NORTH PACIFIC FISHERY MANAGEMENT COUNCIL
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BSAI Crab Plan Team Modeling Workshop
REPORT

January 13 - 15th, 2026

AFSC Seattle, WA

Hybrid Meeting

Committee Members in attendance:

Katie Palof, **Co-Chair** (ADF&G-Juneau)
Anita Kroska, **Coordinator** (NPFMC)
André Punt (Univ. of Washington)
Caitlin Stern (ADF&G-Juneau)
Cody Szuwalski (AFSC-Seattle)
Tyler Jackson (ADF&G-Kodiak)
William Stockhausen (AFSC-Seattle)

Members absent: Mike Litzow (Co-Chair; AFSC-Kodiak), Ben Daly (ADF&G-Kodiak), Brian Garber-Yonts (AFSC-Portland), Erin Fedewa (AFSC-Kodiak), Ethan Nichols (ADF&G-Dutch Harbor), Ginny Eckert (UAF/CFOS-Juneau), William Bechtol (UAF-Homer), *Vacant, quantitative expert*

Modeling Workshop

Assessment authors, some members of the CPT, and others interested in crab modeling met during a 2 1/2 day workshop in January 2026. The agenda for this meeting included a range of topics but focused on GMACS updates and implementation for new stocks, guidelines for diagnostics, and other ongoing research questions within the crab assessment framework.

GMACS versions and updates
The group discussed significant challenges stemming from different team members running different versions of the GMACS software (versions 2.20.20 through 2.20.32). A key concern was that version changes between meetings had introduced undocumented differences in model outputs — particularly in how discard catch likelihoods were handled in Bristol Bay Red King Crab models. The group agreed it would be valuable to designate a single "official" version for assessments going into May, with development versions kept separate. The group also suggested that the CPT minutes include a "updates made to GMACS" section that reflect general GMACS updates since the last version used for most accepted models.

Time was spent working through a specific bug: in newer GMACS versions, discard catch no longer appeared correctly in model likelihoods (landed catch and total catch fit fine, but discards were missing). This was traced to changes in how selectivity and discard penalties were handled between versions.

The group also discussed jittering (a model convergence diagnostic) and how the updated jitter routine now respects PIN file initial parameter values, which changed behavior in ways that affected some assessments. During the workshop, jittering was done by Tyler Jackson using one function call to assess whether the jittering routine was exploring the parameter space appropriately. The goal was to visualize the distribution of initial parameter values and confirm that jittering is respecting bounds and PIN file starting values as intended. Overall, the group was happy with the jittering process and output.

The group discussed formalizing a testing framework — specifically, running a single function call evaluation when switching versions as a "necessary but not sufficient" check before full estimation. Sharing post-CPT base model input files to a central GitHub repository (maintained by Buck) was identified as a best practice to enable cross-version validation.

There was a discussion about standardizing likelihood profile generation (e.g., for catchability, recruitment, and natural mortality) using R scripts, rather than ad-hoc manual approaches. The group noted that tools vary across teams and that there's an opportunity to share scripts more broadly. Tyler's GMACS R output package was highlighted as something the ADF&G authors have found useful.

The group discussed an SSC recommendation to provide more realistic catch projections with the OFL calculation. The projection module in GMACS currently assumes that the OFL is taken, but other projections can be done in GMACS. The question would be - which range of OFL% catches should be included? This could be presented in the projections with a range of F values below the OFL.

GMACS to-do list:

- Integrate time-varying selectivity and growth into forecasts.
- GMACS short report covering differences among versions, for authors to reference (Buck was working on this for May 2026 CPT).
- Work on a projection module in GMACS that will facilitate doing MSE's in GMACS. Expected completion: December 2026.
- Testing code that exists to enter State of Alaska HCRs into GMACS.
- Adding in the ability to use environmental drivers into GMACS. This should make it possible to add covariates in the future (Andre is working on this).

Research topics

Mortality manuscript

Cody presented draft work on modeling episodic natural mortality events (e.g., temperature-linked die-off events). He showed a GAM-based approach linking body size metrics to mortality, and a projection tool that allows scenario-based projections under different natural mortality assumptions. The group discussed challenges with incorporating stochastic mortality events into the formal harvest control rule framework, and the difficulty of setting meaningful reference points (e.g., under Tier 3 assessments) when environmental forcing is a major driver.

RTMB GMACS development update

Work is underway by Buck and Grant Adams to develop an RTMB version of GMACS since ADMB will not be supported in the future. This work is in the early phases, and the main challenge at this time is determining the best parameterization structure when porting the model over from ADMB. A GitHub repo is started for this work and when it is further along the authors will ask GMACS users for testing and input.

BSFRF SBS analysis

Buck presented work on modeling survey selectivity using GAMs, examining environmental covariates (sediment grain size, sorting, depth, temperature) as drivers of crab catchability at the haul level for the side by side work using both NOAA and BSFRF data. For Tanner crab the best model included size with a size/temperature interaction. Temperature showed a modest effect at larger sizes. For Bristol Bay red king crab a simple smooth on size was the best model — none of the environmental covariates added meaningful predictive power. An unexpected dome-shaped selectivity pattern for NMFS gear at intermediate sizes prompted discussion about data artifacts vs. a real biological signal for this stock.

The group discussed next steps with Buck's work and when information from this analysis would be appropriate to bring forward in proposed models. Currently the priority for the Tanner crab model is the transition to GMACS and for the snow crab model it is resolving model convergence issues, therefore no model scenarios were recommended at this time. For BBRKC the lack of a relationship similar to the other stocks makes next steps more questionable at this time.

GMACS scallop model

Tyler presented an Alaska scallop assessment model in GMACS for the group's review. This model covered data from several districts (Northeast, Yakutat, and others). Key highlights:

- Pre-2009 catch data are unreliable due to informal recording practices (captains estimating basket counts by eye), so model misfits to early data were considered acceptable.
- Post-2009 observer data are more structured, though discard data remain small relative to retained catch.
- CPUE standardization used GAMs (borrowed from Aleutian Islands methods), but fitting multiple CPUE series simultaneously is challenging because different beds within districts are fished inconsistently across years.
- Survey biomass data are sparse and have large CVs in some districts, limiting model leverage.
- Size composition fits were reasonable in aggregate but showed some residual patterns, particularly in early years.
- The group discussed M (natural mortality) assumptions and whether the model structure (single-area, no spatial dynamics) could realistically reconcile divergent trends across areas.

Tyler appreciated the group's review.

Hybrid snow/Tanner crab

Discussion focused on how the snow crab and Tanner crab assessments should include hybrid data in May 2026 model runs as sensitivity runs. The consensus was that the snow and Tanner crab assessment authors should each present three model runs on this topic. The first run should include hybrids in the fishery data, the second run should include hybrids in survey data, and the third should include hybrids in both fishery and survey data. The group agreed that this plan would be a useful step in exploring the effects of including hybrid crab in the assessments. The group also noted that it would be helpful to see a quantification of snow and Tanner crab spatial overlap over time and an analysis of possible correlations between spatial overlap and hybrid abundance. Participants noted that hybrid data products might be available from the cooperative pot surveys.

New business

Upcoming CPT meeting dates and locations:

- May 11th - 15th, 2026: virtual
- Sept. 14th - 18th, 2026: Seattle, WA

Others in attendance: **indicates virtual*

Grant Adams
Lee Cronin-Fine
Scott Goodman*
Melissa Haltuch
Madi Heller Shipley
Kirstin Holsman*
Jim Ianelli
Cory Lescher*
Danielle Merculief*
Cole Monnahan
Harrison Moore*
Mateo Paz-Soldan*
Serine Reeves*
Nicole Schmidt*
Ian Stewart*