C3 BSAI CRAB STOCKS

KATIE PALOF & MIKE LITZOW (CPT CO-CHAIRS)

OCTOBER 2025 NPFMC MEETING (VIRTUAL)

CPT MEETING MINUTES - SEPT 8TH– 12TH (VIRTUAL)

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, next 2029

→ Assessed in September/ October

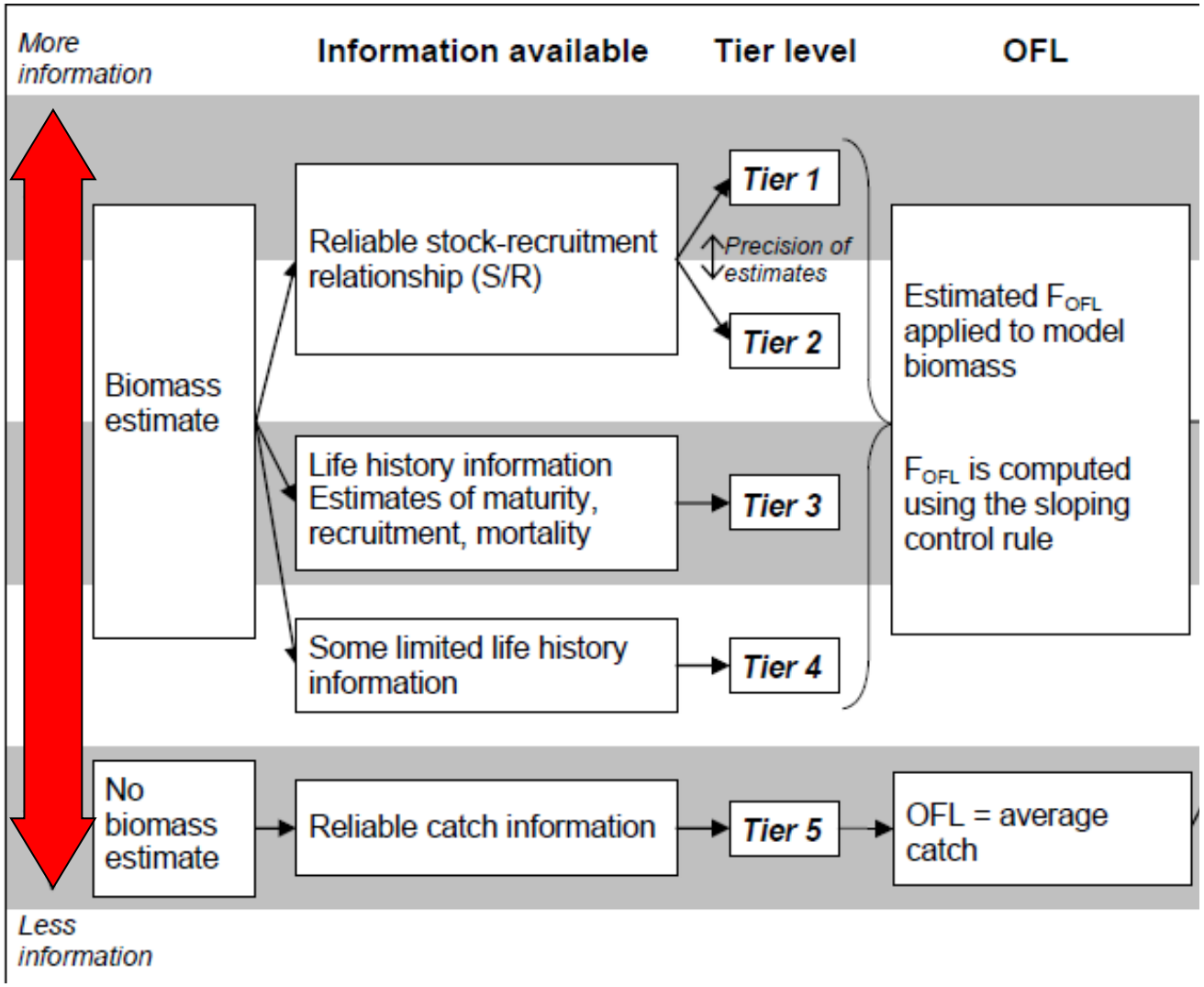
→ Triennial cycle, next assessment in 2025

→ Biennial cycle, next assessment in 2026

Norton Sound red king crab

→ Assessed in January/ February

Nov (virtual) / Dec council

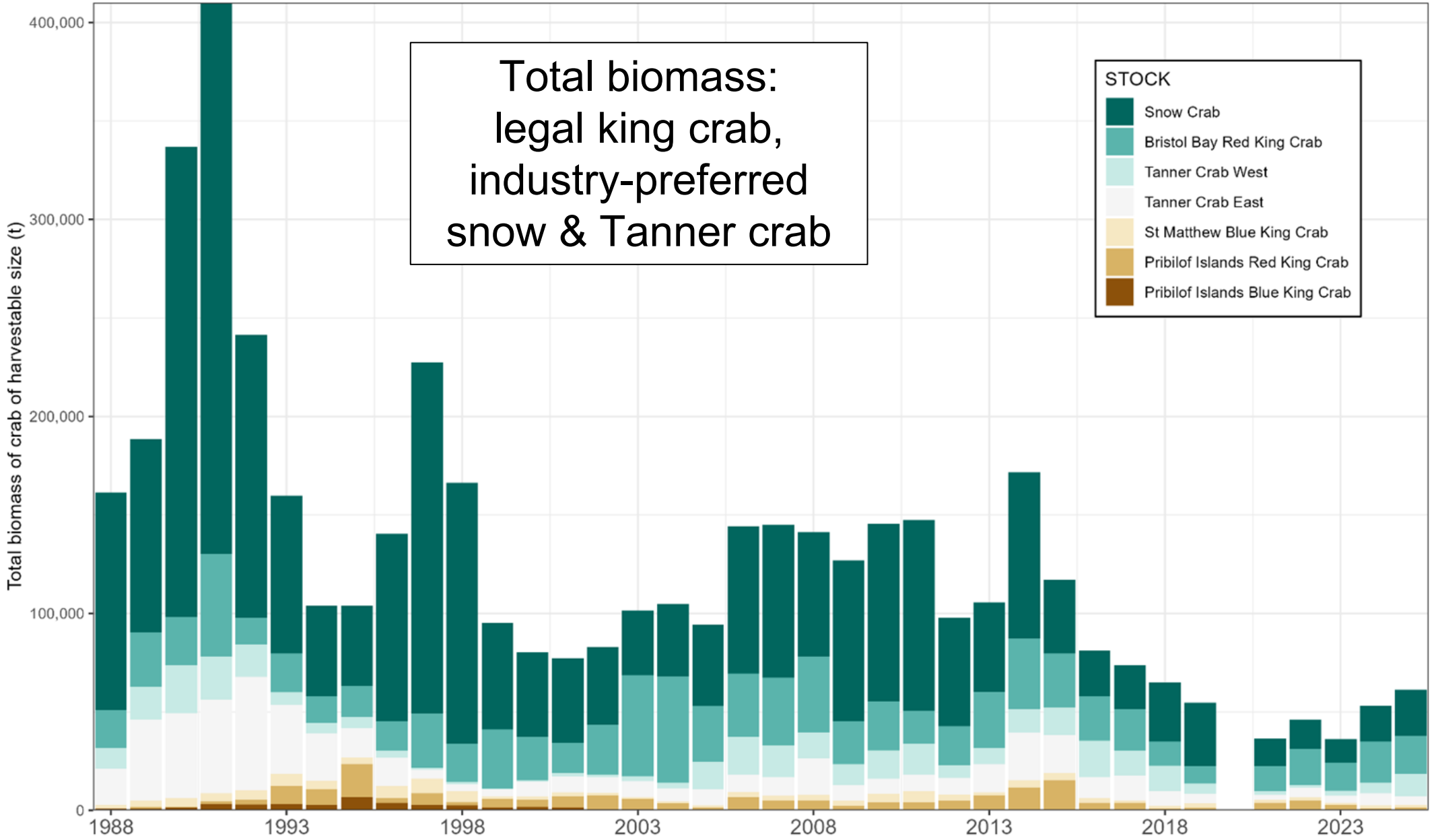

More information
Information available
Tier level
OFL
Biomass estimate
Reliable stock-recruitment relationship (S/R)
Tier 1
Precision of estimates
Tier 2
Life history information Estimates of maturity, recruitment, mortality
Tier 3
Some limited life history information
Tier 4
Estimated F_{OFL} applied to model biomass
F_{OFL} is computed using the sloping control rule
No biomass estimate
Reliable catch information
Tier 5
OFL = average catch
Less information

September 2025 Agenda

- ✓ Summer trawl survey results
- ✓ 2023/24 fishery season summary (taken up under each stock)
- ✓ **Snow crab final assessment, OFL and ABC,** and ESP report card
- ✓ **Tanner crab final assessment, OFL and ABC,** and ESP
- ✓ **BBRKC final assessment, OFL and ABC,** and ESP report card
- ✓ **PIRKC final assessment, OFL and ABC**
- ✓ **PIBKC final assessment, OFL and ABC**
- ✓ Risk table drafts and next steps
- ✓ Overfishing updates on non-assessed stocks
- ✓ Ecosystem status report – Bering Sea
- ✓ BSFRF research updates
- ✓ Skipper survey updates
- ✓ NSRKC research track model-based indices progress
- ✓ New business

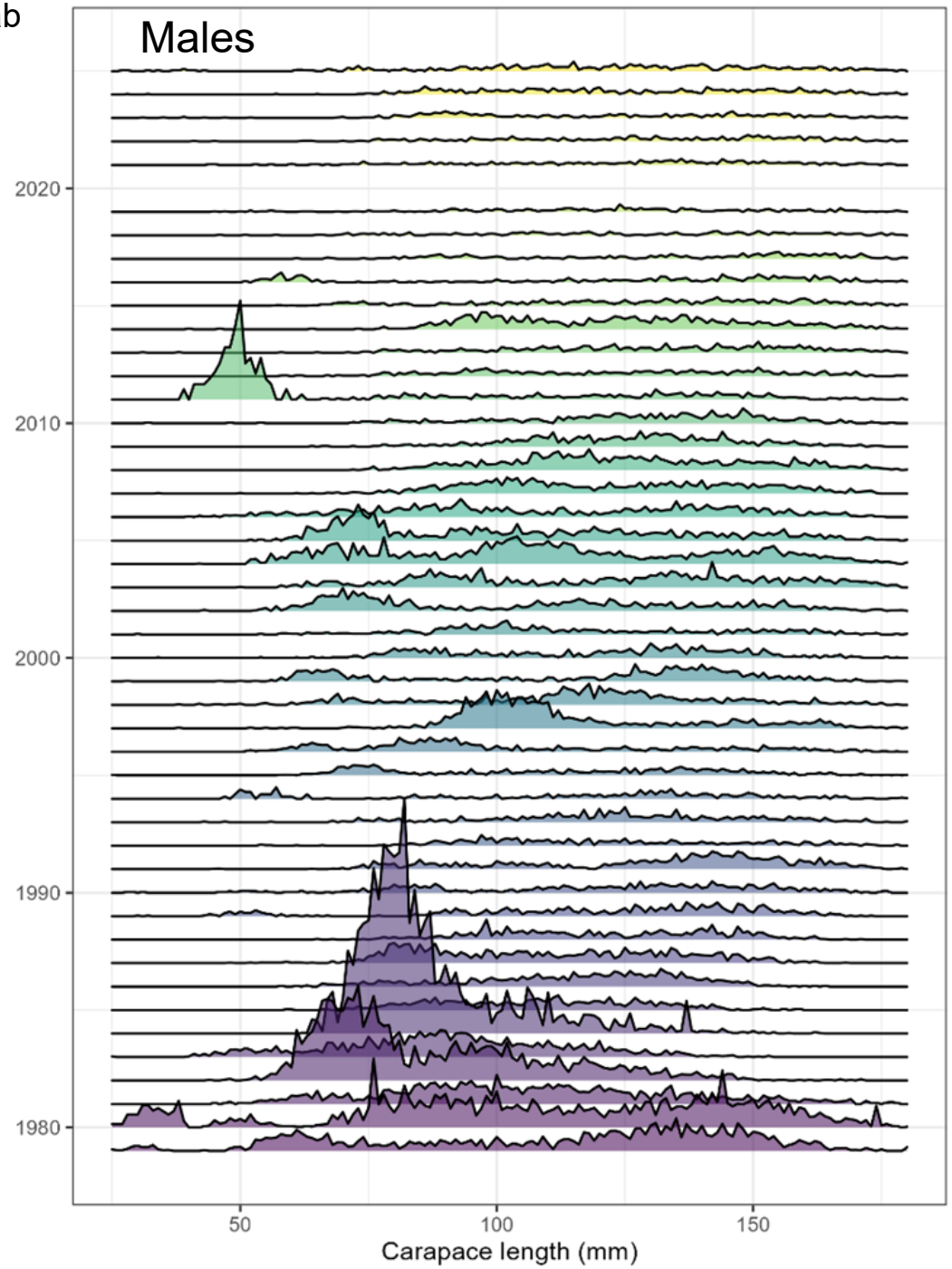
Survey Results

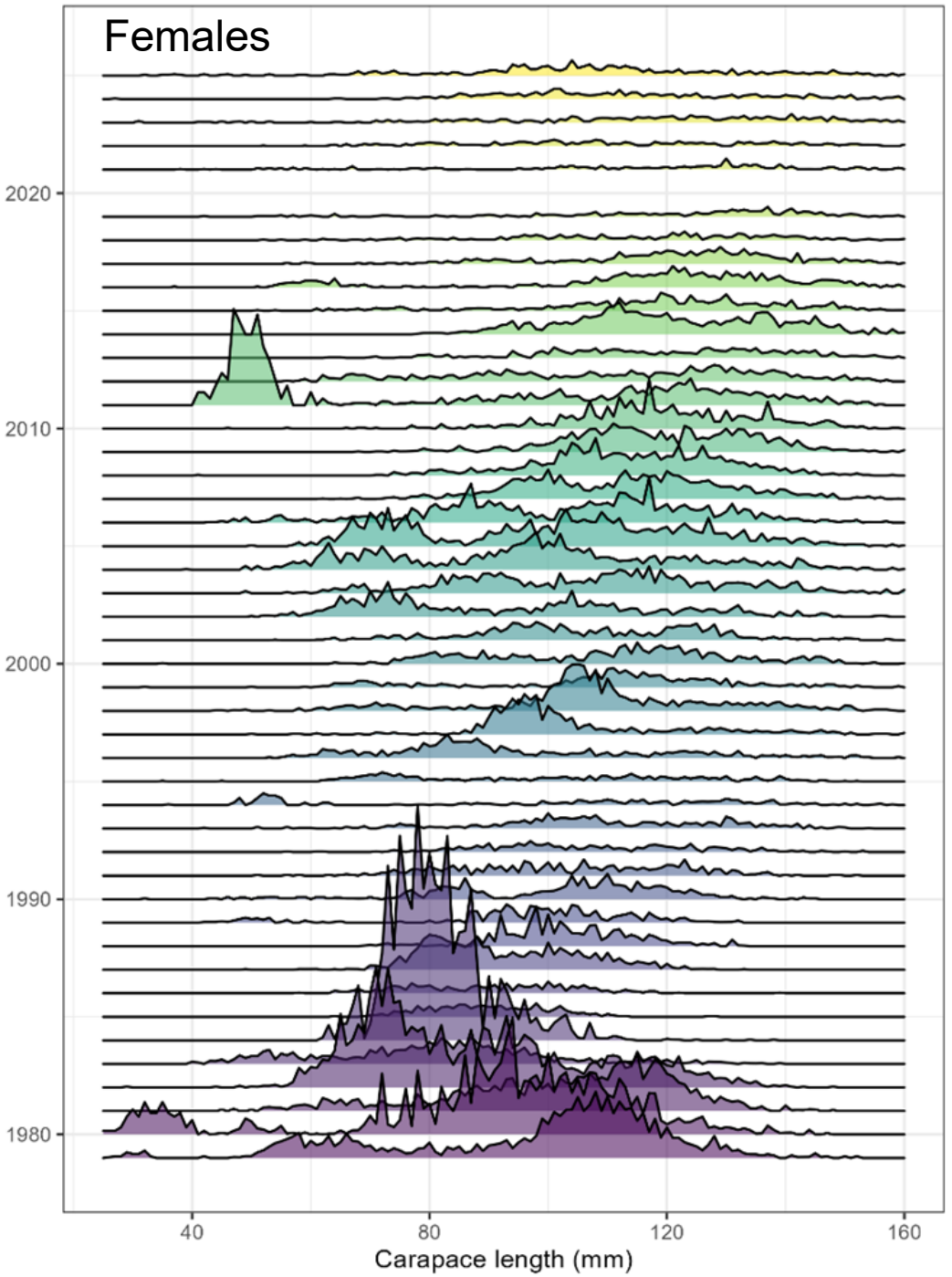
- 349 stations in Eastern Bering Sea, May - July
- Northern Bering Sea also surveyed, those results not presented to CPT
- Total harvestable biomass gradually recovering from 2021 low



Bristol Bay Red King Crab

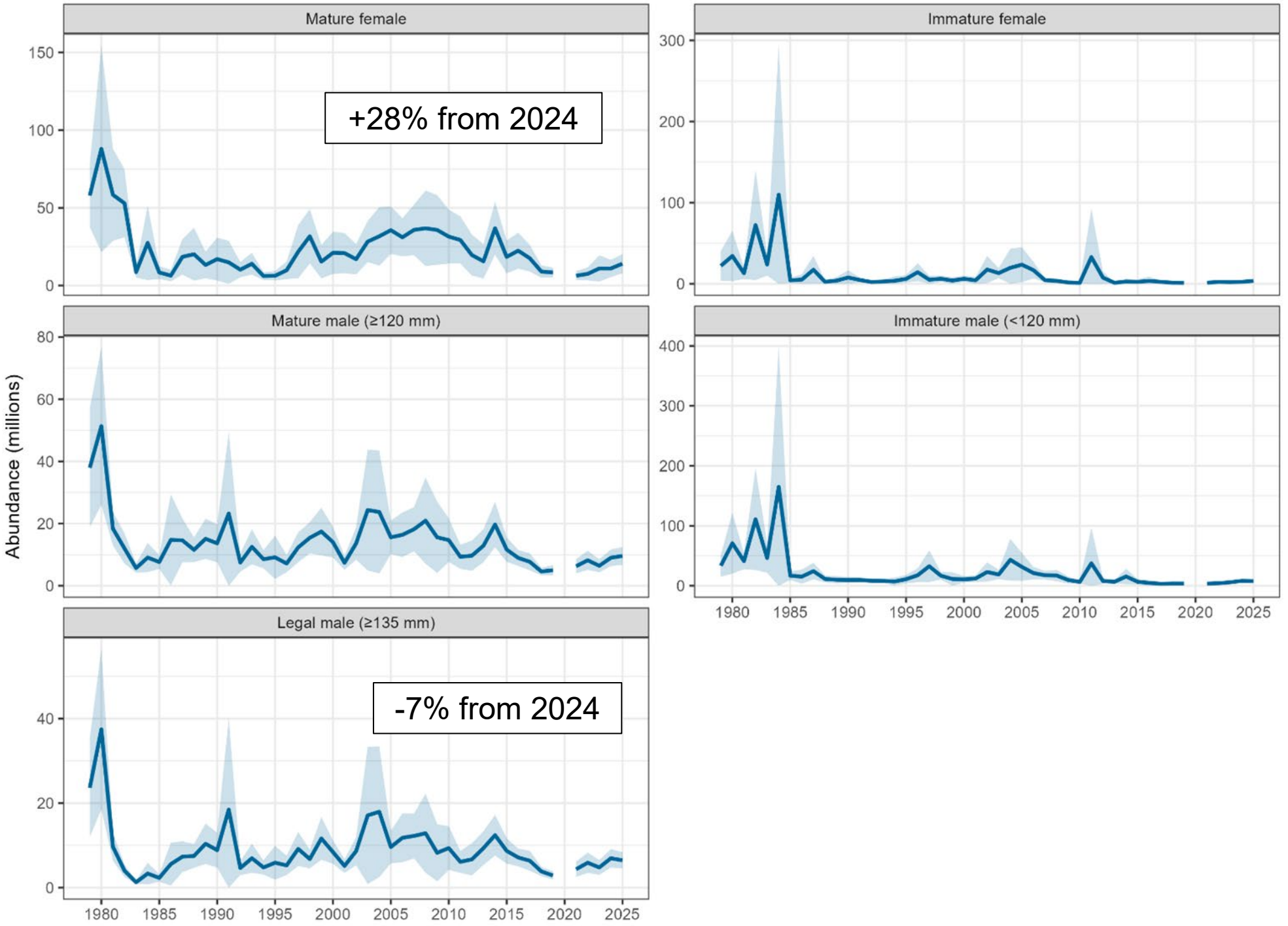
- No retow this year (4% mature females not molted-mated)
- Male & female abundance remain near historic lows



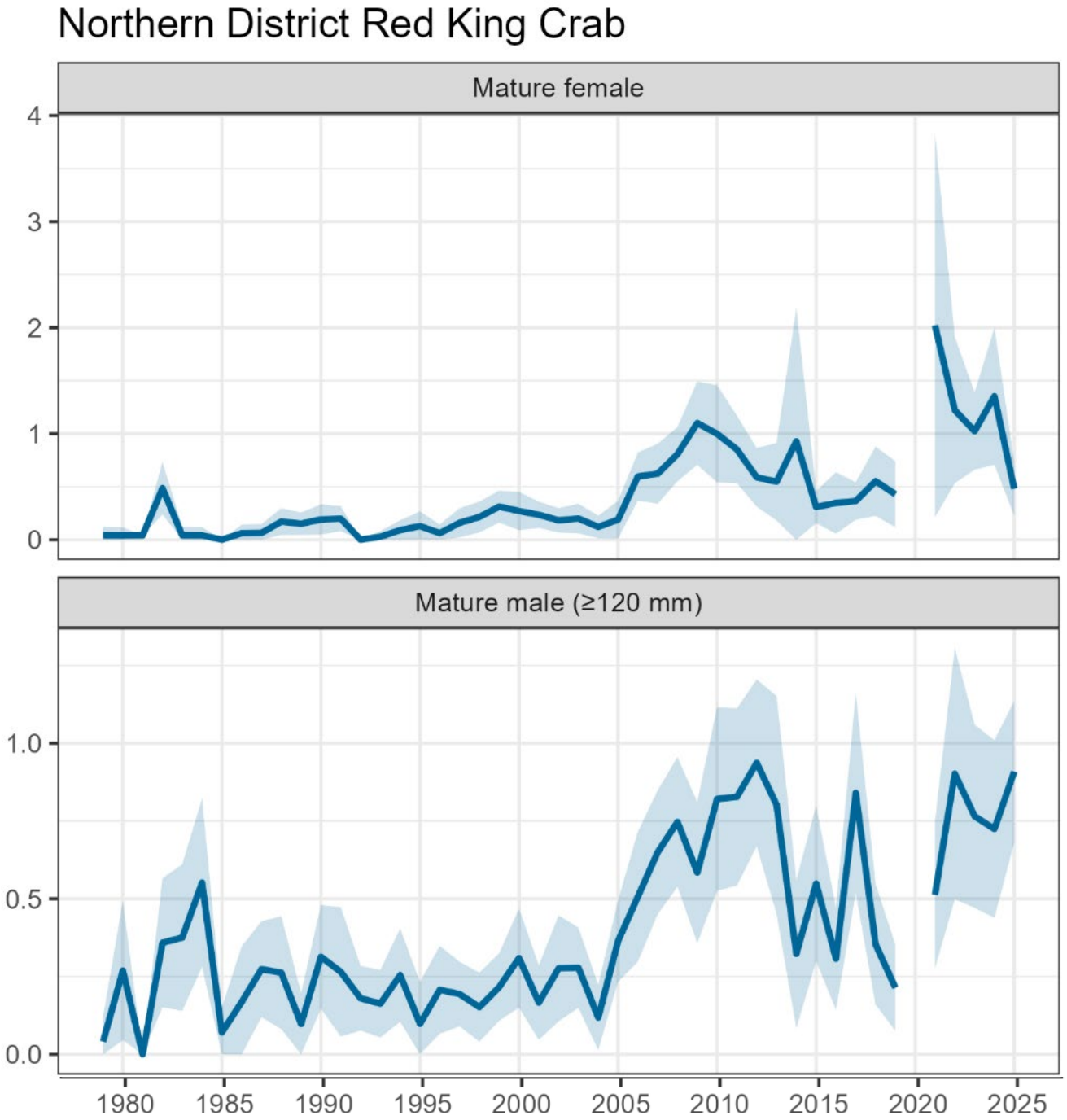


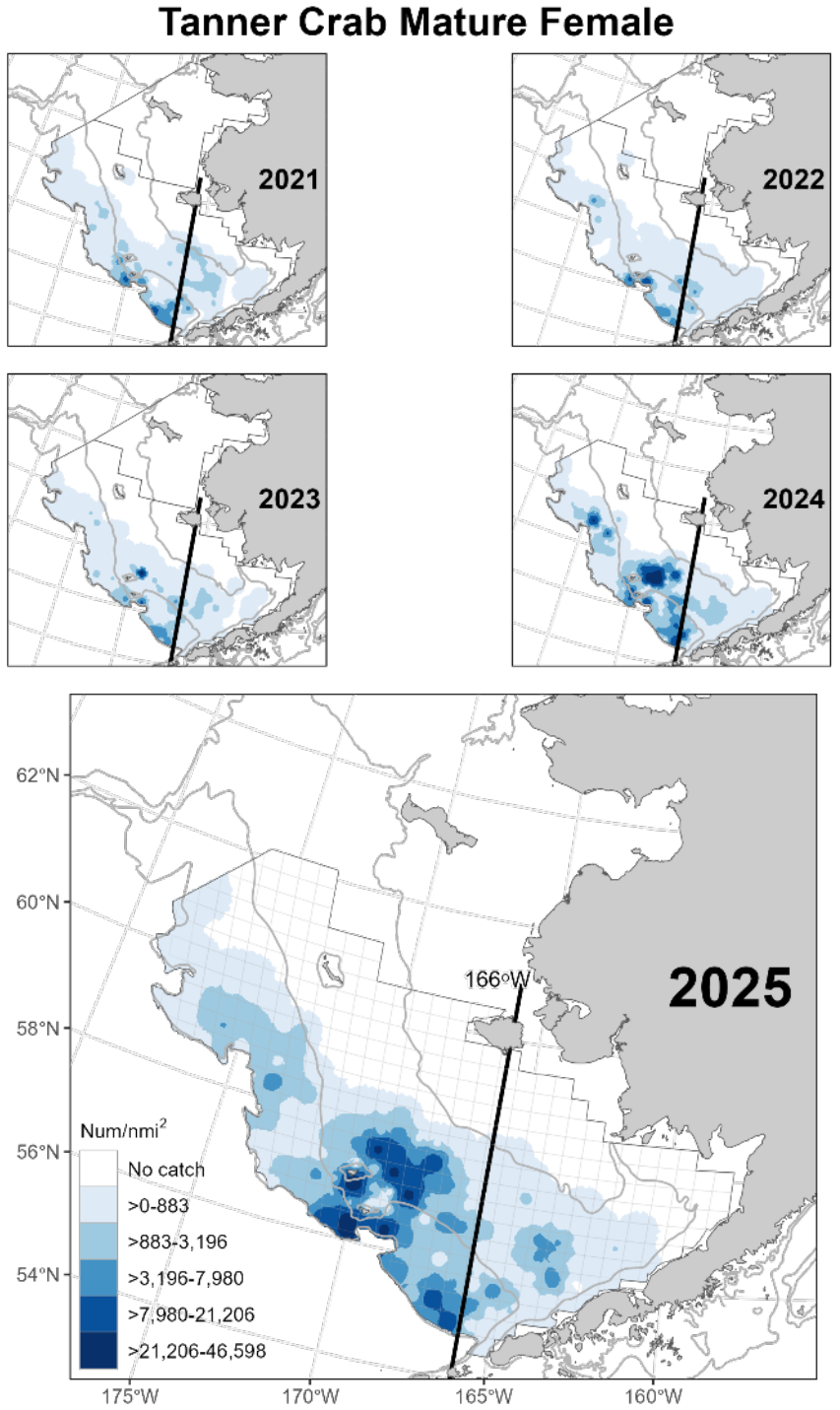
Bristol Bay Red King Crab

- Mature female & male abundance / legal abundance showing positive trend since 2021
- Immature abundance still extremely low



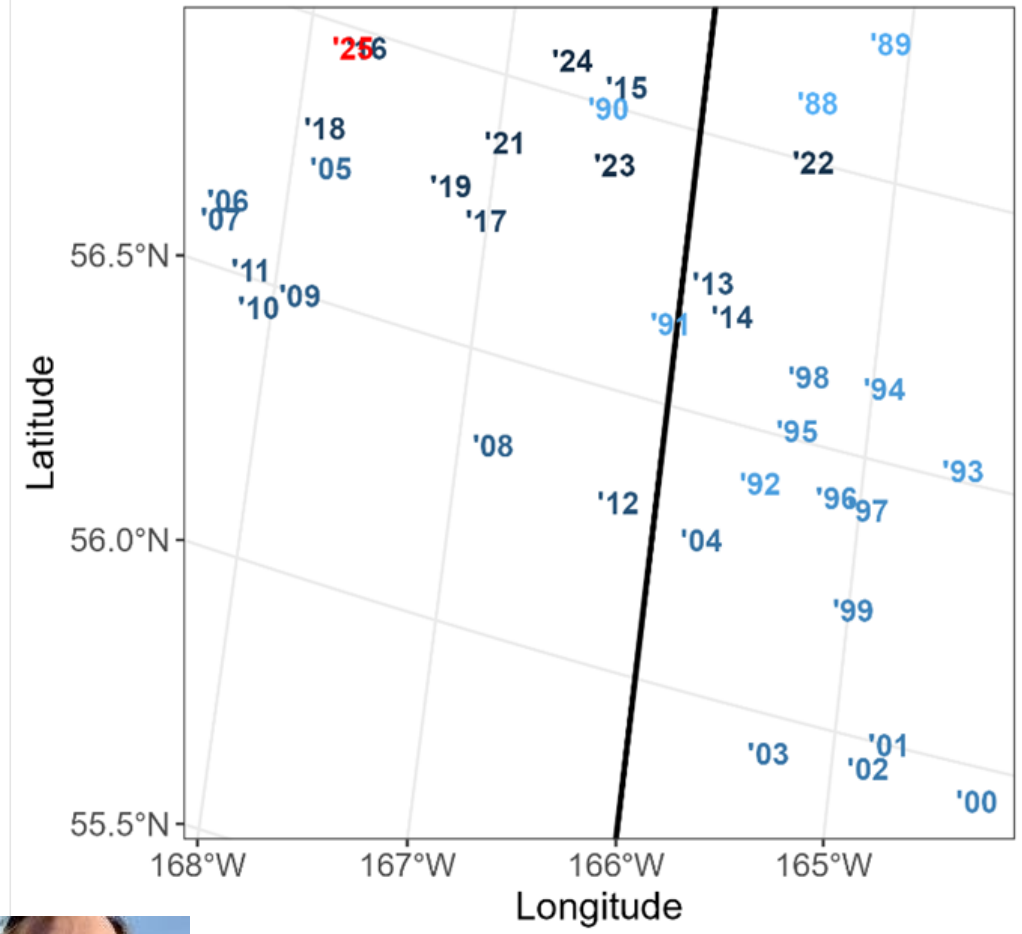
- Mature female & male abundance at elevated levels seen since ~2006
- Magnitude of abundance still much lower than Bristol Bay

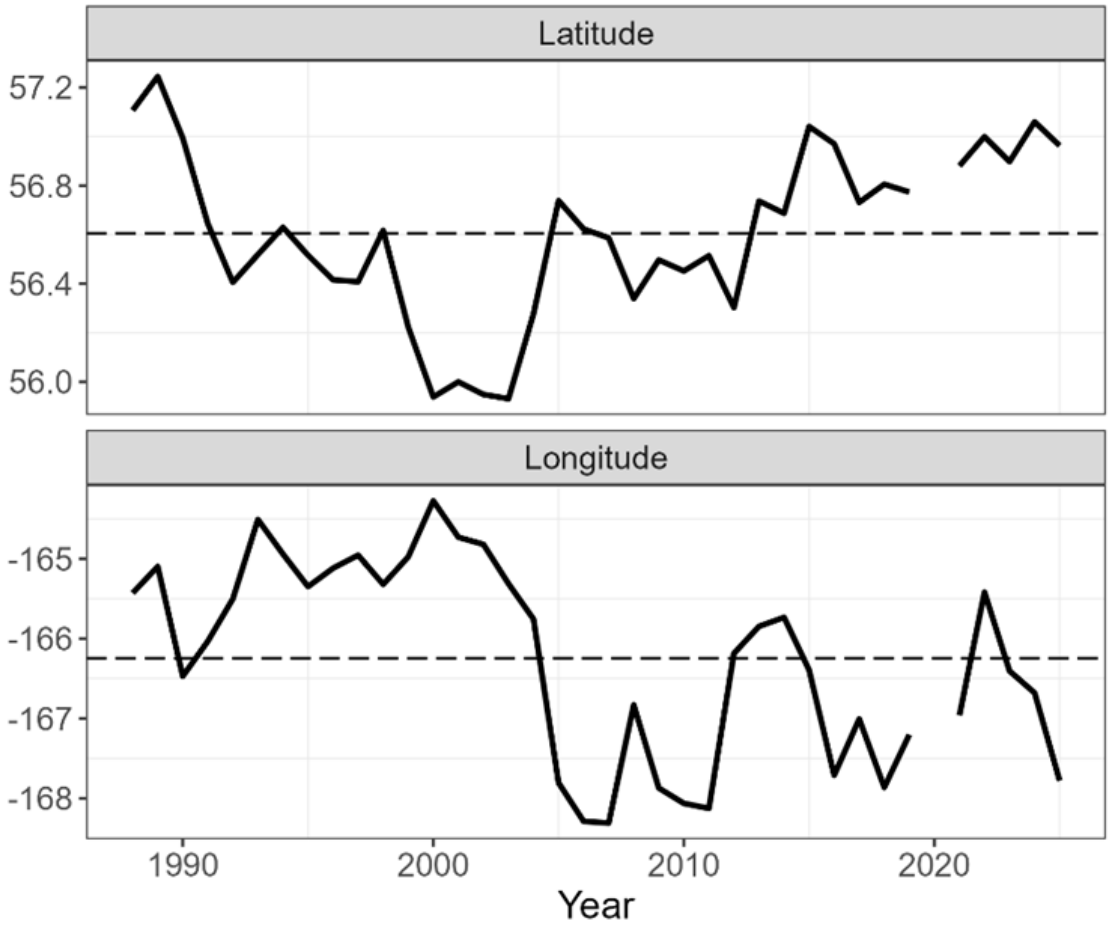



Tanner Crab Mature Female
2021
2022
2023
2024
2025
166°W
62°N
60°N
58°N
56°N
54°N
175°W
170°W
165°W
160°W
Num/nmi²
No catch
>0-883
>883-3,196
>3,196-7,980
>7,980-21,206
>21,206-46,598

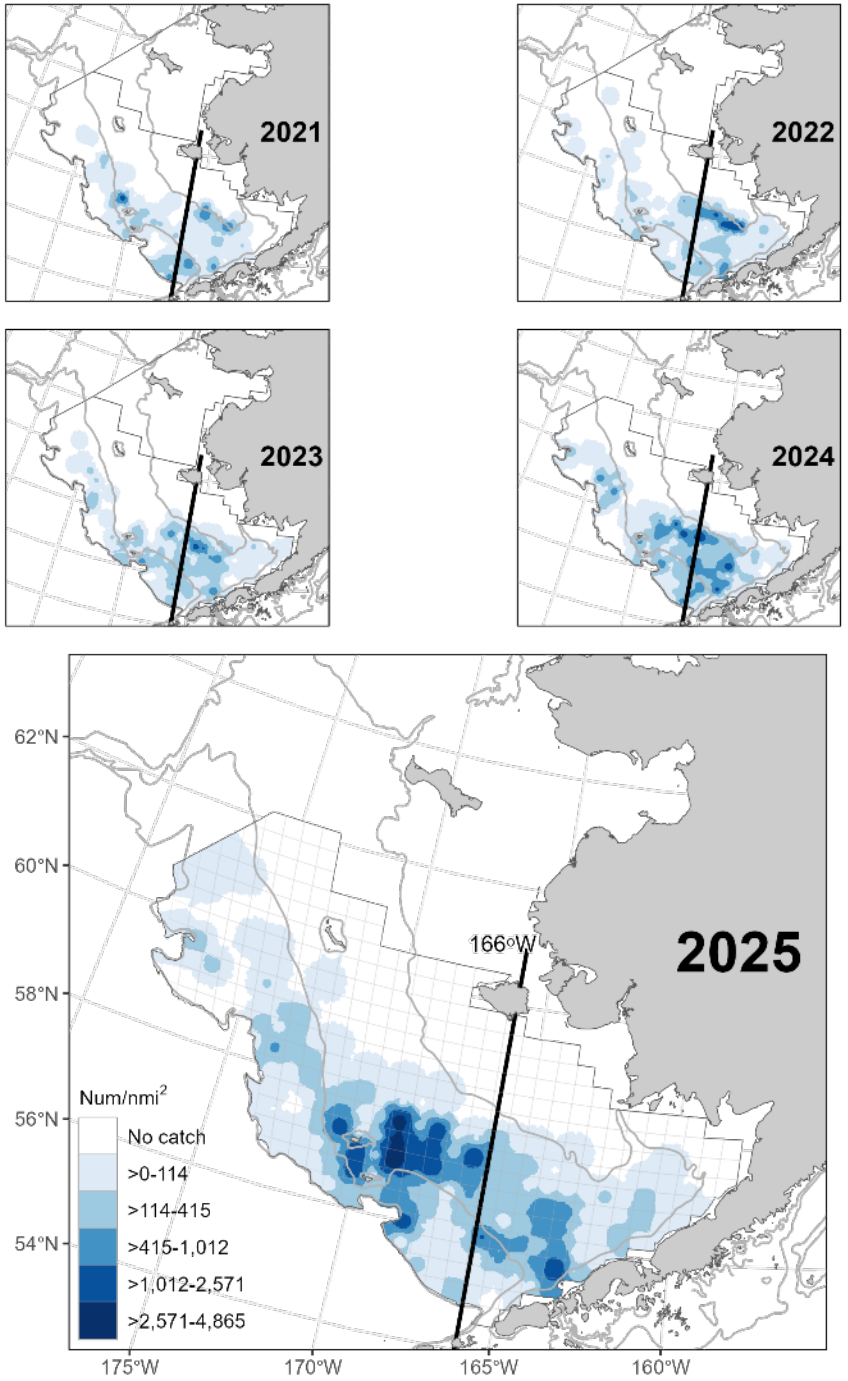
Center of Abundance

Tanner Crab Industry Preferred Male



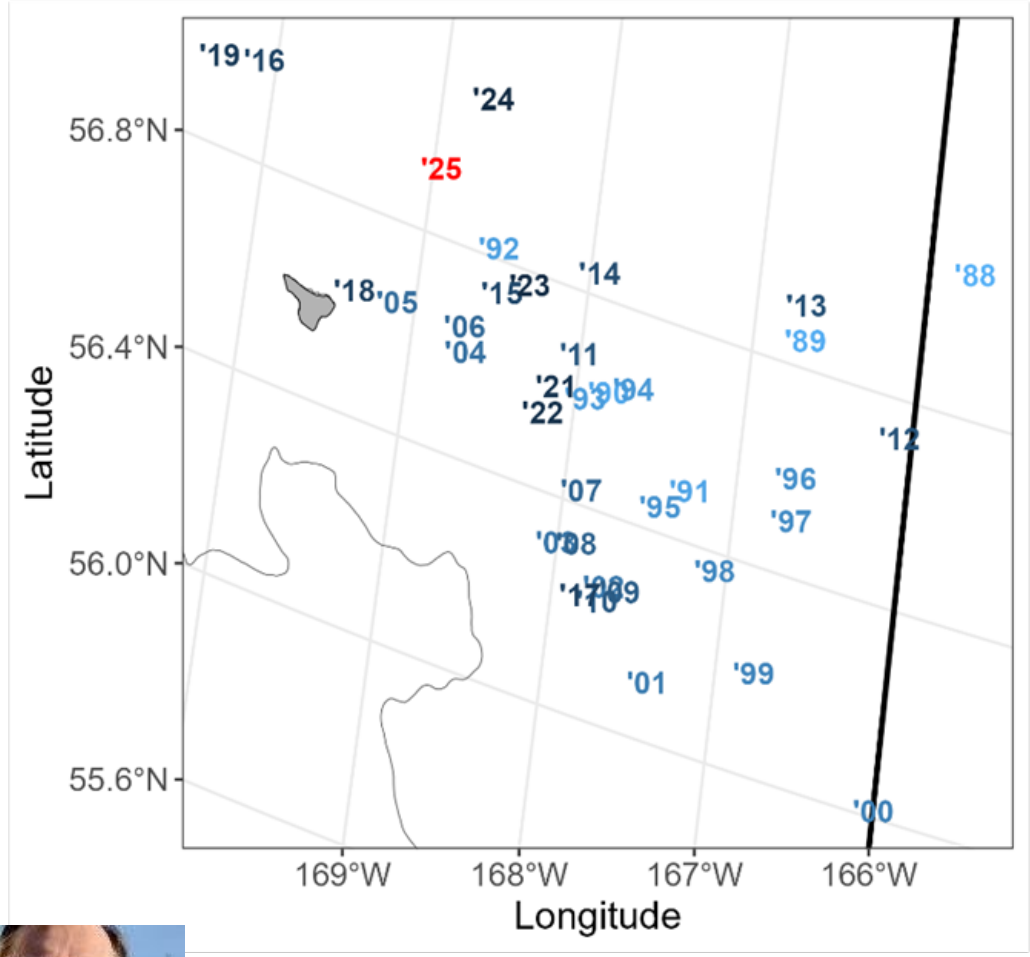


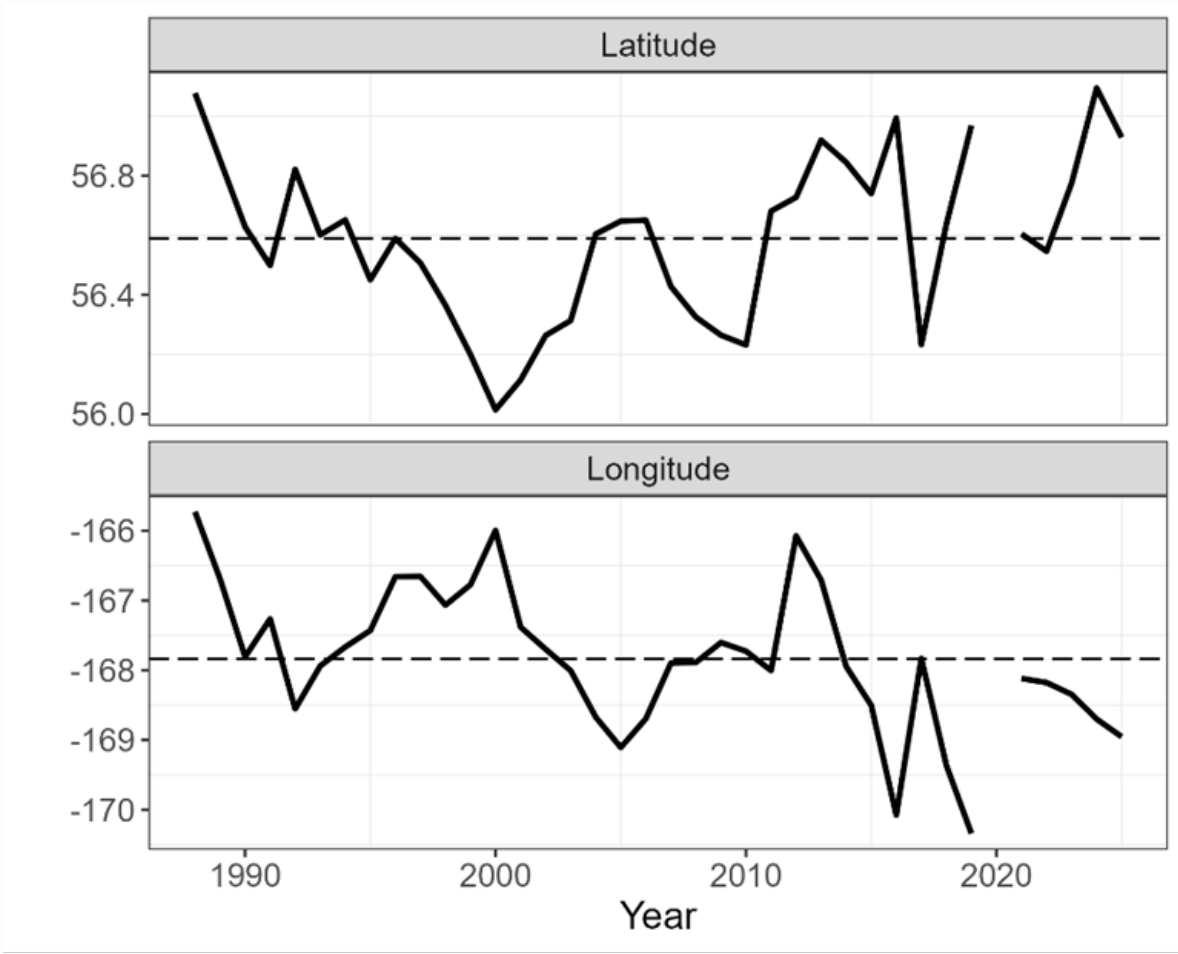
Tanner Crab Industry Preferred Male



Center of Abundance

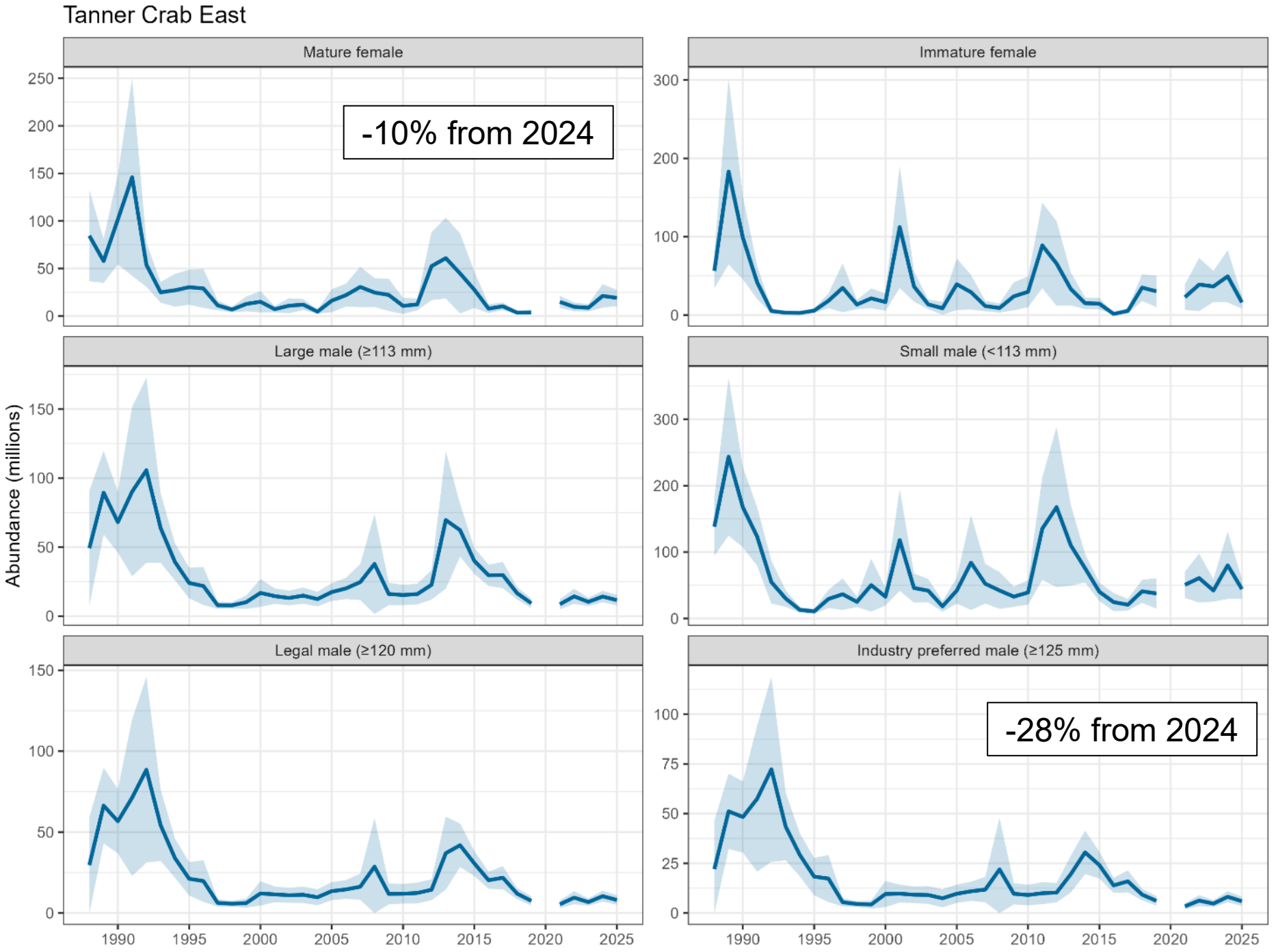
Tanner Crab Mature Female





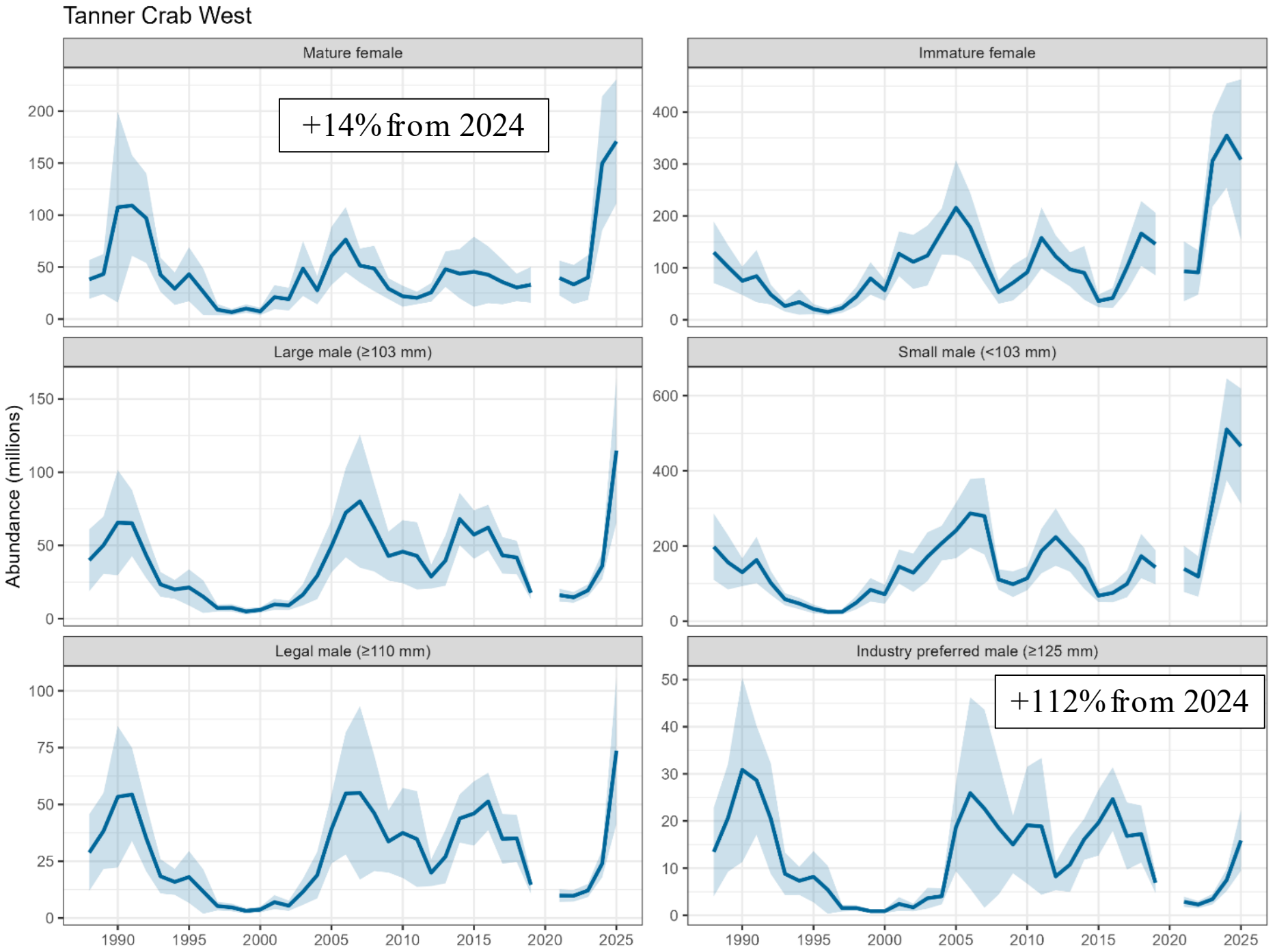
East of 166°

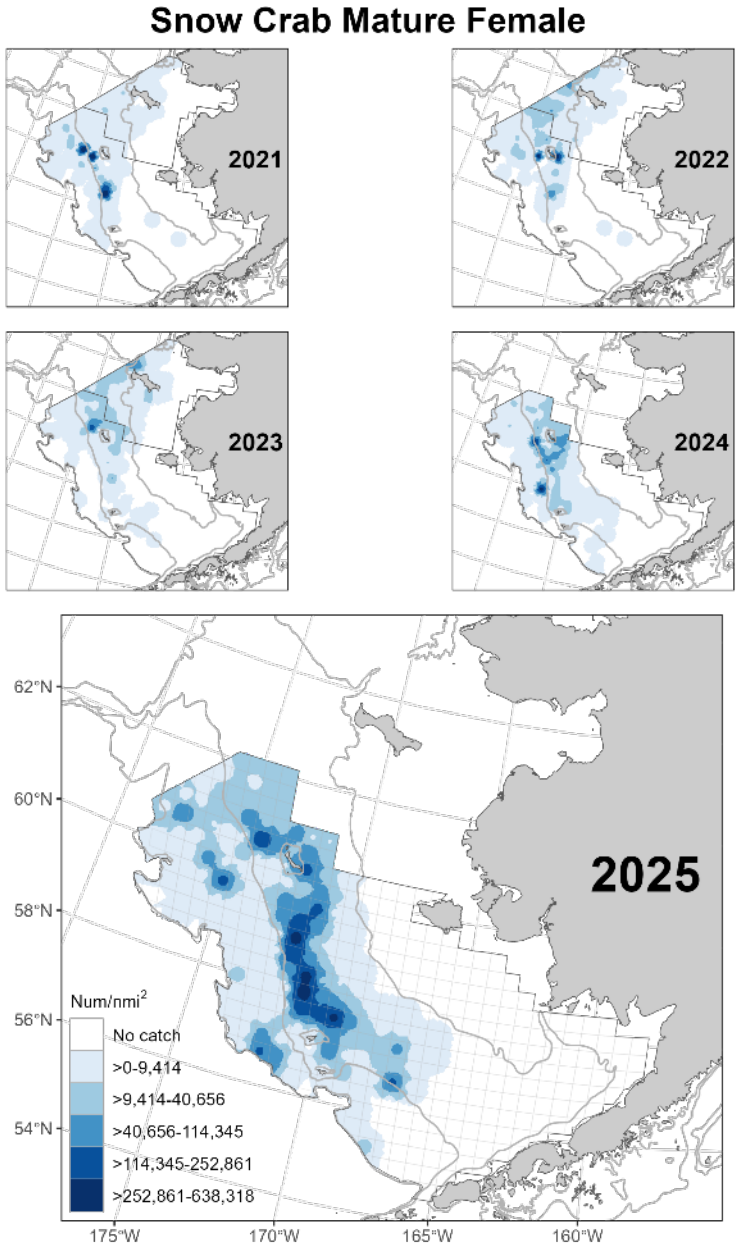
- Abundance at low levels, steady or declining
- No evidence of smaller size classes recruiting to survey in abundance

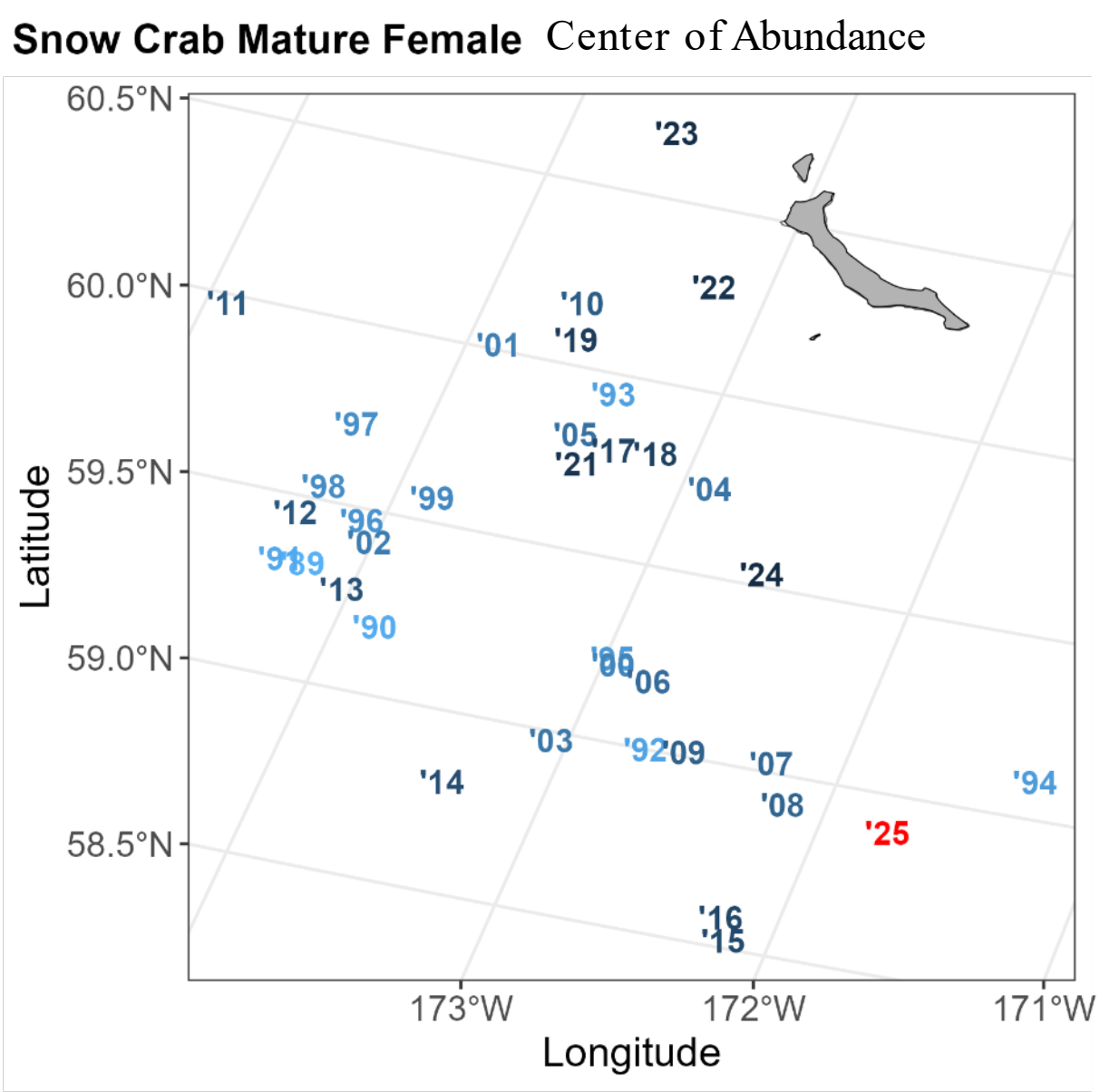


West of 166°

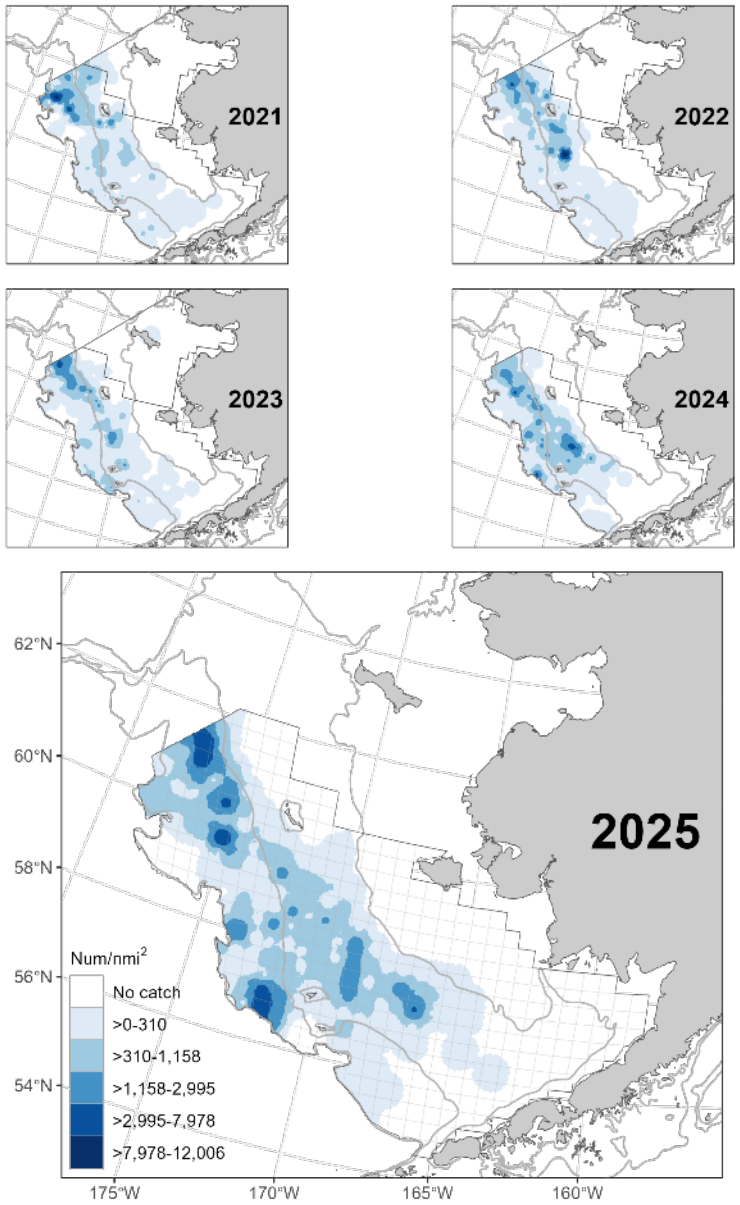
- Abundance at all-time highs
- Exception is industry-preferred size (5” carapace width
- Still evidence of smaller size classes recruiting to survey in abundance



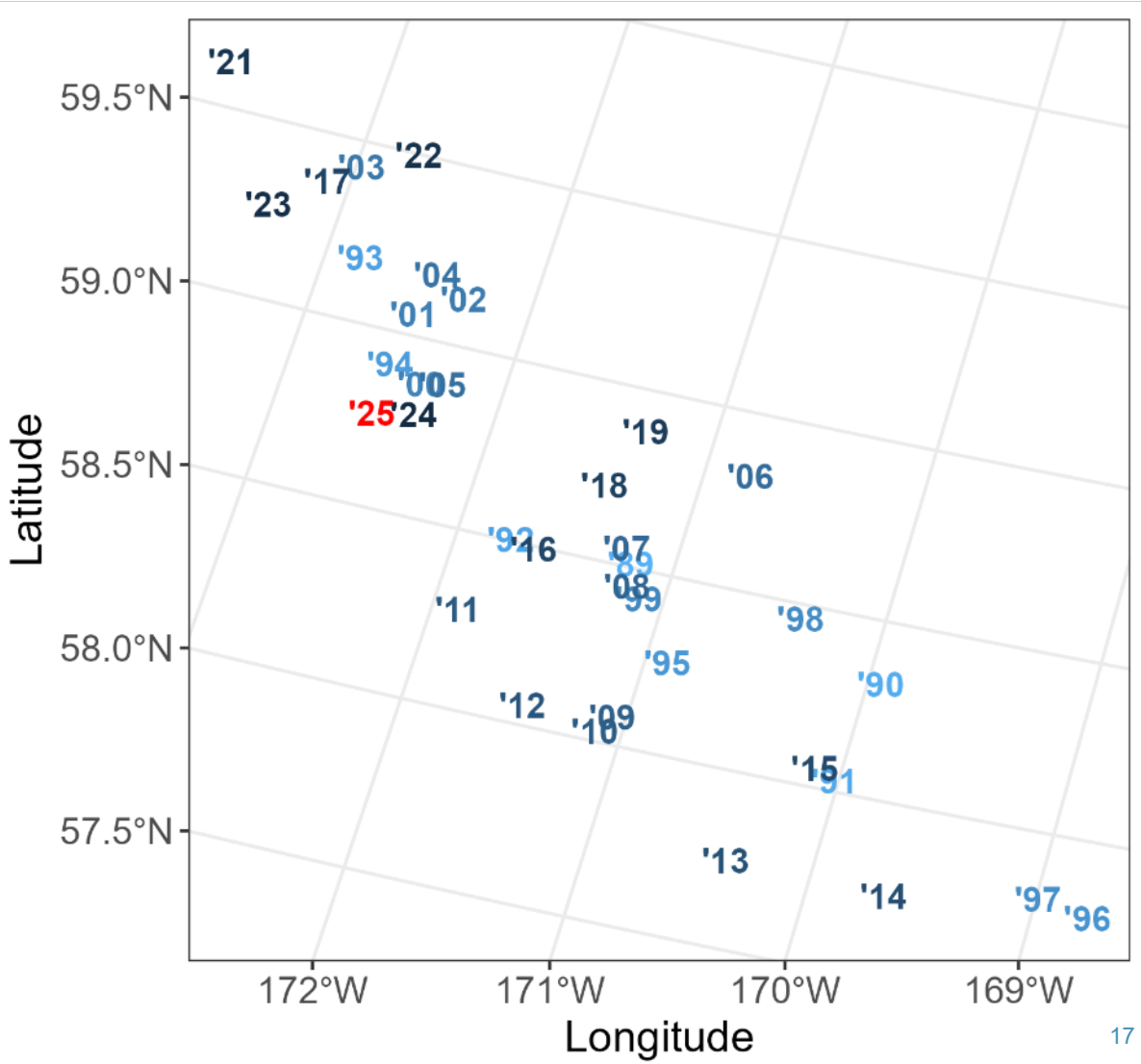

Snow Crab Mature Female
2021
2022
2023
2024
2025
62°N
60°N
58°N
56°N
54°N
175°W
170°W
165°W
160°W
Num/nmi²
No catch
>0-9,414
>9,414-40,656
>40,656-114,345
>114,345-252,861
>252,861-638,318


Snow Crab Mature Female Center of Abundance
60.5°N
60.0°N
59.5°N
59.0°N
58.5°N
Latitude
173°W
172°W
171°W
Longitude
'23
'22
'11
'10
'19
'01
'93
'97
'05
'21
'17
'18
'04
'98
'99
'12
'96
'02
'89
'13
'24
'90
'06
'03
'92
'09
'07
'14
'94
'08
'25
'16
'15

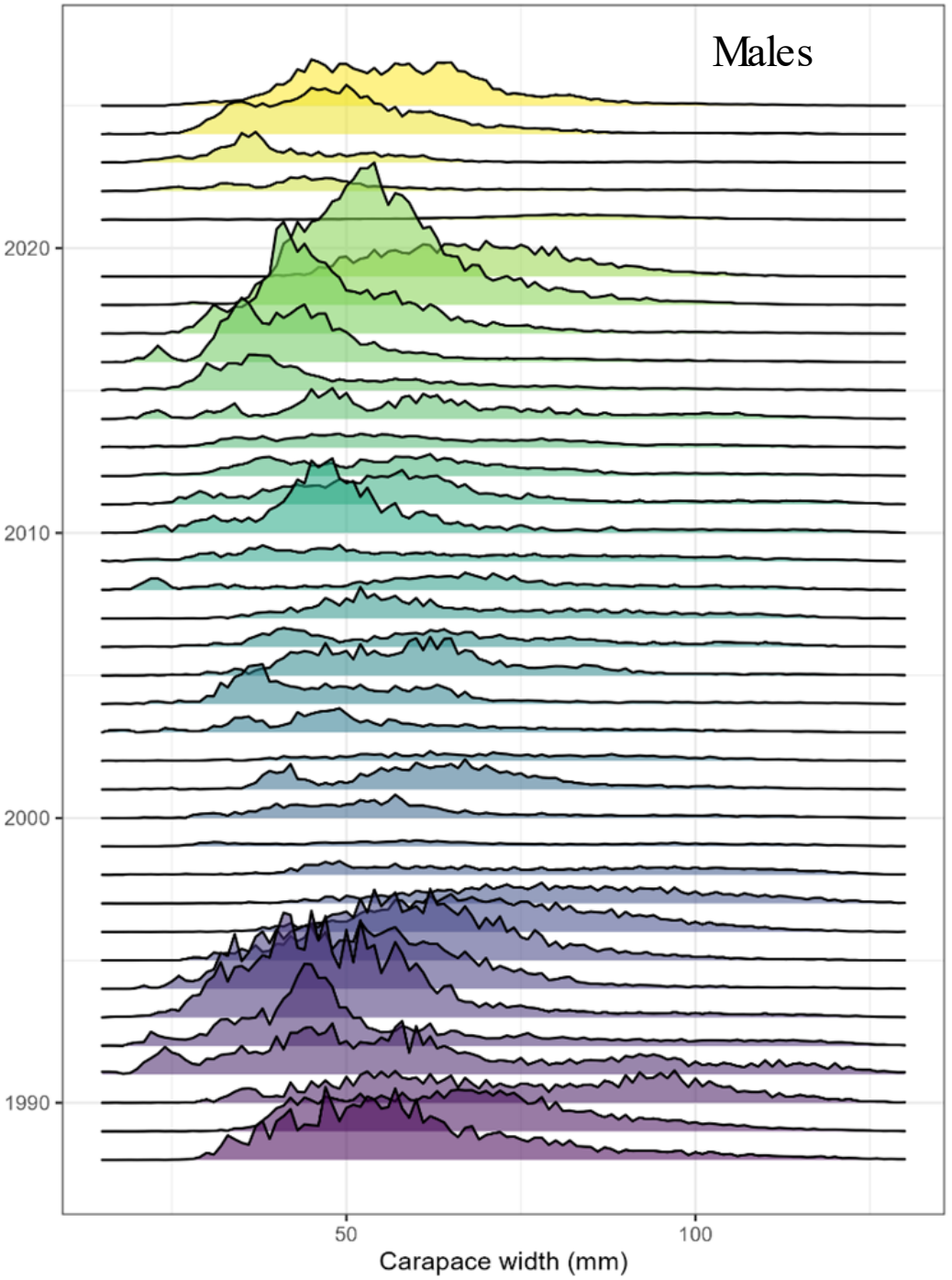
Snow Crab Industry Preferred Male

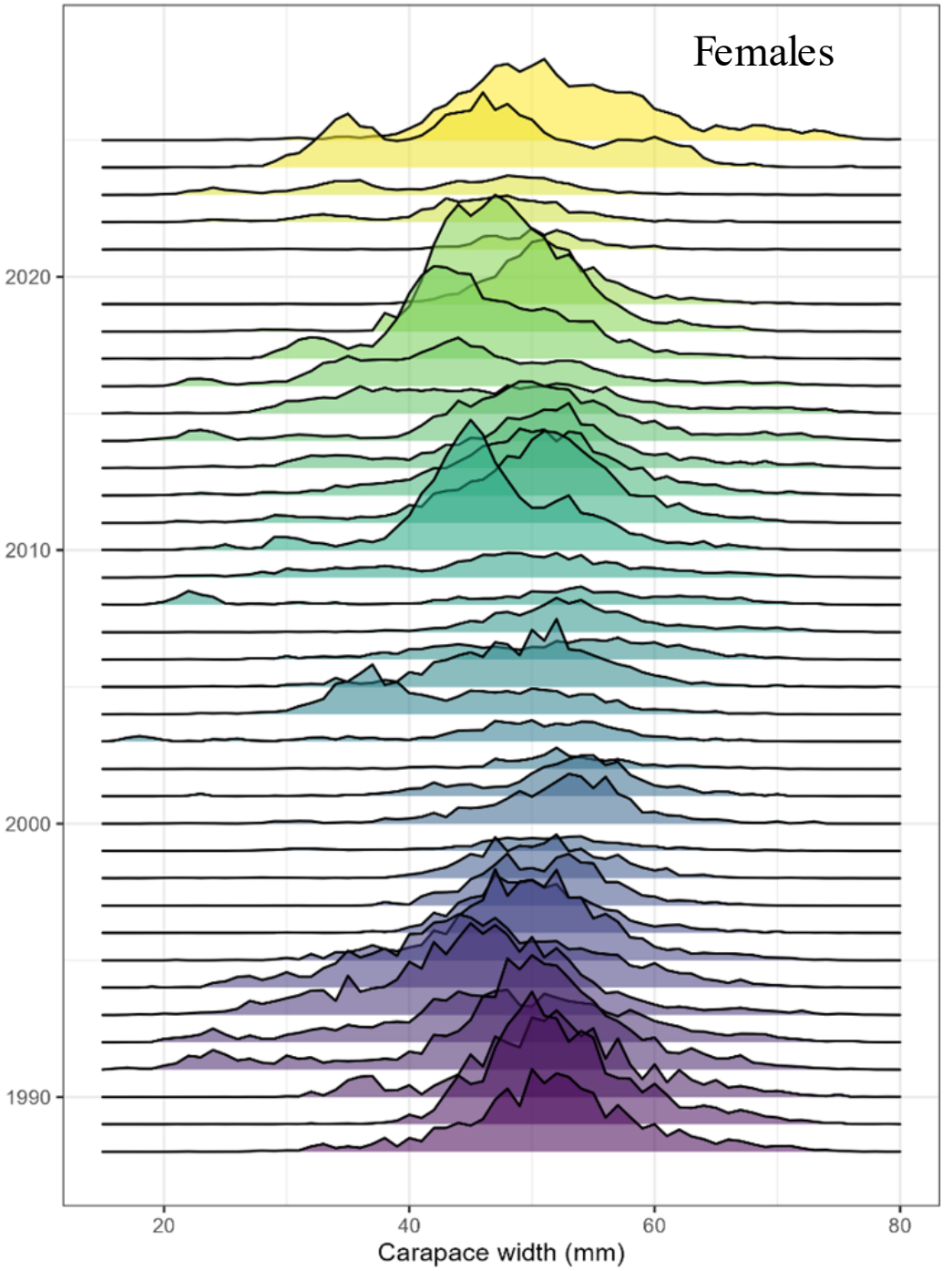


Snow Crab Industry Preferred Male Center of Abundance



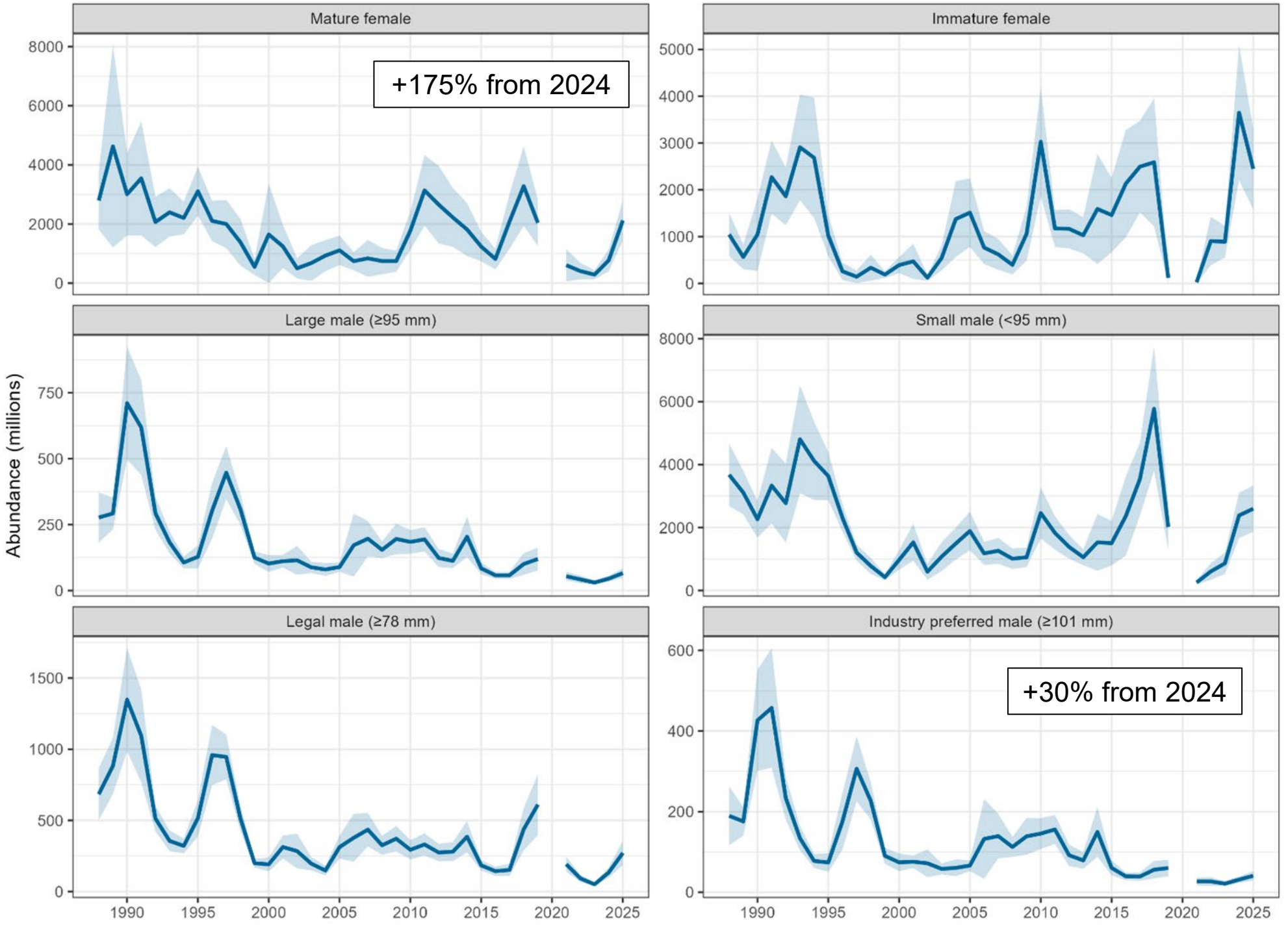
- Males observed since 2022/23 approaching 4” (101 mm)
- Males are not reaching the same large sizes seen in 1980s/1990s
- Unprecedented abundance of larger females





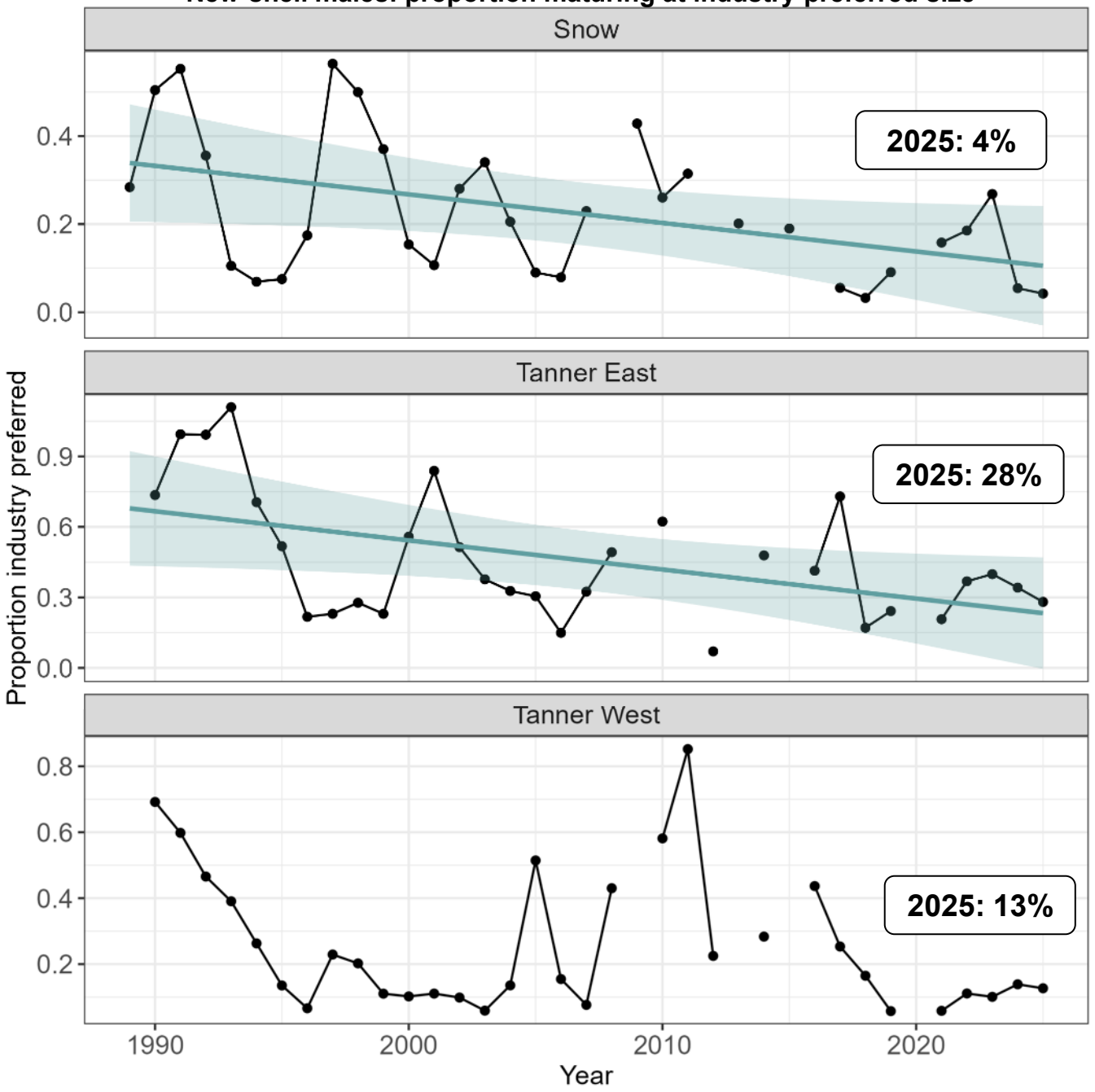
Snow Crab

- Recovery continues with high abundance of small size classes
- Mature female abundance near time series mean
- Abundance of morphometrically-mature males up 11-fold since 2023 (not plotted here)
- Industry-preferred male abundance still near time series low



Snow Crab

New-shell males: proportion maturing at industry-preferred size



GAMMs with AR1 correlation structure

Snow

```
Approximate significance of smooth terms:
        edf Ref.df     F p-value
s(YEAR)   1      1 4.037  0.0536 .
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) =  0.185
  Scale est. = 0.017955  n = 32
```

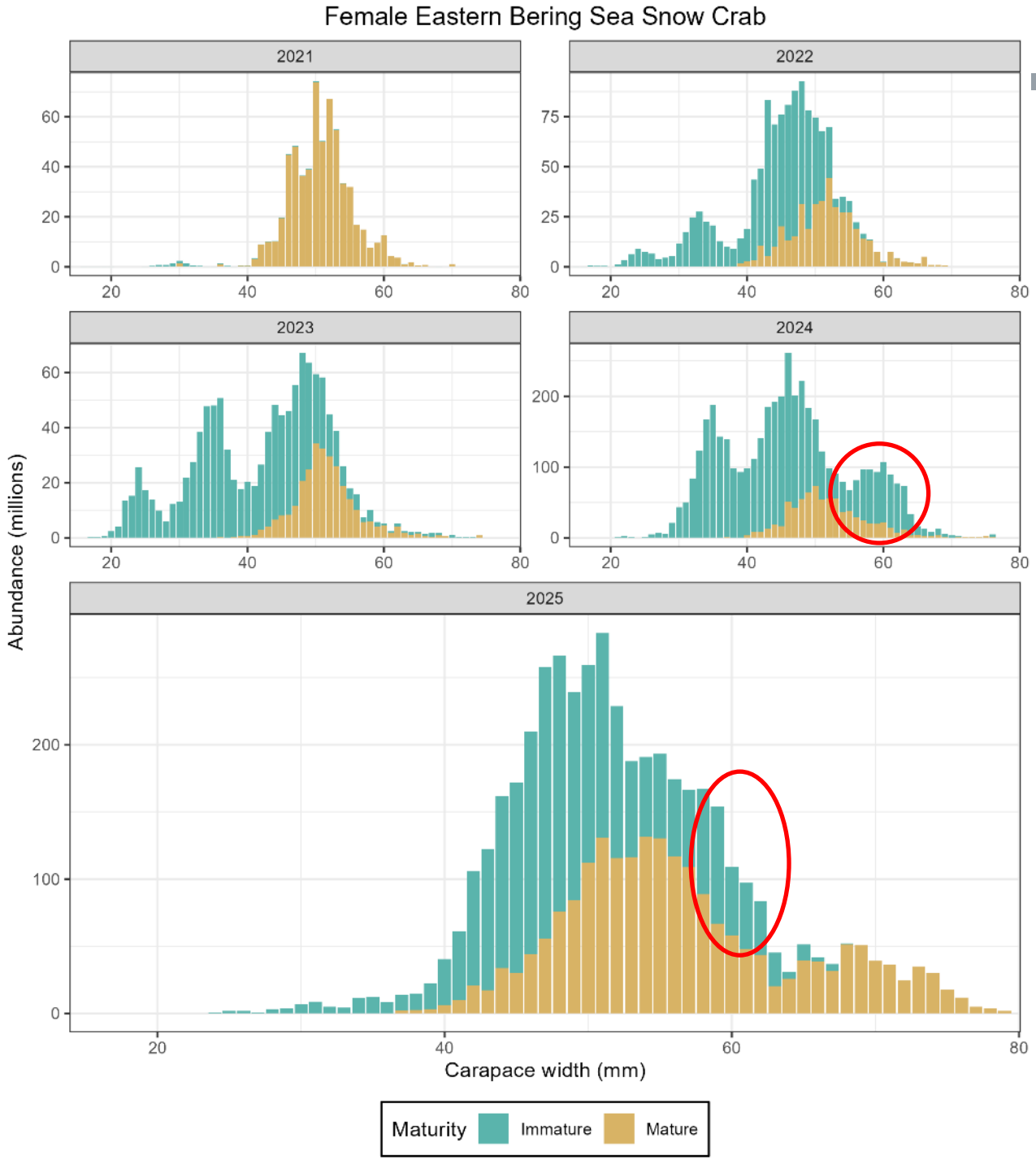
Tanner East

```
Approximate significance of smooth terms:
        edf Ref.df     F p-value
s(YEAR)   1      1 4.554  0.0414 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) =  0.219
  Scale est. = 0.049306  n = 31
```

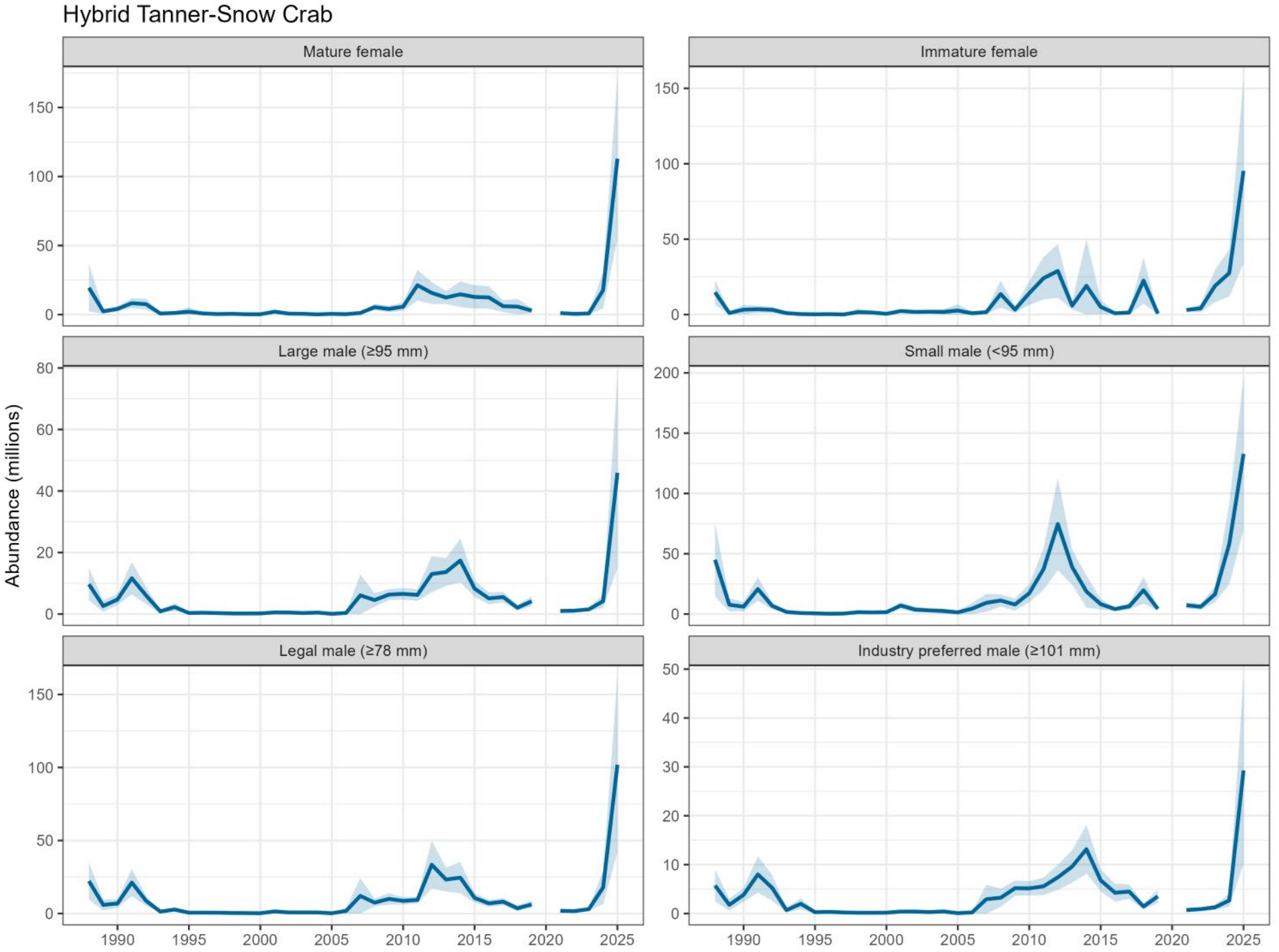
Tanner West

```
Approximate significance of smooth terms:
        edf Ref.df     F p-value
s(YEAR)   1      1 0.999   0.326

R-sq.(adj) =  -0.00117
  Scale est. = 0.011703  n = 32
```

- Unusual abundance of large immature females continues

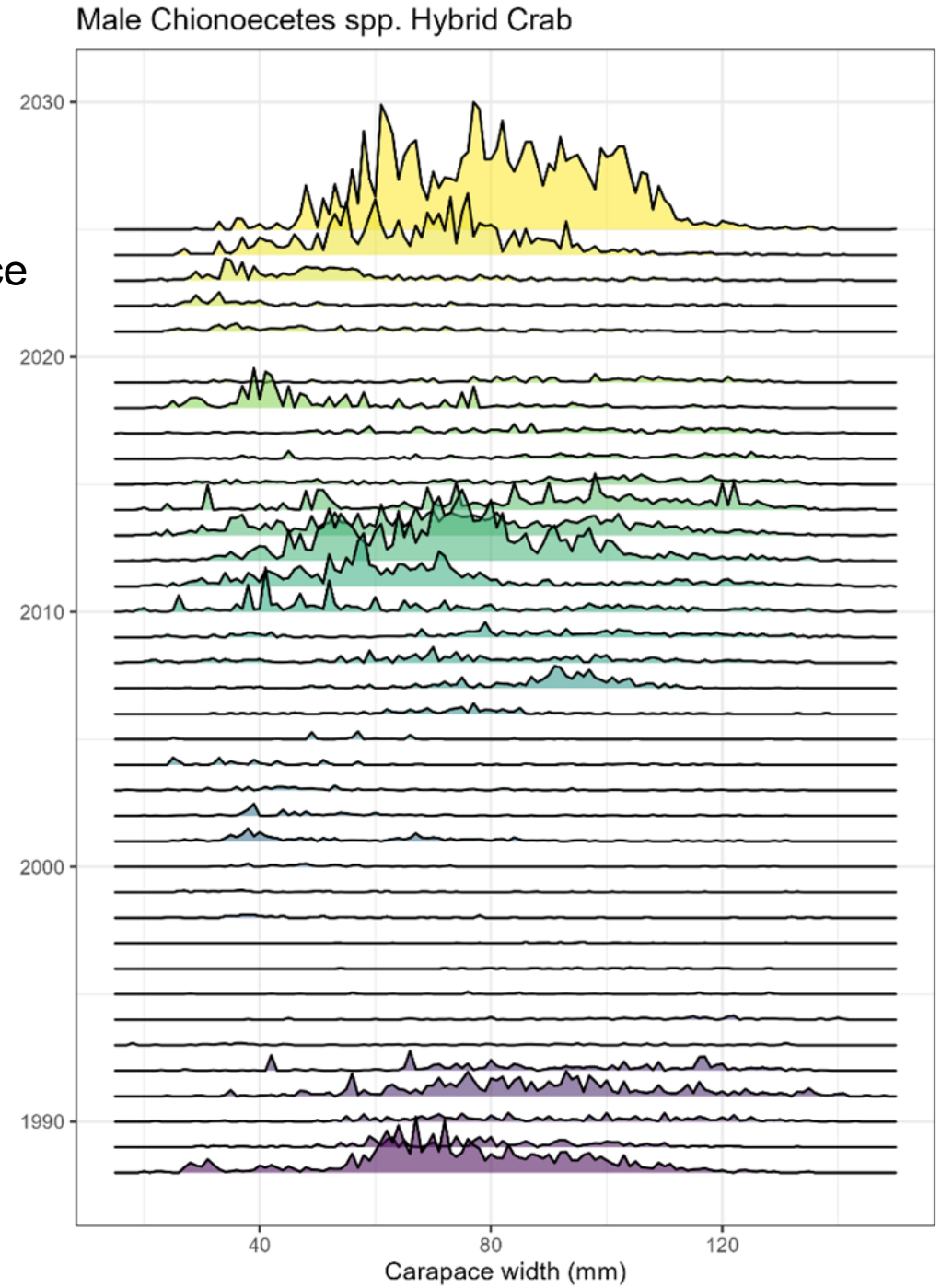


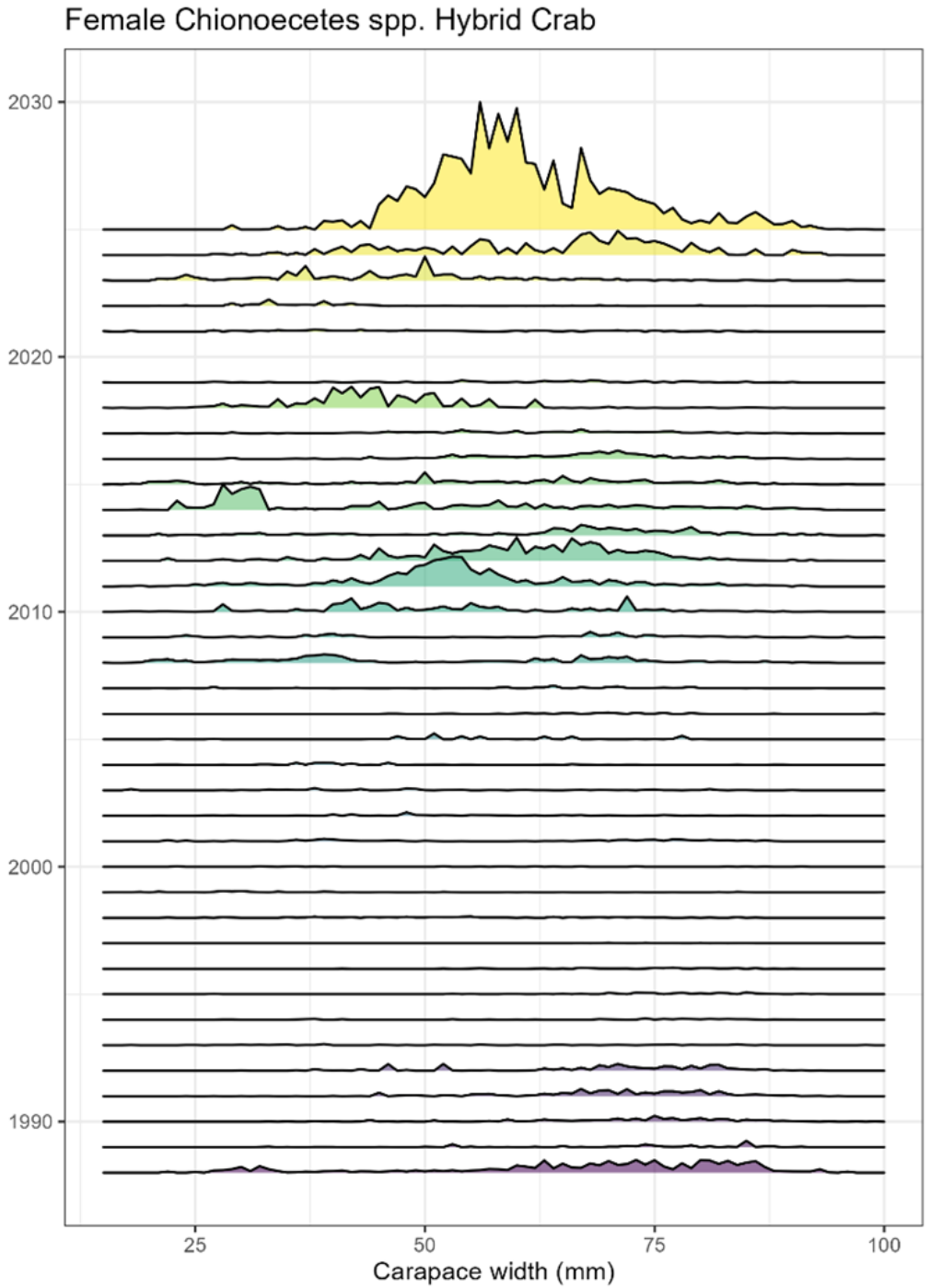
- Unprecedented abundance for all size-sex categories
- 20% of *Chionoecetes* males ≥ 101mm CW were hybrids
- High confidence that these results are not data artefacts



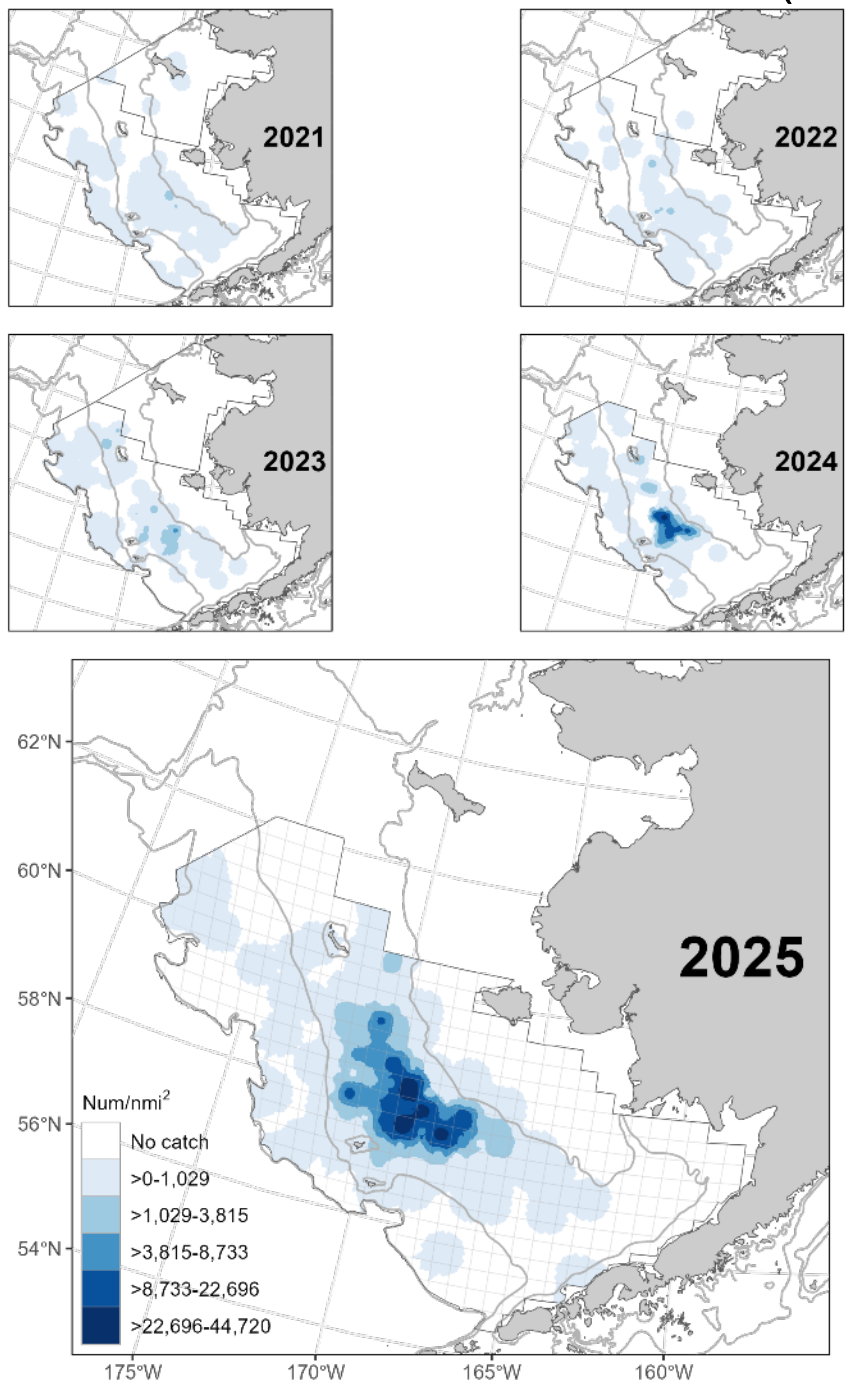
Hybrids

- Pulse of abundance observed to a lesser degree in 2023-2024
- Hybrid ID more difficult for smaller animals





- Spatial distribution coherent within and between years



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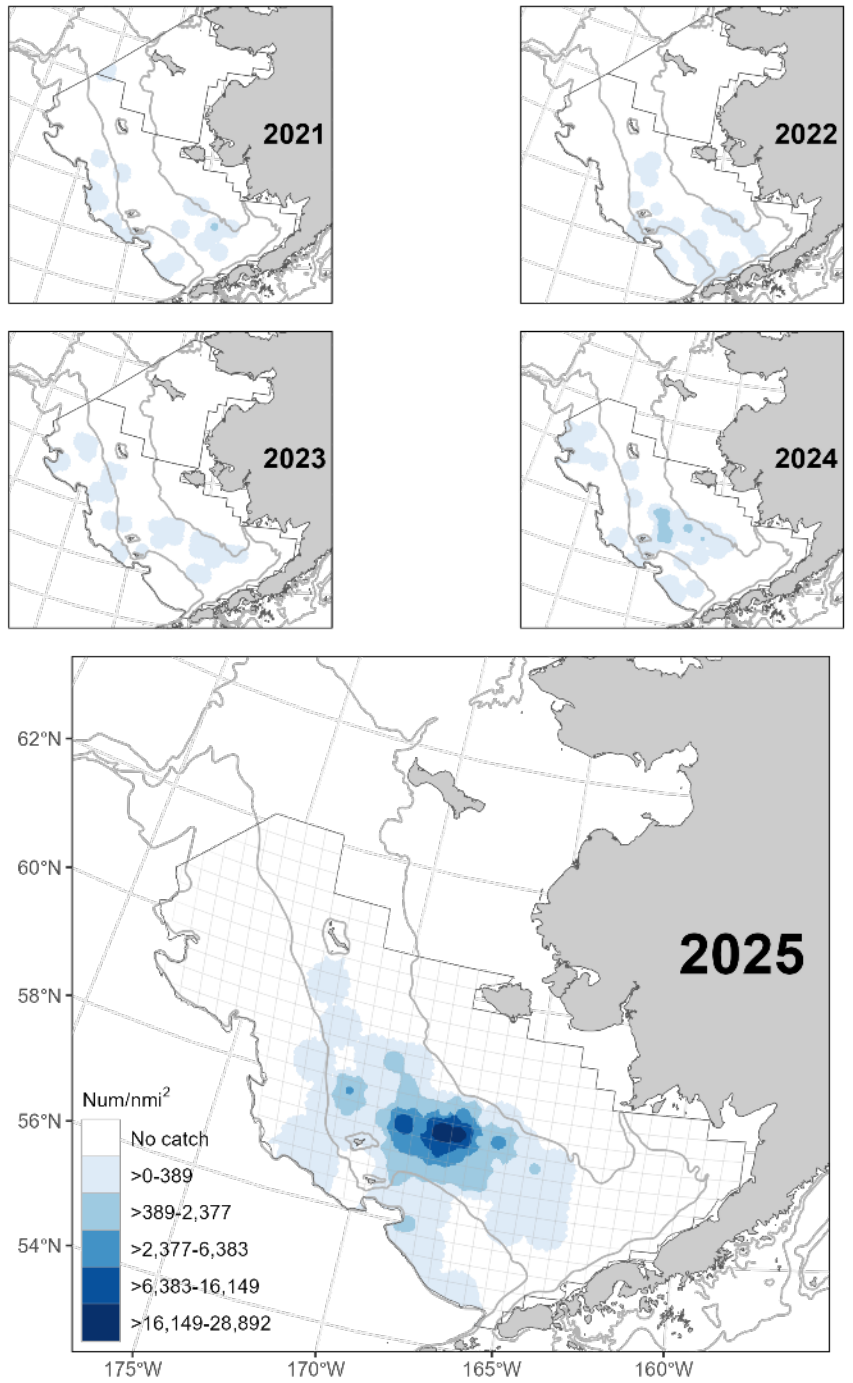

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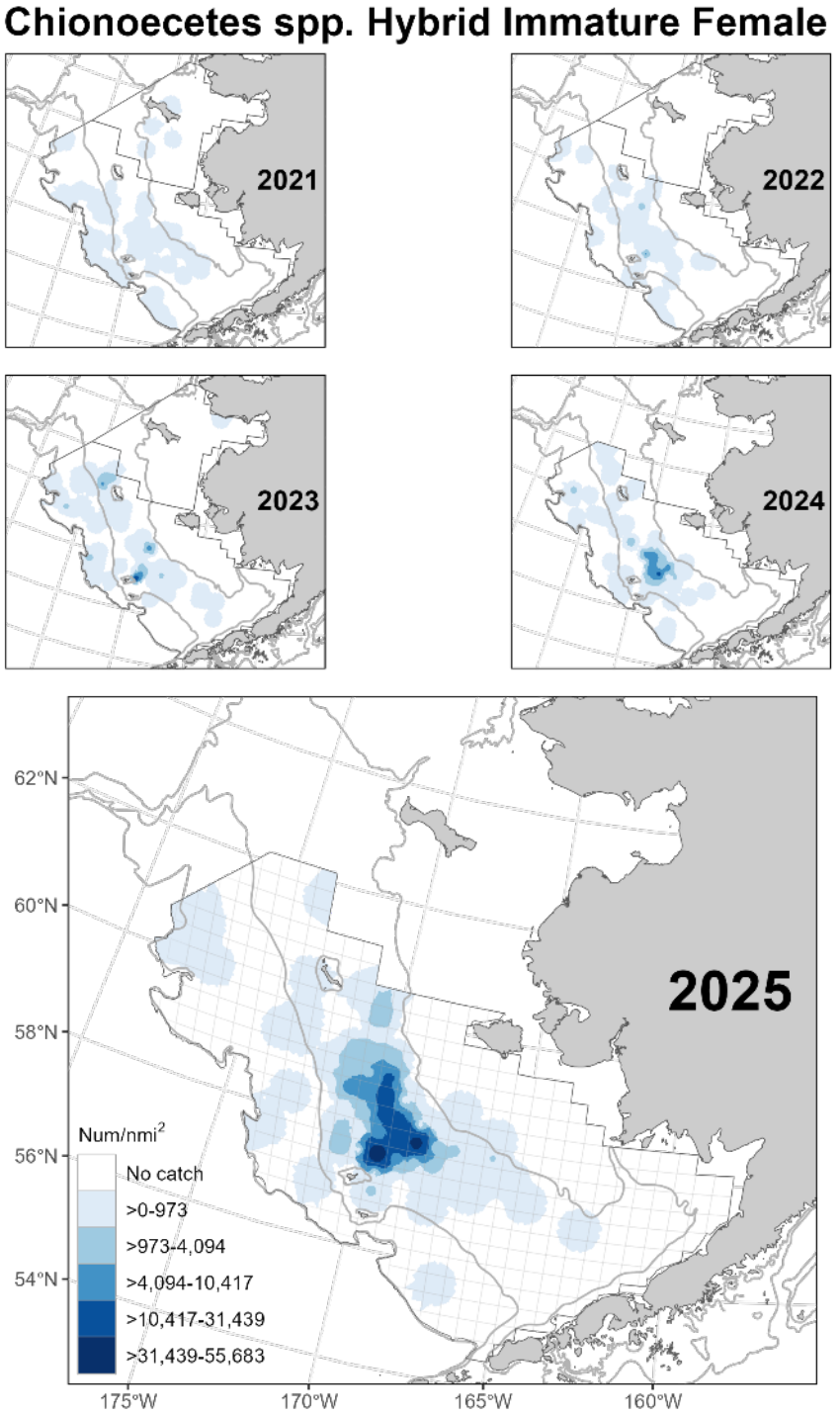

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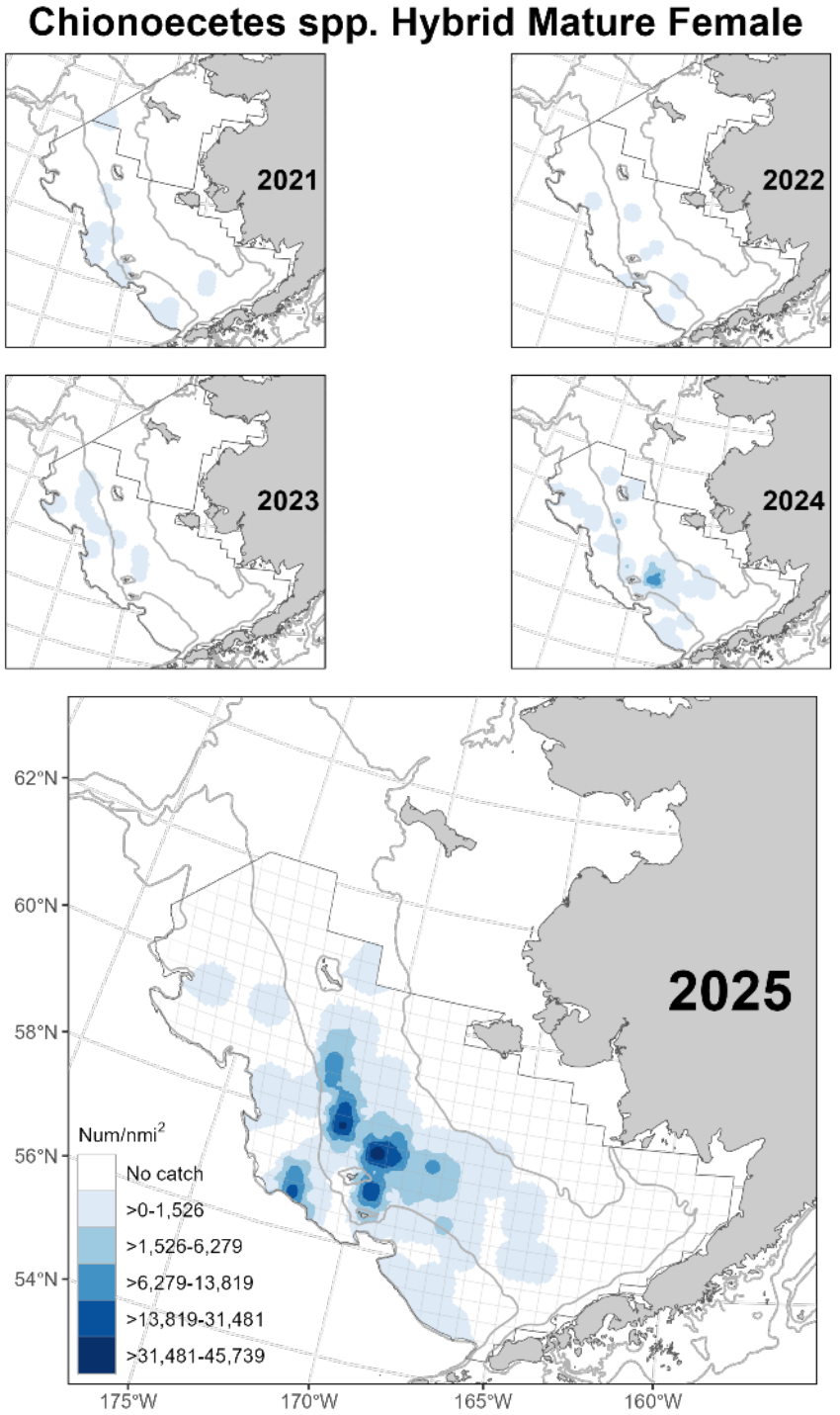
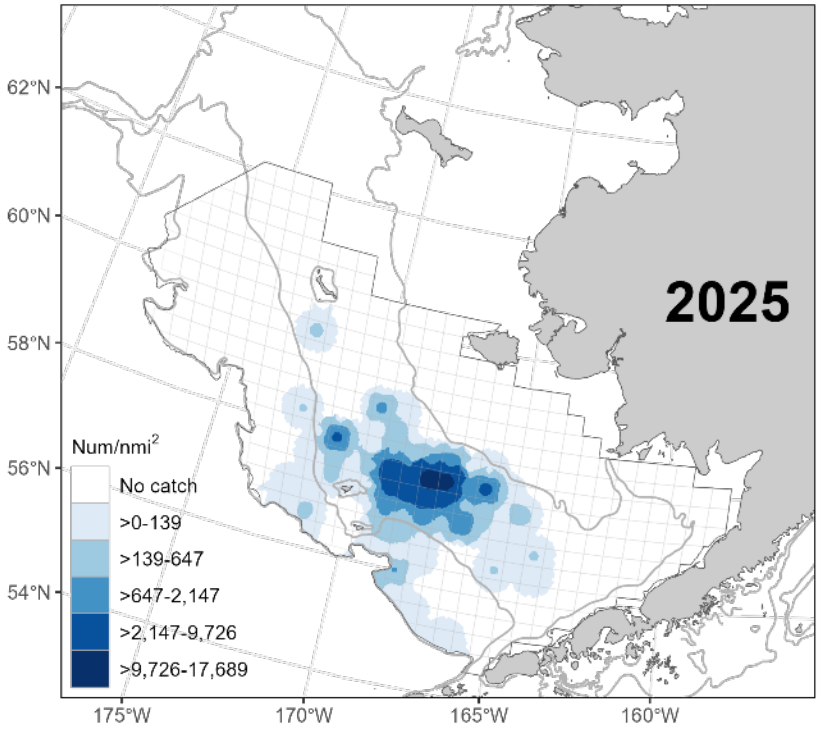
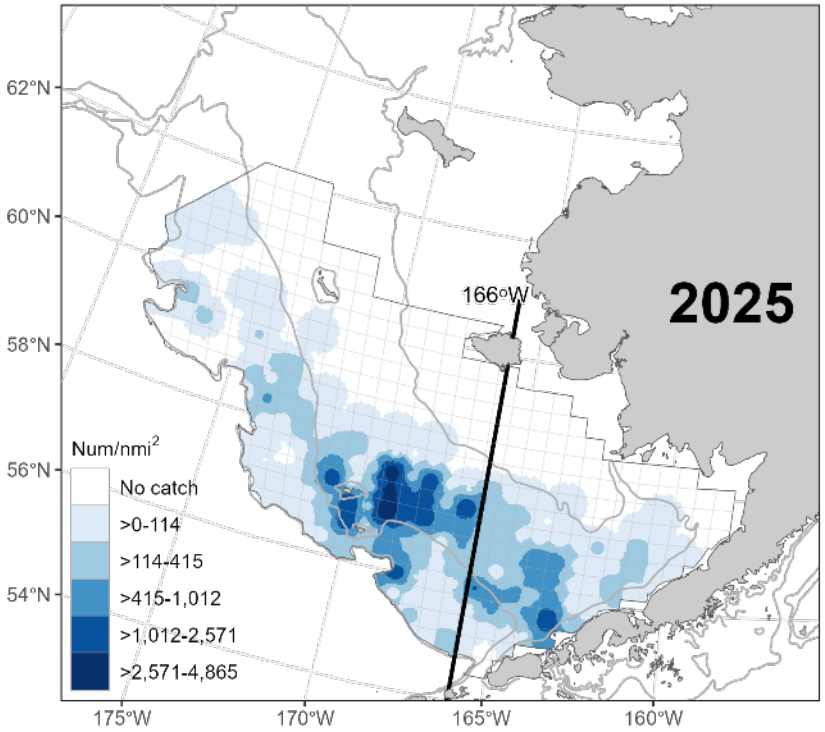


Industry-preferred sizes: strongest overlap with Tanner

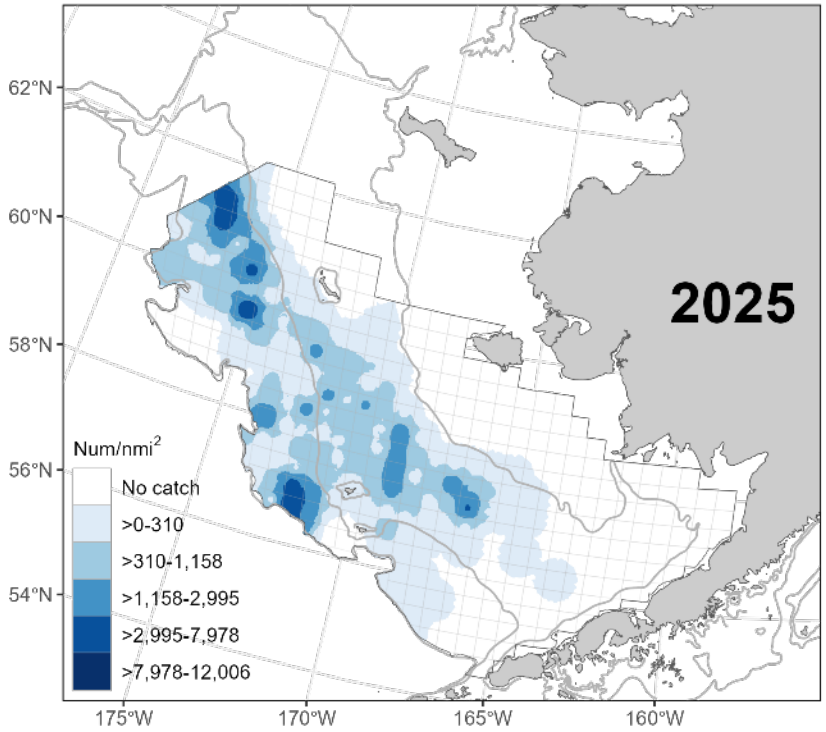
4” male hybrid



5” male Tanner



4” male snow



Hybrids: Data sources and fishery considerations

Data sources

- Bottom trawl survey: identified based on intermediate scores from a suite of characteristics (epistome shape; eye color; rostrum angle and shape; carapace shape, scalloping, and Pterygostomian spines)
- Groundfish observers: identify 3 categories: opilio, bairdi, or unidentified Tanner crab
- Crab observers: identify crab into 4 categories – snow, tanner, snow-like hybrid, tanner-like hybrid (2 red eyes and an "M" shaped mouth)
- Port samplers: identify crab into 4 categories – snow, tanner, snow-like hybrid, tanner-like hybrid (2 red eyes and an "M" shaped mouth)

Fisheries considerations

- For landings in directed fisheries: Crab is bairdi if eyes are red and epistome is M-shaped, otherwise opilio
- Hybrids can therefore only be landed as opilio - typically ~2% of landings
- Hybrids are not considered in FMP and are not counted towards OFL for either species

Hybrids: CPT discussion

- Awareness that this situation is unprecedented and motivates re-evaluation of hybrid considerations
- Spike in hybrid abundance co-occurs with unprecedented perturbations to snow crab stock: 2019-2021 collapse, 2024-2025 delayed maturation in females
- Stakeholder input requesting reconsideration of several topics
    - How hybrids are counted towards OFL/ABC
    - How hybrids can be accounted for in TACs and other State management considerations
- CPT placed hybrids on agenda for May 2026: biological and fisheries management considerations

Risk table progress

- Reviewed draft risk tables for 3 main stocks (also saw PIBKC and PIRKC)
- CPT still has process questions and more discussion needed to fully incorporate risk tables into the crab buffer process
- May agenda topic should allow for flushing out more risk table standards for crab
- Drafts provided here for context but buffer considerations were determined using traditional practices for this cycle.
- CPT would like to have further discussions in May before we enlist SSC feedback.

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 c… to acknowledge that this is different from the groundfish use of risk t… t a better definition of the goal/objective would help guide futur… ons.
2) Can we utilize risk tables to encompass buffer conce… risk table concerns in our buffer rationale?
3) How should we track and document co… g., continued low recruitment) vs. concerns that ar… k of exceeding the true OFL?
4) How do we record ongoing … how do we distinguish between the two in risk tables an…
5) Should we re… uced concern (i.e., since the buffer can be reduced for crab…
6) W… double dipping" in risk tables and buffer considerations?
7) Wh… stitutes 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?

Updated SOPs to come in May meeting; SSC feedback in June

BRISTOL BAY RED KING CRAB (BBRKC)

FINAL ASSESSMENT 2025

Bristol Bay ESP overview

Ecosystem Considerations

Predictive

- Elevated wind stress in Bristol Bay suggests **poor feeding conditions** for larval red king crab in 2025, and is predicted to result in a decline in recruitment to the fishery in ~6 to 8 years due to poor larval survival.

Contextual

- Bristol Bay was considerably warmer than the last four years, and corrosive bottom waters remain a concern for growth and survival of juvenile red king crab. Overall, **ecosystem concerns are minor** with uncertain impacts on the stock.
- The spatial extent of mature males has expanded with warming bottom temperatures over the past 40 years, and the ratio of red king crab in the Northern District relative to Bristol Bay remains above the 42-year historical average. **Northward stock distribution shifts and range expansion** may limit the utility of spatial closure areas and static management boundaries.
- An increase in the proportion of mature females with empty clutches in 2025 suggests a **potential reduction in reproductive potential** of the stock, although the proportion of empty clutches remains small (< 4%)

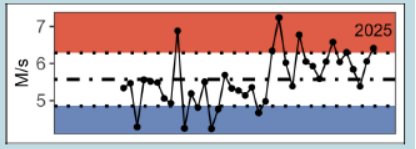
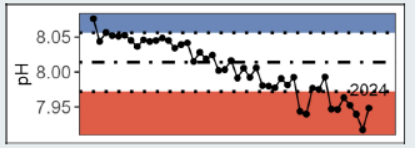
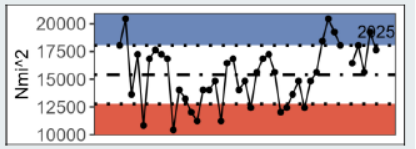
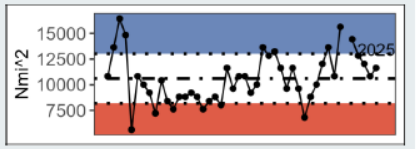
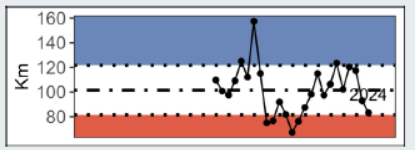
Socioeconomic Considerations

Fishery Informed

- Fishery-informed indicators are generally consistent with **stable or mildly improving stock condition** relative to the recent history of low population density.
- Crab vessel captain observations on fishing conditions in the 2024/25 Bristol Bay red king crab fishery are consistent with **high fishery CPUE**.

Bristol Bay Red King Crab ESP Report Card

Ecosystem Indicators

	Indicator	Status	Trend
Predictive	Summer Wind Stress	Above long-term mean	
	Spring pH	Below long-term mean	
Contextual	BBRKC Mature Male Area Occupied	Near long-term mean	
	BBRKC Mature Female Area Occupied	Near long-term mean	
	Fishery Catch Distance from Shore	Near long-term mean	

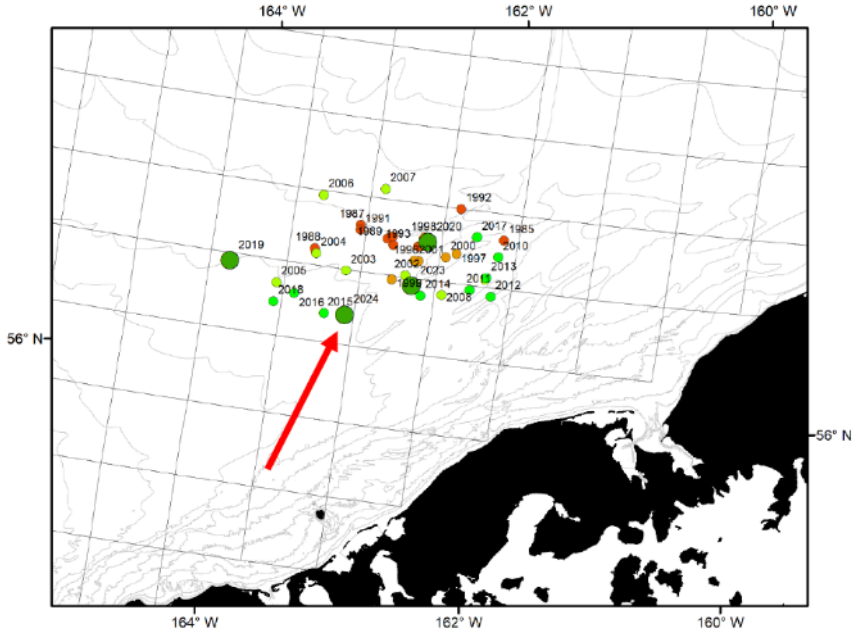
Most recent year indicator status indicates good conditions, average conditions, or poor conditions for the stock

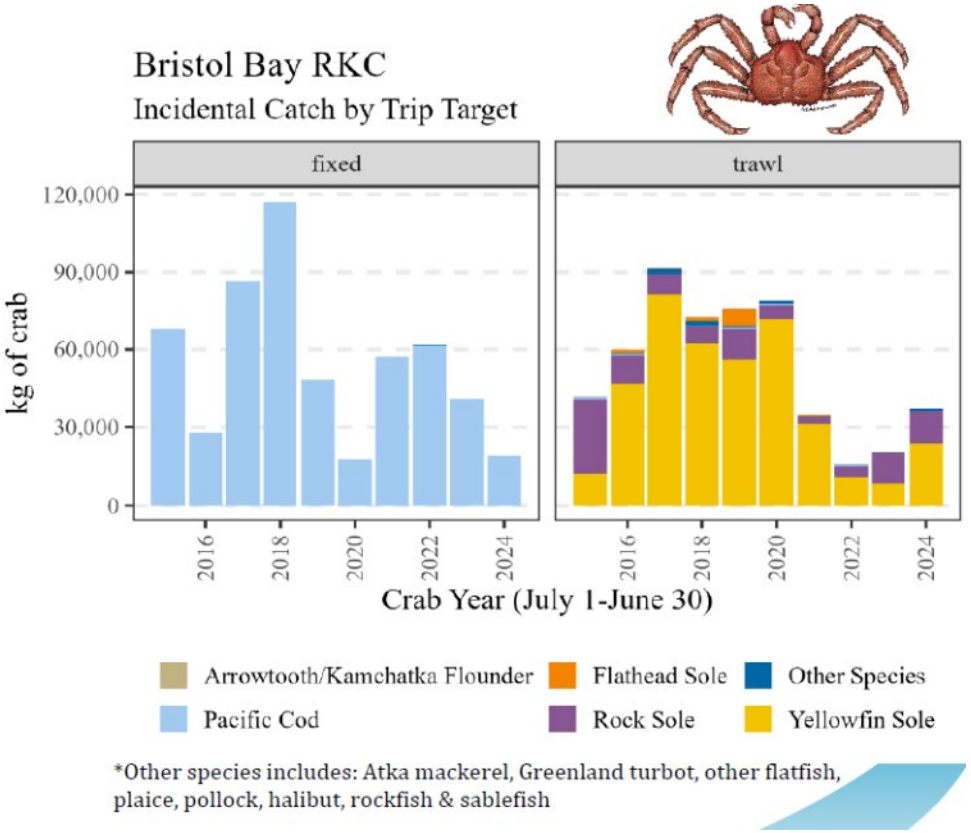
BBRKC overview

- **Tier 3 annual stock assessment, GMACS assessment** framework since 2018
- Mature male biomass increased from 2024, still low compared to long term average
- Directed fishery was open in 2024/25, with higher CPUE (crab/pot) than the previous season
- Estimated mature female biomass is higher than recent years but still lower than it's been since the mid-90s
- 2025 area-swept and State of Alaska LBA model estimates of mature female abundance are above the State Harvest strategy thresholds (8.4 million) this year.
- Low recruitment in recent years (last 8-12 years), projected decline in biomass without a large recruitment event

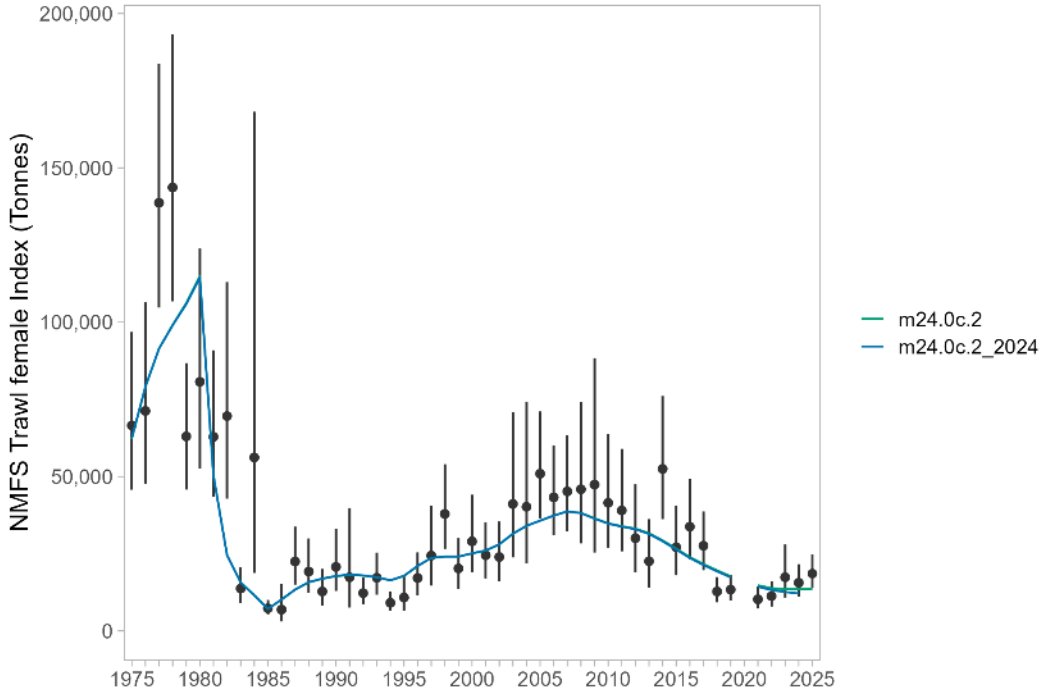
Fishery overview – directed and incidental

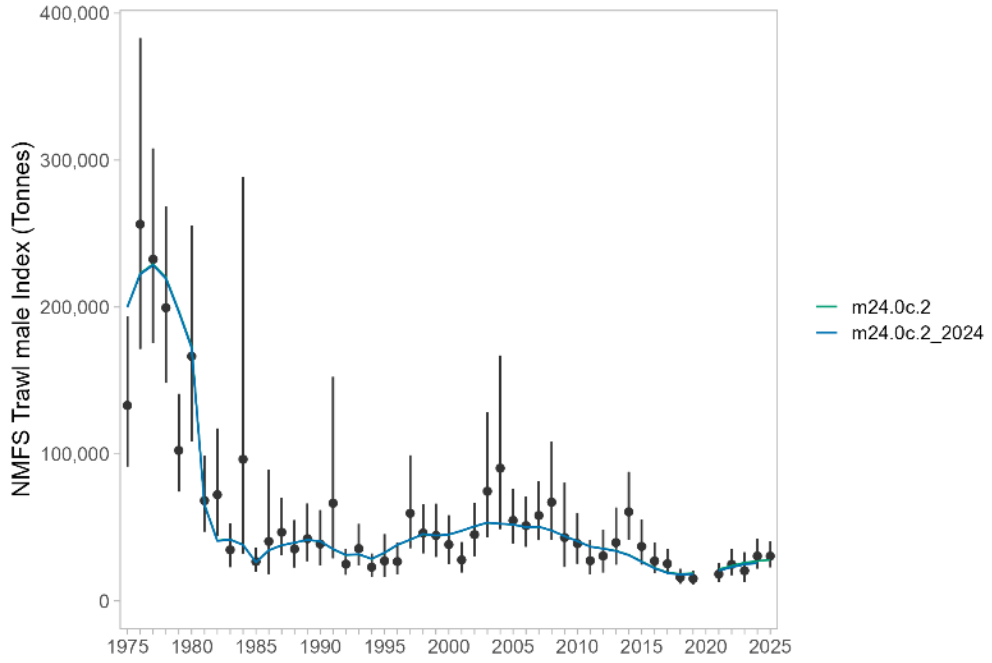
- Retained catch was near TAC at 2.31 million lbs, mostly taken in first two weeks
- Weighted catch center of fishery average area
- CPUE was high compared to last few openings



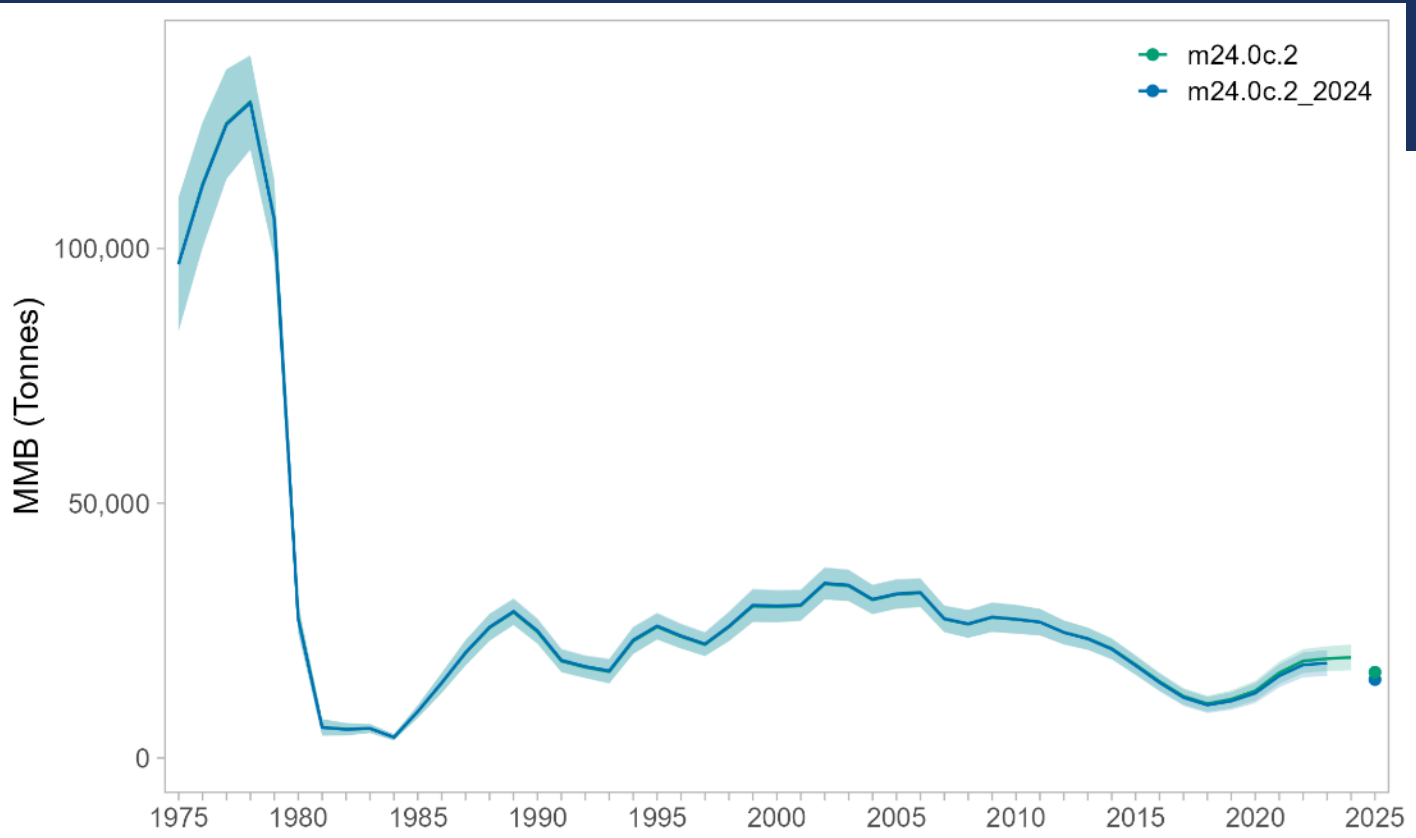


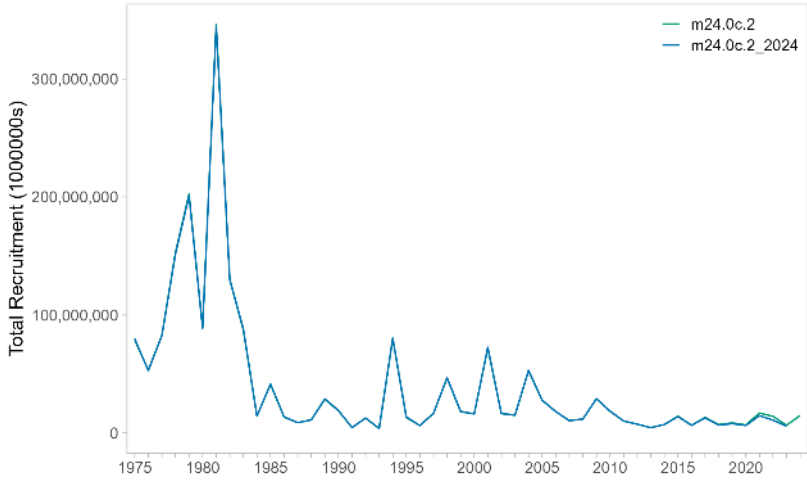
Taken from fishery updates presentation to CPT – see e-agenda





- ✓ Models evaluated:
  - ✓ Model 24.0c – 2024 base model provided for comparison
  - ✓ Model 24.0c.2 – recommended model from May 2025, includes new GMACS version and data updates
    - ✓ Model results are nearly identical
  - ✓ Tier 4 REMA fallback
- ✓ Females are stable in modeled survey estimate (top), despite survey increase
- ✓ Males had a small increase in modeled survey (bottom) and trawl survey results

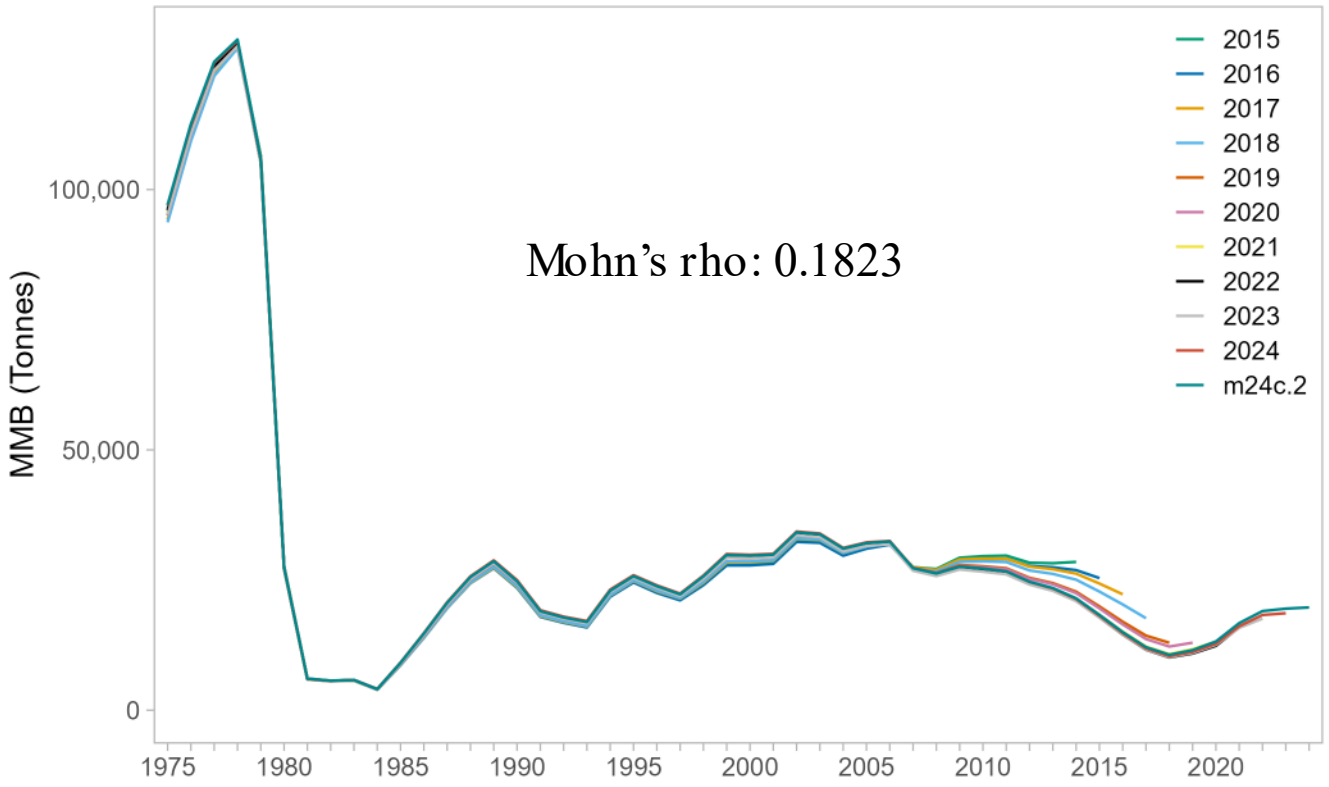




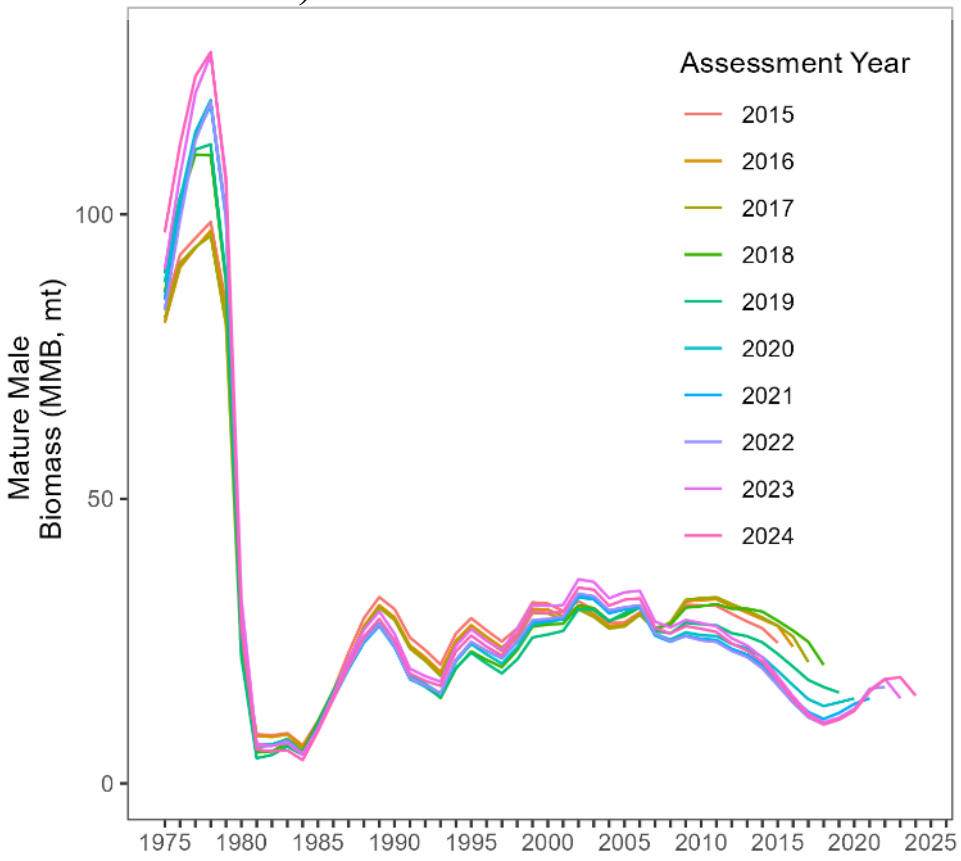
- ✓ Model output reflects base model with current data year additions.
- ✓ Recent recruitment (last 10 to 15 years) lower than historical levels

Retrospective patterns

Model 24.0c.2



Historic retrospective – uses accepted model output in that assessment year (source SAFE documents)



✓Retrospective pattern in MMB less than previous year

✓Retrospective and historical retrospective reflect relatively stable model results in the last 10 years

✓Projections under recent recruitment expectations (2014 – 2024) have declining stock at mid to high exploitation rates (> F ~ 0.08)

Table 1: Status and catch specifications (1000 t) for the CPT recommended model (24.0c.2).

Year	MSST	Biomass (MMB_{mating})	TAC	Retained Catch	Total Catch	OFL	ABC
2021/22	12.01	16.64	0	0.02	0.10	2.23	1.78
2022/23	9.68	18.34	0	0.02	0.11	3.04	2.43
2023/24	9.35	18.65	0.975	0.96	1.34	4.42	3.54
2024/25	9.26	19.74	1.05	1.05	1.20	5.02	4.02
2025/26		16.84				5.85	4.68

CPT recommendation: Model 24.0c.2, ABC buffer 20%
Author recommended 24.0c.2
Total catch mortality (directed + bycatch) < OFL therefore overfishing did not occur in 2024/25

Buffer considerations:

- Recommend staying with 20% for upcoming year (no large changes or improvements in uncertainty)
- Ecosystem considerations from ESP – wind stress and corrosive bottom water
- Declining trend or low levels of mature male biomass and mature female biomass
- Non-stationarity in recruitment expectations (not incorporated in the model since model expects recruitment events using 1984 to 2024)
- Retrospective pattern in MMB

Risk table draft

Table 1: Risk Table category summary for BBRKC

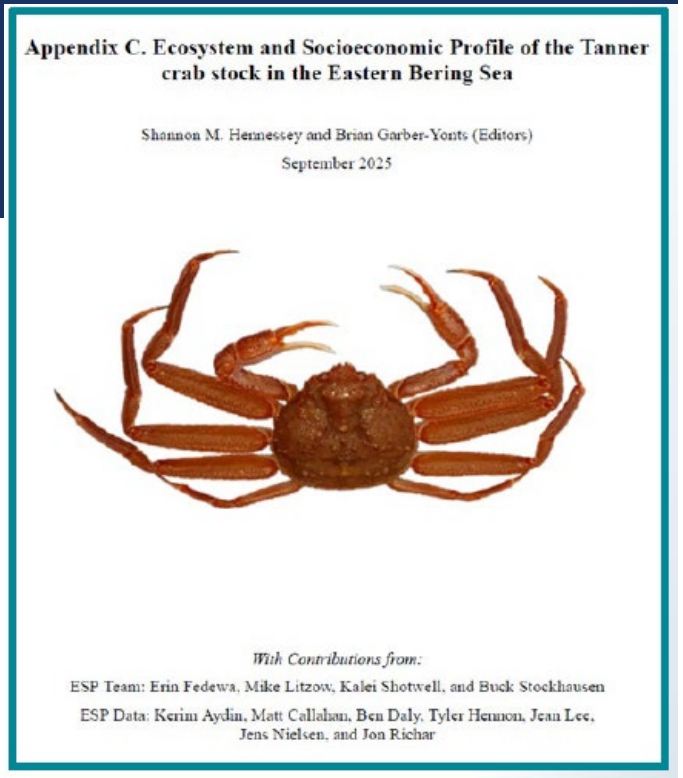
Assessment-related Considerations	Population Dynamics Considerations	Ecosystem Considerations	Fishery-informed Stock Considerations
Level: 1 Minimal concern	Level: 2 Substantial concern	Level: 2 Substantial concern	Level: 1 Minimal concern
- Retrospective pattern in MMB (high Mohn's rho). This has been present for the last few years - Stable GMACS reference model since 2018 - Historic natural mortality event (early 80s)	- Unknown reasons behind recruitment failure (early life stages survival most likely) - Potential shifting spatial distributions - Weak to no stock-recruit relationship - Low levels of abundance compared to historic levels (shifting baseline, non-stationarity)	- Corrosive bottom waters and increased wind stress in Bristol Bay remain a concern for growth and survival of larval and juvenile BBRKC - BB bottom waters were warm in 2025 but there is uncertainty what impacts this has on the stock	- Recent year fishery CPUE was higher than last 10 year average - Total potlifts and number of active vessels at or near historic lows - Skipper survey reported high CPUE and majority saw an increase in legal males

TANNER CRAB

FINAL ASSESSMENT 2025

Tanner crab ESP

- Full ESP document
- Responses to CPT and SSC comments from June
- Ecosystem:
  - Three predictive indicators with recruitment:
    - benthic predator density – increasing from 2021-2024; suggests increasing predator-prey interactions and potential reduced survival
    - juvenile temperature occupied – temp of 3.5 C; suggests average growth and survival
    - along-shelf wind - unsure
  - Disease prevalence – 2nd highest to date (2.7%)
  - Northwest stock distribution shift and range expansion since 2021, males range contraction in 2025
  - Increased size at maturity for both male and female tanner crab
- Socioeconomic:
  - Marginally reduced fleet, increased potlifts
  - Center of gravity of fishing shifted towards W/E boundary
  - Both E and W fisheries fully utilized


Appendix C. Ecosystem and Socioeconomic Profile of the Tanner crab stock in the Eastern Bering Sea

Shannon M. Hennessey and Brian Garber-Yonts (Editors)

September 2025

With Contributions from:

ESP Team: Erin Fedewa, Mike Litzow, Kalei Shotwell, and Buck Stockhausen

ESP Data: Kerim Aydin, Matt Callahan, Ben Daly, Tyler Hennon, Jean Lee, Jens Nielsen, and Jon Richar

Tanner crab 2025 overview

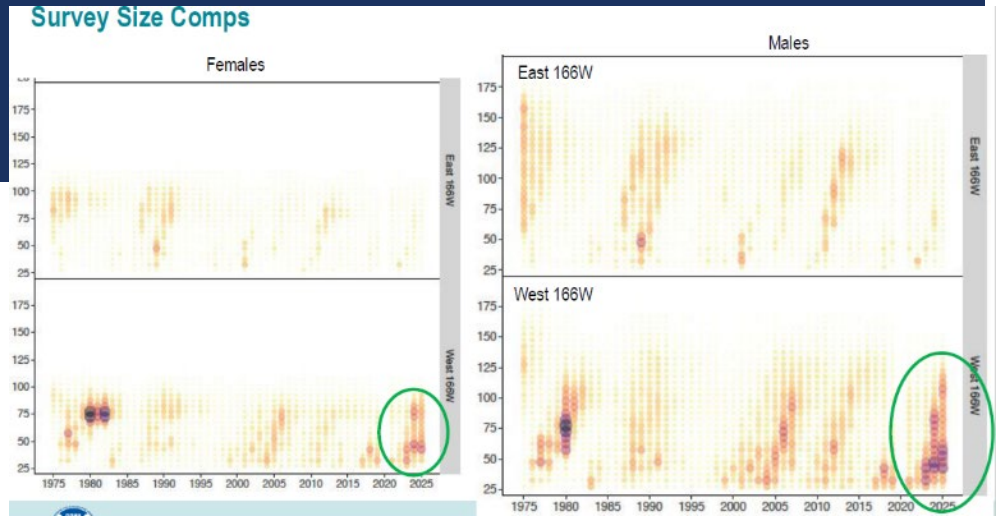
Overview

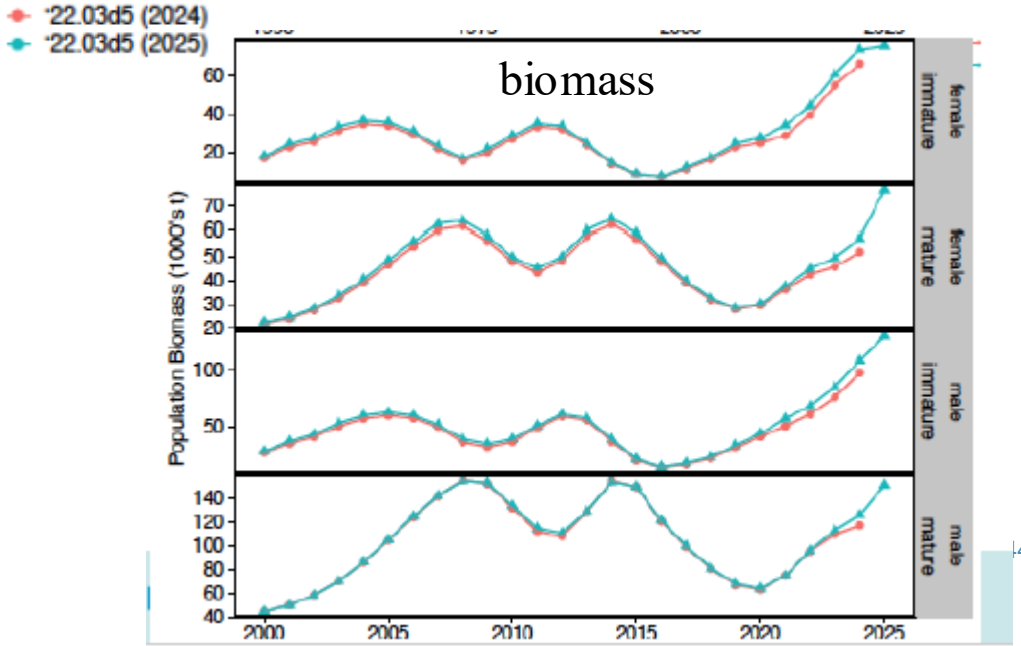
- ADFG manages fishery in two areas
  - **fishery open in both areas**
  - East 166W: TAC: 803 t. RC: 803 t
  - West 166W: TAC: 2,041 t. RC: 2,049 t
- 2025 NMFS EBS Shelf Survey Biomass
  - male biomass: 111 kt (-E, +W, +T)
  - IP male biomass: 16 kt (-E, +W, +T)
  - imm fem biomass: 12 kt (-E, -W, -T)
  - mat fem biomass: 29 kt (-E,+W,+T)
  - **2023 recruitment moving into larger sizes**
- 2023/24 OFL: 41.29 kt
  - Total catch mortality: 3.09 kt
  - **overfishing did not occur**
- 2025 assessment
  - Same Tier 3 model as 2024 (22.03d5)
  - Tier 3a ($B>B_{MSY}$; **not overfished**)
  - OFL: 51.02 kt; ABC: 40.81 kt
  - Concerns: model **overly-optimistic**

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2021/22	17.37	62.05	0.50	0.49	0.78	27.17	21.74
2022/23	18.19	74.17	0.91	0.91	1.19	32.81	26.25
2023/24	20.00	88.21	0.94	0.94	1.09	36.20	27.15
2024/25	21.61	99.53	2.84	2.85	3.09	41.29	33.03
2025/26	NA	75.96	NA	NA	NA	51.02	40.81
In 1,000's metric tons						12.54	10.66	TIER 4

Tanner crab

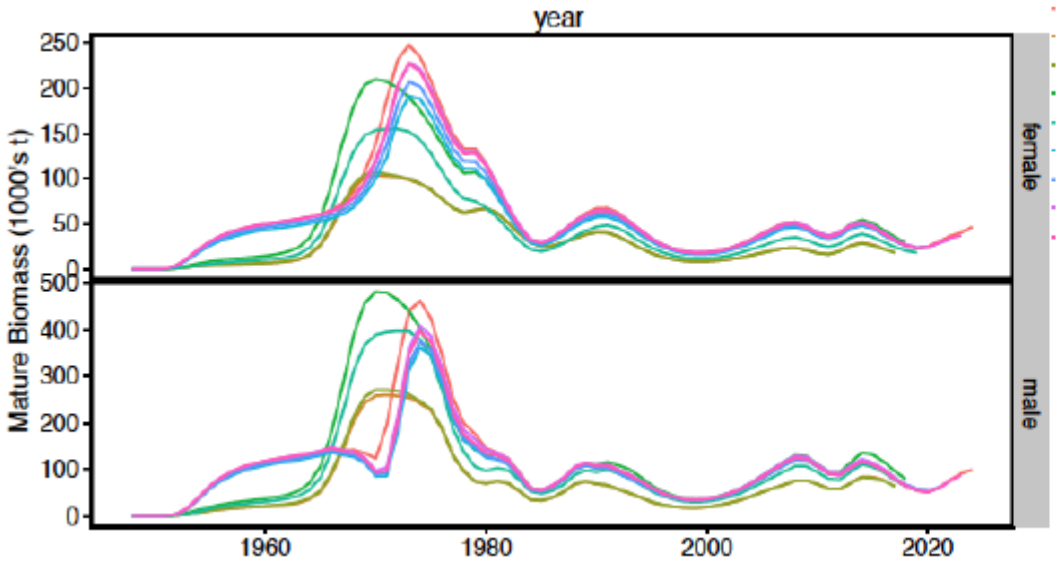
- GMACS progression on-going, expected to see model development at Jan modeling workshop
- Model 22.03d5; same as 2024 assessment
  - Size comps are continuing through the population (past concern)
  - Model fit similar, still concerns for "optimistic" model
  - No issues with model convergence (jitter) or parameter bounds
- Tier 4 fallback provided

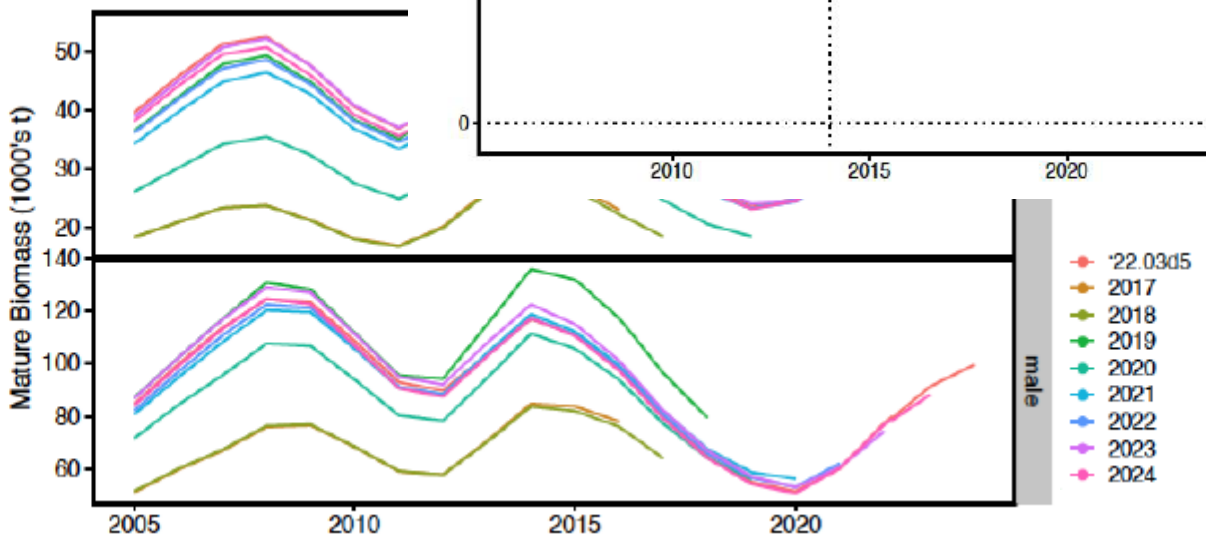


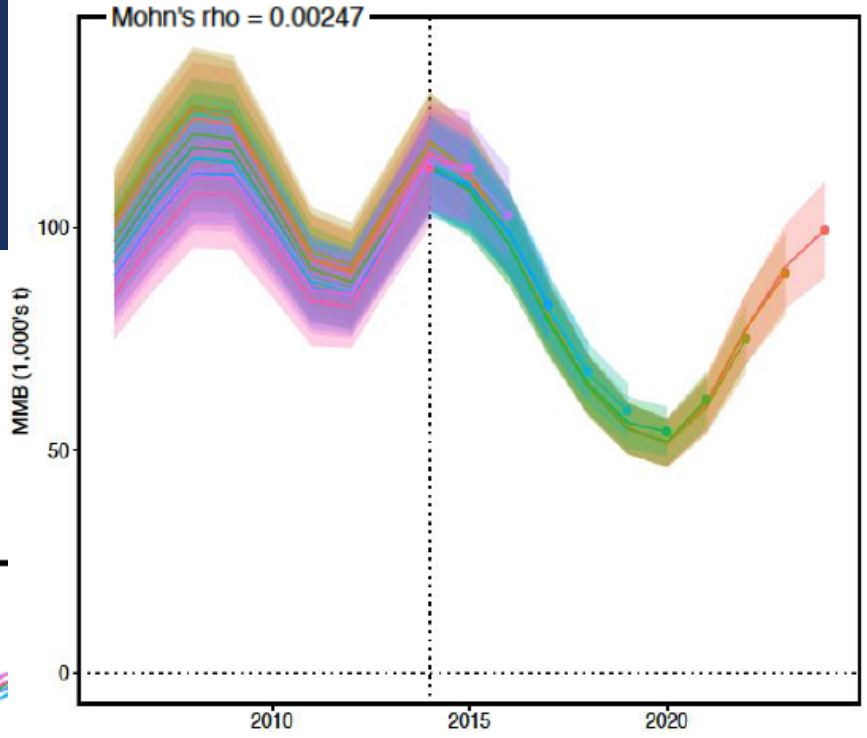


Retrospectives

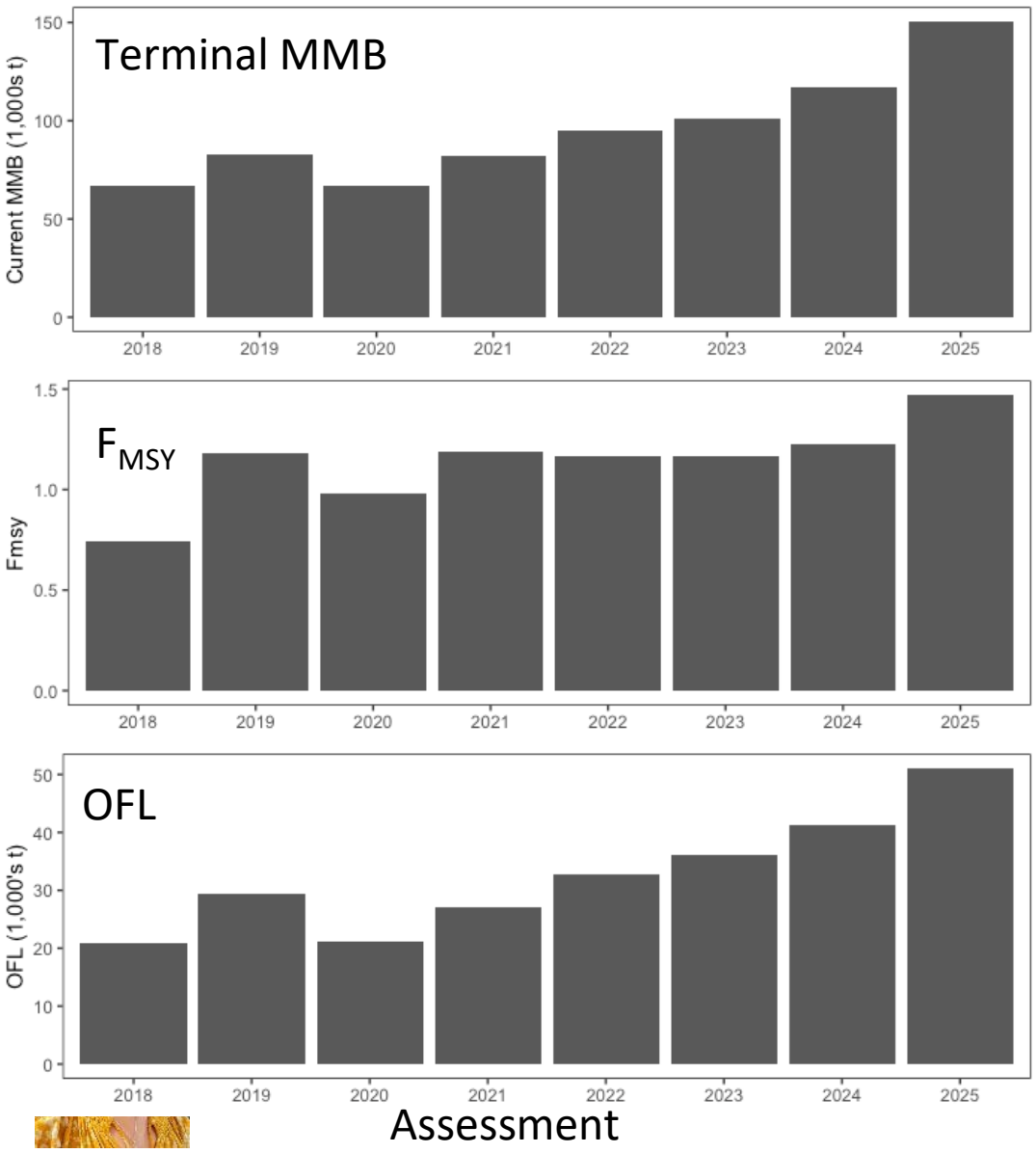
Historical comparisons (using accepted model in that assessment year







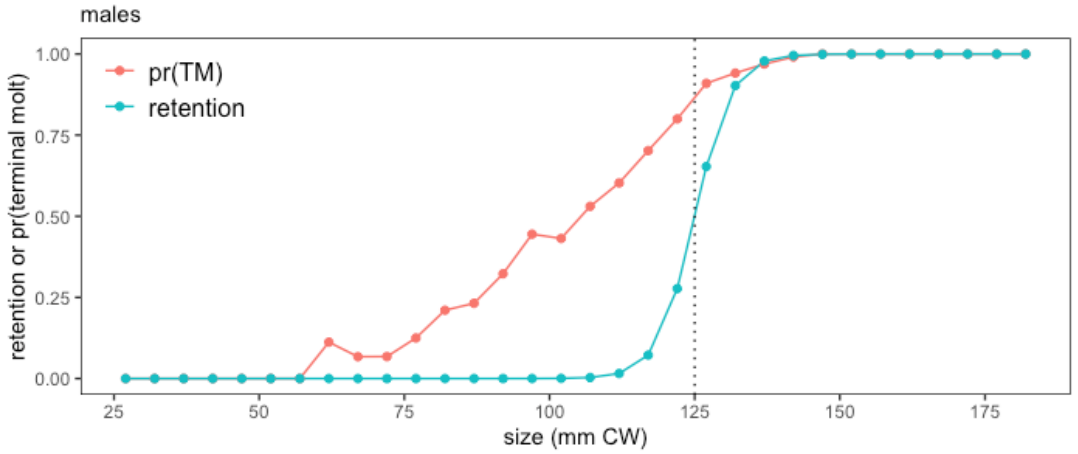
Tanner crab

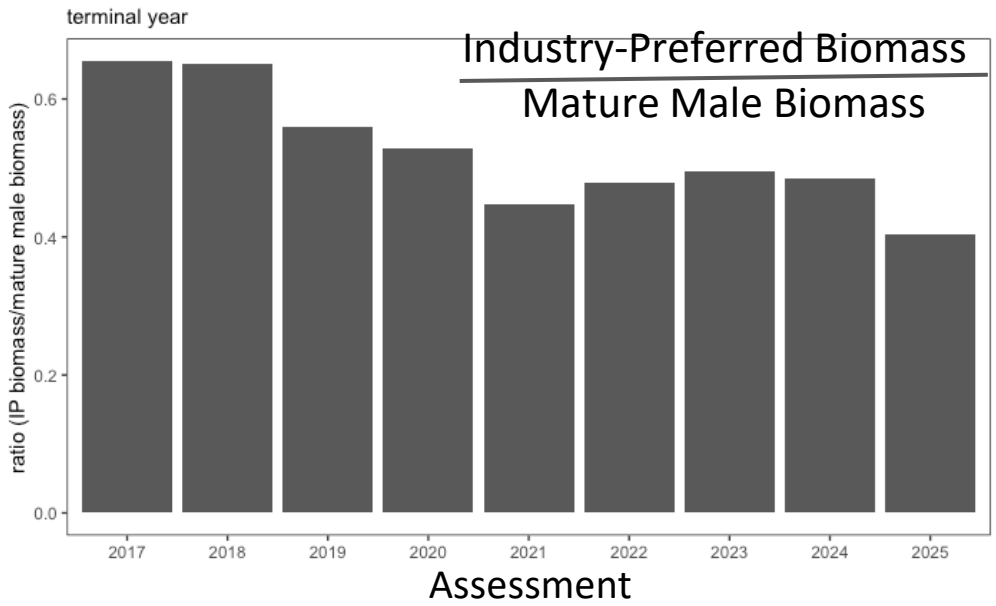


51 kt

Tier 3 OFL:

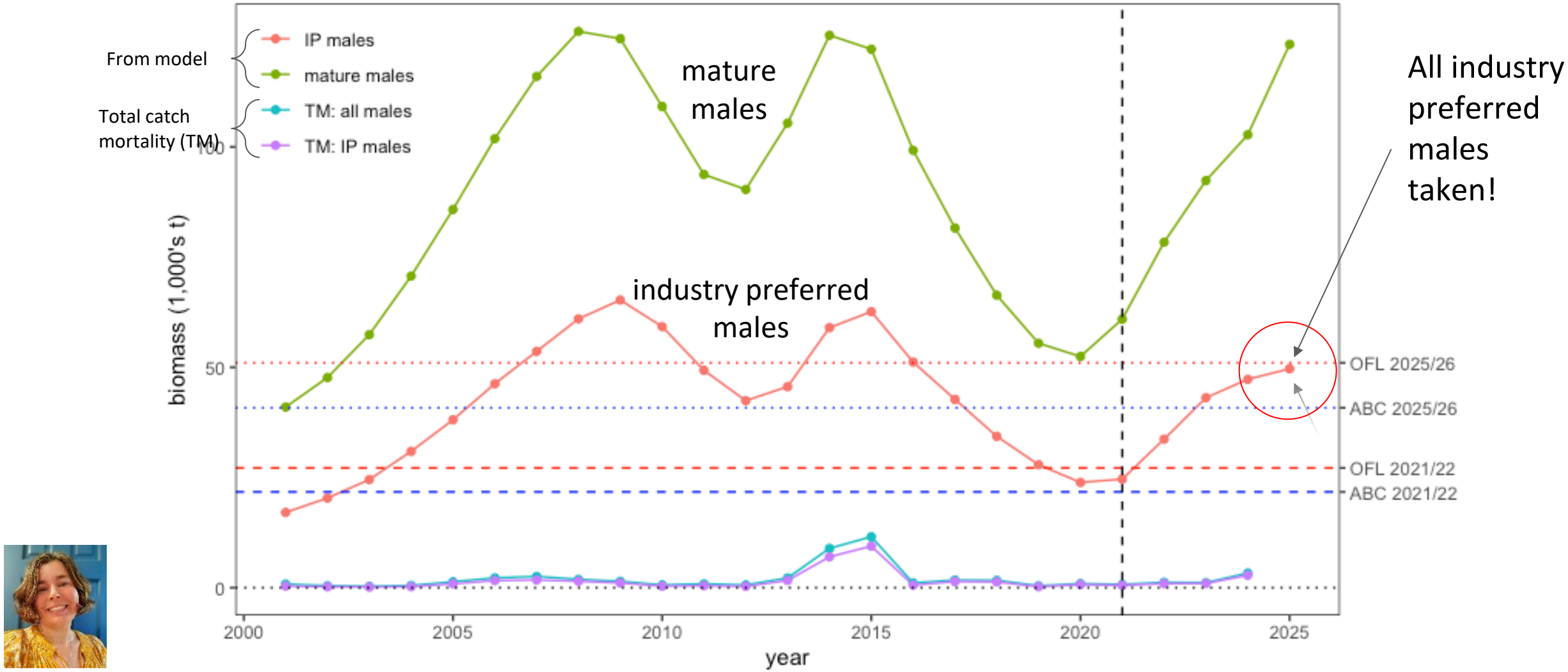
- $F_{35\%}$, $B_{35\%}$ proxies for F_{MSY}, B_{MSY}
- B = MMB uses **morphometric** maturity





Tanner crab: 2025 OFL

Tier 3 OFL: 51 kt; ABC: 41 kt



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2025/26	NA	75.96	NA	NA	NA	51.02	40.81

CPT recommendation: Model 22.03d5, ABC buffer 20%
Author recommended 22.03d5

Buffer considerations:

- Continuing concern over model performance (abundance of large crab still overestimated)
- Continuing concern over MMB as index of reproductive potential
- Continuing concern over F35%, B35% as metrics for sustainable fishery
- Positive: movement of recruits into larger sizes classes

Risk table draft

Assessment-related considerations	*Population dynamics considerations*	*Environmental/ecosystem considerations*	*Fishery Performance*
Level 2: increased concern	*Level 1: Normal*	*Level 1: Normal*	*Level 1: Normal*
Fails to achieve the dynamic range seen in survey biomass, concern regarding currency for reproductive potential, concern regarding proxies used for Fmsy and Bmsy	The majority of stock-specific ecosystem indicators related to natural mortality, growth, and recruitment suggest no additional concerns. While bitter crab disease prevalence was high, the magnitude of impact on the stock remains unknown.	Warm conditions with a reduced cold pool extent in 2024; forecast to be warm with delayed sea ice arrival in 2025. While bottom waters were warm in 2025, ecosystem concerns are minor with uncertain impacts on the stock. Corrosive bottom waters remain a concern for growth and survival. Competitive pressure may be low, while predation pressure may be increasing.	Fishery-informed indicators generally support stable stock condition relative to the most recent seasons and the post-2005 historical record. No considerations observed in the most recent fishery suggest greater than normal risk of overfishing, independent of other considerations captured in the assessment and risk table.

SNOW CRAB

FINAL ASSESSMENT 2025

Snow crab trends

Small increase in preferred males

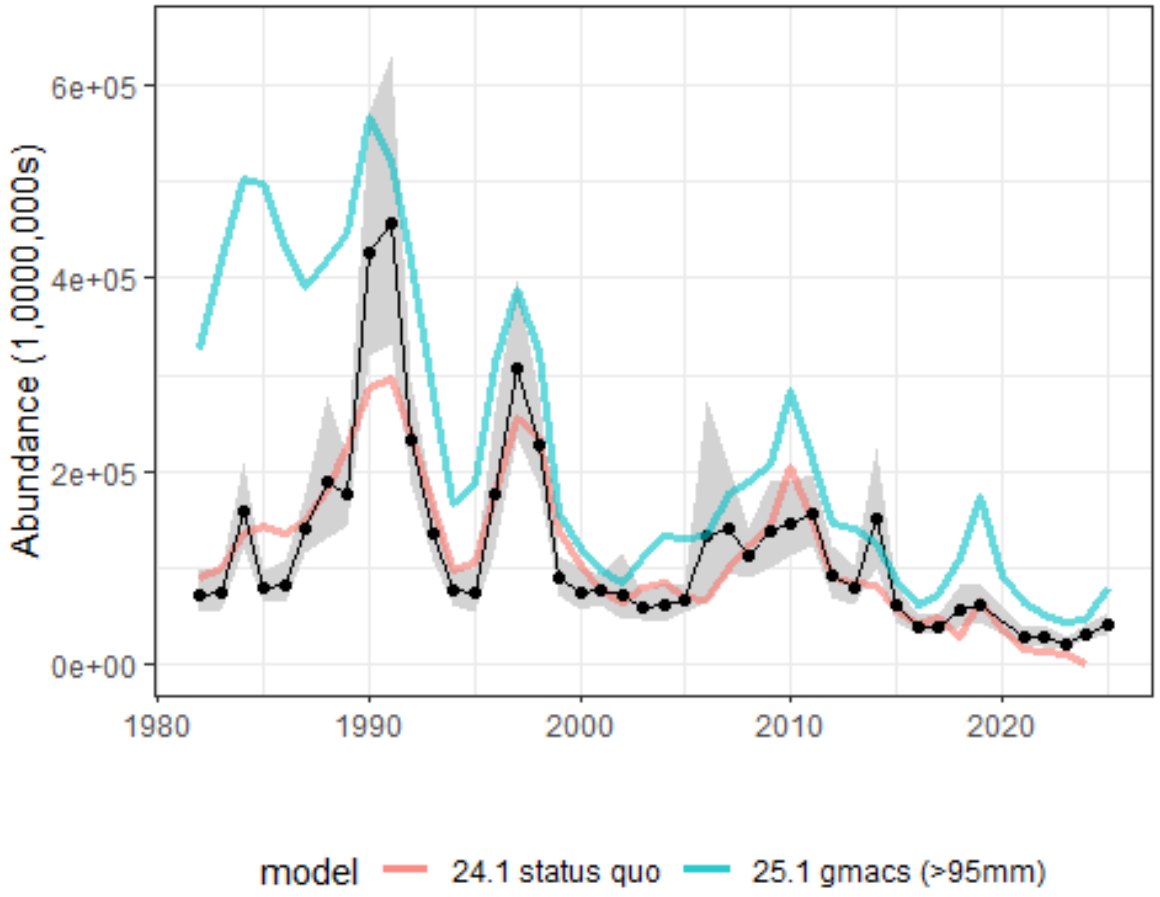
- 7th lowest on record
- 8% of the maximum observed

Last 9 years are the lowest on record

- In order: 2023, 2021, 2022, 2024, 2017, 2016, 2025, 2018, 2019

Large numbers of medium sized males

Terminal molt issues



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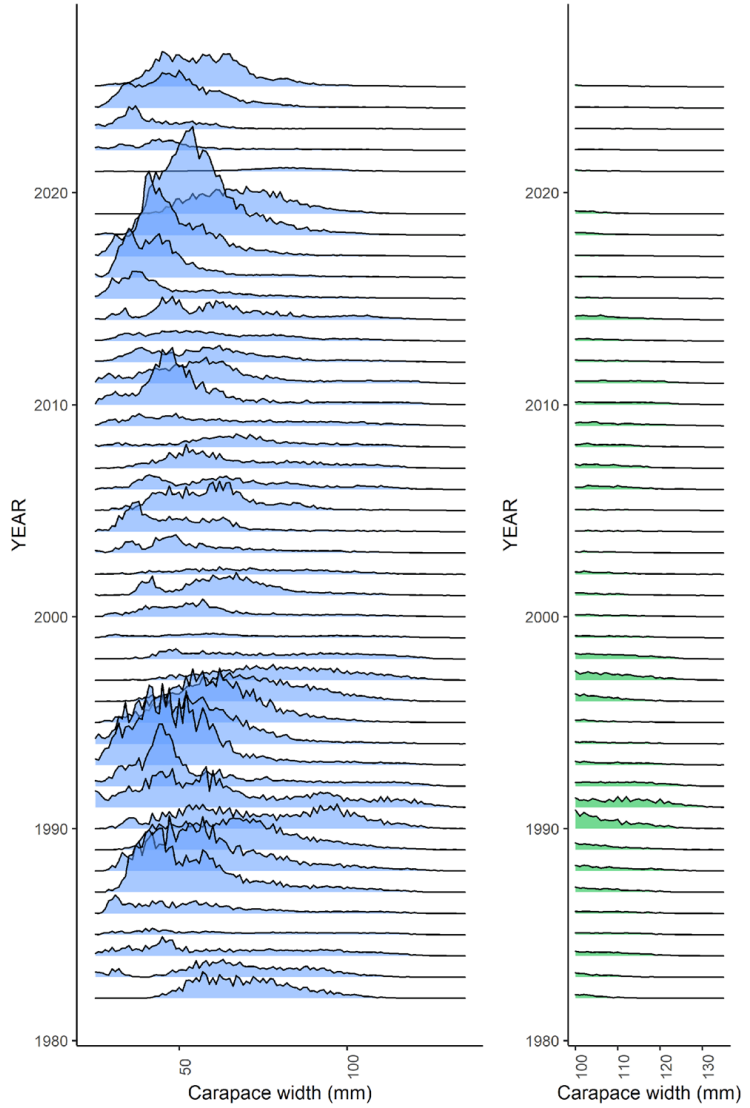


SSC comments

maximin analysis + Ricker stock-recruitment

- **SBPR% -> 36% to 34% when using >95mm as currency.**

Include historical bias plots

- **Done**

ABC control rule

- **No time, but this sounds a lot like a tier 4 rule focused on large males.**

Environment and density relationships to maturity and mortality

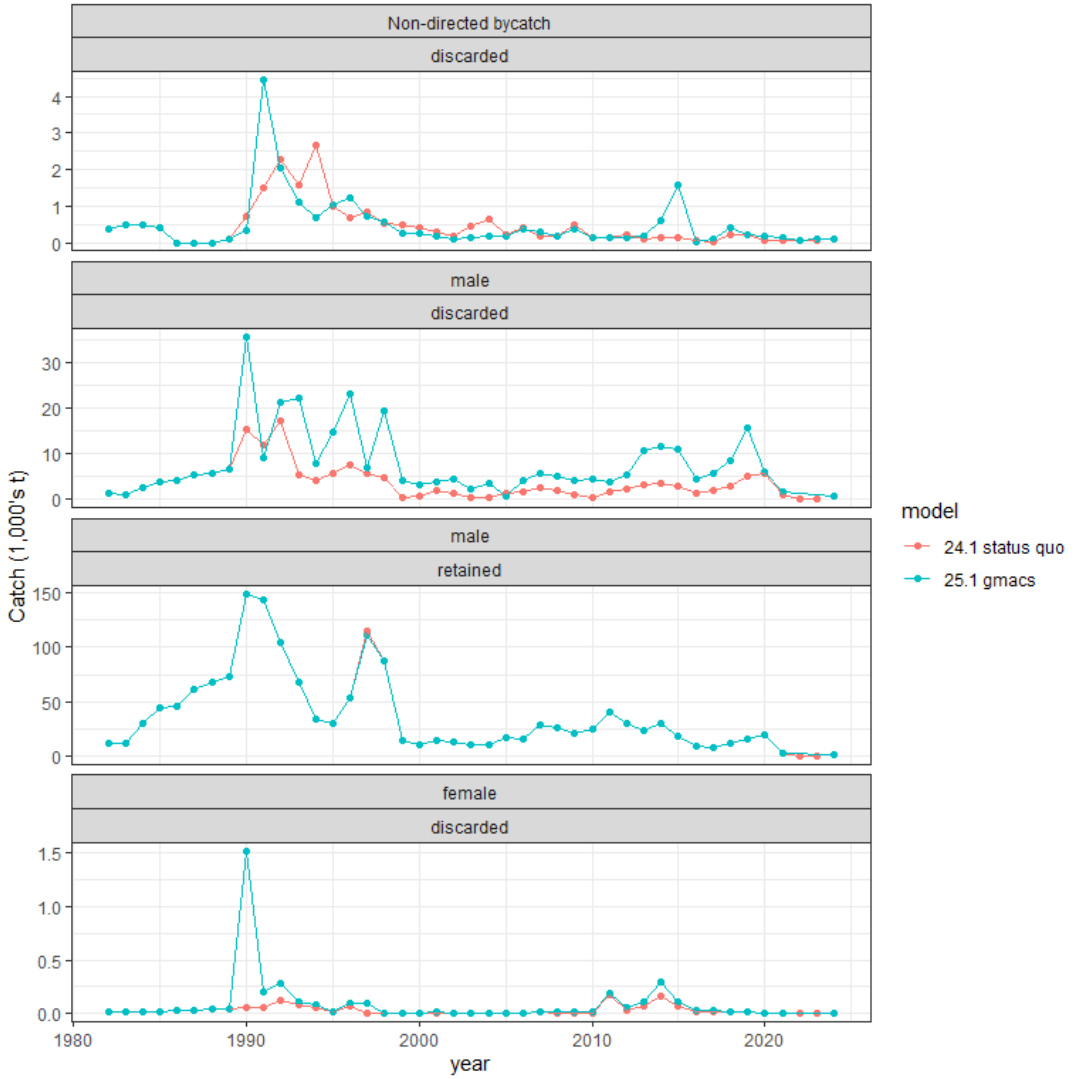
- **This was presented in 2024 (and now in review)**

SSC comments

**SSC comment: As the figures presented on the updated 1991+ catch data appear to indicate substantial differences in male discards, the SSC requests that the September document more clearly describe changes in the discard estimation and accounting process. **

The change in discards came from the way in which mortality was accounted for (i.e. before data input or within the model).

Larger differences farther back (with a couple of exceptions).



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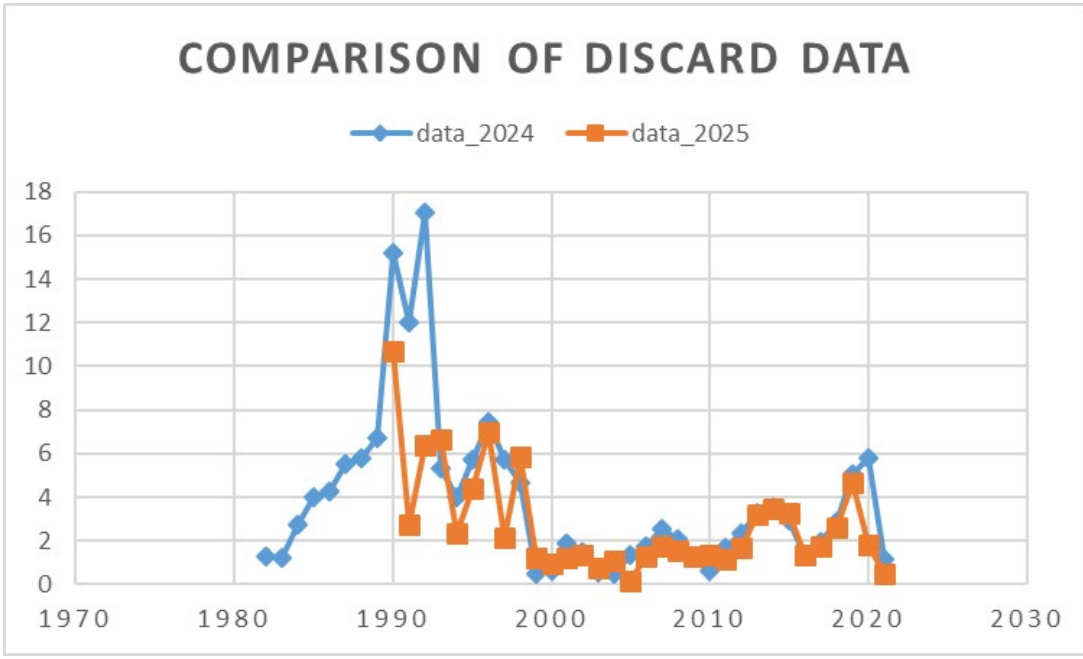
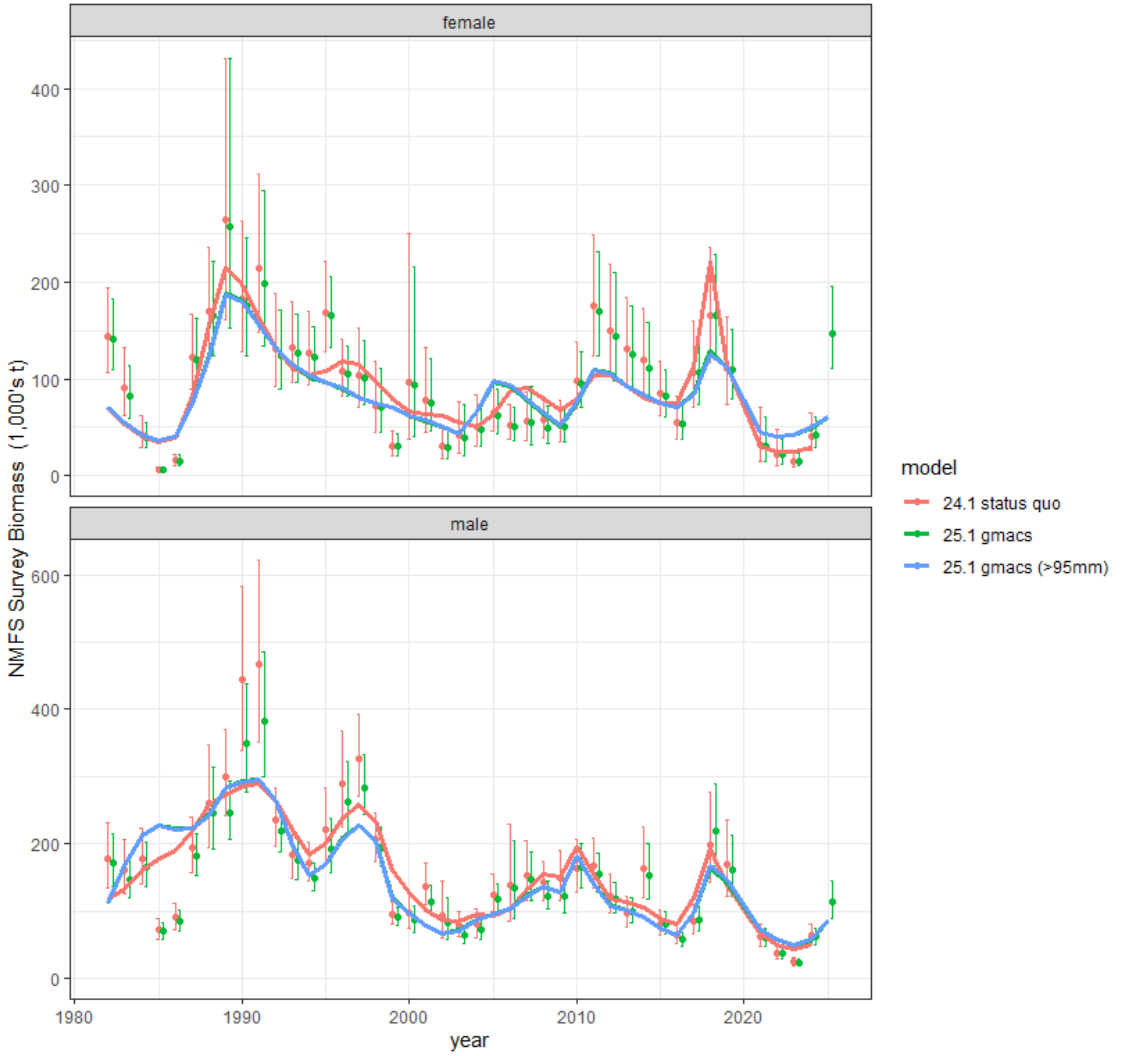


Data change

Survey data

- Underlying survey data not change; the way terminal molt was applied before entry to assessment was
- Both sexes updated
- Large changes for males in some years
- Incorporating the time-varying probability of terminal molt
- Early data points were historically difficult to fit
- Updates did not change the trajectory of estimates significantly



Historical changes

Process	Historical assumptions	Updated assumptions	
Recruits	Equal sex ratio	Unequal sex ratios	Retrospective patterns
Natural mortality	Constant with strong priors	Strong priors and time-block in 2018-2019	Lack of survey fit
Growth	Piece-wise	Linear	Model instability
Maturity	Single estimated ogive	Input yearly observations	Data interpretation (2022)
Fishing mortality	Freely estimated	GMACS changed form	Reproducibility
Fishery selectivity	Freely estimated	GMACS changed form	Reproducibility
Survey selectivity	Logistic, BSFRF as survey	Non-parametric, BSFRF as priors	Data interpretation (2022)

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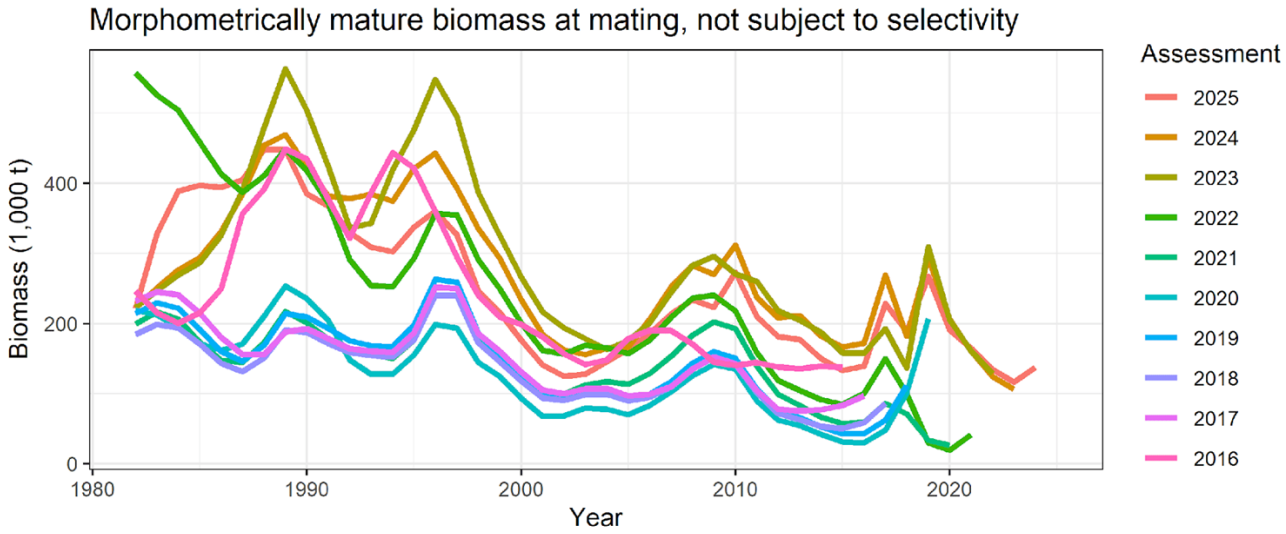
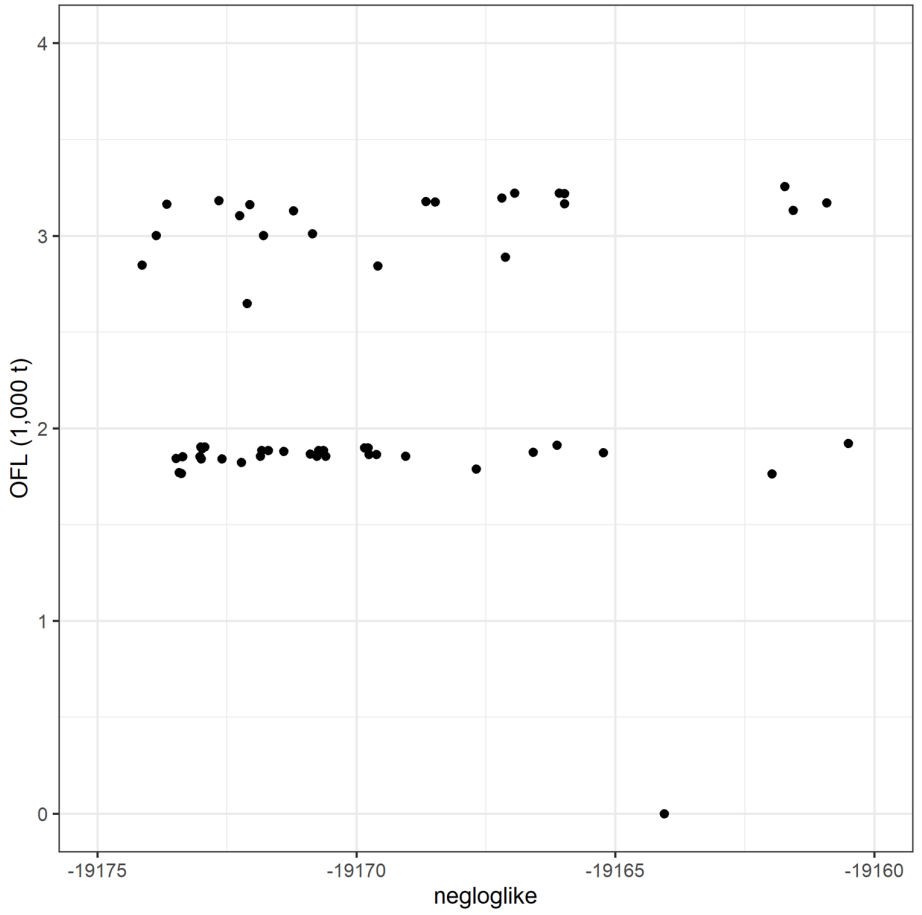


Model diagnostics

- Retrospective patterns not terribly concerning
- Jittering patterns were concerning
- Differences in terminal year come from differences in estimated recruitment several years prior



ESP

Predictive

None

Contextual

- Juvenile Temperature of Occupancy
- Winter Sea Ice Extent
- Juvenile Disease Prevalence
- Juvenile Energetic Condition
- Pacific Cod Consumption
- Male Size at Maturity
- Mature Male Area Occupied
- Mature Male Center of Abundance
- Female Reproductive Failure
- Operational Sex Ratio

Monitoring

- Arctic Oscillation
- Benthic Prey Density
- Chl-*a* Concentration
- Spatial Extent of Bottom Waters < 0°C
- Female Size at Maturity

Recommendations

2024 OFL

- Author: Tier 4, 95mm = 0.66 (20%)
- CPT: Tier 3, 95mm = 0.05 (20%)
- SSC: Tier 3, morph = 19.6 (60%)

Author/CPT Rationale

- No big crab == no fishery
  - "Optimal yield"
- Preferred abundance trend strongly negative under conservative management
- Potential biological issues
  - Density dependent maturity
  - Large males important in reproduction
  - Genetic component

2025 OFL

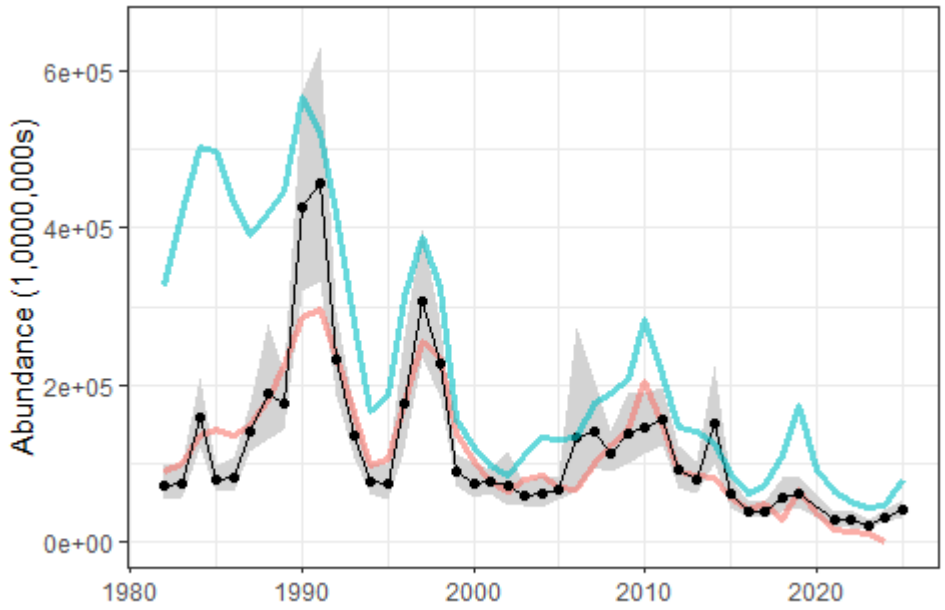
- Author: Tier 3, 95mm = 3.26 (20%)
- CPT: Tier 3, 95mm = 3.26 (20%)
- SSC:

Author/CPT Rationale

- No change

Rationale

- Our goal is maximum sustainable yield.
- Yield is derived from large crab.
- Large crab are on a downward spiral in spite of conservative management and more stable trajectories of smaller crab.
- Several potential feedbacks exist requiring large males to produce more large males.
- Focusing on large males is supported by the best available science to improve long-term yields.



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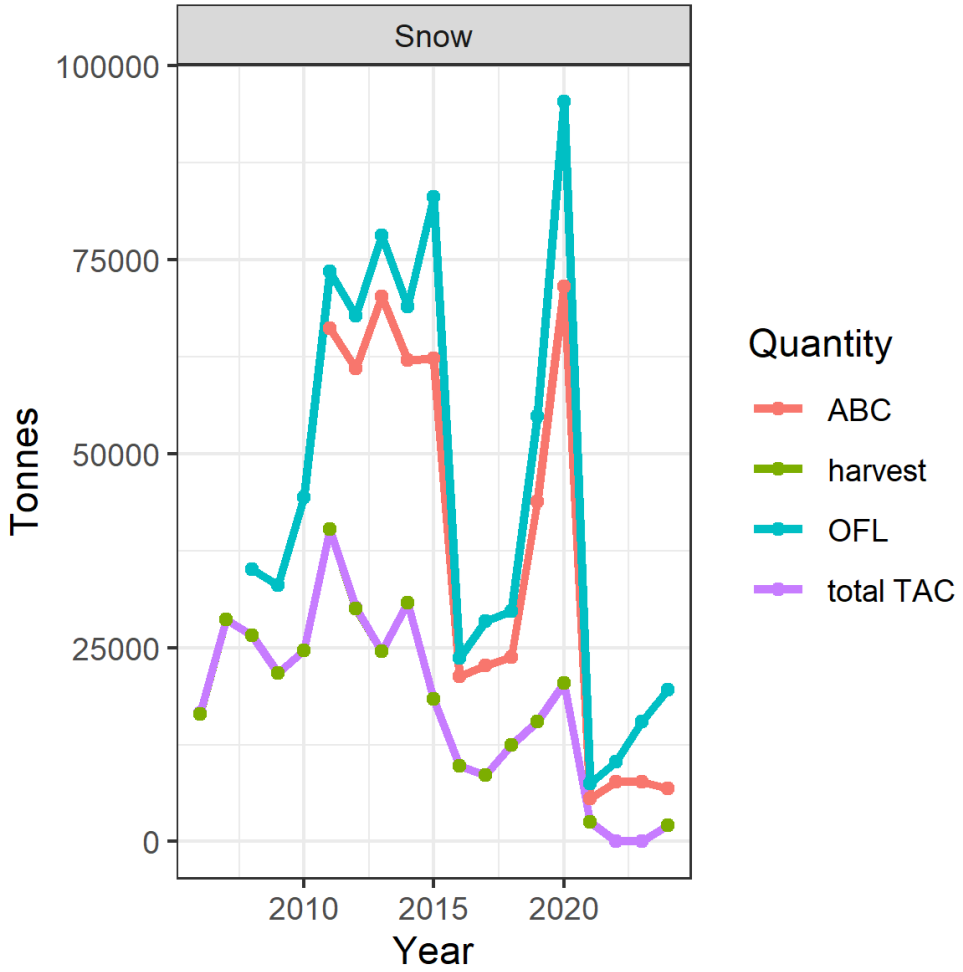
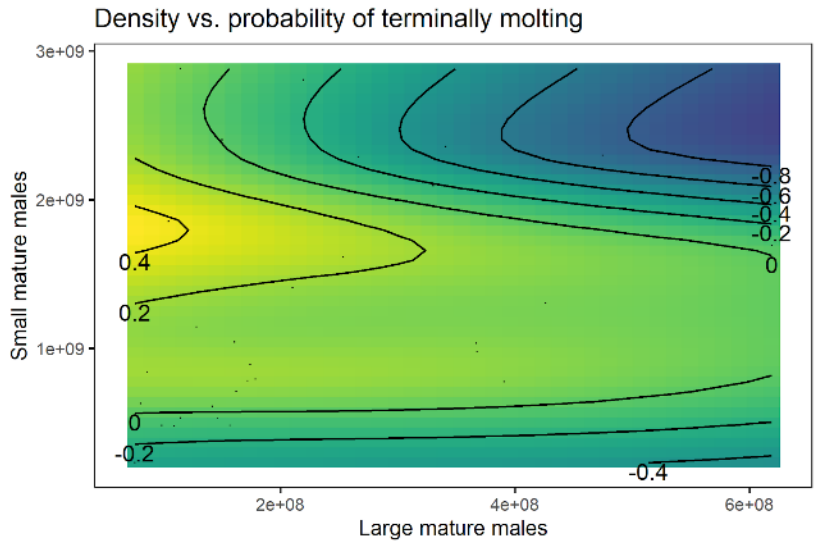
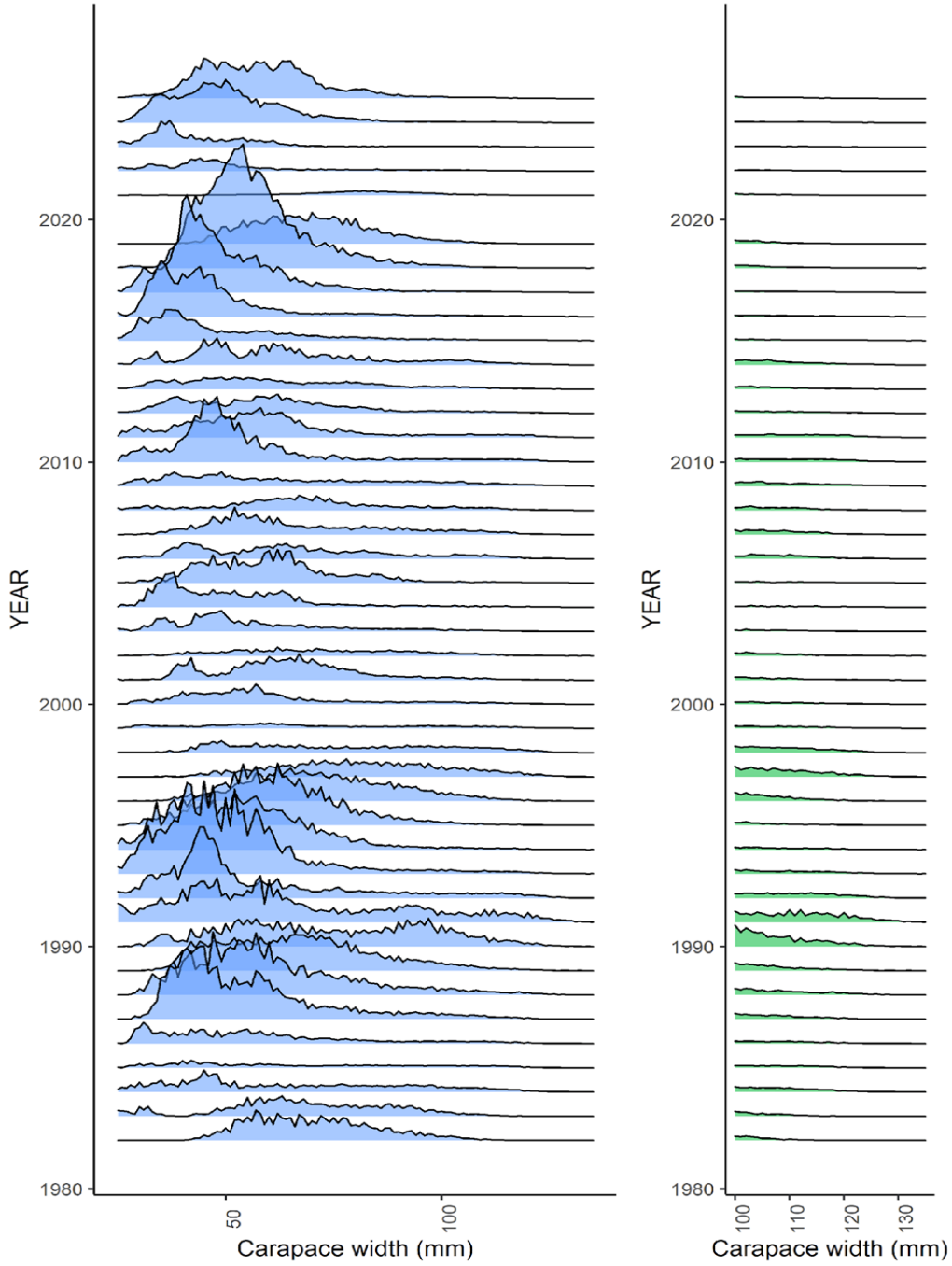


Rationale

Biological concerns (in order of author concern)

- Density dependent terminal molt
- Mate limitation
  - hybridization
- Sperm limitation
- Directional selection

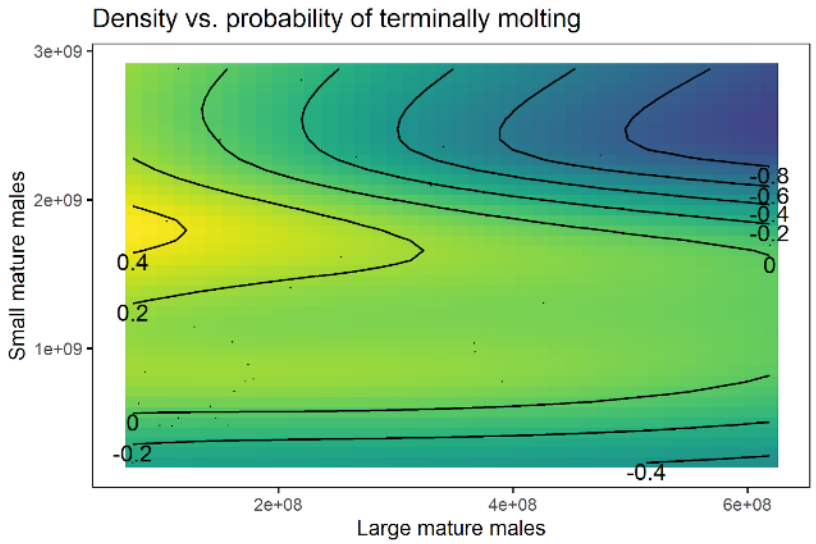


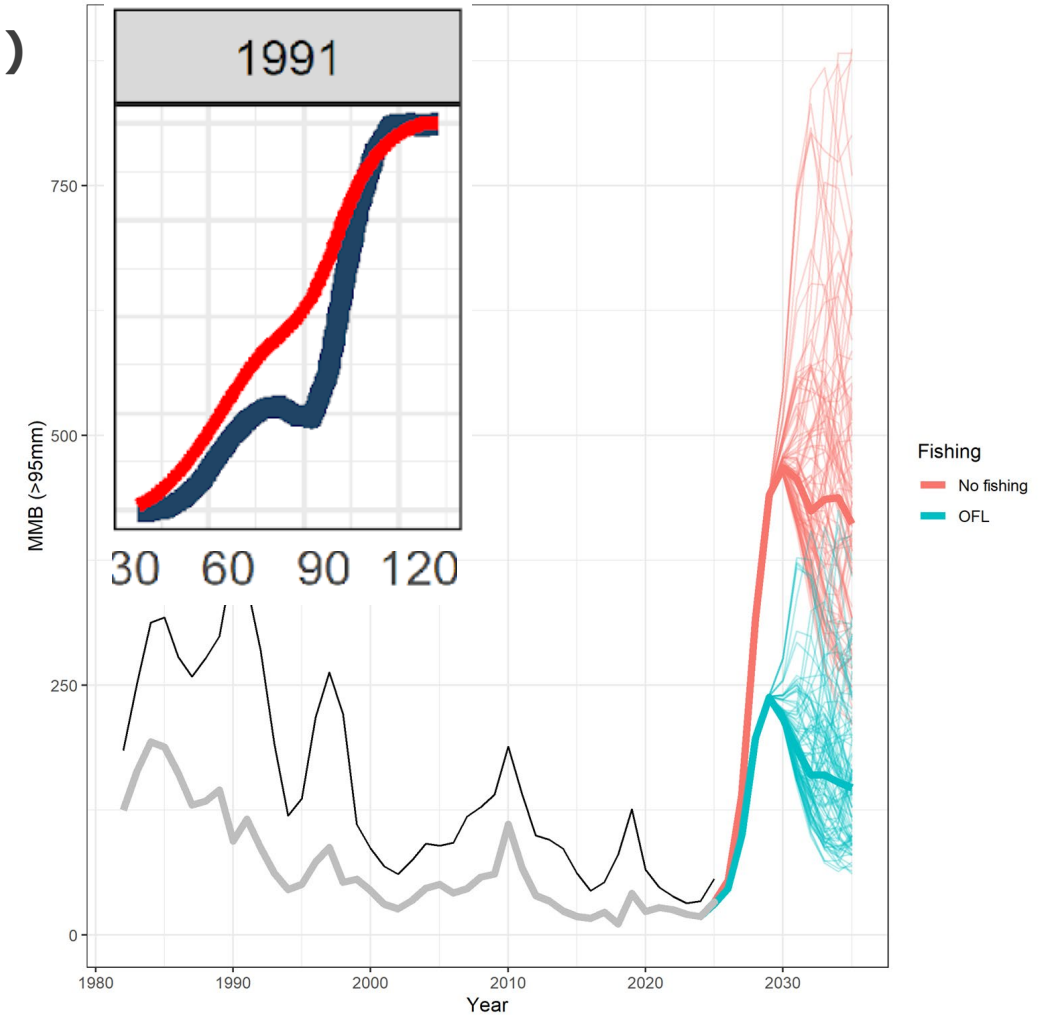


Rationale

Biological concerns (in order of author concern)

- Density dependent terminal molt
- Mate limitation
  - hybridization
- Sperm limitation
- Directional selection





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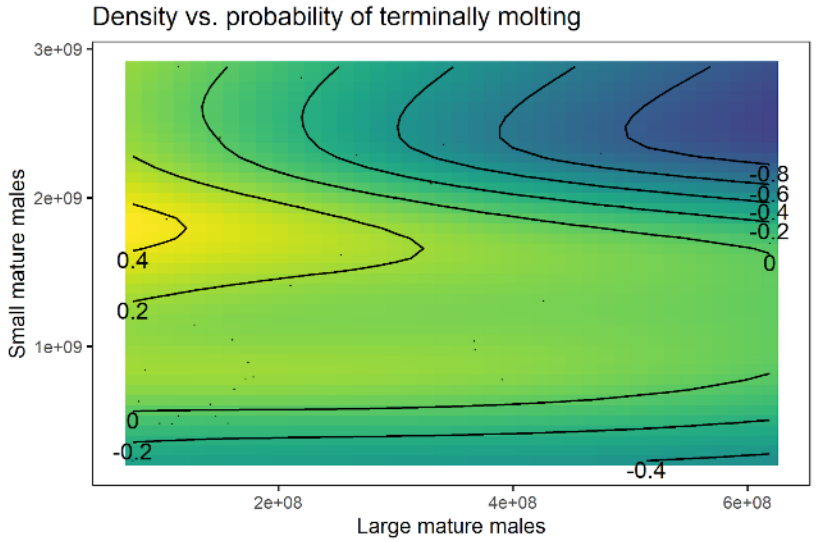
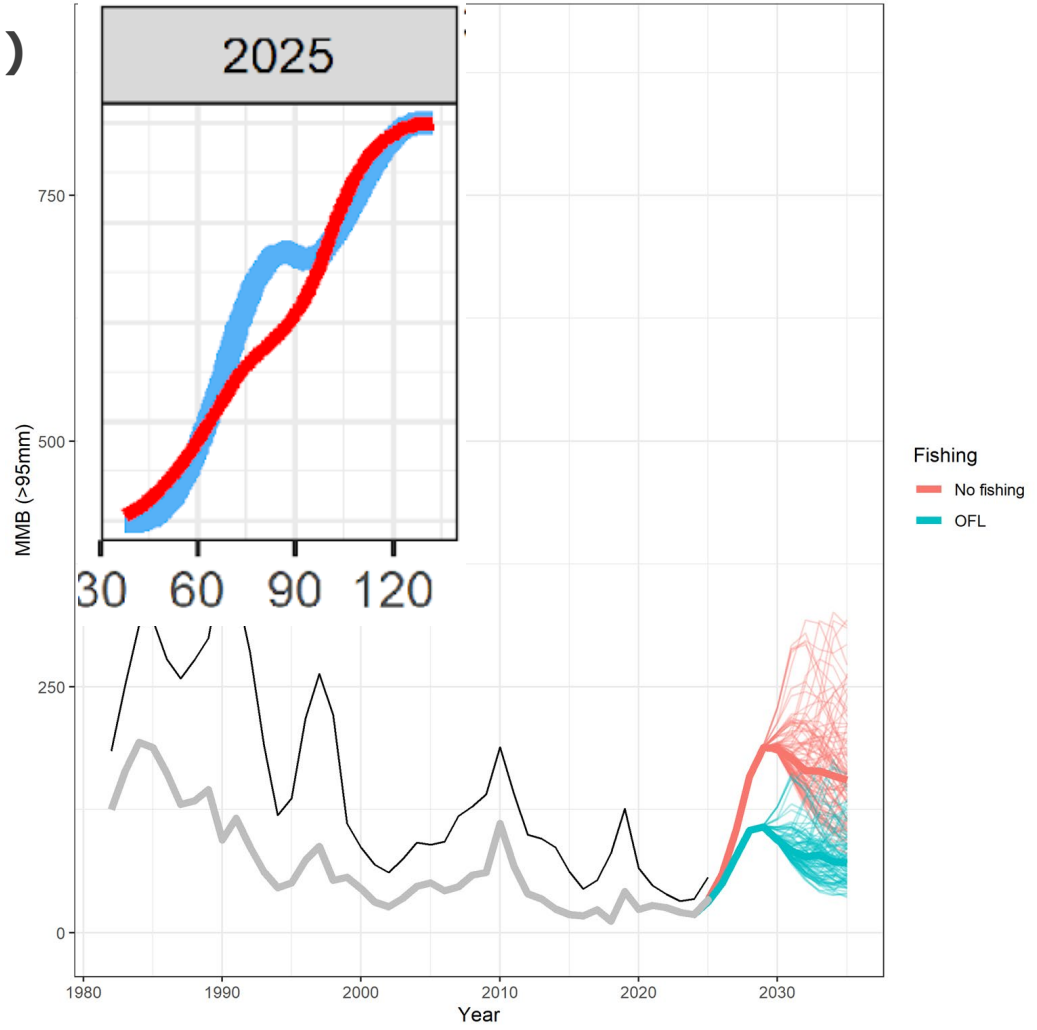




Snow crab CPT recommendations

- CPT recommends changing definition of male maturity to ≥ 95 mm carapace width
- Based on best available scientific information concerning importance of large males for reproductive status of the stock:
  - Most females mated with one (59%) or two (32%) males during 2007-2016 (Slater et al. 2024)
    - Lower average # of mates than observed in other populations
    - Suggests mating opportunities may be limiting and females may be at risk of sperm limitation
  - Smaller males have smaller sperm reserves than large males (Sainte-Marie et al. 1995)
  - Population with reduced proportion of large males is at increased risk of sperm limitation (Baker et al. 2022)
  - Size at terminal molt in males is density-dependent and inversely related to the abundance of large males (Mullowney and Baker 2021)
- Additional benefits noted for FMP Economic and Social Objective

Snow crab CPT recommendations

- Modeling recommendations
  - Conduct jittering analysis with 2019 as the terminal year to assess role of 2020/21 stock collapse in producing multiple model solutions near the MLE
  - Do not runs separate jitter runs for the same model with two definitions of maturity
  - Investigate the potential for different numbers of male and female size bins in the model, as with BBRKC
- CPT concurs with author-recommended 20% ABC buffer
  - Concerns over jittering analysis
  - Population dynamics concerns over male declining size at maturity
- Model 25.3 with ≥ 95 mm CW definition of maturity produces OFL = 3.26 kt, ABC = 2.6 kt

Table 1: Historical status and catch specifications for snow crab (1,000t).

Year	MSST	Biomass (MMB)	TAC	Retained catch	Total catch	OFL	ABC
2015/2016	75.8	91.6	18.4	18.4	21.4	83.1	62.3
2016/2017	69.7	96.1	9.7	9.7	11	23.7	21.3
2017/2018	71.4	99.6	8.6	8.6	10.5	28.4	22.7
2018/2019	63	123.1	12.5	12.5	15.4	29.7	23.8
2019/2020	56.8	167.3	15.4	15.4	20.8	54.9	43.9
2020/2021	76.7	26.7	20.4	20.4	26.2	95.4	71.6
2021/2022	91.6	41.3	2.5	2.5	3.6	7.5	5.6
2022/2023	78	92.4	0	0	0.06	10.3	7.7
2023/2024	95.9	155.91	0	0	0.11	15.44	7.72
2024/2025	93.5	19.0	2.1	2.1	2.81	19.6	6.86
2025/2026		31.1				3.26	2.6

Pribilof Islands Red King Crab (PIRKC)

Final Stock Assessment and Fishery Evaluation

Overview

- Tier 4 stock
- B_{MSY} proxy = 35% of average model-estimated MMB for 2000 through present year - 1
- Last assessment in 2022
- Fishery closed over conservation concerns for blue king crab
- 2024/2025 OFL = 685 t; total catch = 0.87 t; overfishing did not occur
- Two male-only models presented
  - 25.1 = last accepted model (22.1) implemented in current version of GMACS (2.20.22) + updated survey and catch data
  - 25.2 = 25.1 + ADF&G pot survey data from 2003, 2005, 2008, 2011

June SSC comments

The SSC requests the author bring forward additional detail on the transition to the new GMACS version and diagnostics in the fall.

-- Author presented comparative fits for models 22.1 & 25.1. However, given the large number of changes to GMACS over three years and the difficulty comparing across versions, little progress was made on tracking down the source of differences.

The SSC recommends the CPT discuss and bring forward recommendation for revised time interval to align with PIBKC.

-- CPT recommends change to quadrennial assessment to match PIBKC (next assessment in 2029).

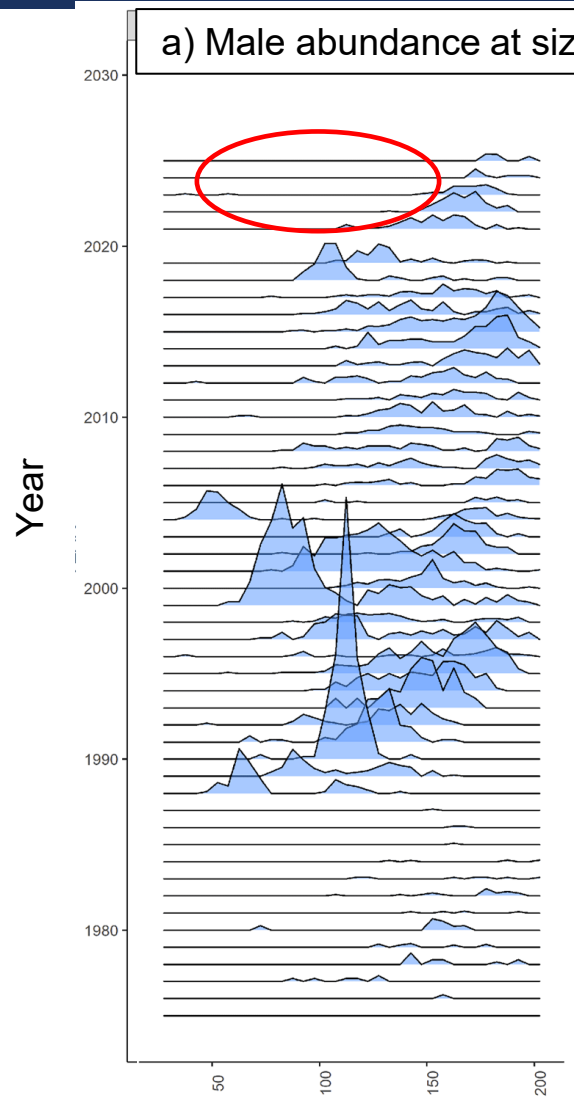
The SSC recommends this assessment remain in the GMACS framework.

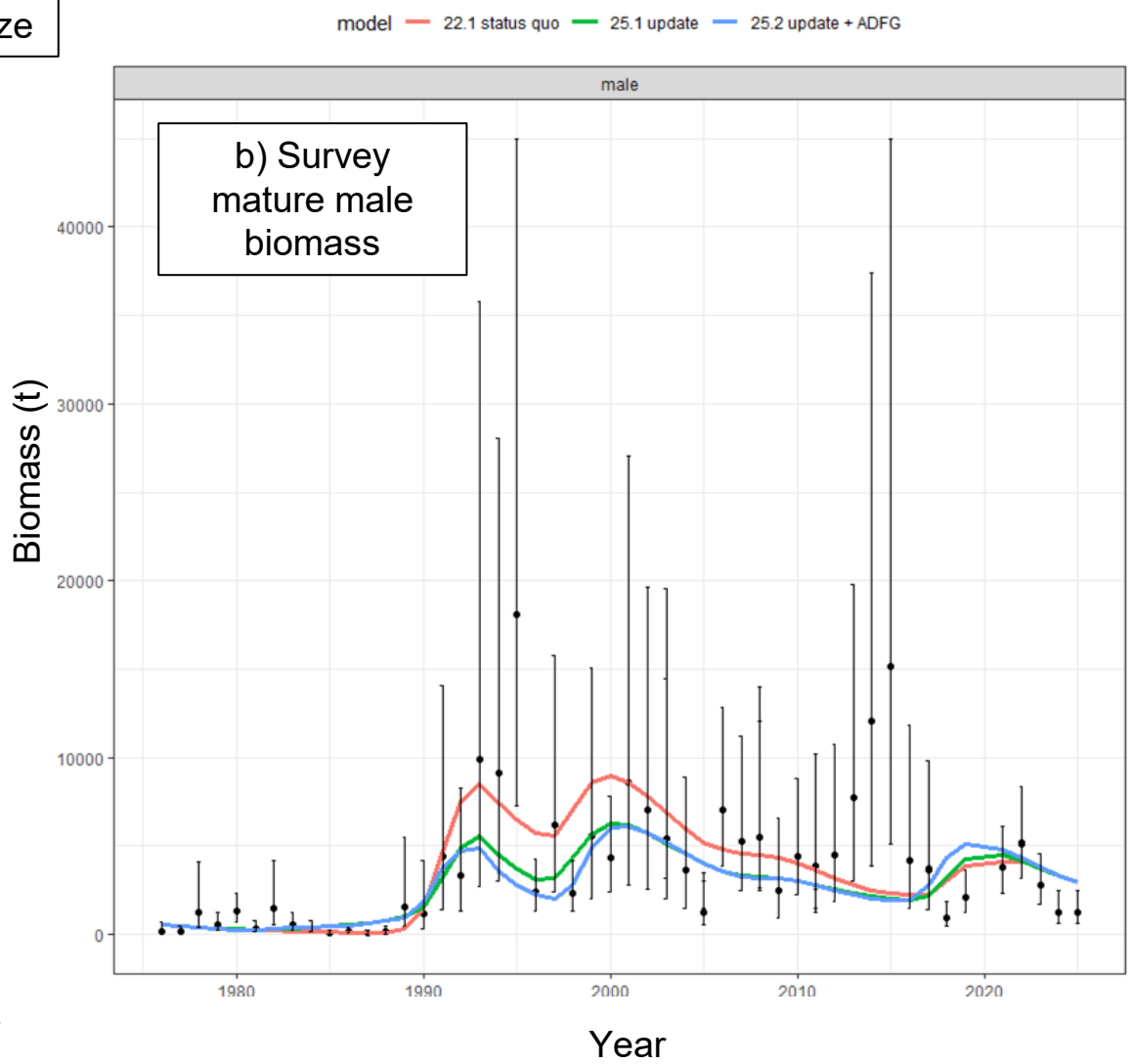
-- The CPT concurs.

PIRKC population trend

a) Survey shows persistent absence of small size classes since 2019

b) Survey-estimated MMB has declined since 2022 and is approaching B_{MSY}





PIRKC: CPT recommendations

- CPT endorses model 25.2
  - Fits similar to 25.1
  - Utilizes all available data
- CPT recommends no changes to B_{MSY} year range
- CPT concurs with recommended 25% ABC buffer
  - Consistent with historical buffers for this stock; based on need to borrow life history information from other stocks
  - Loss of corner stations biases survey estimates downwards and does not justify an additional buffer
- Recommended OFL = 489 t; recommended ABC = 367 t
- 2025/2025 MMB = 1.76 x B_{MSY}; not overfished

Pribilof Islands Blue King Crab (PIBKC)

Final Stock Assessment and Fishery Evaluation

Overview & Recommendations

- Tier 4 stock; quadrennial assessment going forward
- Under a rebuilding plan; **remains at an overfished status at ~4% of B_{MSY}**
- OFL = 1.16 t (set in rebuilding plan), total catch = 0.03 t, **overfishing did not occur**
- Single model brought forward: GLMM fit in sdmTMB to estimate survey MMB
- CPT recommends adoption of this model for the next assessment
- CPT endorses continuing use of 25% ABC buffer (in place since 2014)
- For the next four crab years: OFL = 1.16 t; **recommended ABC = 0.87 t**
- CPT recommends that future assessments should apply 50% mortality for fixed gear groundfish bycatch, in line with other king crab stocks

BALANCE OF CPT REPORT

Overfishing status updates (2024/25 total catch)

- WAIRKC – Tier 5, directed fishery closed, total catch mortality was 0.01 t (bycatch in AIGKC and groundfish)
  - 0.01 t << OFL (56t) therefore overfishing did NOT occur
- SMBKC – directed fishery closed, total catch mortality was 0.0007 t
  - 0.0007 t << OFL (0.129 t) therefore overfishing did NOT occur
- PIGKC – directed fishery was open (2 vessels so confidential), TAC was set below ABC
  - Total catch mortality < OFL (114t) therefore overfishing did NOT occur
- AIGKC
  - Total catch mortality 2.43 mt < 3.73 mt OFL therefore overfishing did NOT occur

SSC comments: Full / update assessment considerations

- CPT took up this discussion and reviewed groundfish definitions
- CPT discussed the SSC recommendation to consider whether there is value in defining different assessment types
- CPT consensus was that CPT members are satisfied with the status quo approach
  - Full assessments for each stock according to its assessment cycle
  - Values in having a full safe for easy access to historical and up to date information
  - Use assessment frequency as the method to balance workload considerations
- "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. "

QUESTIONS?

- Thanks to all CPT members and crab assessment authors.