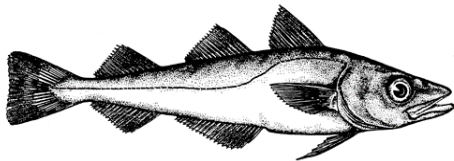




NOAA
FISHERIES



GOA Pollock Updates

Cole Monnahan
2026 October SSC

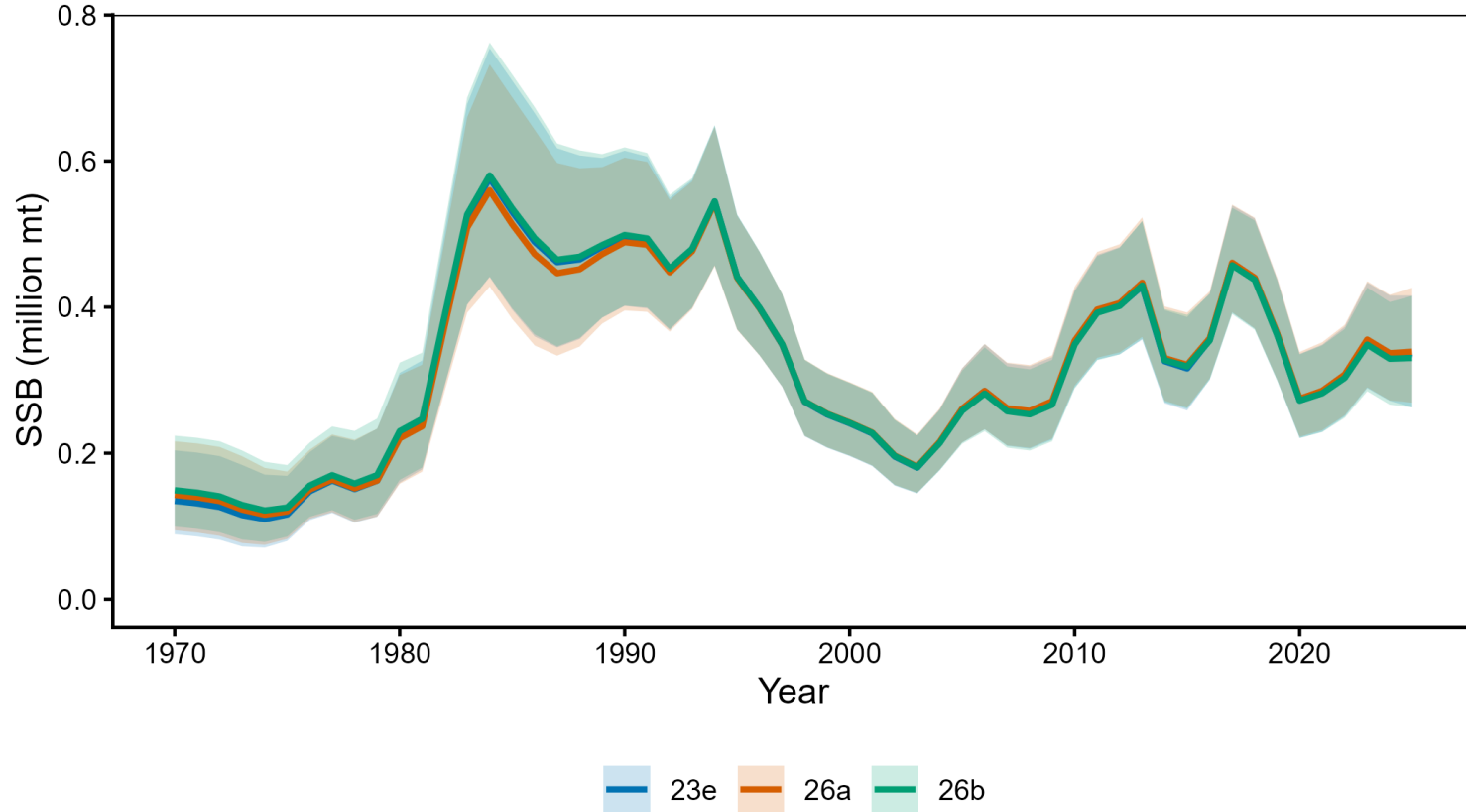
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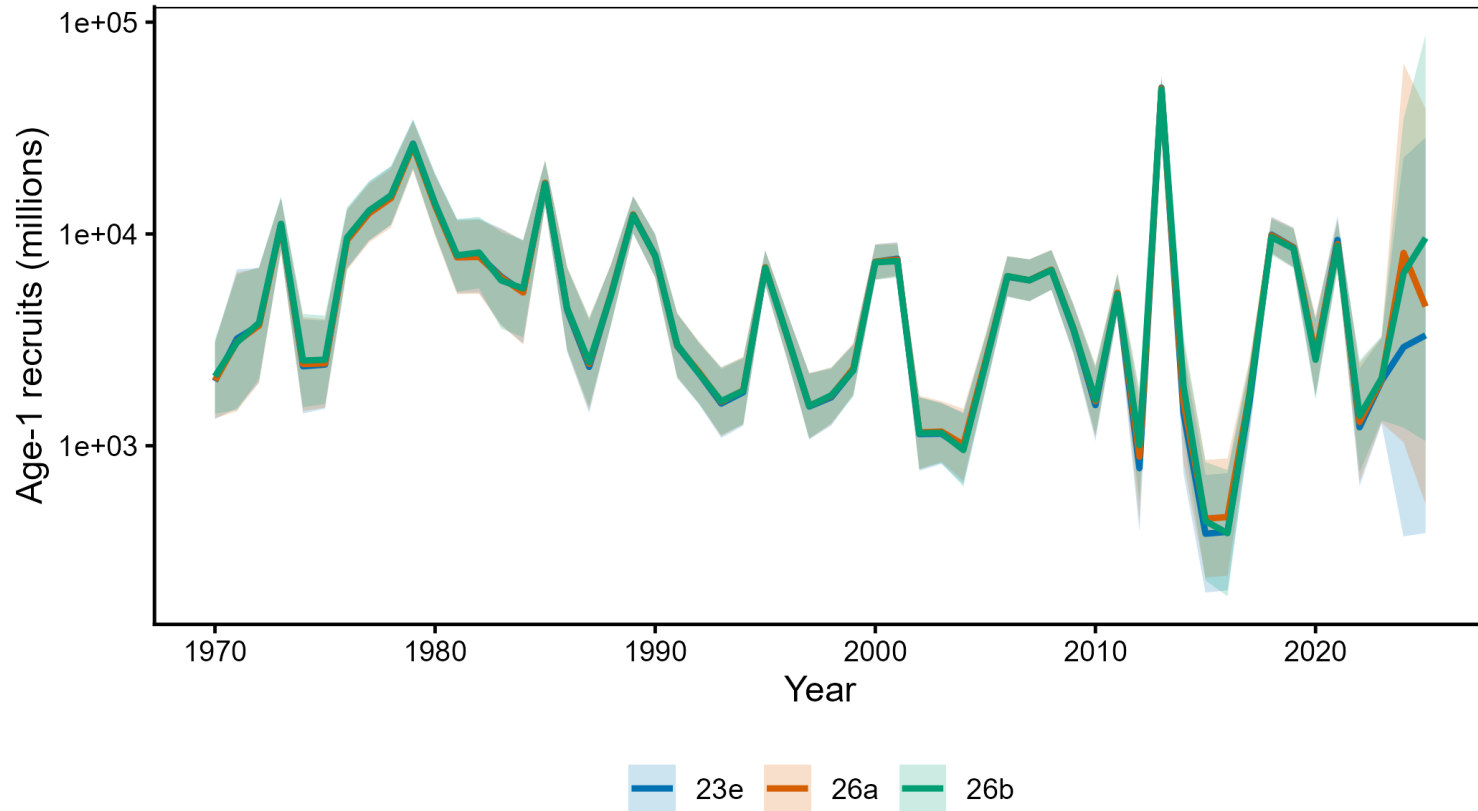
Summary for 2026

- Move to Rceattle has clear advantages
- **26a: Rceattle with iid recruitment and σ_R estimated**
- **26b: Model 26a + a DSEM module on recruitment**
- Model 26b is recommended for operational use.
- Very poor fit to NMFS BT, investigation in process
- Familiar issues with absolute scale and data conflict

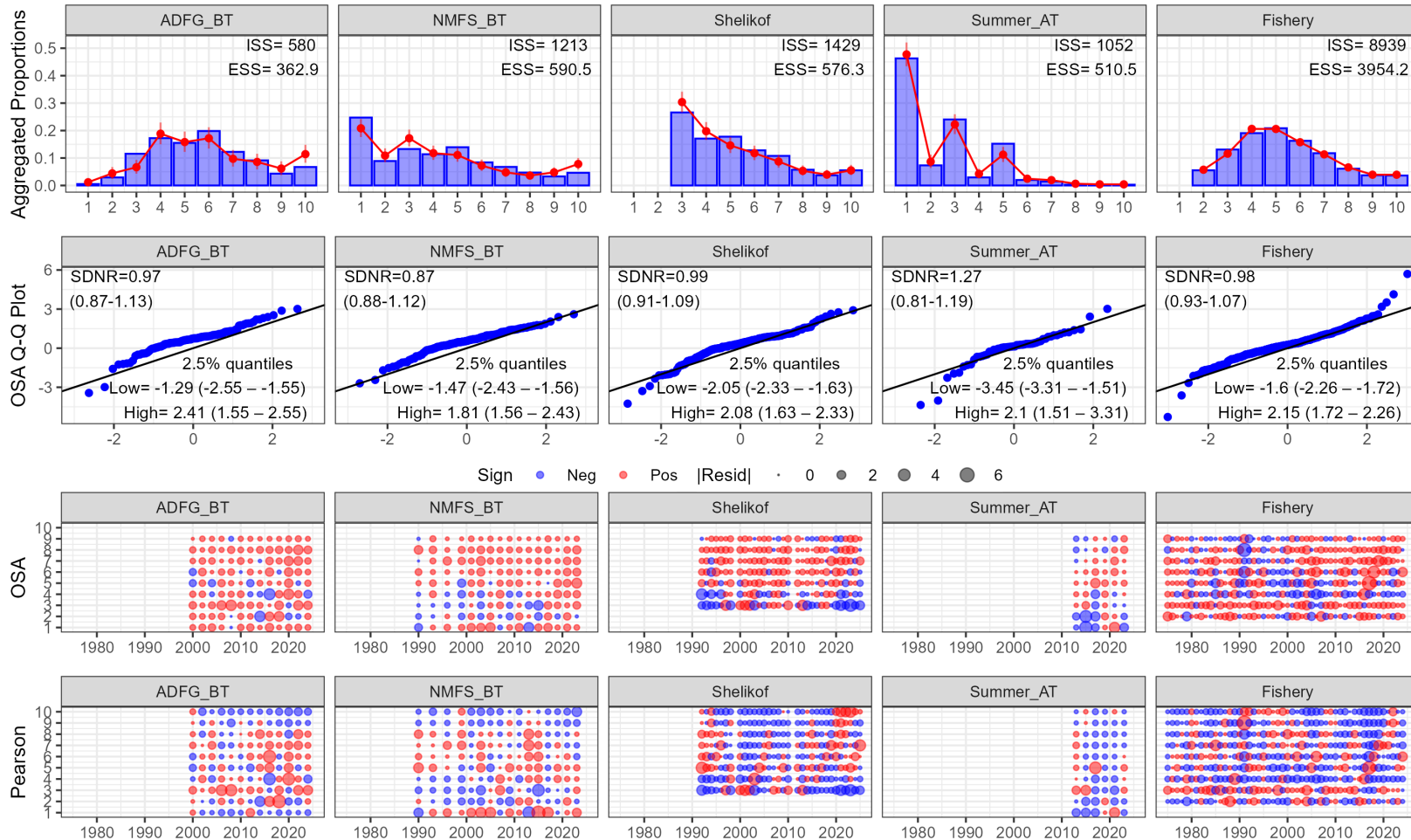
Model results: SSB



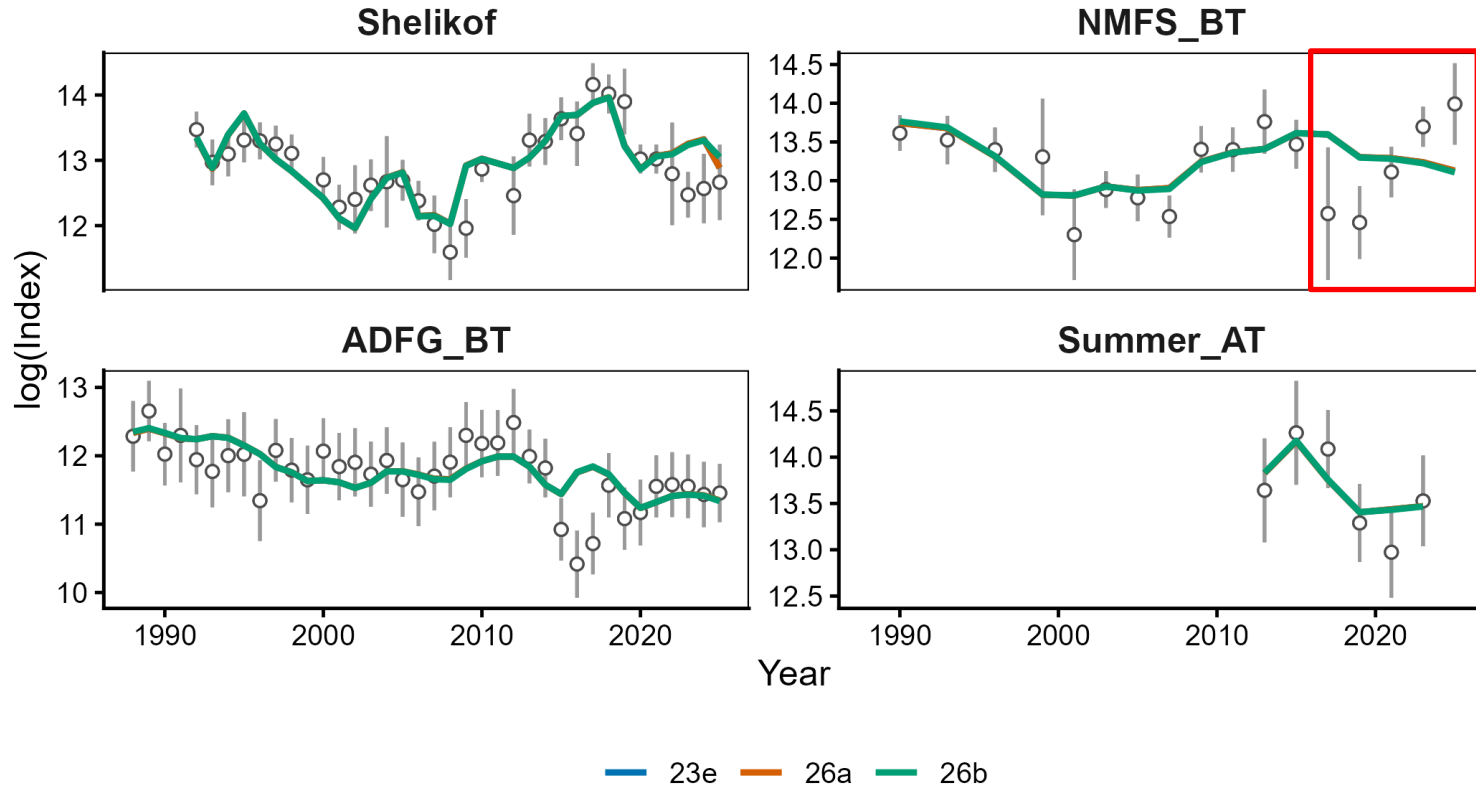
Model results: recruitment



26b

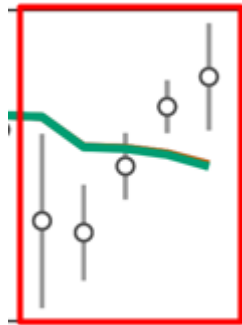


Model results: Index fits



Hypothesis: EBS fish entering GOA

- Large 610 tows led to highest estimate on record
- Could increasing numbers of EBS fish be in 610?
- Raises big issues about stock structure/connectivity
- Have plans to work with AGP in 2027 to test stock ID using otolith morphology or FT-NIRS



Hypothesis: Shifts in vertical availability of BT

- Constant catchability implies consistent vertical availability
- A trend down in the water column would increase BT biomass estimates and violate constant q assumption
- Monnahan et al. (2021) found substantial changes in EBS availability
- We have plans to model GOA vertical distribution in 2027. Will give best information about vertical availability.
- Limited by AT summer survey which was suspended in 2025 and not planned for 2027. **Must have both BT and AT in the same year to do this analysis.**

Overall concerns + discussion + research updates

- Poor NMFS BT fit, unlikely to be a simple answer but will know more in 2027
- Continued issues with scale without the NMFS BT, and data conflict
- Plus group too low? – **will explore for next year**
- Some issues in composition fits
 - Should I use time-varying age-based survey selectivity?
 - Growth variation + constant gear => variation in age-based select
- **PT request:** *try to include additional surveyed areas not currently included in the winter survey index estimates*
 - Ongoing research. An analytical plan is in place, expect results 2027.

A scientific framework for ecosystem-linked assessments

Incorporating ecosystem, environmental, and climate information into assessments and fisheries management is a key NMFS goal:

- NOAA Fisheries Climate Science Strategy (NCSS; Link et al., 2015)
 - Ecosystem-based Fisheries Management Road Map (NMFS 2016)
 - Next Generation Stock Assessment Enterprise (Lynch et al. 2018).
-
- This is also a long-term goal of the ESP (Shotwell et al. 2022)
 - But few AFSC, and only 8/232 (3.4%) of US stocks, directly link a covariate (Karp and Vieser 2024).

A scientific framework for ecosystem-linked assessments

Karp and Vieser (2024) identified barriers to meeting mandates:

- Limited mechanistic understanding of the system
- Limited data, model capabilities, and agency capacity to do the work
- Institutional inertia

Our proposal and vision to meet our mandates:

- Formalize structural-causal models as a **scientific** framework to build mechanistic understanding from observational data
- Use ESPs as the framework to collate relevant data and form a **diverse science team to develop mechanistic hypotheses**.
- DSEM-integrated assessments as a **statistical** tool to incorporate mechanistic hypotheses into fisheries management

Model 26b: DSEM linkage details

- Model 26b is based on published research (Champagnat et al. 2026)
- Incorporates 8 ESP variables directly into the assessment
- Earlier versions were shown in 2024 and encouraged by PT & SSC
- We plan to continue using mean recruitment for management

Causal Models as a Scientific Framework for Next-Generation Ecosystem and Climate-Linked Stock Assessments

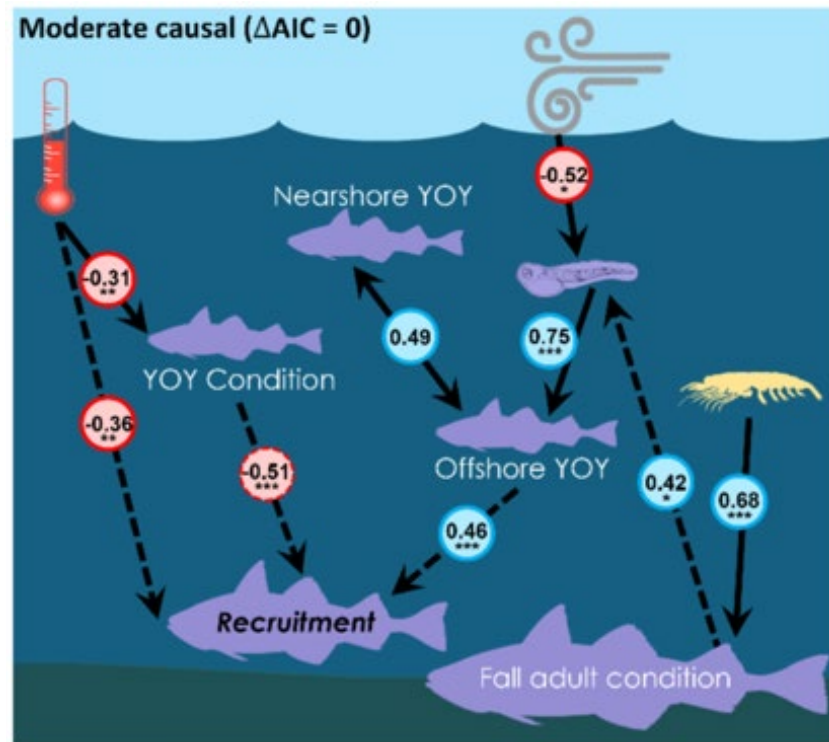
J. Champagnat^{1,2}  | C. C. Monnahan³ | J. Y. Sullivan⁴ | James T. Thorson³  | S. K. Shotwell⁴ | L. Rogers³  | A. E. Punt¹ 

Model 26b: DSEM linkage details

Champagnat et al. (2026)

- DSEM added to Rceattle and confirmed results with new data/model.
- “Moderate” complexity DAG recommended
- Strong statistical performance
- DSEM now can do non-linear and non-stationary effects (Thorson and Kristensen 2026)

Model	No. pars	ΔAIC	σ_R	% Reduction in unexplained variance
iid	219	31.4	1.02	0.0
AR1	220	28.1	0.96	10.1
Regression	220	22.7	0.78	41.4
Simple causal	224	9.6	0.59	65.8
Moderate causal	228	0.0	0.61	64.0
Complex causal	230	11.4	0.59	65.8



Discussion points for DSEM workflow

- How to develop sets of DAGs? How many? What levels of complexity?
- How often should the set of DAGs be revisited and preferred model changed?
- How to select and validate a causal DAG?
- How to modify the risk table since some variables are now in the assessment itself?
- Do we use short-term projections of recruitment for ABC/OFL calculations?
- Do we modify the HCR?

2026 recommendations

- We recommend model 26b for use in 2026
- Use mean recruitment for ABC calculations

Model	Description	SSB (2025)	B0	B40	B35	FOFL	FABC	OFL (2026)	ABC (2026)
23e	2025 accepted model	262,552	580,000	232,000	203,000	0.326	0.275	210,648	181,084
26a	Rceattle bridge of 23e with σ_R estimated	275,679	588,000	235,000	206,000	0.326	0.275	251,336	215,609
26b	26a but with DSEM linkage to recruitment	268,776	585,000	234,000	205,000	0.326	0.275	243,518	208,933

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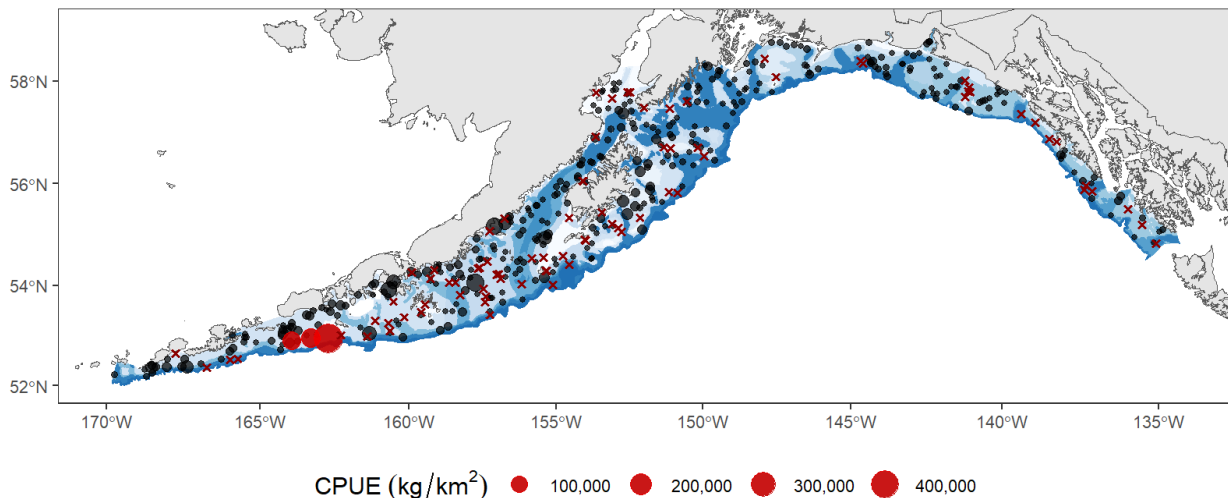
Acknowledgements

- The DSEM work is part of a larger AFSC team:
Jim Thorson, Kalei Shotwell, Grant Adams, Jane Sullivan, Juliette Champagnat
- Thanks to the ESP team

Extra slides

Influence of large tows in 2025

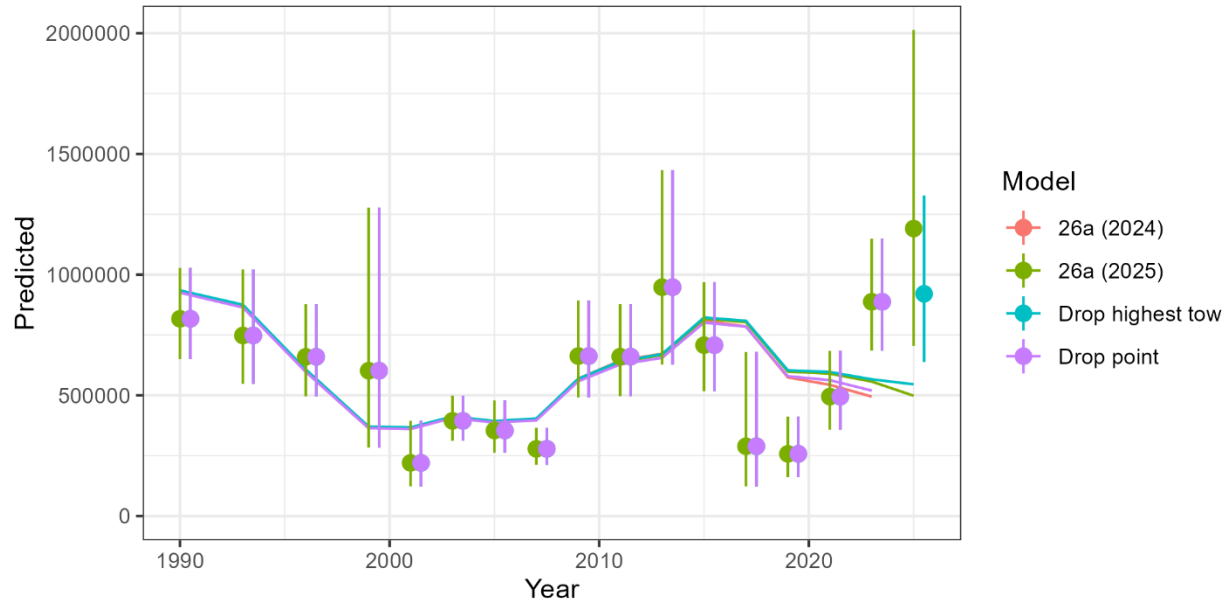
- Three very large tows in 610
- Adjacent to Unimak Pass
- Without the largest tow biomass and CV drop by 23% and 30% respectively



Big thanks to Megsie Siple and Zack Oyafuso

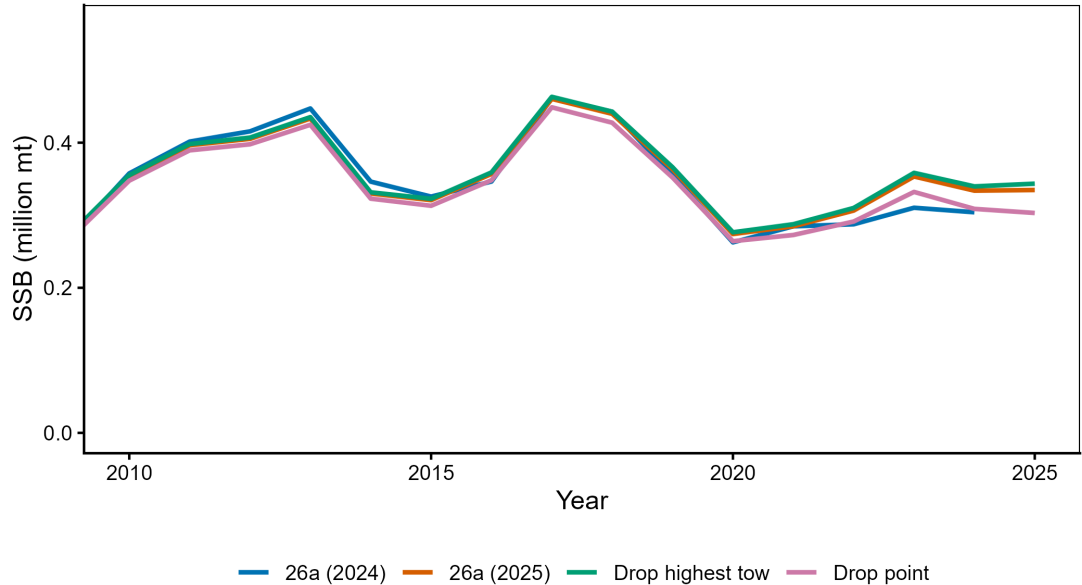
Influence of large tows in 2025

- Fit models without the point, or the largest tow removed
- Dropping the highest tow **increases** SSB
- Lower biomass, but also more weight so pulls it up more



Influence of large tows in 2025

- Fit models without the point, or the largest tow removed
- Dropping the highest tow **increases** SSB
- Lower biomass, but also more weight so pulls it up more



Shifts in vertical availability

- No equivalent GOA analysis
- But can look at summer AT data for clues
- Very large variation in biomass above 10m
- Implies time-varying vertical availability

Thanks to Nate Lauffenburger (MACE)

