C2 BSAI CRAB STOCKS

MIKE LITZOW (CPT CO-CHAIR)

JUNE 2024 NPFMC MEETING | KODIAK, AK

CPT MEETING MINUTES – MAY 14TH – 16TH | ANCHORAGE, AK

BSAI CRAB STOCKS MANAGEMENT TIMING

Aleutian Islands golden king crab
Pribilof Islands golden king crab *
Western Aleutian Islands(Adak) red king crab *

→ Assessed in May/June

→ Triennial cycle, next assessment in 2026

EBS snow crab
Bristol Bay red king crab
EBS Tanner crab
Pribilof Islands blue king crab *
Pribilof Islands red king crab *
St. Matthew blue king crab *

→ Biennial cycle, next assessment in 2025

→ Assessed in September/ October

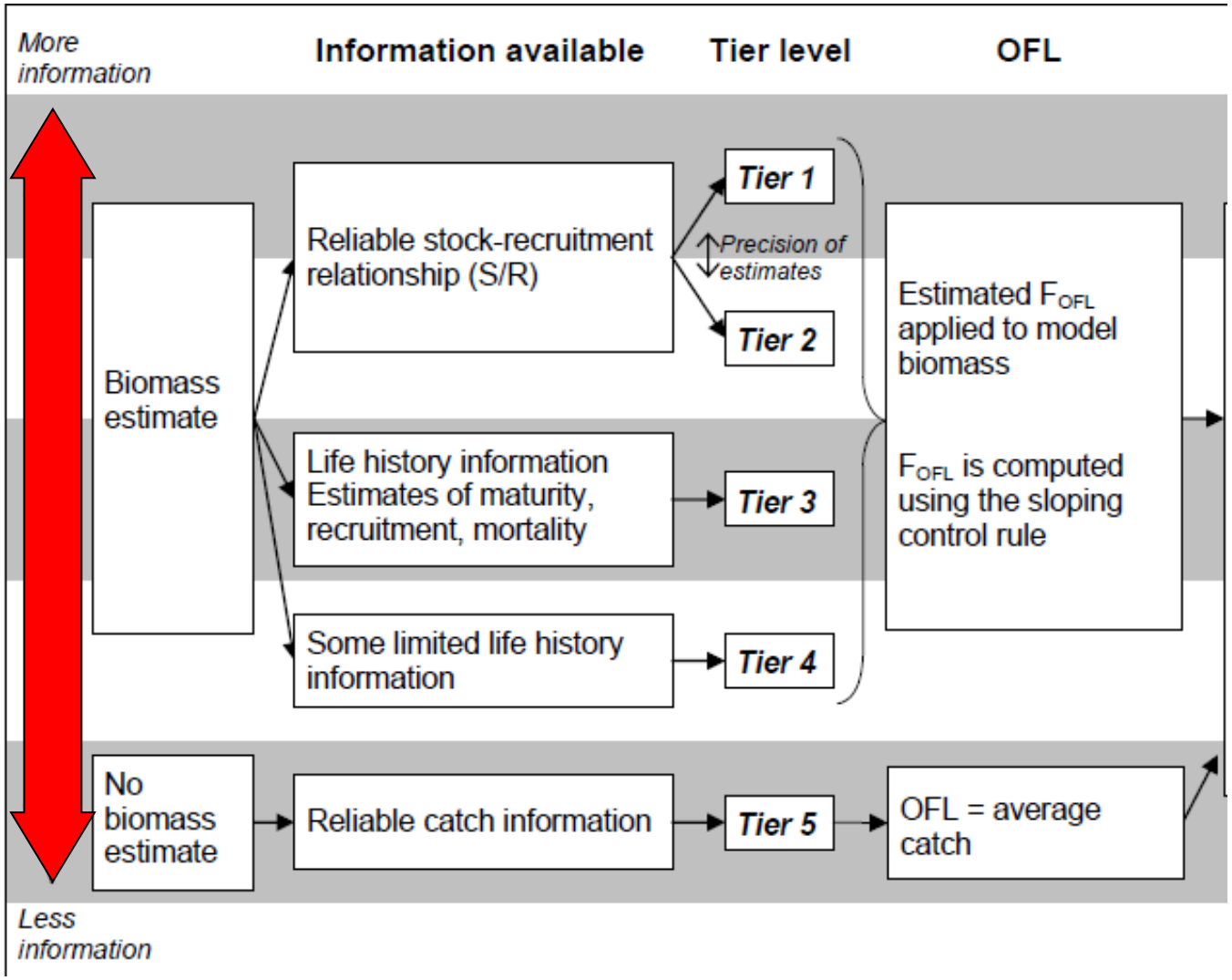
→ Triennial cycle, next assessment in 2025

→ Biennial cycle, next assessment in 2024

Norton Sound red king crab

→ Assessed in January/ February

Nov (virtual) / Dec council



ABC buffer

10-20%

10-25%

25-40%

MAY 2024 AGENDA

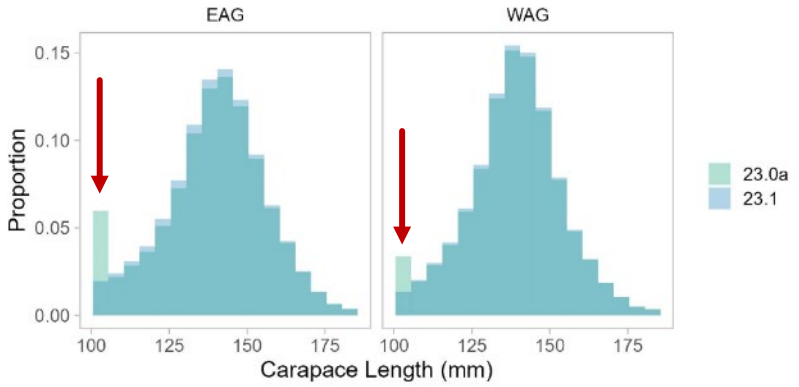
- ✓ **AIGKC final assessment, OFL and ABC**
- ✓ Proposed model runs:
  - ✓ Tanner crab
  - ✓ Bristol Bay red king crab
  - ✓ St. Matthew blue king crab
  - ✓ Snow crab
- ✓ Bering Sea Fisheries Research Foundation research updates
- ✓ Council topic updates
- ✓ ESP updates and planning
- ✓ Survey updates
- ✓ Crab observer program updates
- ✓ GMACS updates

ALEUTIAN ISLAND GOLDEN KING CRAB (AIGKC)

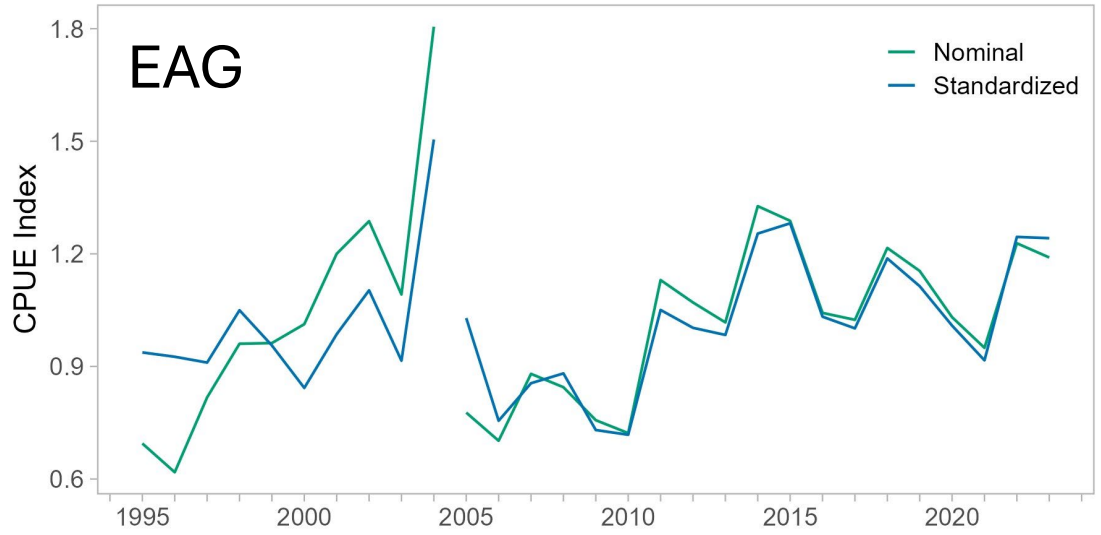
FINAL SAFE, OFL / ABC 2024

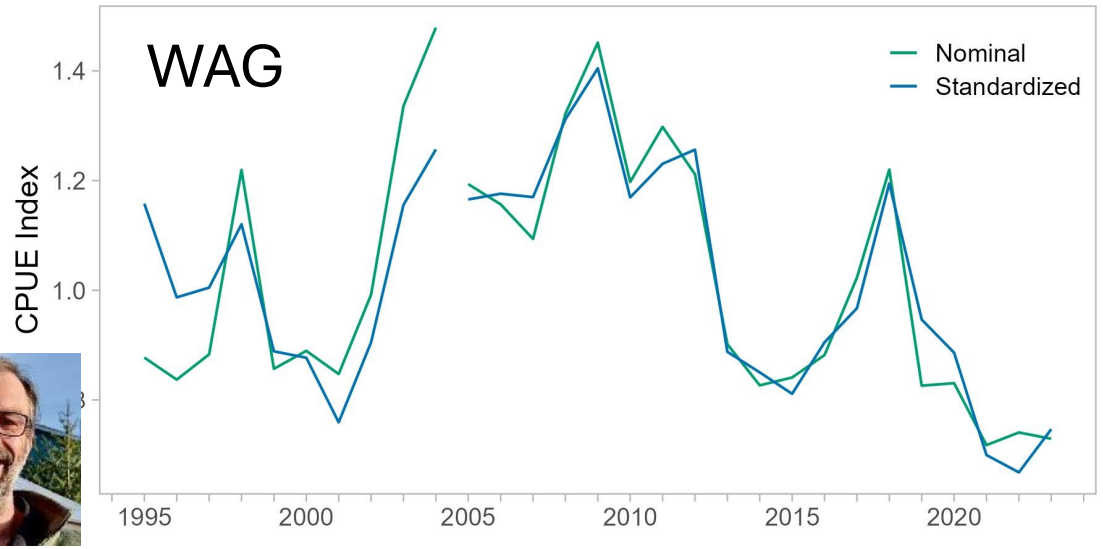
AIGKC EXPLORATIONS

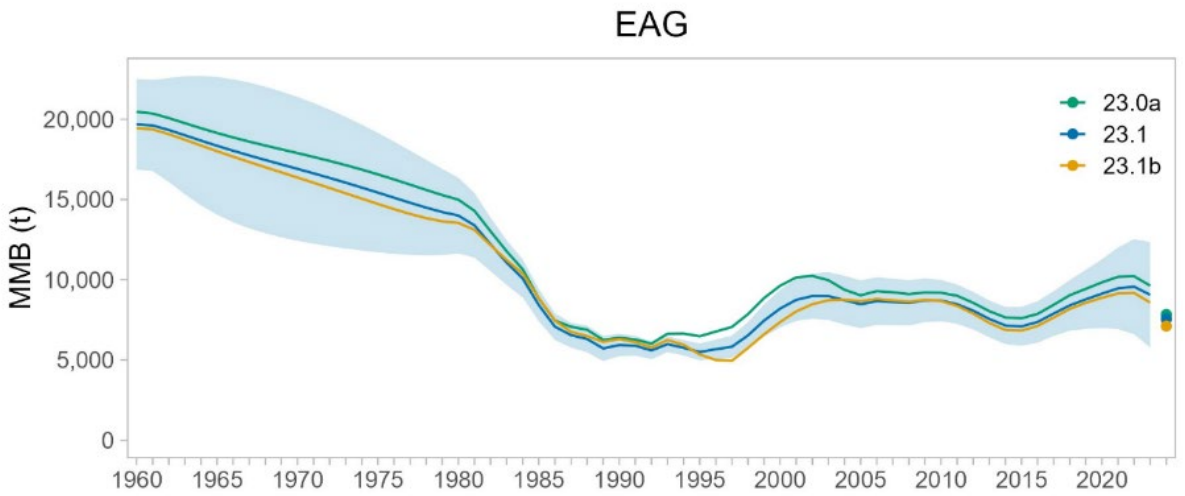
- First final models under new authorship (Tyler Jackson)
- Data streamlining and recreating historic data from database performed in Jan 2024
- CPUE standardization
  - Detailed in appendix A; updated reviewed in Jan 2024
  - Changes from Jan to May:
    - Explore Tweedie distributions
    - Remove s(Lon, Lat) as covariate – overfitting concerns
    - Correct fish ticket data pull (included many 0 data entries that were errors)
- Model options:
  - 23.0a (base model 2023)
  - 23.1 (**CPT recommended:** 23.0a + truncated size composition to exclude crab less than the smallest size bin)
  - 23.1b (23.a + two selectivity periods in pre-rationalization CPUE)

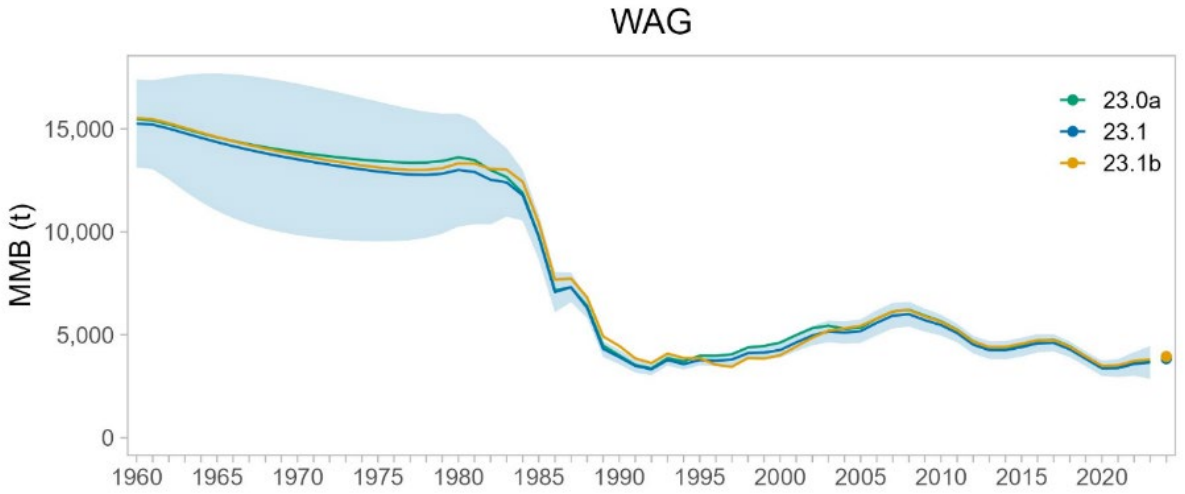


MODEL FIT


EAG
Nominal
Standardized
CPUE Index
1.8
1.5
1.2
0.9
0.6
1995
2000
2005
2010
2015
2020


WAG
Nominal
Standardized
CPUE Index
1.4
1.2
1.0
1995
2000
2005
2010
2015
2020


EAG
23.0a
23.1
23.1b
MMB (t)
20,000
15,000
10,000
5,000
0
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020


WAG
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15,000
10,000
5,000
0
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020

FINAL RECOMMENDATIONS

- Model 23.1 for both areas
- 25% ABC buffer consistent with 2023 assessment
  - Level of uncertainty similar
    - Improvements in data processing and CPUE standardization
    - Poor model fit to index and poor retrospective patterns still prevalent

Table 14: Comparison of biological reference points for EAG models.

Model	MMB (t)	$B_{35\%}$ (t)	$\frac{MMB}{B_{35\%}}$	$\bar{R}_{1987-2017}$	$F_{35\%}$	F_{OFL}	OFL (t)
23.0a	7,834	7,138	1.10	2,822	0.55	0.55	3,035
23.1	7,551	6,905	1.09	2,781	0.55	0.55	2,825
23.1b	7,112	6,906	1.03	2,795	0.59	0.59	2,699

Model	MMB (mil lb)	$B_{35\%}$ (mil lb)	$\frac{MMB}{B_{35\%}}$	$\bar{R}_{1987-2017}$	$F_{35\%}$	F_{OFL}	OFL (mil lb)
23.0a	17.27	15.74	1.10	2,822	0.55	0.55	6.69
23.1	16.65	15.22	1.09	2,781	0.55	0.55	6.23
23.1b	15.68	15.23	1.03	2,795	0.59	0.59	5.95

Table 15: Comparison of biological reference points for WAG models.

Model	MMB (t)	$B_{35\%}$ (t)	$\frac{MMB}{B_{35\%}}$	$\bar{R}_{1987-2017}$	$F_{35\%}$	F_{OFL}	OFL (t)
23.0a	3,904	4,698	0.83	1,869	0.54	0.44	945
23.1	3,837	4,638	0.83	1,866	0.54	0.44	900
23.1b	3,944	4,716	0.84	1,914	0.57	0.46	951

Model	MMB (mil lb)	$B_{35\%}$ (mil lb)	$\frac{MMB}{B_{35\%}}$	$\bar{R}_{1987-2017}$	$F_{35\%}$	F_{OFL}	OFL (mil lb)
23.0a	8.61	10.36	0.83	1,869	0.54	0.44	2.08
23.1	8.46	10.23	0.83	1,866	0.54	0.44	1.98
23.1b	8.70	10.40	0.84	1,914	0.57	0.46	2.10

BRISTOL BAY RED KING / TANNER / ST. MATTHEW I. BLUE KING CRAB PROPOSED MODELS

CPT recommendations:

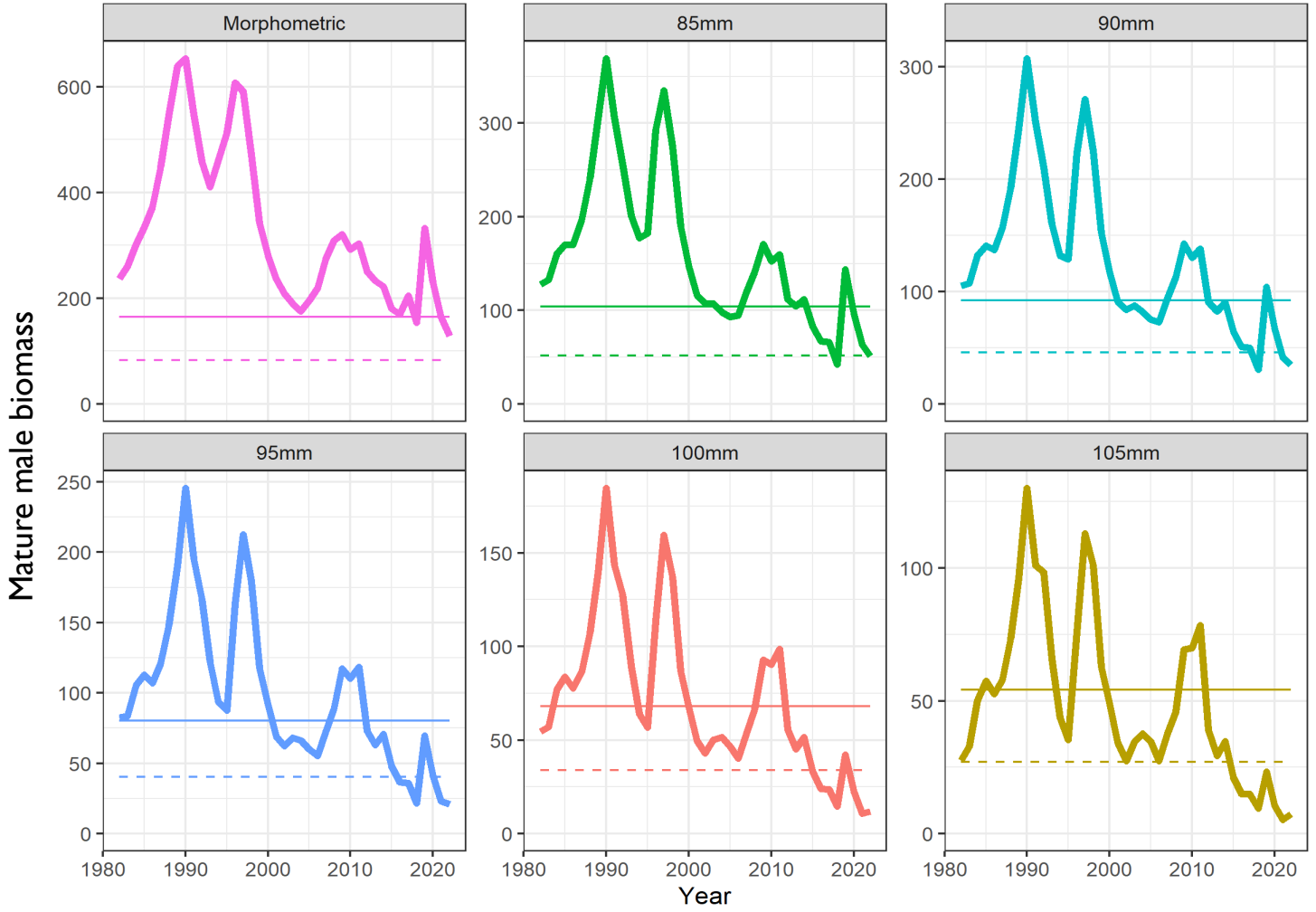
- Bristol Bay red king crab
  - Two Tier 3 models (2023 accepted model, additional model without time block for molt probabilities)
  - Tier 4 fallback from 2023
- Tanner crab
  - One Tier 3 model (2023 accepted model with updated BSFRF data)
  - Good initial progress on GMACS version, not ready for specs this cycle
  - Tier 4 fallback from 2023
- St. Matthew blue king crab
  - Two Tier 4 models (one accepted from 2016)

SNOW CRAB: PROPOSED MODEL RUNS 2024

- Proposed models
  - Tier 3 - Model 23.3a (last year's accepted model)
  - Tier 4 fallback option (two versions)
- Narrative description of modeling approach (in document on agenda)
- Currency of management
- Population projections under continued sea ice decline

CURRENCY OF MANAGEMENT: IMPLICATIONS FOR STATUS & OFL

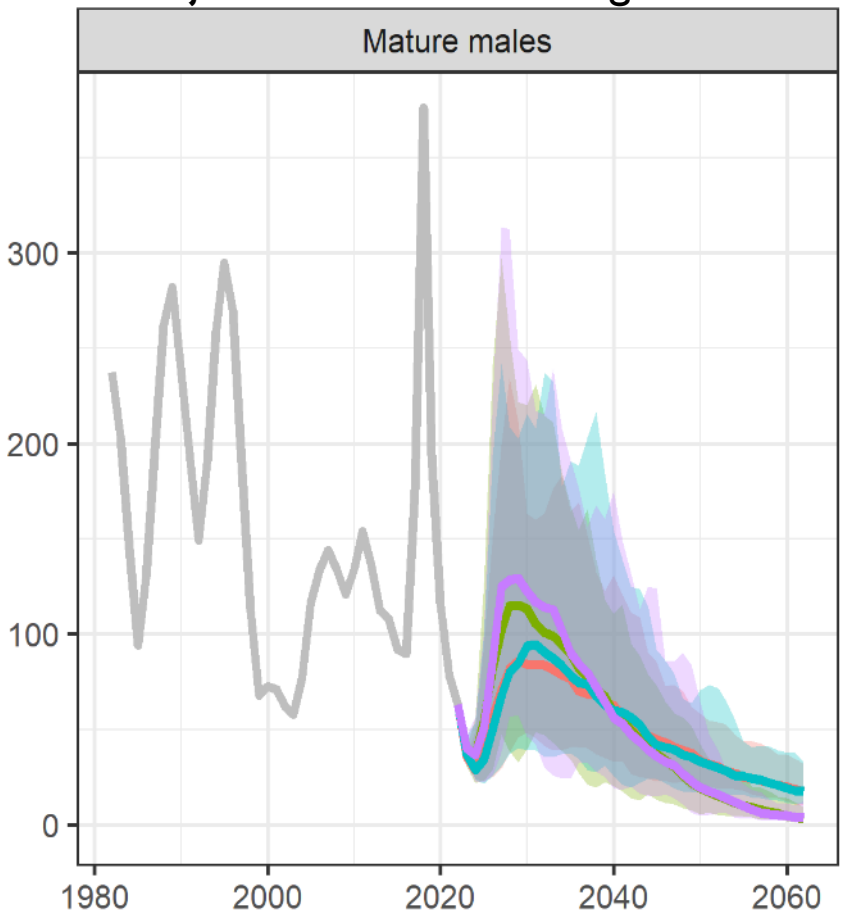
- (Right) Estimated mature male biomass from model 23.3a using different currencies of management. Solid lines = BMSY, dashed line = Minimum Stock Size Threshold
- CPT recommended an approach for setting an appropriate currency of management while accounting for uncertainty in the portion of the stock driving density dependence
- Expect to see this approach brought forward in September/October to support spec setting



DECADAL-SCALE POPULATION PROJECTIONS

- Three recent papers have confirmed the importance of marginal ice habitat for snow crab (Szuwalski et al. 2023, Mullowney et al. 2024, Litzow et al. in press)
- **Density dependence** and **environmental covariates** explain variability in *mortality*, *recruitment* and *maturity* better than no covariates.
- Impacts of changes in **ice** are strong for *mortality* and *recruitment*
- **Density dependence** in *mortality* allows for a short window for rebound, after which the population declines

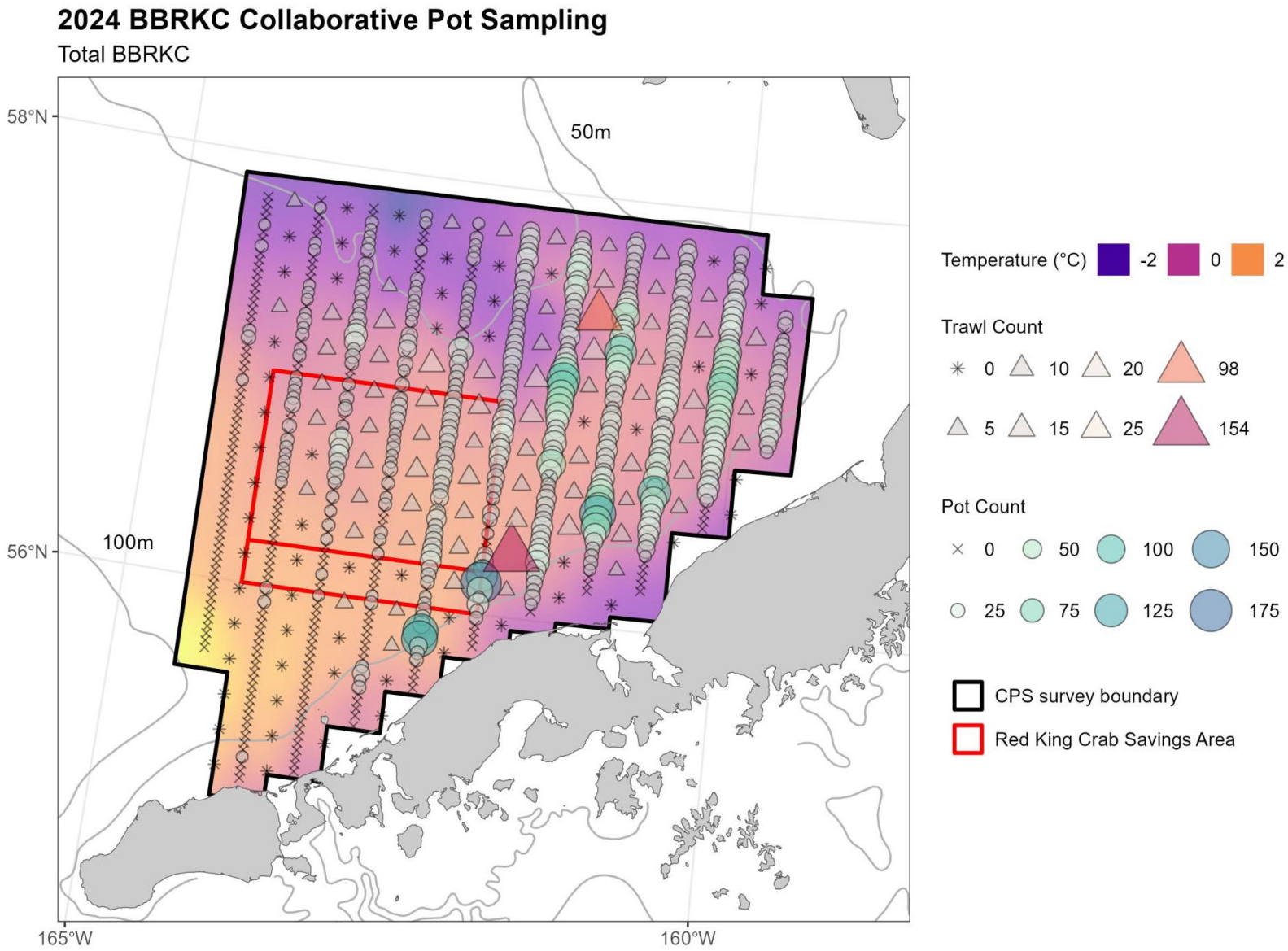
Projection under declining sea ice



BALANCE OF CPT REPORT

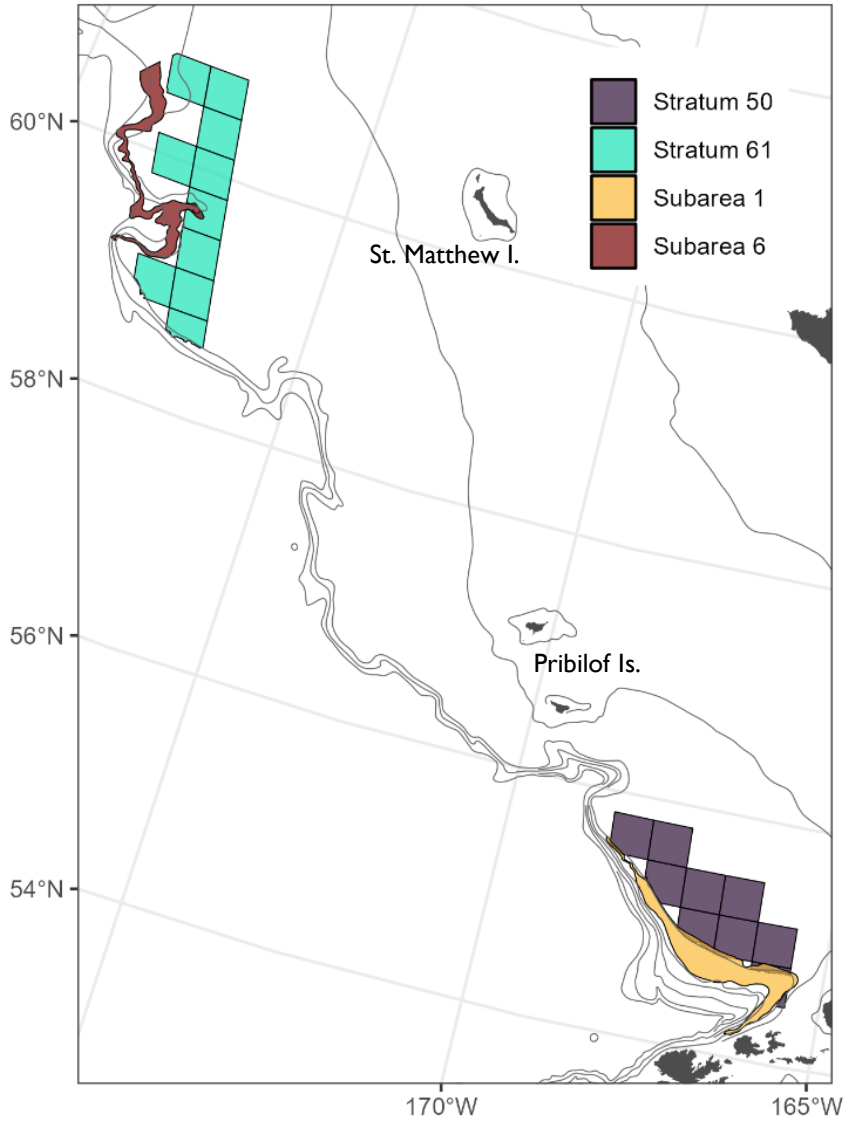
BERING SEA FISHERIES RESEARCH FOUNDATION RESEARCH UPDATE

- CPS2
  - 646 pot lifts, 128 Nephrops trawl sets
  - ~7,000 RKC captured
  - Pot: 76% male / 24% female
  - Trawl: 44% male / 56% female
- Other BBRKC work
  - Camsled / larval collectors
  - Sat tags



BERING SEA FISHERIES RESEARCH FOUNDATION RESEARCH UPDATE

- Slope:shelf gear comparison to 400m for survey modernization (August 2024)
- *Opilio* collaborative sampling tentatively planned alongside NMFS, using pots & Nephrops trawl



QUESTIONS?

- Thanks to all CPT members and crab assessment authors.
- Thanks to Sarah Rheinsmith-Gardiner for ALL of her work as our plan team coordinator!