Report, the CPT discussed the idea of developing an ABC control rule for the snow crab stock. The ABC control rule could specify a maximum exploitation rate on males ≥ 95mm CW. CPT members expressed concern about the availability of scientific information to develop an evidence-based maximum exploitation rate.

CPT members also raised questions about how this approach would differ from the Tier 4 option currently available. The CPT requested further clarification from the SSC about the goals for an ABC control rule for snow crab and what evidence would be considered suitable to set a maximum exploitation rate.

Several fishery participants and other members of the public commented throughout the discussion of the snow crab final SAFE. In response to a question about where the stock is in its rebuilding trajectory, Andrew Olson (NMFS-Juneau) stated that the stock is considered not overfished due to MMB being greater than the minimum stock size threshold (MSST) using the 2024 accepted model, and the stock is making adequate progress toward rebuilding. The rebuilding plan for this stock was implemented in 2023 and the projected target time for rebuilding, taking into account the biology of the species and current environmental conditions, is 6 years. A stakeholder commented that snow crab were abundant and easy to find during the 2024/25 fishery. The CPT noted that the high CPUE in the retained fishery and the perception of abundance were documented in the Skipper Survey, captured in the snow crab ESP report card, and reflected in the risk table (Appendix B). There was also extensive discussion on the high abundance of snow crab/Tanner crab hybrids observed in the 2025 survey, the exclusion of those hybrids from the survey data time series used in the stock assessment model, and the ways in which hybrid abundance could be considered in the State TAC-setting process. As stated in the Tanner crab discussion, the CPT plans to take up a hybrid discussion topic at the May 2026 meeting.

PIRKC final SAFE

Cody Szuwalski presented the final SAFE for PIRKC (see also App. A). The last full stock assessment was in 2022. A directed fishery is not currently open for this stock due to concerns for bycatch of the PIBKC stock, which is overfished and under a rebuilding plan. The author discussed previous CPT and SSC comments, specifically addressing those from the June council meeting.

Tracking down GMACS updates after the last three years was difficult due to the amount of development the framework has undergone. The author provided a comparison of the last accepted model (22.1) and the current GMACS version (model 25.1, using version 2.20.22). The CPT discussed the expectation that versioning changes would continue to be a challenge for this stock on the 3 or 4 year cycle, but that maintaining the GMACS framework for this assessment is still preferred over alternative methods. The GMACS framework allows for the size composition data, historic survey data, and bycatch data to be included in the assessment, whereas a survey smoother or spatio-temporal model would not.

The author presented two models for consideration in this year's assessment: model 25.1, the updated base model with an updated version of GMACS data updated to 2025, and model 25.2, which is model 25.1 with the addition of the historic ADF&G pot survey data from 2003, 2005, 2008, and 2011.The updated base model (model 25.1) exhibited some differences in the model fit to survey biomass in the earlier part of the time series relative to model 22.1, but fits in the more recent time period were similar.

Fits were generally similar for models 25.1 and 25.2. Both had poor fits to the last two years of survey data, which may be due in part to the removal of corner stations from the survey sampling design in 2024 and 2025. Fits to catch time series and size comps were similar, as were estimates of growth, recruitment, and selectivity from the two models. The author recommended adopting model 25.2 since it includes all the available data for this stock. The B_{MSY} proxy for this stock is specified as 35% of the average MMB from 2000 to the present year minus 1, which was a period of no fishing. The author pointed out that although the current stock status is above B_{MSY} the biomass is trending down and may worsen if the trend for the last two survey data points continues.

The CPT endorsed model 25.2 for specification setting and recommended no changes to the B_{MSY} year range. This results in a Tier 4 OFL of 489 tons, and a resulting ABC (using a 25% buffer) of 367 tons. The author and CPT recommended keeping a 25% buffer on this stock. The CPT discussed if consideration of an additional buffer was warranted due to the loss of corner stations during the last two years of the survey, but it was determined that this would likely bias the survey estimates low and therefore was already accounted for in the model process. This same logic was applied to the discussion of the ABC buffer and loss of corner stations during the 2024 cycle for St. Matthew I. blue king crab.

The **CPT recommends moving this stock to a four-year assessment cycle, with the next assessment to occur in 2029**, aligning with the assessment schedule for PIBKC. The CPT also **recommends that if the survey estimate of biomass dips below the MSST value reported here (641.7 tons) it should trigger a more frequent assessment schedule.** In the next assessment cycle, the **CPT recommends that the author consider the loss of the corner stations in more detail in the assessment document.** Prioritization of this recommendation will be determined by the author's bandwidth and prioritization of his other duties, but could at minimum include a survey time series comparison with and without corner stations. If time and resources allow, the author could also work on model-based indices for assessment input, which could be modeled after the SMBKC assessment, assuming that those authors are successful in including model-based indices in their 2026 assessment.

Overfishing Status Updates: WAIRKC, PIGKC, AIGKC, SMBKC

An overview of catch relative to overfishing limits (OFL) for the 2024/2025 fishing season was provided for the WAIRKC, AIGKC, PIGKC, and SMBKC fisheries by Ben Daly (ADF&G–Kodiak), Tyler Jackson (ADF&G–Kodiak), and Caitlin Stern (ADF&G–Juneau). Total catch for each stock was below its respective OFL; therefore, overfishing did not occur.

The WAIRKC and PIGKC stocks are on triennial assessment cycles, with the most recent assessments completed by the Crab Plan Team (CPT) in May 2023. The current OFLs and acceptable biological catches (ABCs) for these stocks will remain in effect until the next scheduled assessments in May 2026.

SMBKC is assessed biennially, with the latest stock assessment completed in September 2024. The existing OFL and ABC for SMBKC will remain in place until the next assessment in September 2026.

AIGKC is on an annual assessment cycle and was last assessed in May 2025. However, the 2024/2025 fishery had not been completed at that time. As such, the overfishing status for AIGKC was evaluated at the September CPT meeting using final fishery data, which confirmed that overfishing did not occur.

New Business

Meeting schedule:

- Nov 6th, 2025, Virtual
- Jan 13th to 15th, 2026, Jan. Modeling Workshop, Seattle, WA (T)
- May 11th - 15th, 2026, Virtual
- Sept 14th - 18th, 2026, Seattle, WA

November 2025 agenda topics:

- AIGKC proposed model runs
- NSRKC final specs
- Maturity data flow
- HCR updates

January 2026 Modeling Workshop topics:

- GMACS short report on version history
    - GMACS to-do list
- Tanner crab
    - GMACS - PIN file
    - Present head-to-head comparison with TCSAM02 assessment model
    - “working” next gen RTMB GMACS prototype
    - BSFRF/NMFS selectivity analysis (Tanner and BBRKC)
    - CIE review - what aspects need to be weighed in on?
- BBRKC - MCMC output & diagnostics
- Model-based indices - NSRKC
- Snow crab - jittering with truncated data

May 2026 agenda topics:

- Emerging issues around unprecedented hybrid abundance (presenters TBD)
    - Management: discussing the application of hybrid biomass for calculation of OFLs and ABCs
    - Biological factors contributing to hybridization: range overlap, influence of mate availability, etc.
    - Other relevant topics as determined by presenters
- Risk tables - work on questions from this mtg
- GMACS short report
- Possible CIE review of Tanner crab (or Sept, timing dependent) (T)

- Jan. Modeling Workshop report
- Research updates (BSFRF, ABSC skipper survey results, others)
- Skipper survey development - methods and applications
- ESP updates or development (T)
- AIGKC Final SAFE
- Proposed models:
    - Tanner
    - Snow
    - BBRKC
    - SMBKC
    - NSRKC
- CPT self-evaluation (T)

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