

INTERNATIONAL PACIFIC



HALIBUT COMMISSION

Data overview and stock assessment for Pacific halibut at the end of 2024

Agenda item: 5.2

IPHC-2024-IM100-11 Rev_1

(I. Stewart, A. Hicks, R. Webster & D. Wilson)



Summary of results

- Fishing mortality increased slightly from 2023, despite a lower TCEY in 2024
- Continued shift from older to younger fish in both the fishery and FISS
- Assessment results indicate that spawning biomass is lower than estimated last year
- The stock remains at a low productivity level due to low weight-at-age and low recruitment through at least 2016

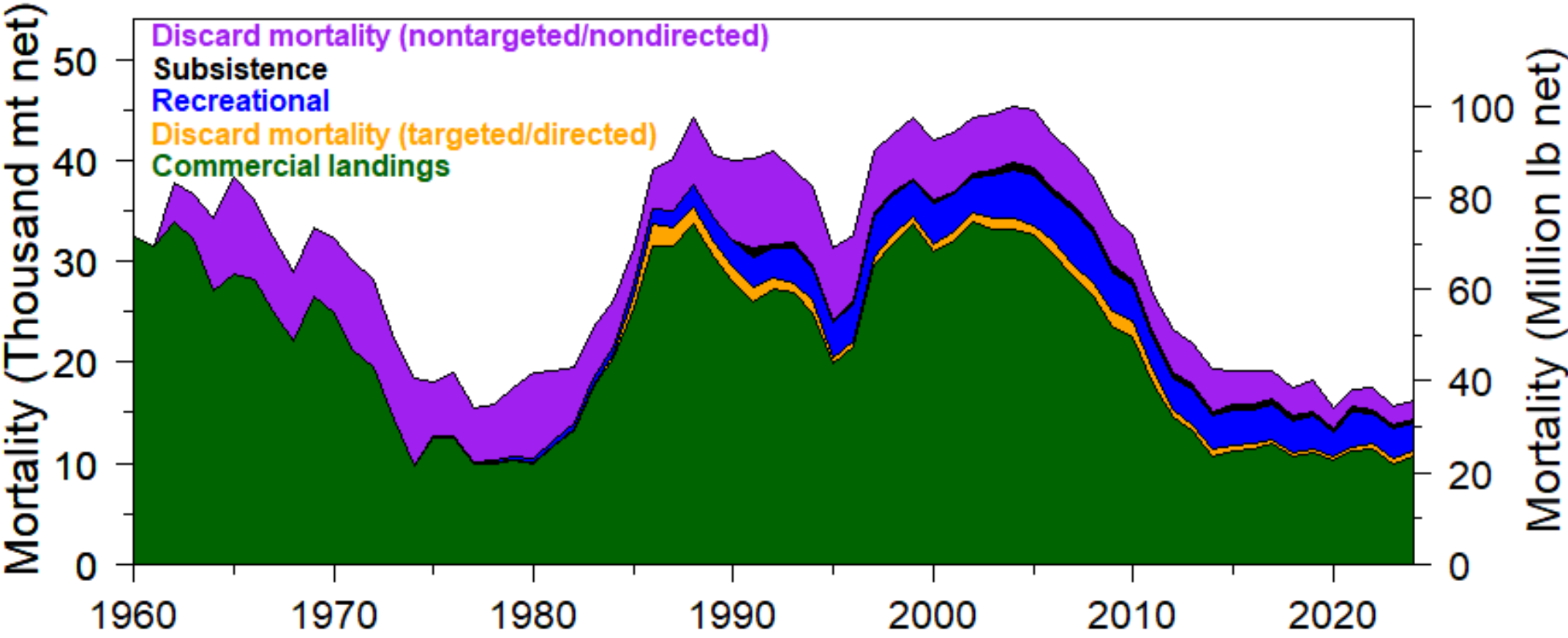


Outline

- Data sources
 - Mortality
 - Trends
 - Biological
- Modelling
 - Results
 - Reference points



Historical mortality



2024 Mortality

Projected from AM100 based on adopted mortality limits

Year	Commercial Landings	Commercial discards	Recreational	Subsistence	Non-directed discards	Total
2024	24.03	1.32	6.24	0.83	4.42	36.84

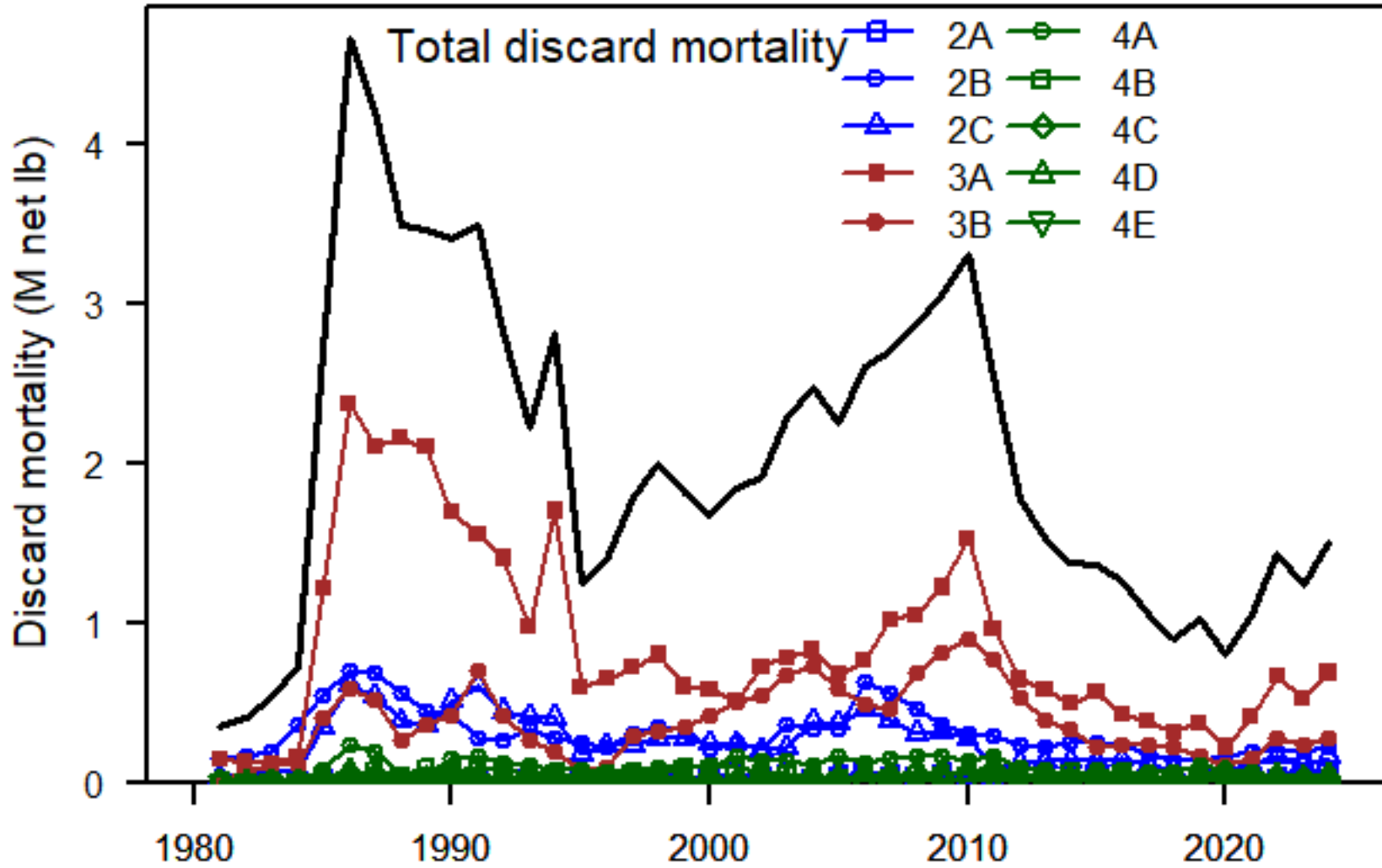
Estimated for this year's stock assessment analysis

Year	Commercial Landings	Commercial discards	Recreational	Subsistence	Non-directed discards	Total
2024	23.32	1.50	5.88	0.83	4.11	35.63

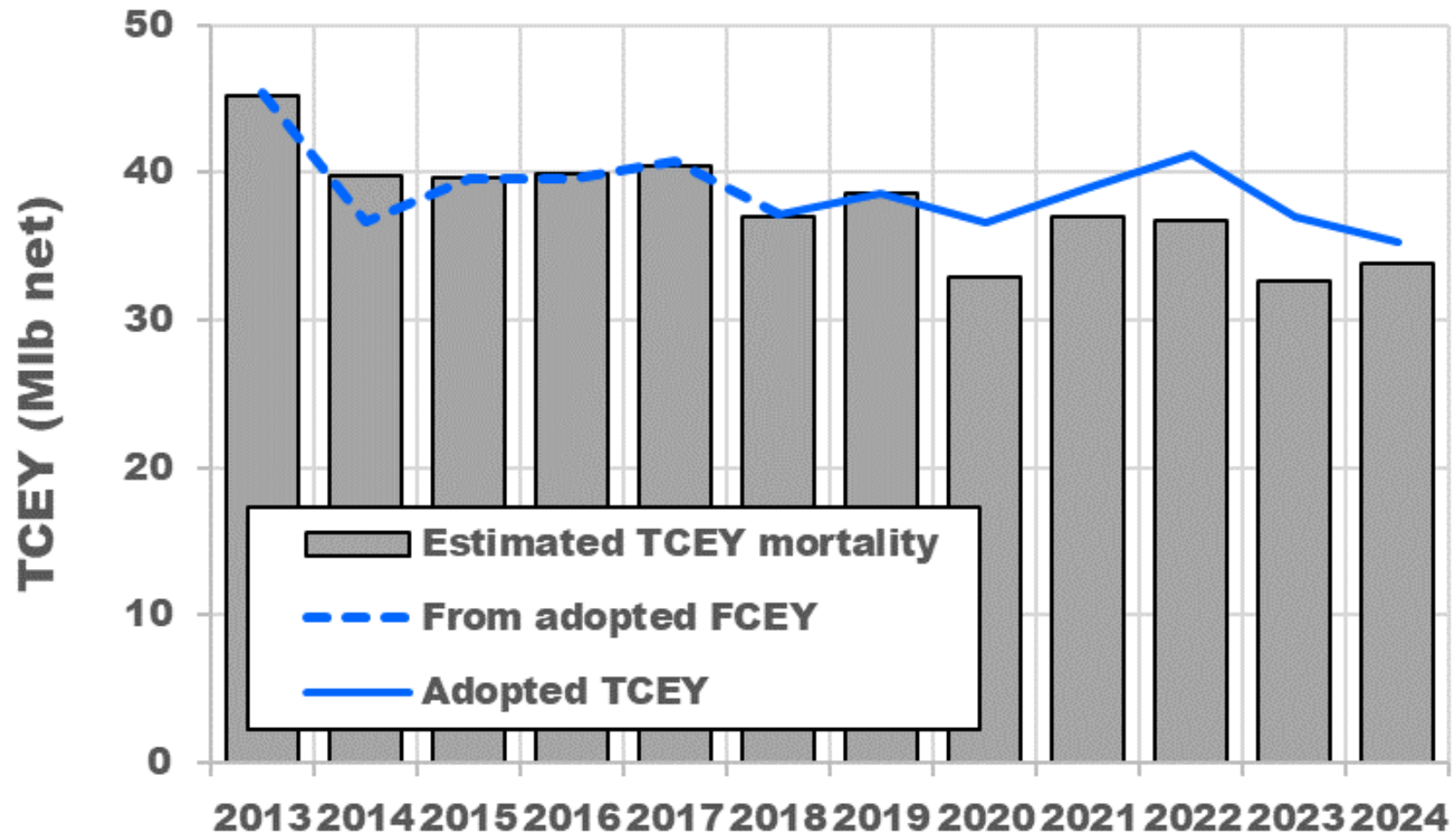
3-yr avg: **4.50**



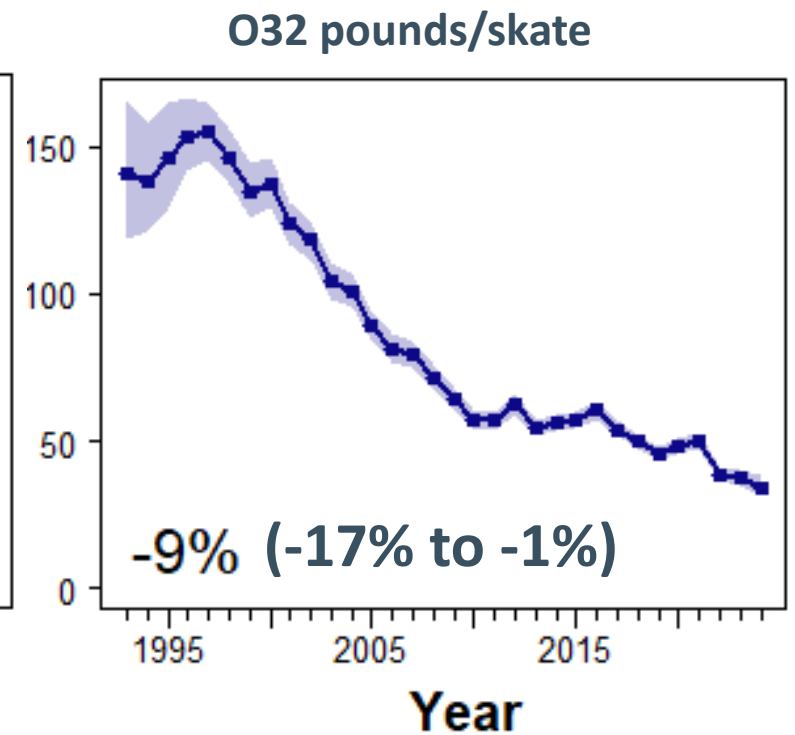
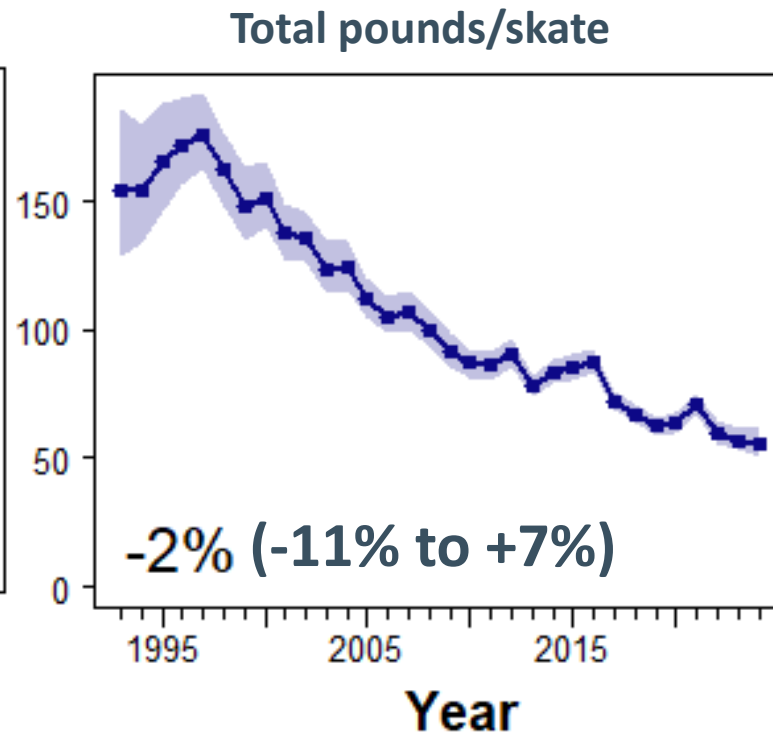
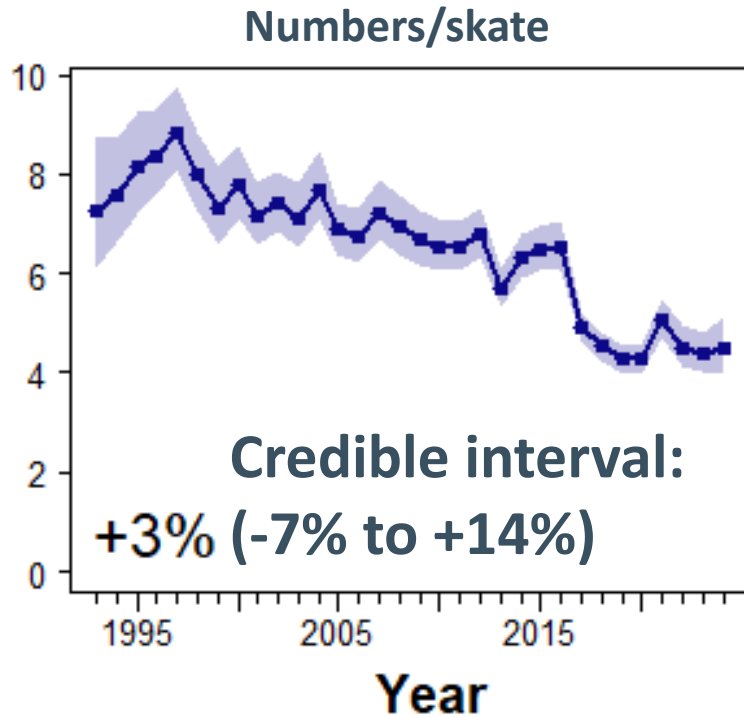
Directed commercial discard mortality



Recent TCEYs

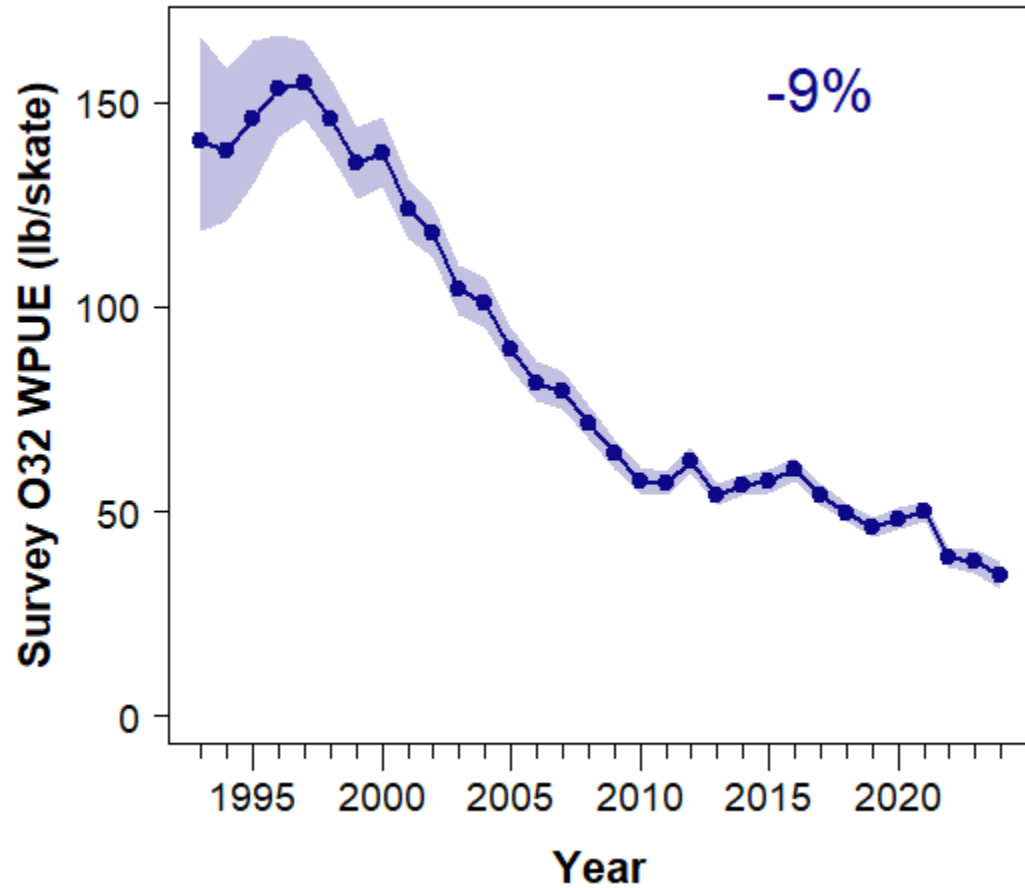


Coastwide FISS trends

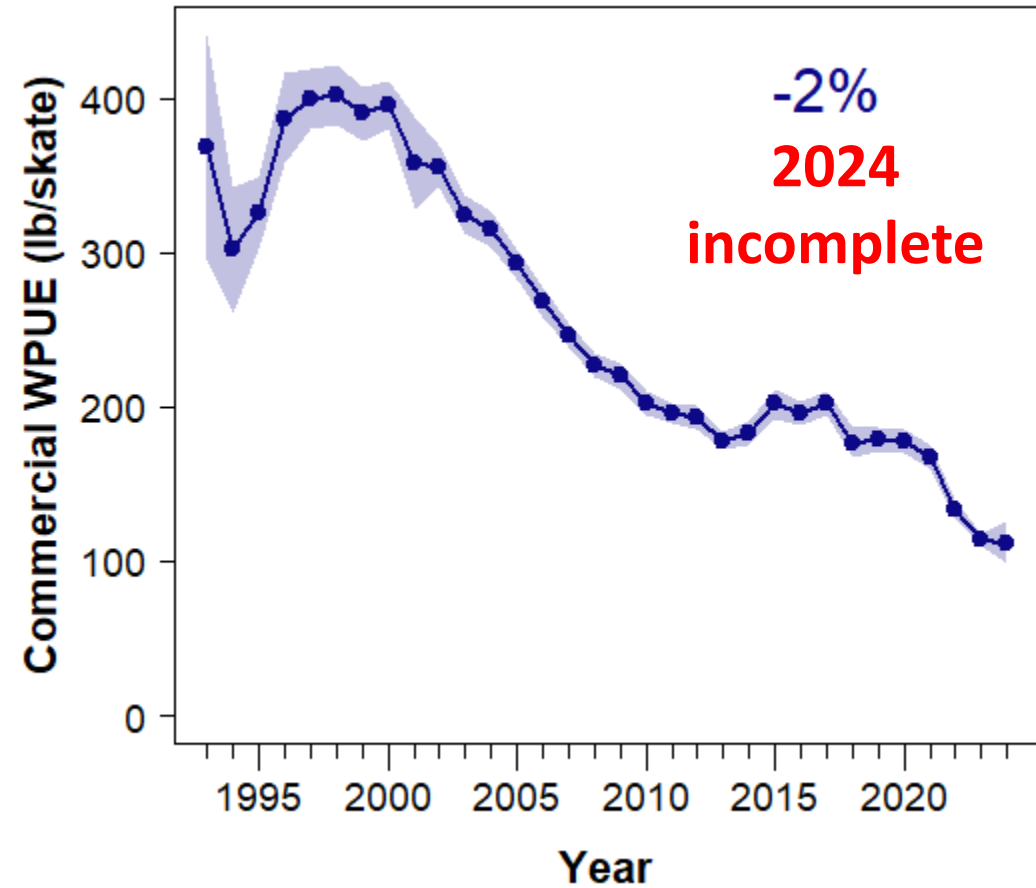


O32 FISS and Fishery trends

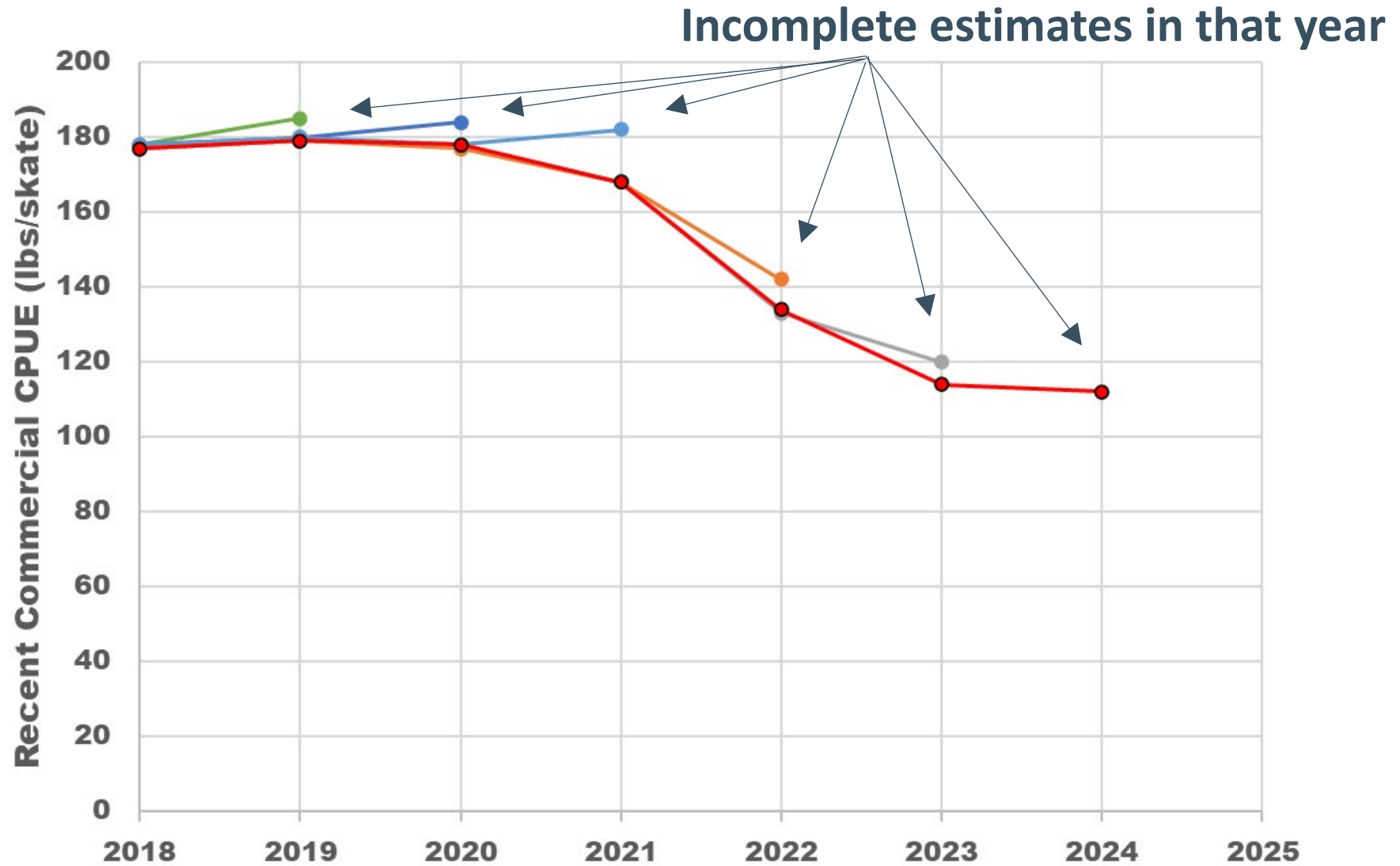
Coastwide survey



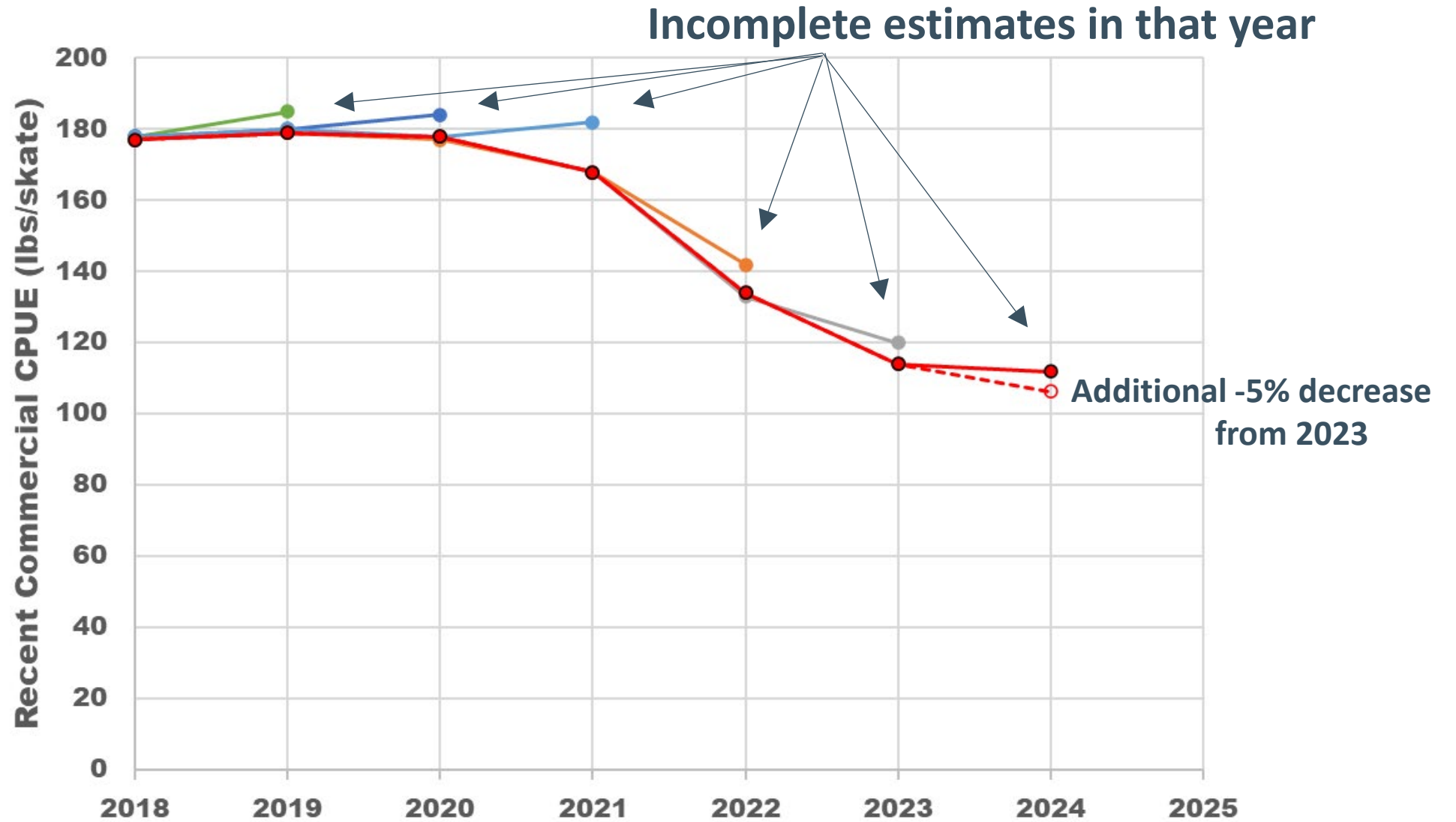
Coastwide commercial



Recent fishery WPUE updates



Recent fishery WPUE updates



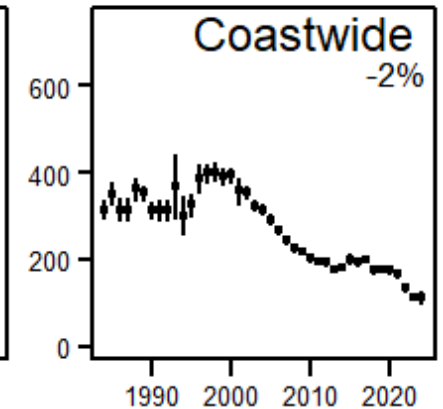
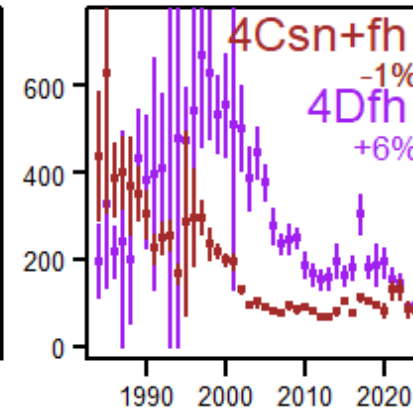
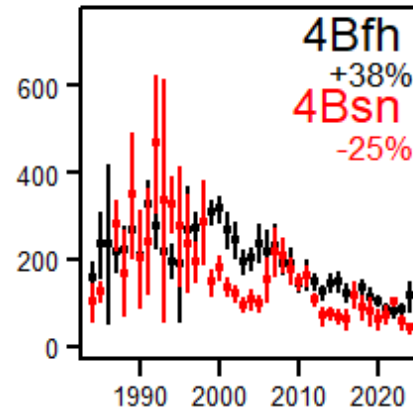
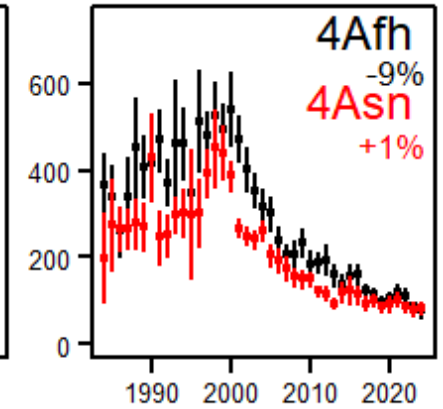
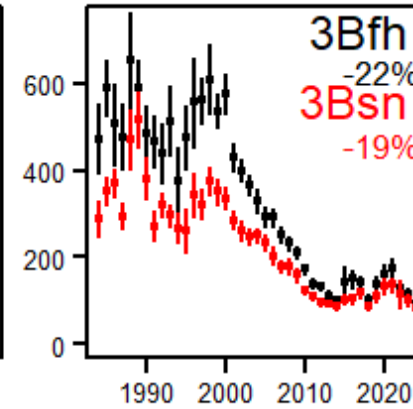
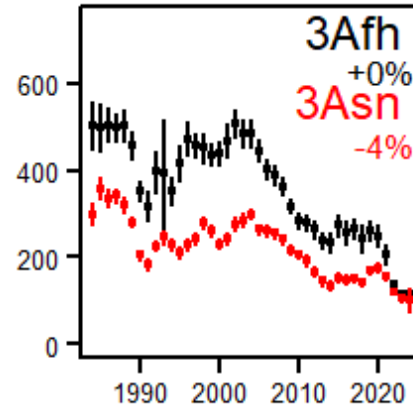
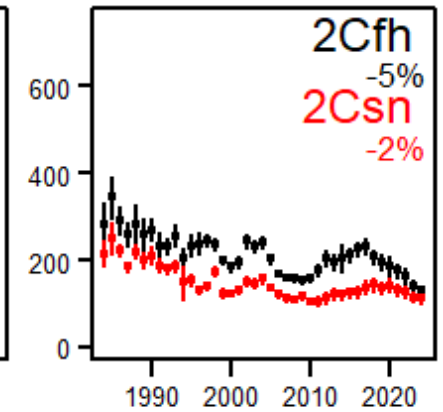
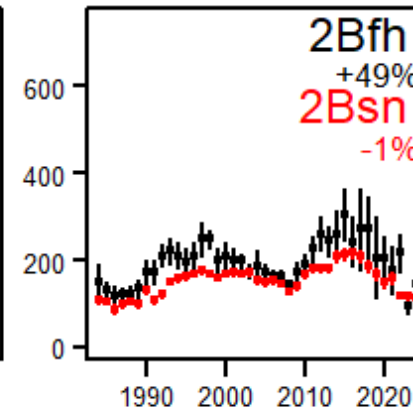
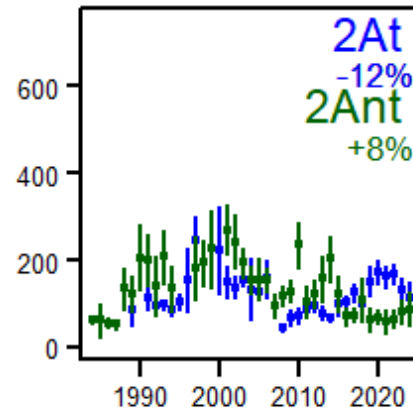
Fishery trends (2024 incomplete)

2A Tribal
2A non-Tribal

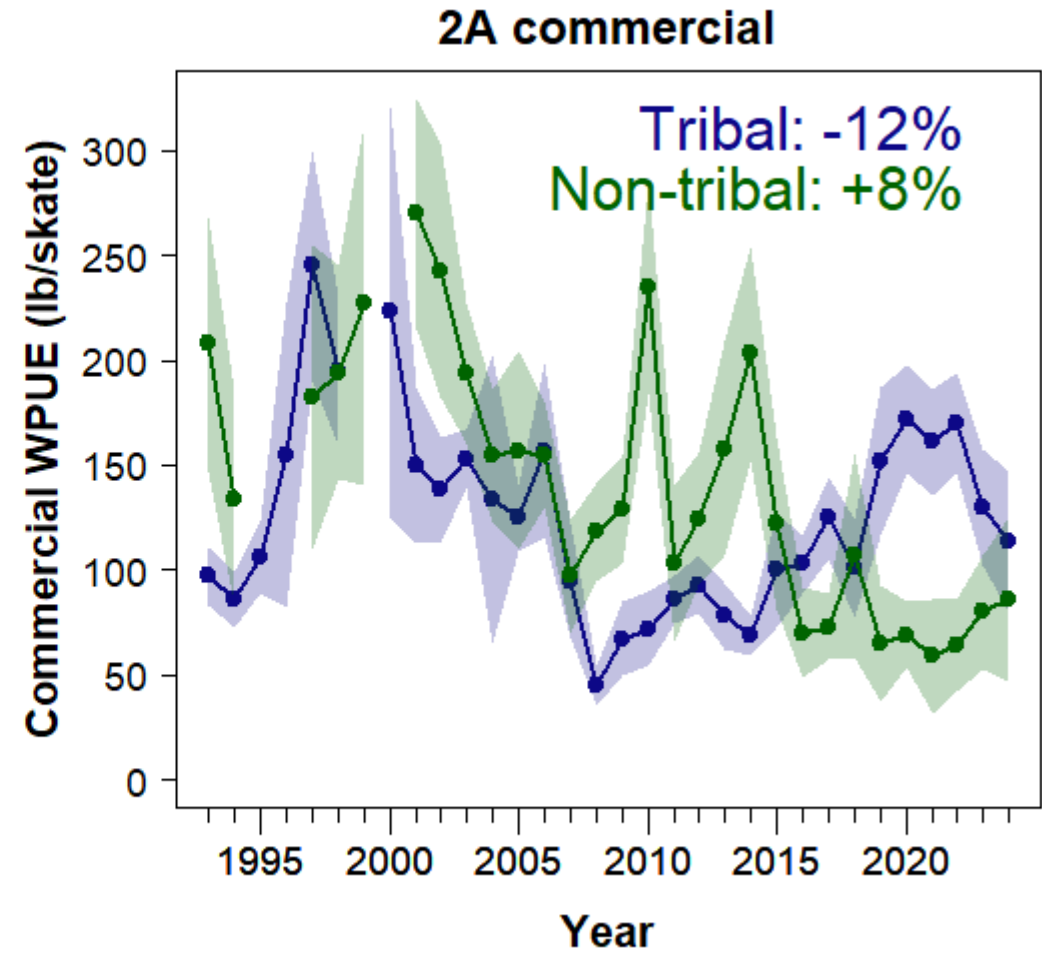
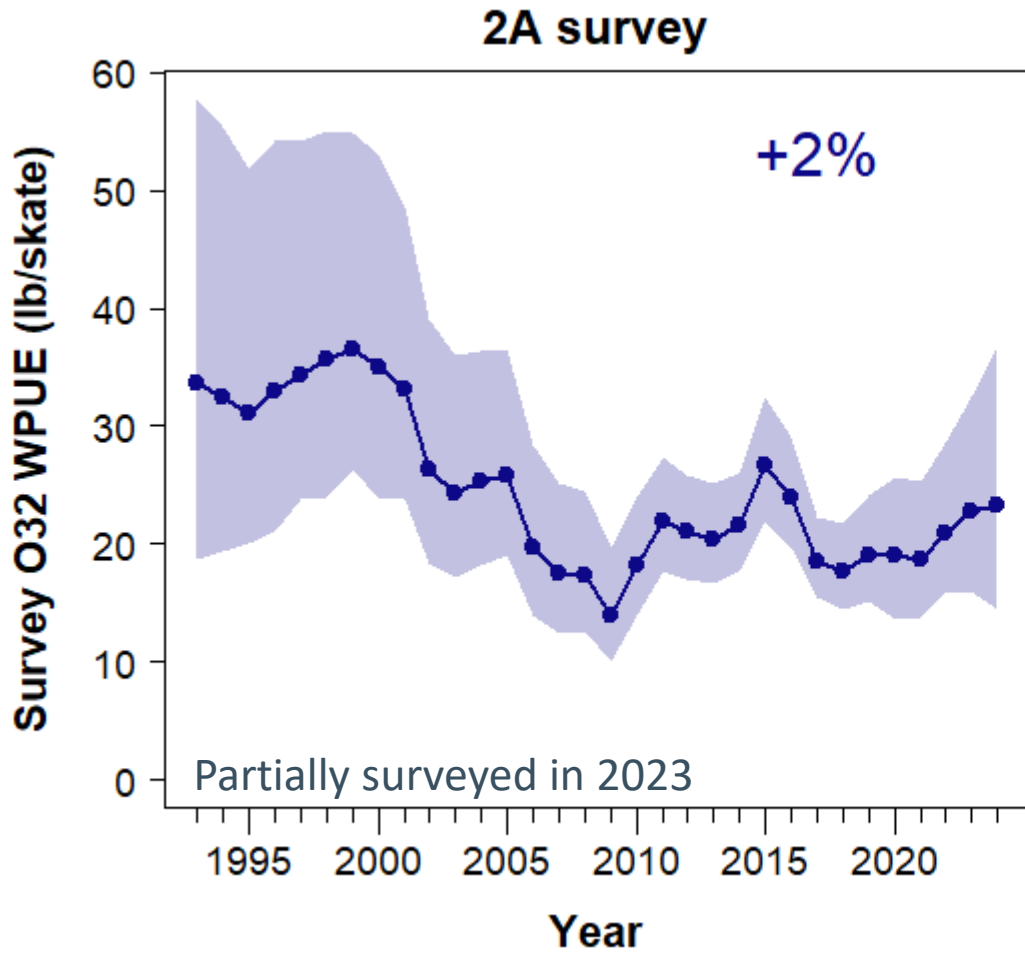
Fixed hook
Snap

4C
4D

Commercial WPUE (net lb/skate)

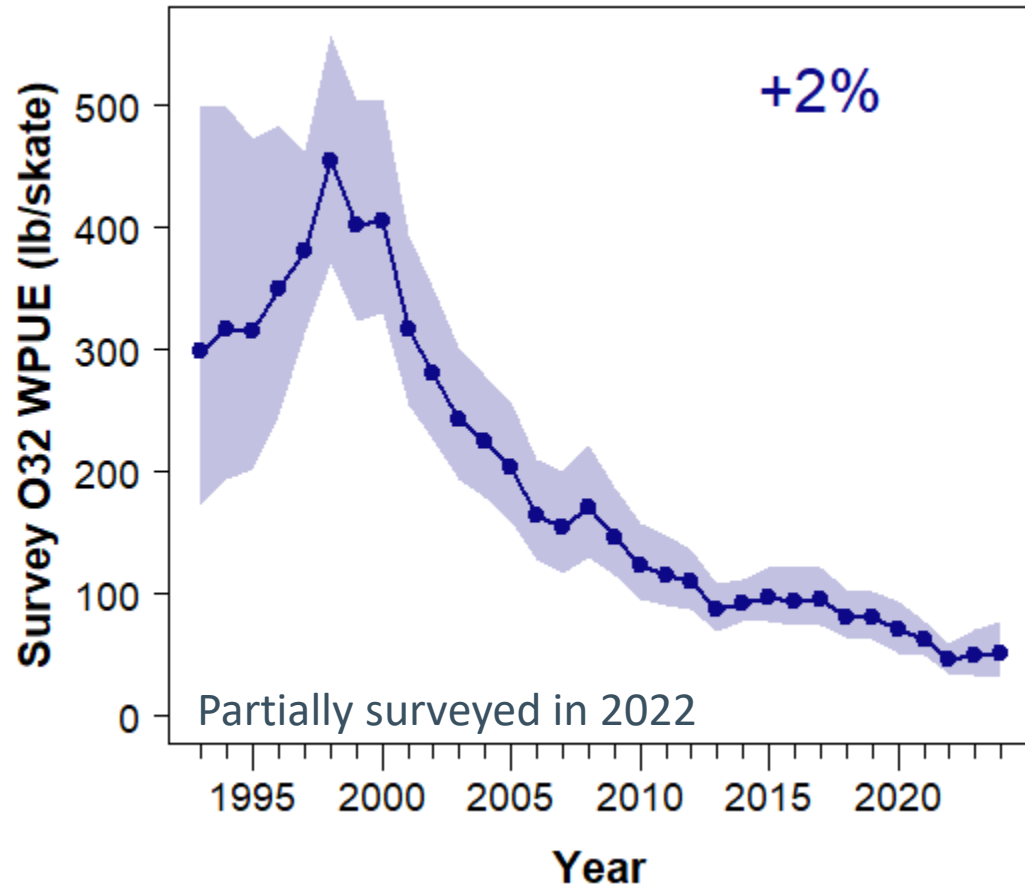


O32 FISS and Fishery trends – Areas without FISS sampling in 2024

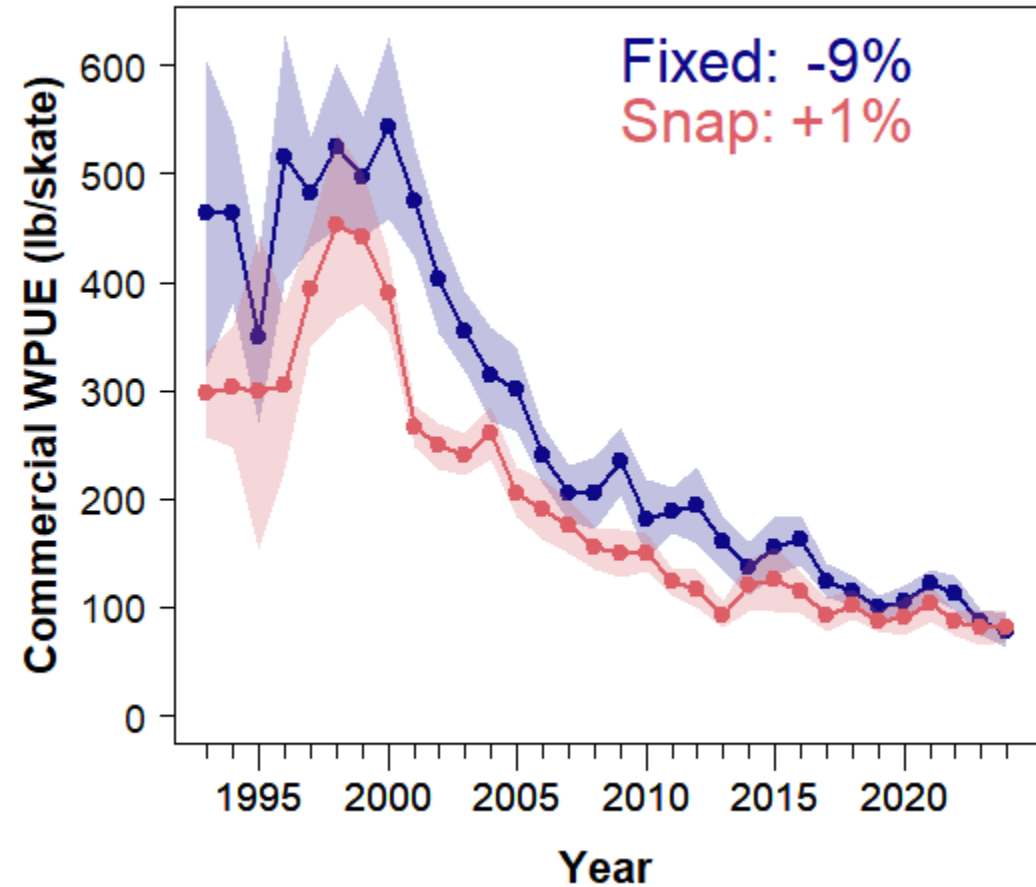


O32 FISS and Fishery trends – Areas without FISS sampling in 2024

4A survey

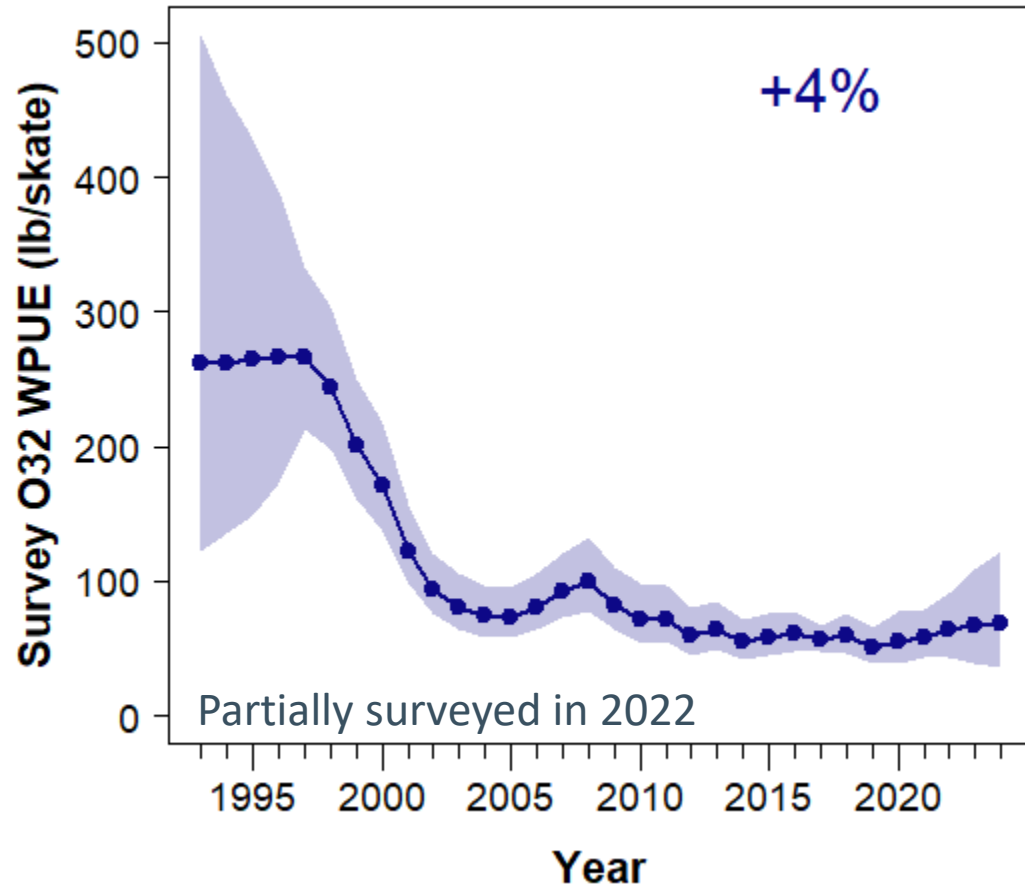


4A commercial

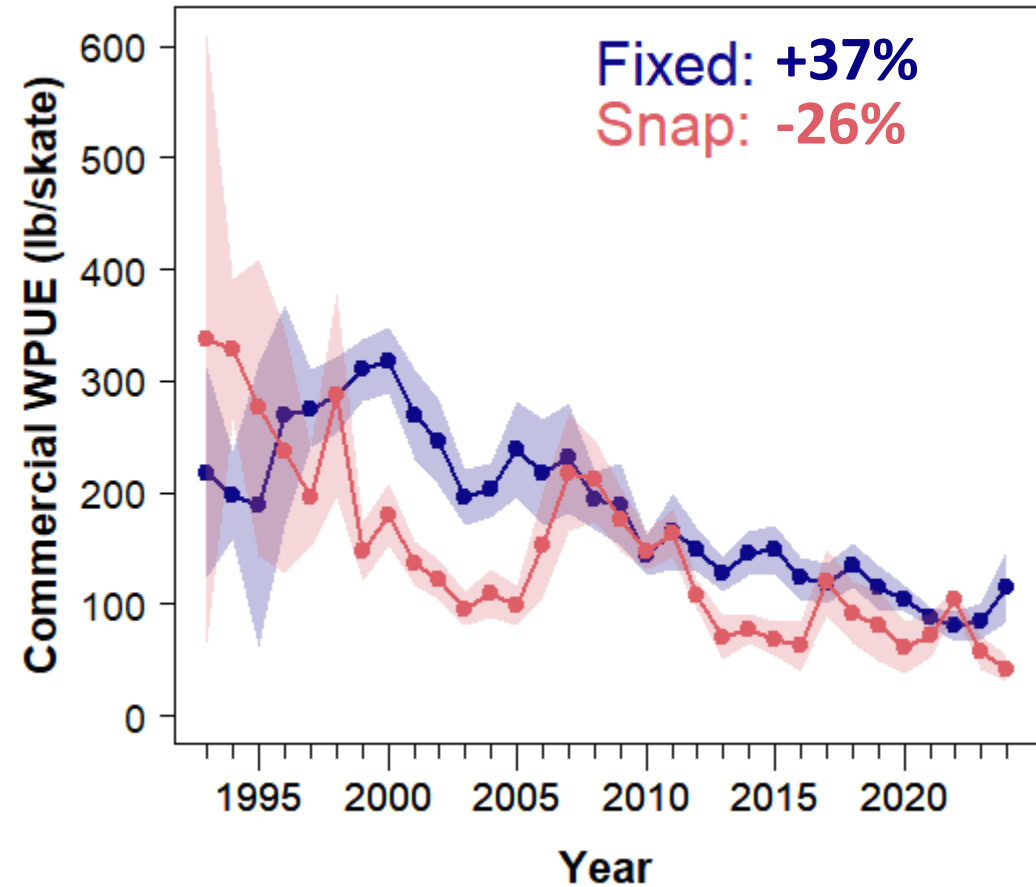


O32 FISS and Fishery trends – Areas without FISS sampling in 2024

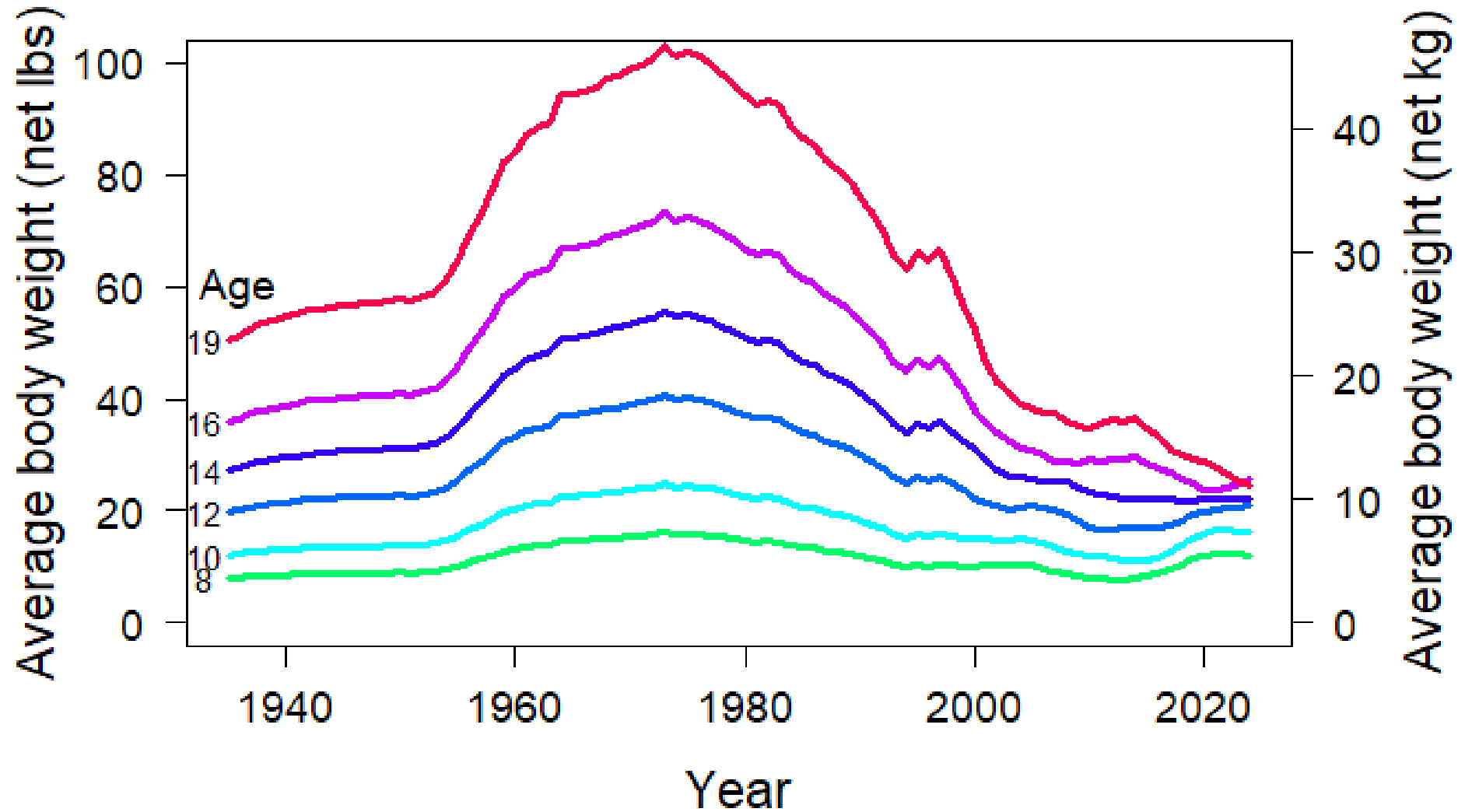
4B survey



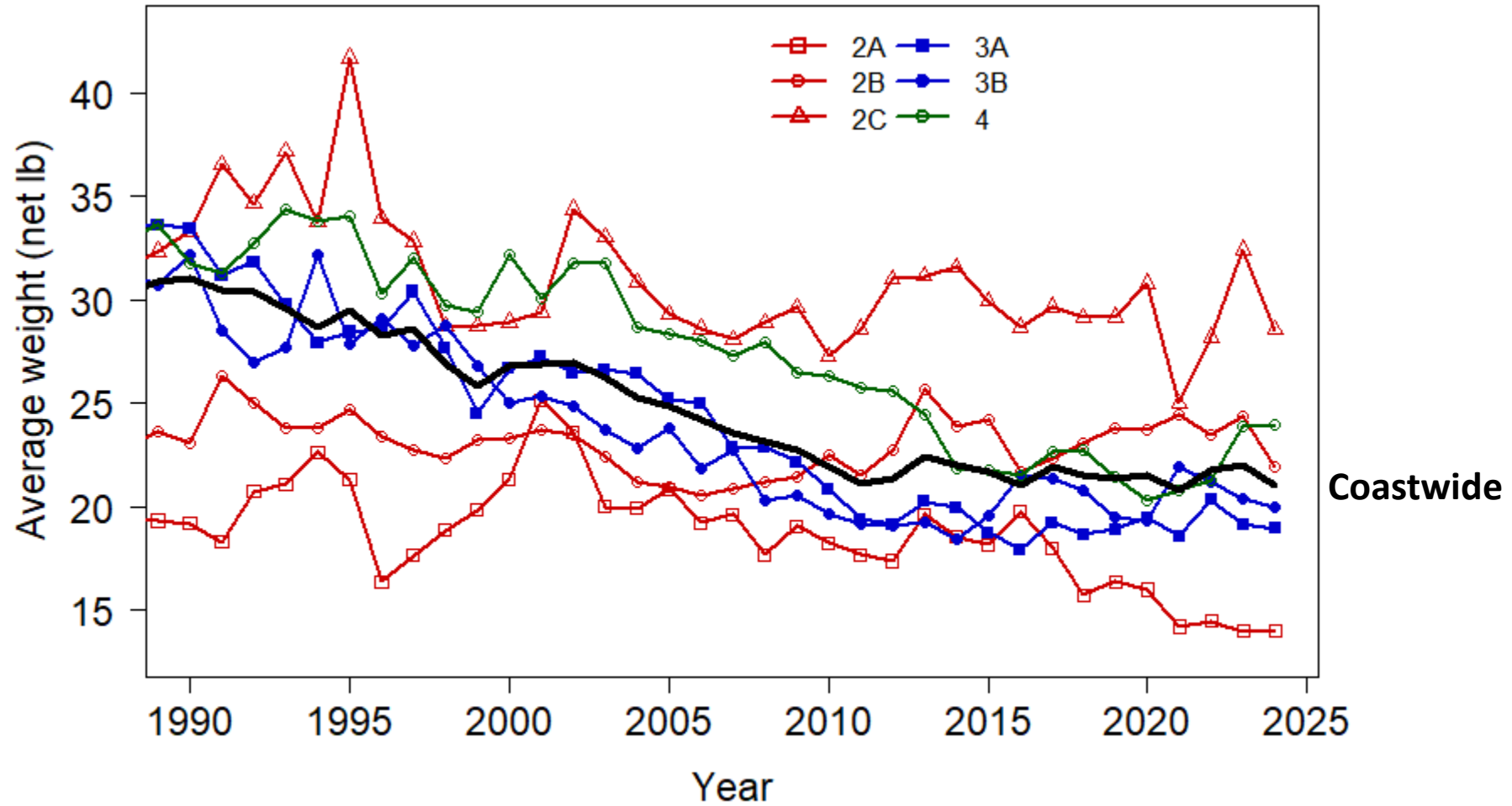
4B commercial



Female weight-at-age

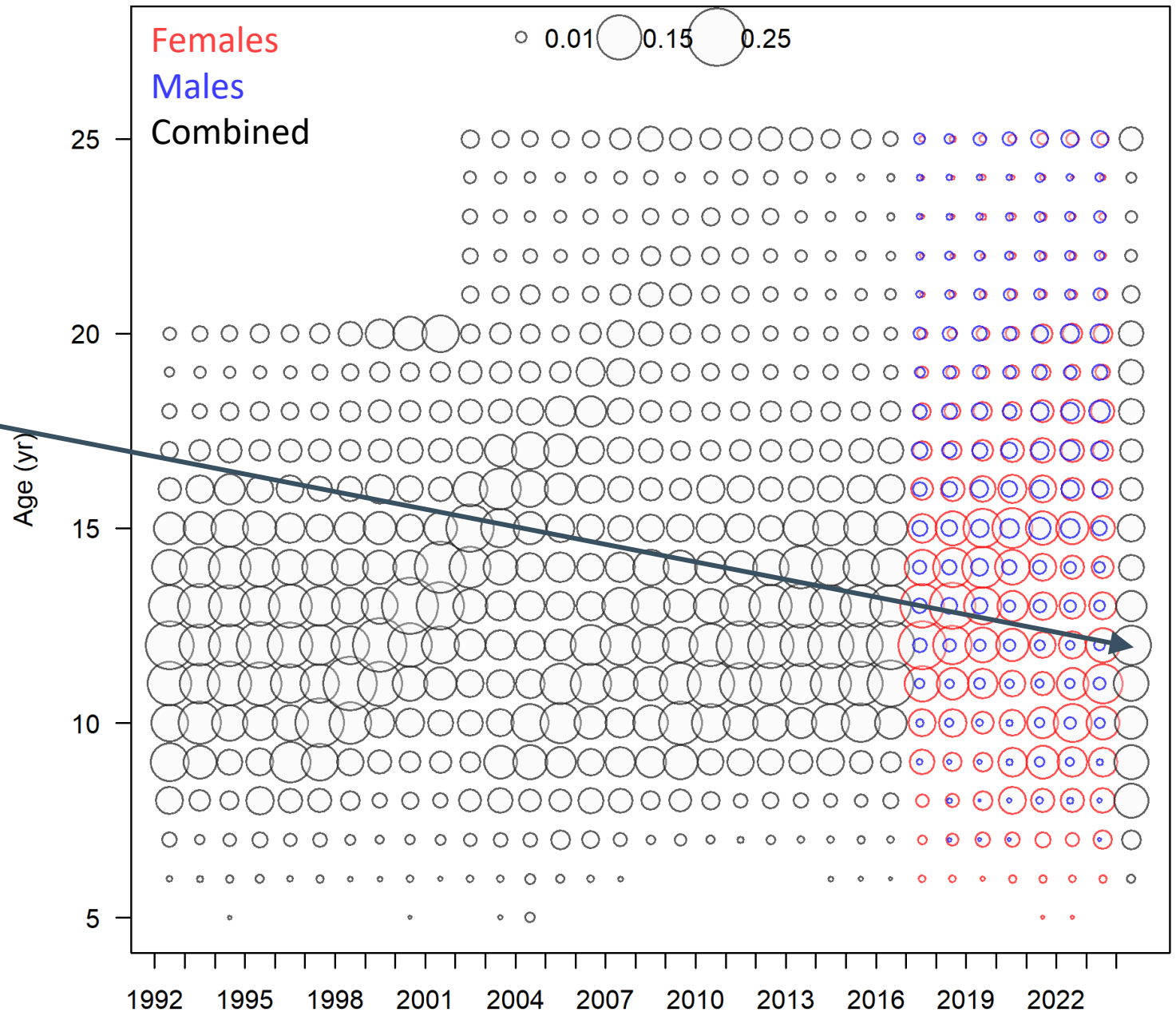


Average weight – landed fish



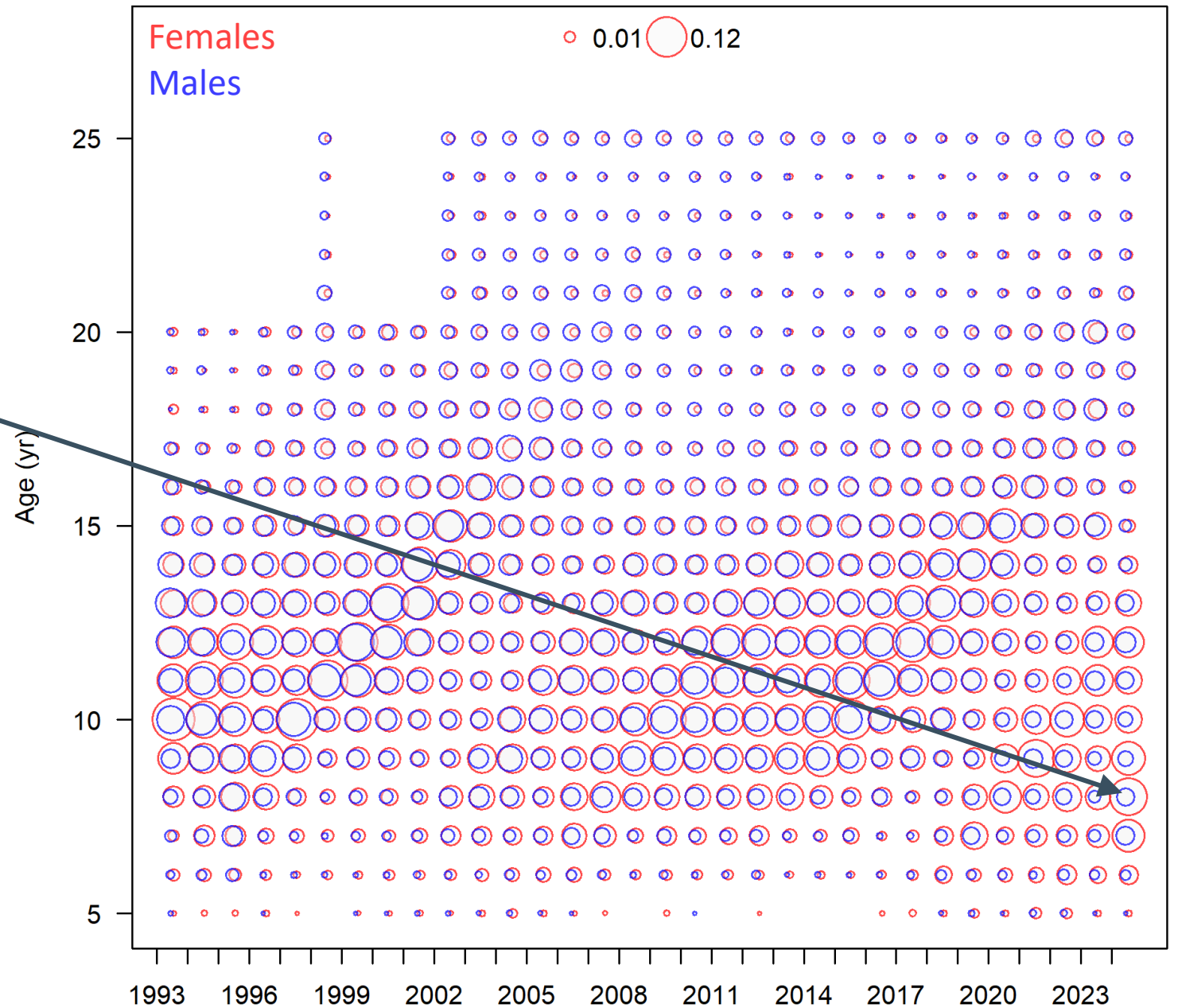
Recent fishery ages

Largest proportion in 2024:
2012 year-class

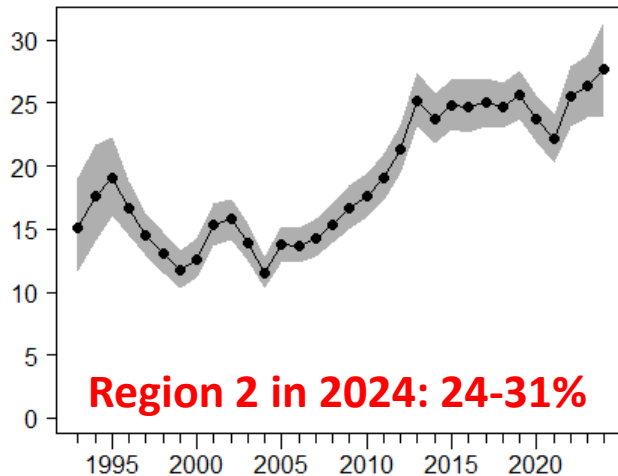
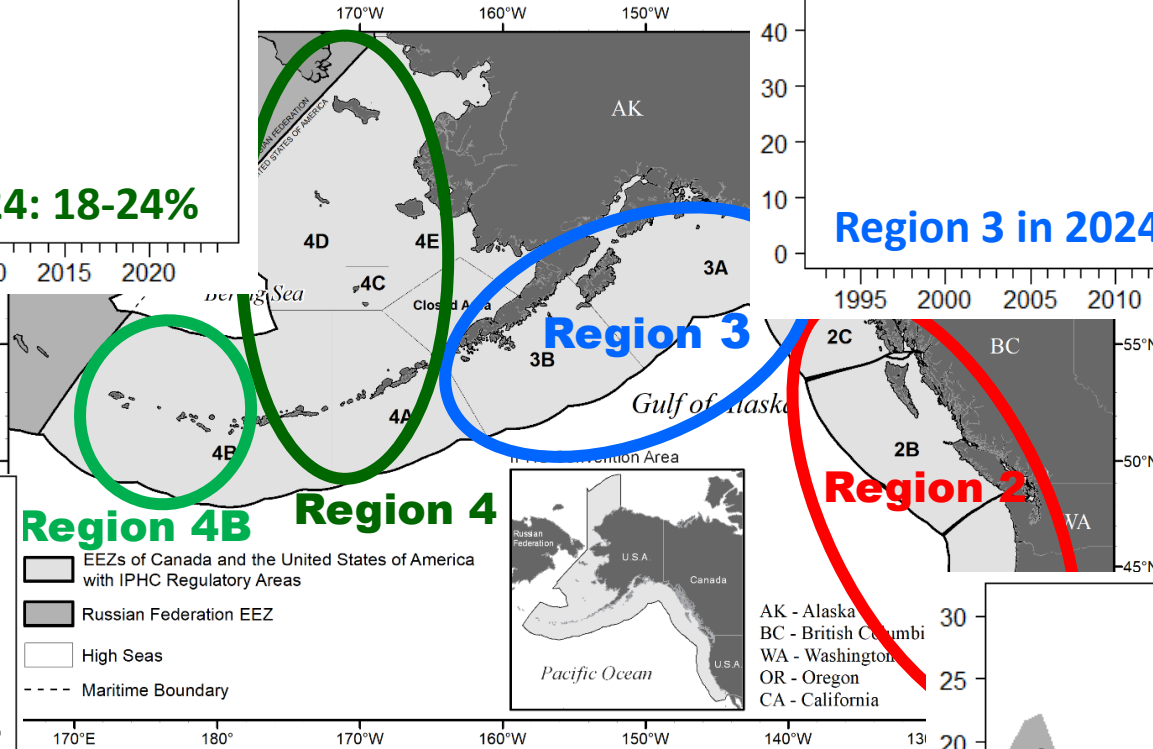
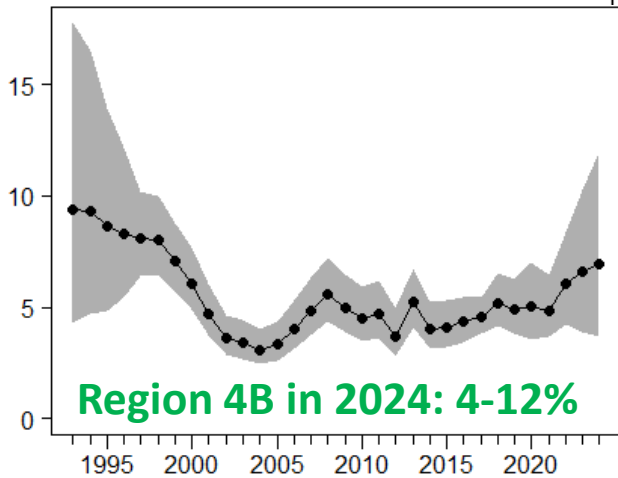
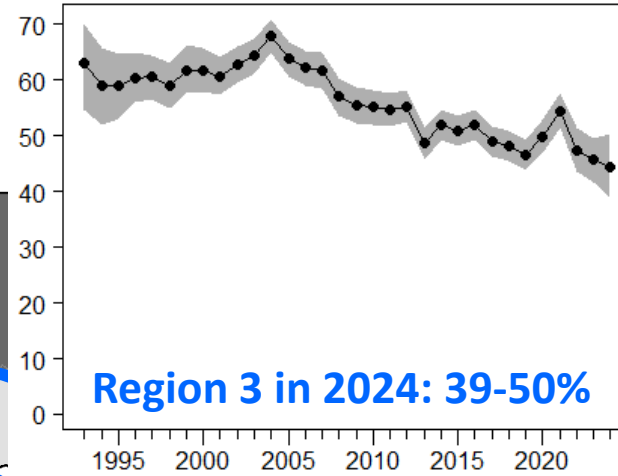
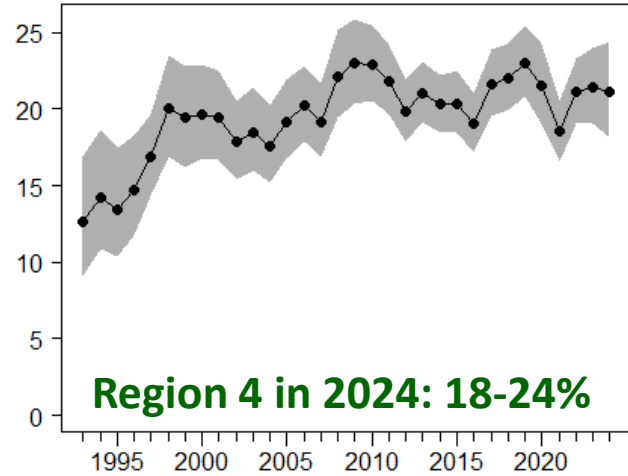


FISS ages

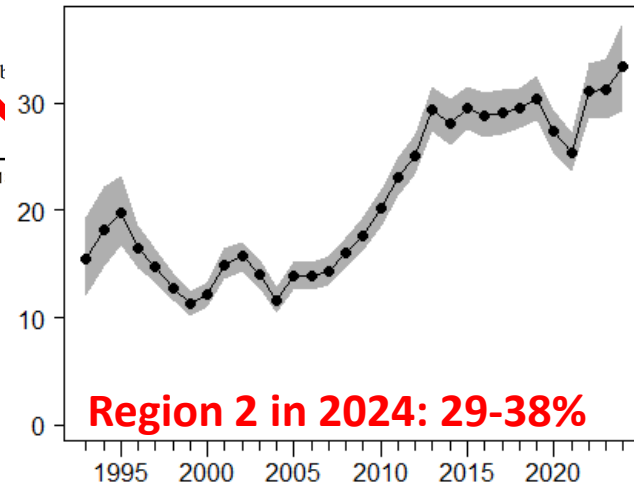
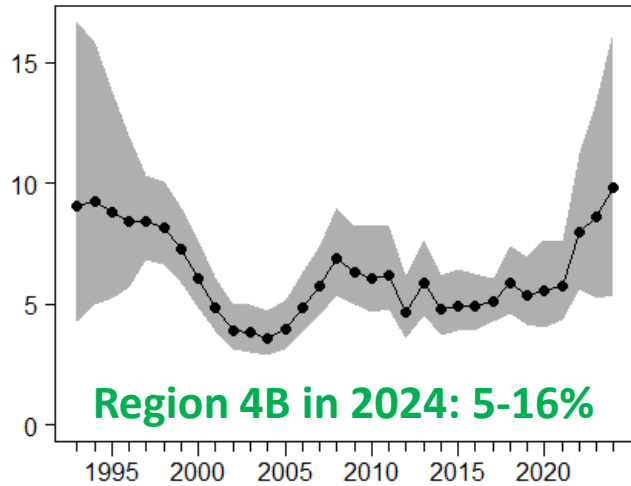
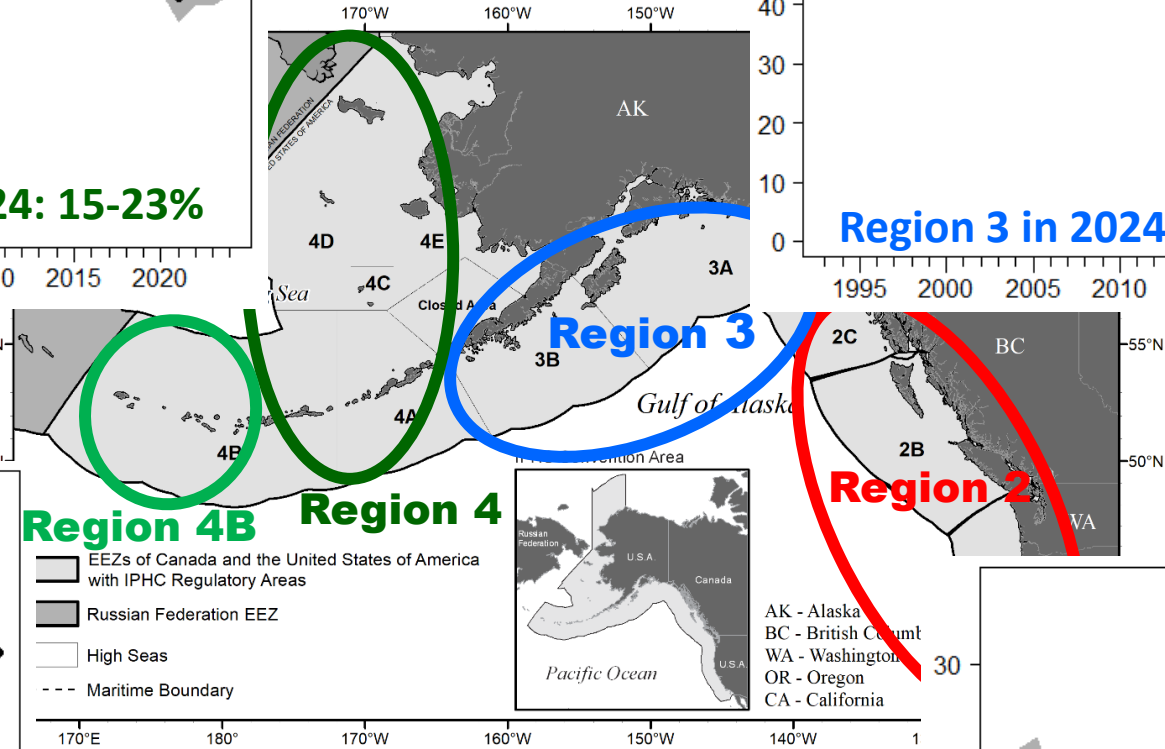
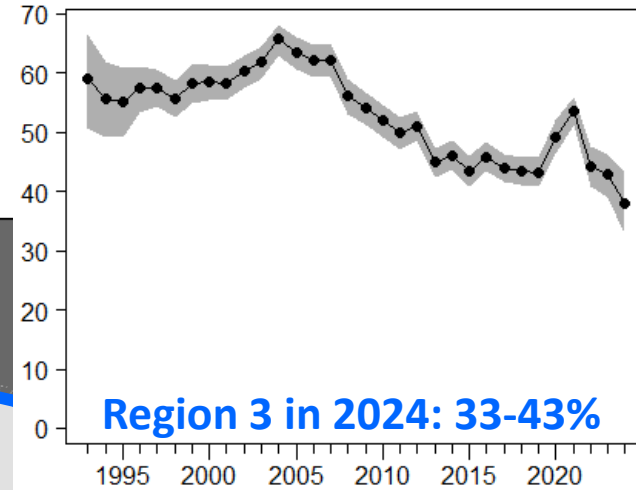
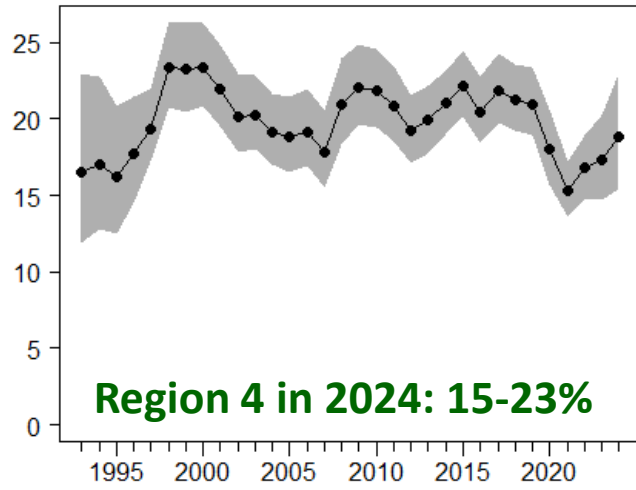
Largest proportion in 2024:
2016 year-class



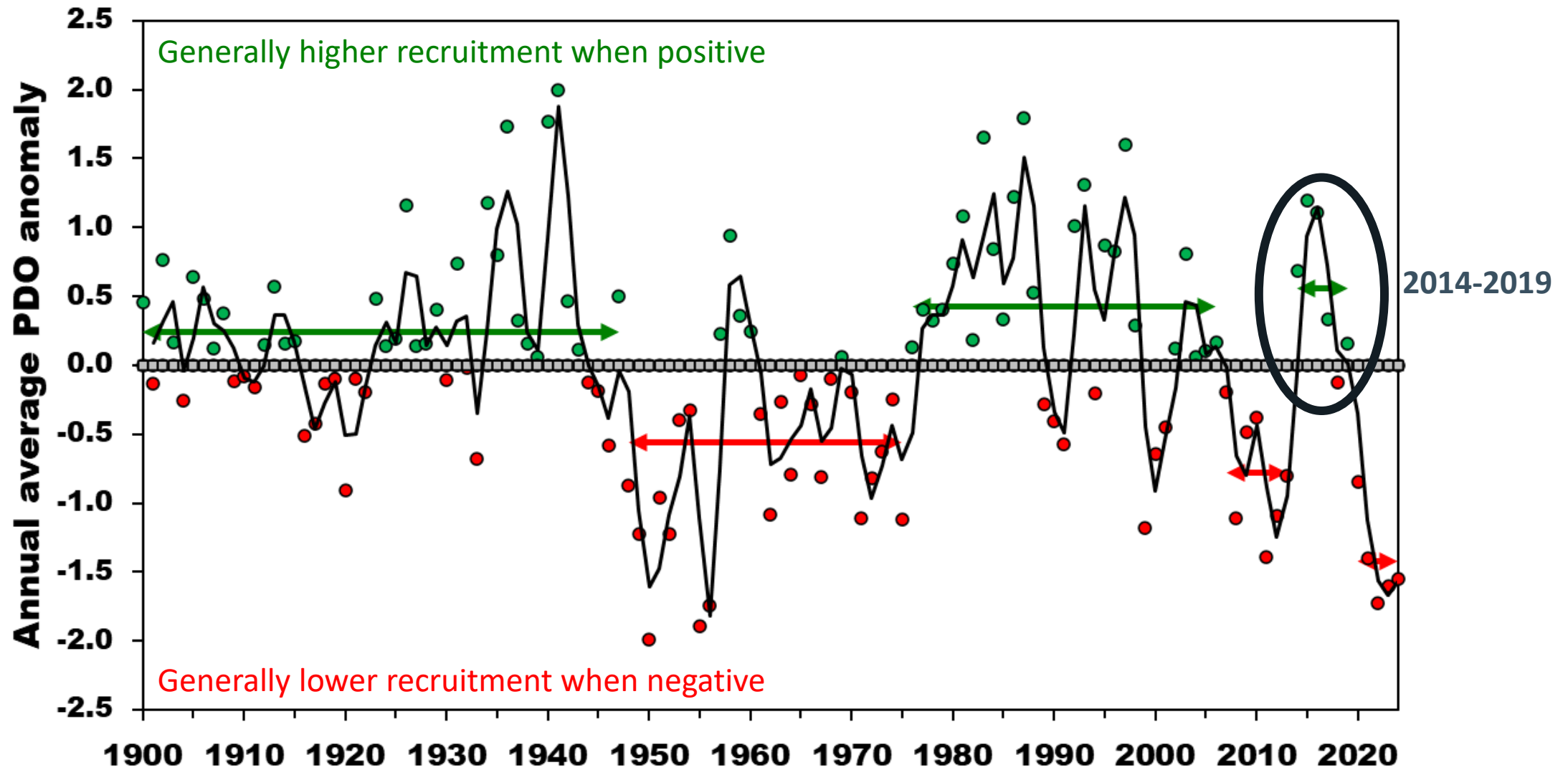
Stock distribution (all sizes - credible intervals)



Stock distribution (O32 – credible intervals)



Ecosystem conditions: Pacific Decadal Oscillation (PDO)



Recent ecosystem conditions

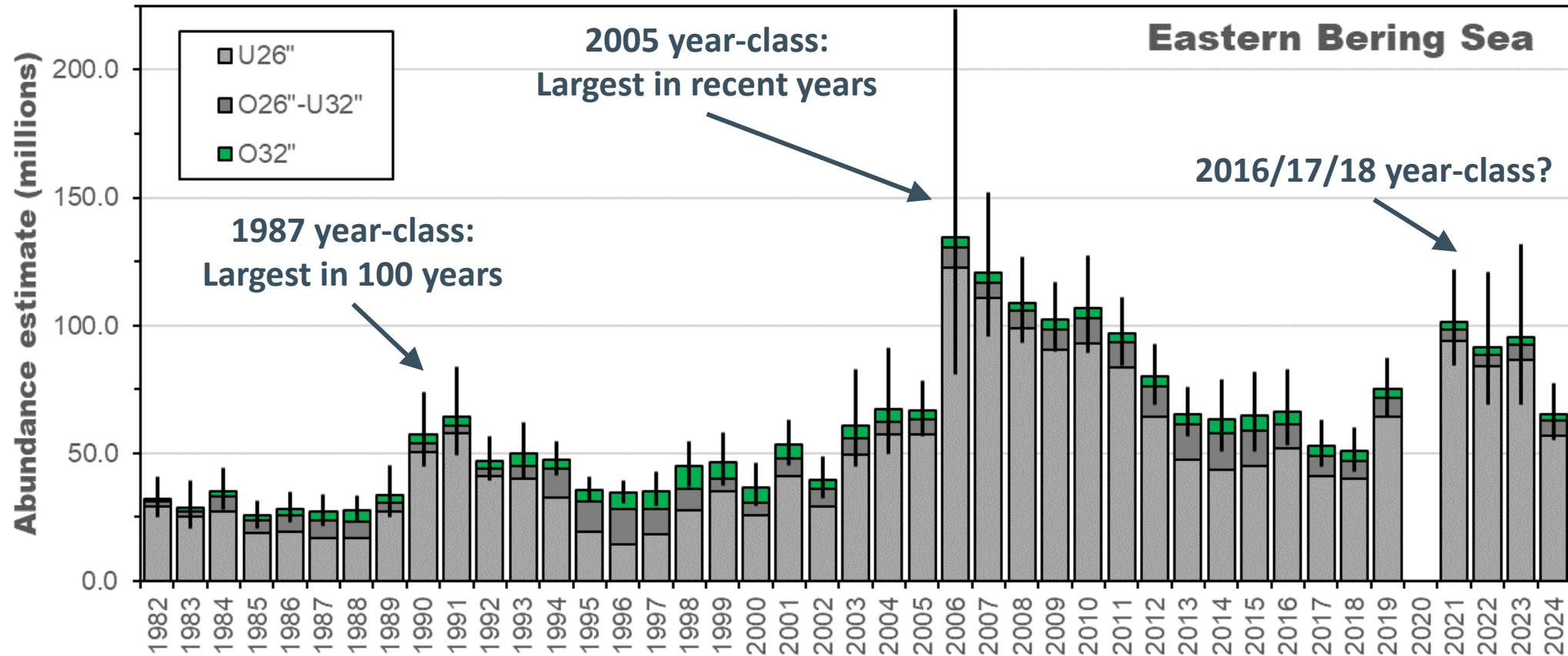
- Bering Sea (2024): Oceanography (e.g., temperature, ice cover) near-average, biological/species response mixed, crab stocks remain low
- Aleutian Islands (2024): Slightly cooler than last 10+ years, lower productivity in the west, generally poor groundfish body condition
- GOA (2024): Continued long-term warming, planktivorous groundfish doing better than benthic feeders, forage fish above average
- B.C. (2023): Below average upwelling, mixed groundfish trends
- California current (2023-24): Continued offshore marine heatwaves, reduced upwelling, mixed productivity across species

Take-away: Potential effects difficult to characterize for Pacific halibut, new patterns each year = low predictability

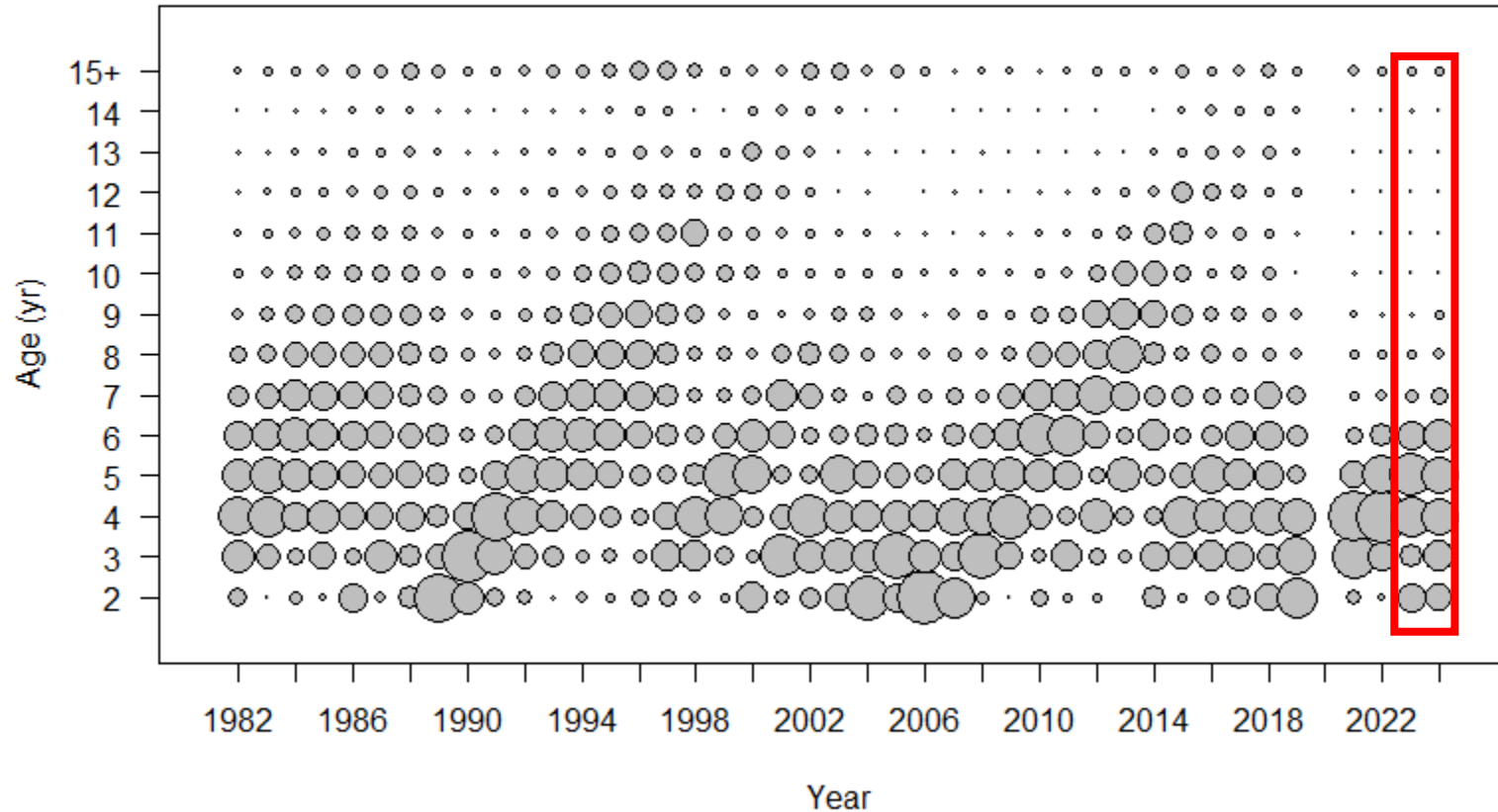
Most recent reports: [Bering Sea](#), [Gulf of Alaska](#), [Aleutian Islands](#), [B.C.](#), [California current](#)



NOAA Fisheries Eastern Bering Sea trawl survey



NOAA Fisheries Eastern Bering Sea trawl survey

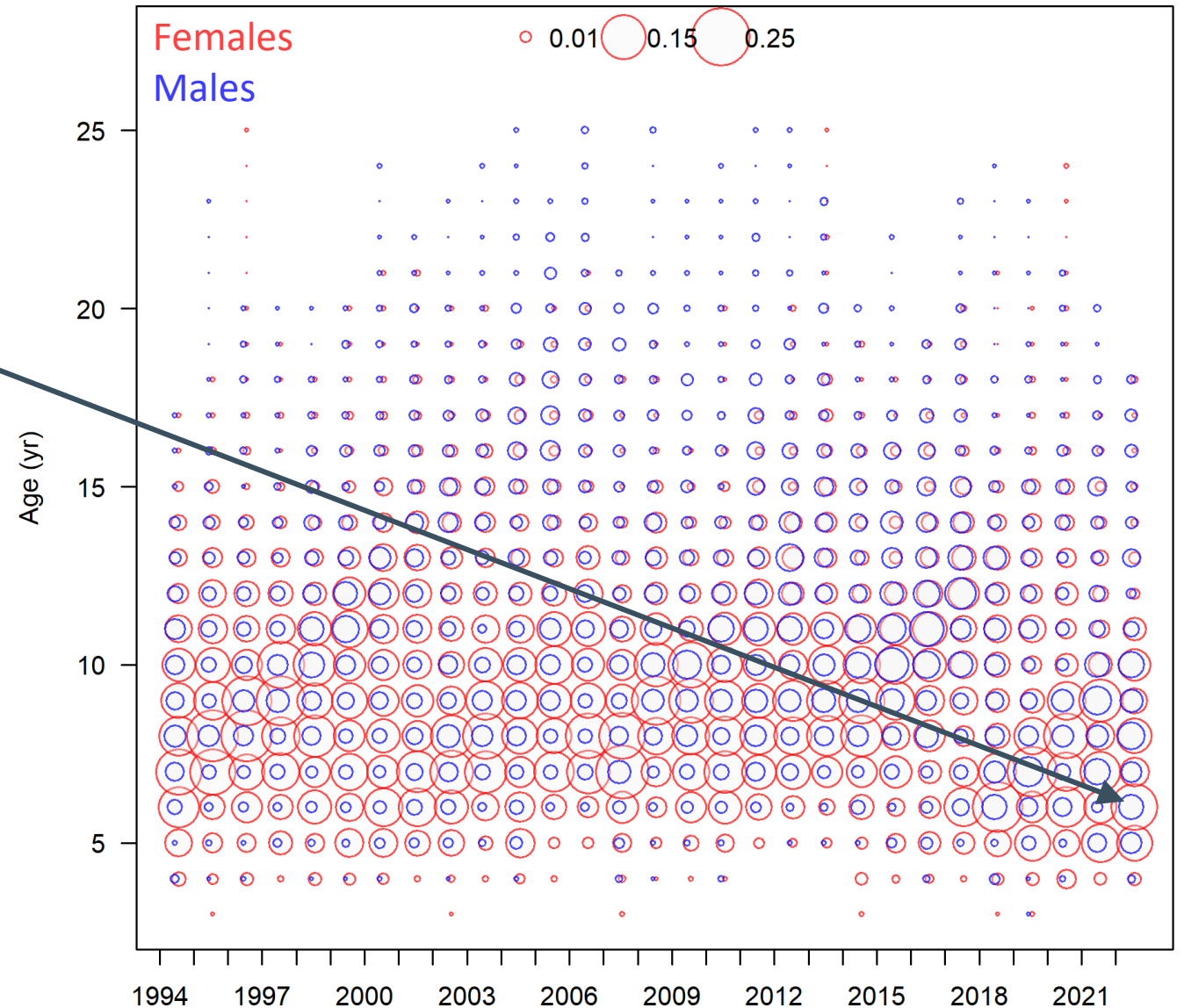


Based on 2022 age-length key



ADFG recreational ages: 3A (1994-2022)

Largest proportion in 2022:
2016 year-class



Outline

- Data sources
 - Mortality
 - Trends
 - Biological
- Modelling
 - Results
 - Reference points



Stock assessment development history

- 2015: Full assessment – formalized 4-model ensemble methods
- 2016-2018: Updates
- 2019: Full assessment – included new commercial fishery sex-ratio data
- 2020-2021: Updates
- 2022: Full assessment – improved treatment of natural mortality
- 2023: Update
- 2024: Update – no changes to treatment of data or model structure
- 2025: *Full assessment planned*



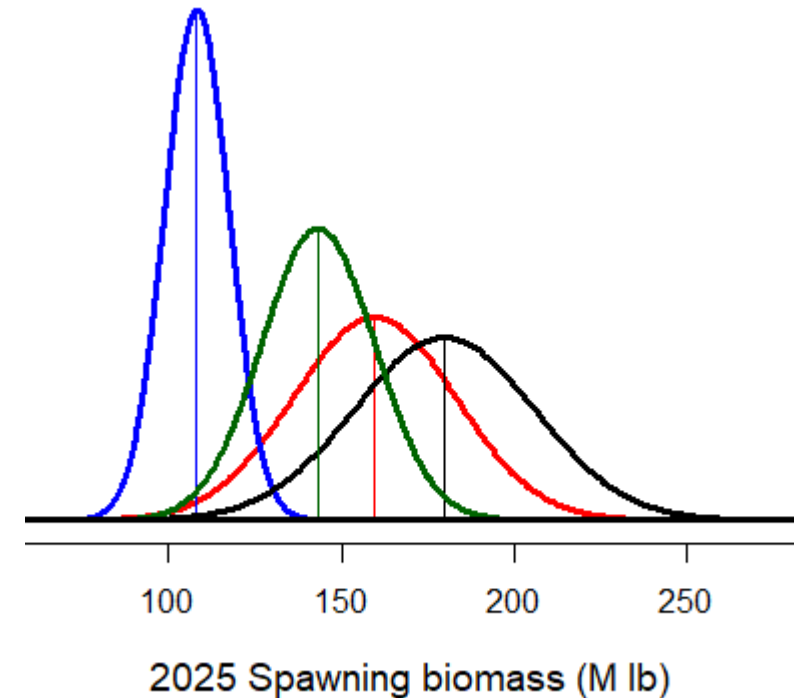
Supporting analyses in 2024

- Simulation testing the stock assessment ensemble (SRB024)
 - The data we have appear sufficient to estimate the dynamics, given the model structure and ensemble approach
- Simulation testing of FISS designs (SRB025)
 - Reduced FISS designs can lead to biased trends
 - Results indicate that this bias propagates into assessment results
 - If the FISS index is decreasing by 15% over 3 years and we fail to detect it:
 - We overestimate the biomass (by 3%)
 - We underestimate the fishing intensity (SPR = 45%, when the true value is 44%)
 - We underestimate the risk of stock decline (56% when the true value is 65%)
 - Reductions in the TCEY of ~1.5-4 Mlb would be needed to account for a potential bias of this magnitude

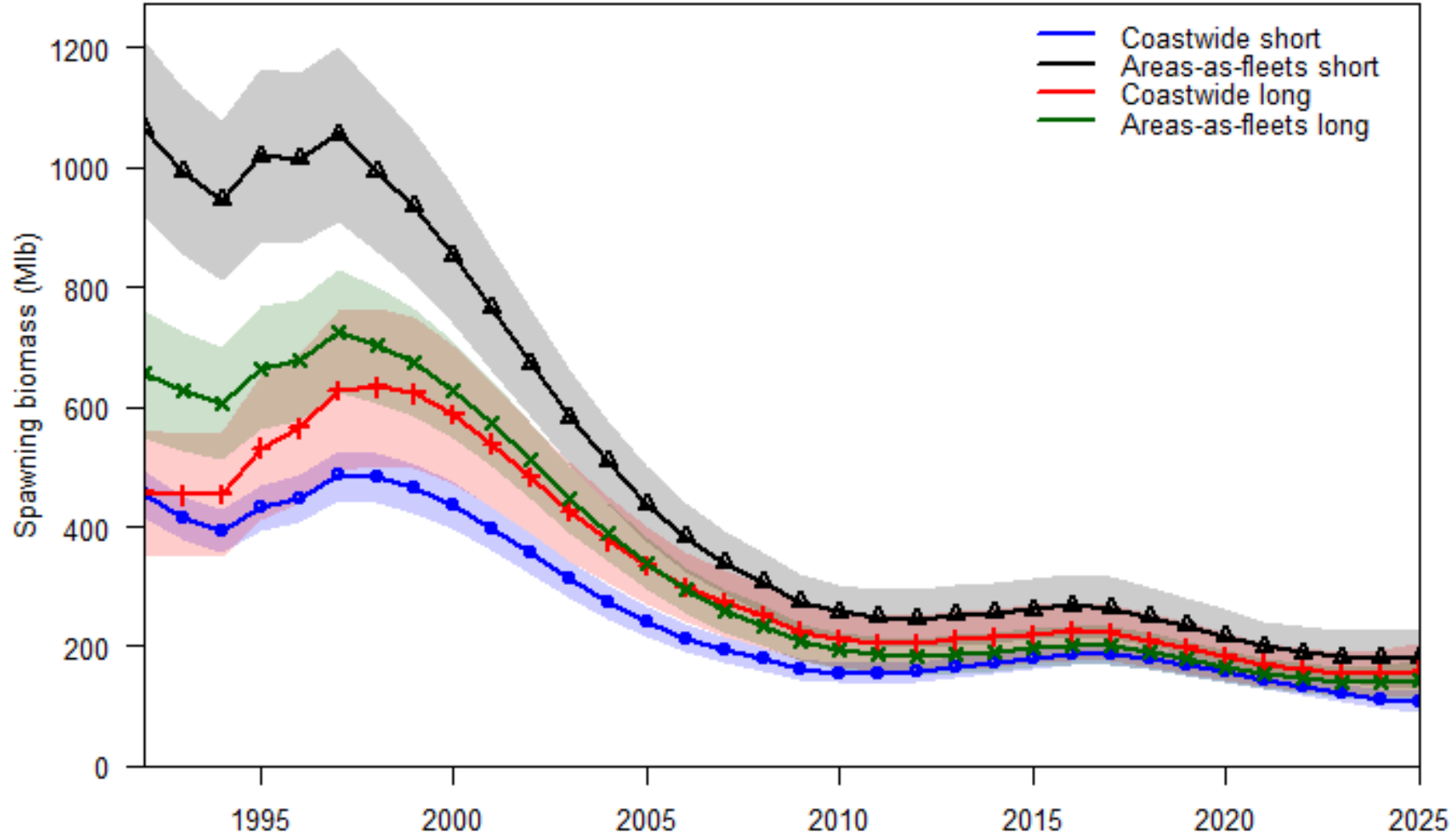


2024 stock assessment

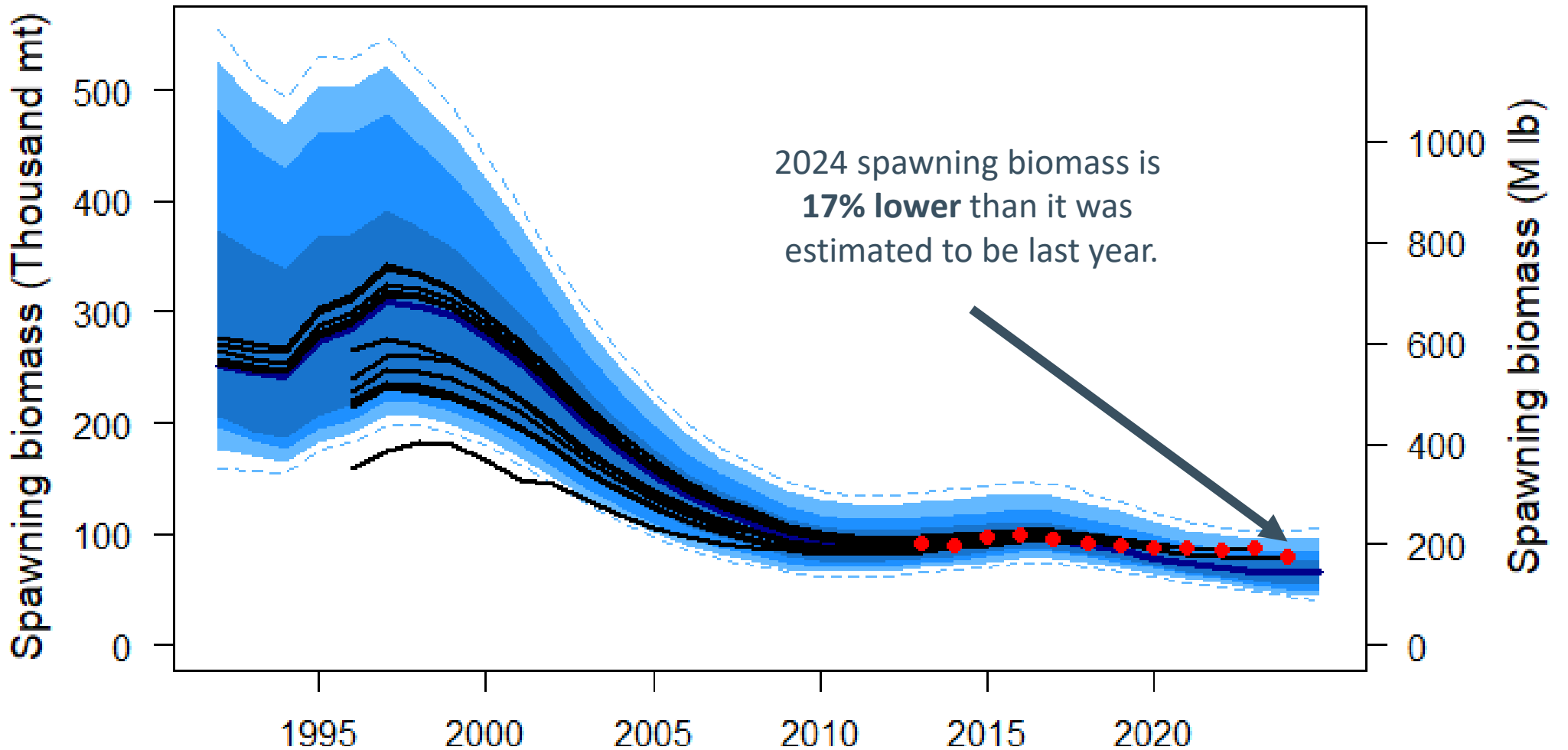
- Same 4 models as in recent assessments:
 - Long and short time-series
 - Aggregated, separate data by Region
- Each responds differently to new data and represents a different hypothesis about how the population dynamics and observations are best represented
- Results are equally weighted and integrated into a single probability distribution



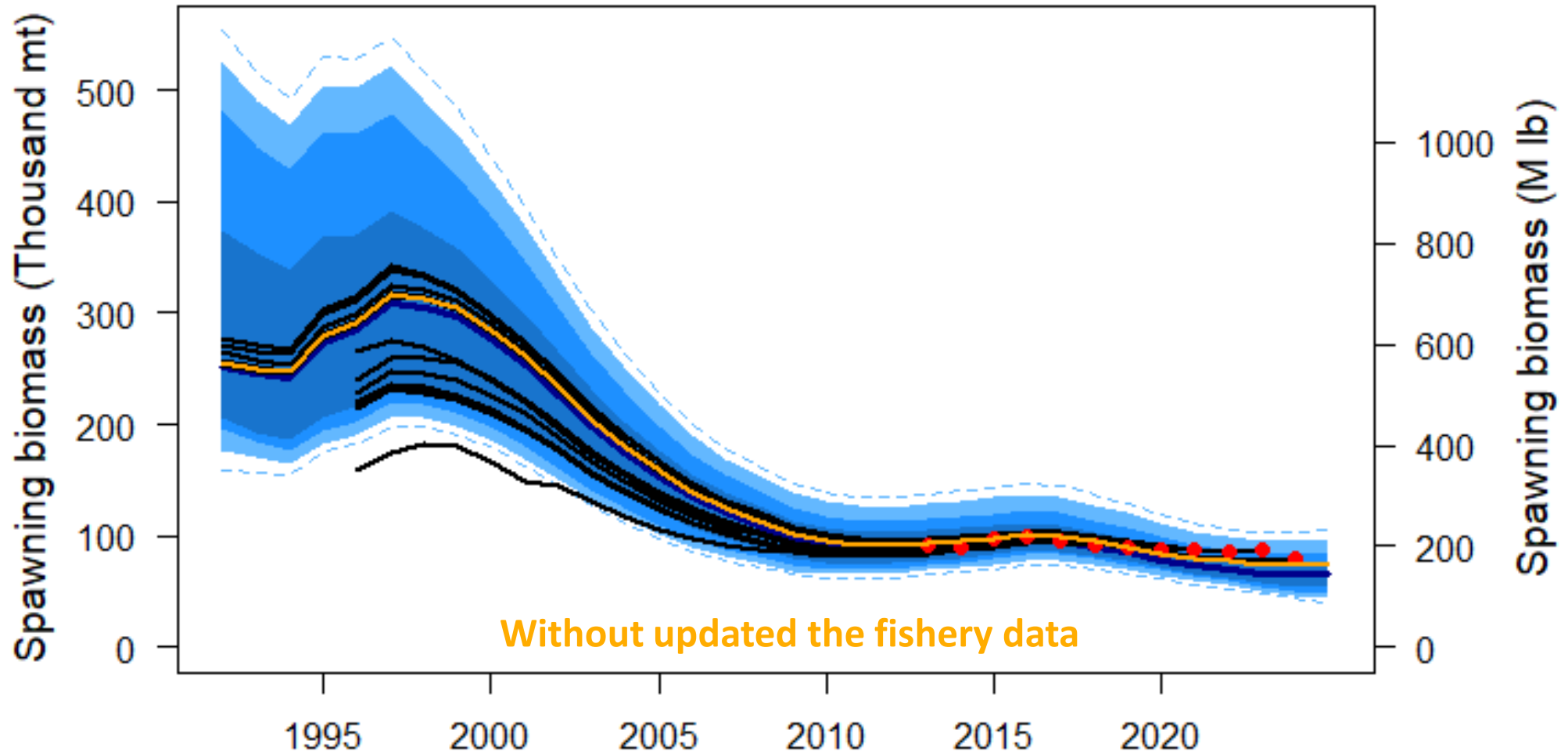
Spawning biomass from each of the four models



Comparison to previous assessments

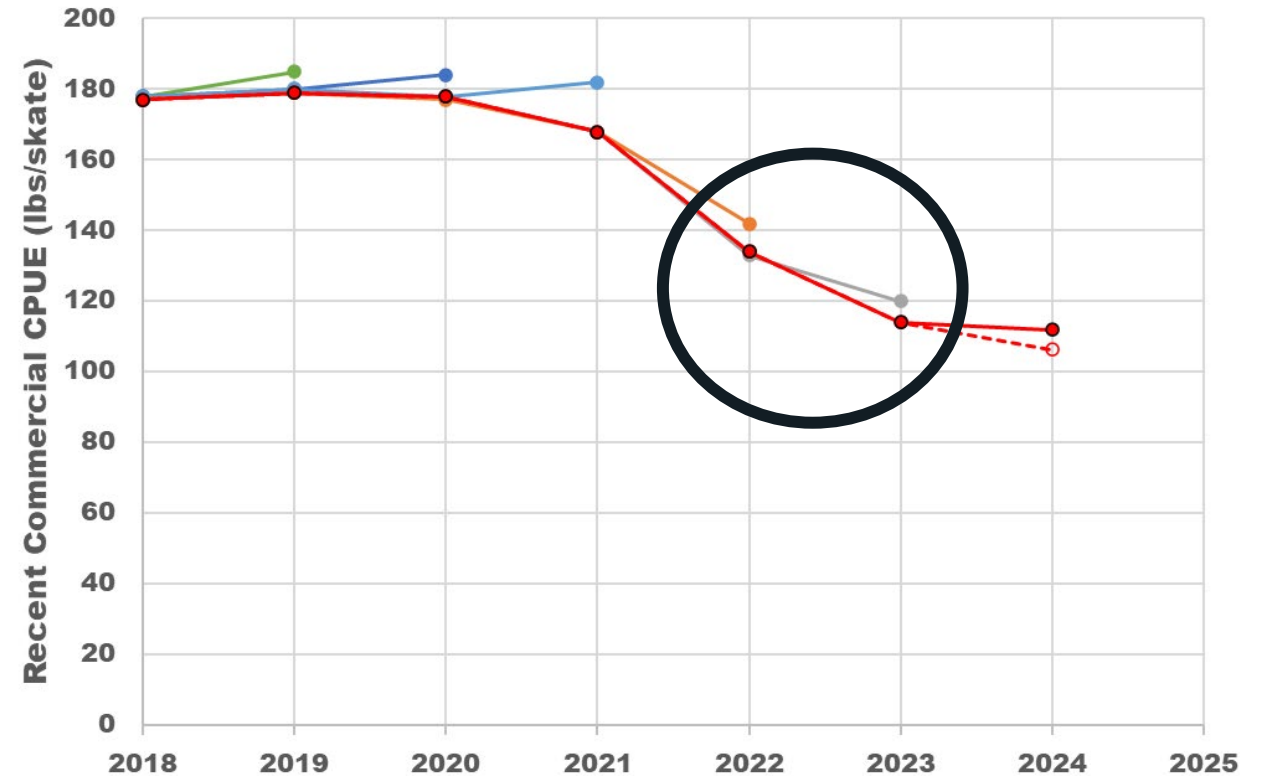


Effect of updated fishery data

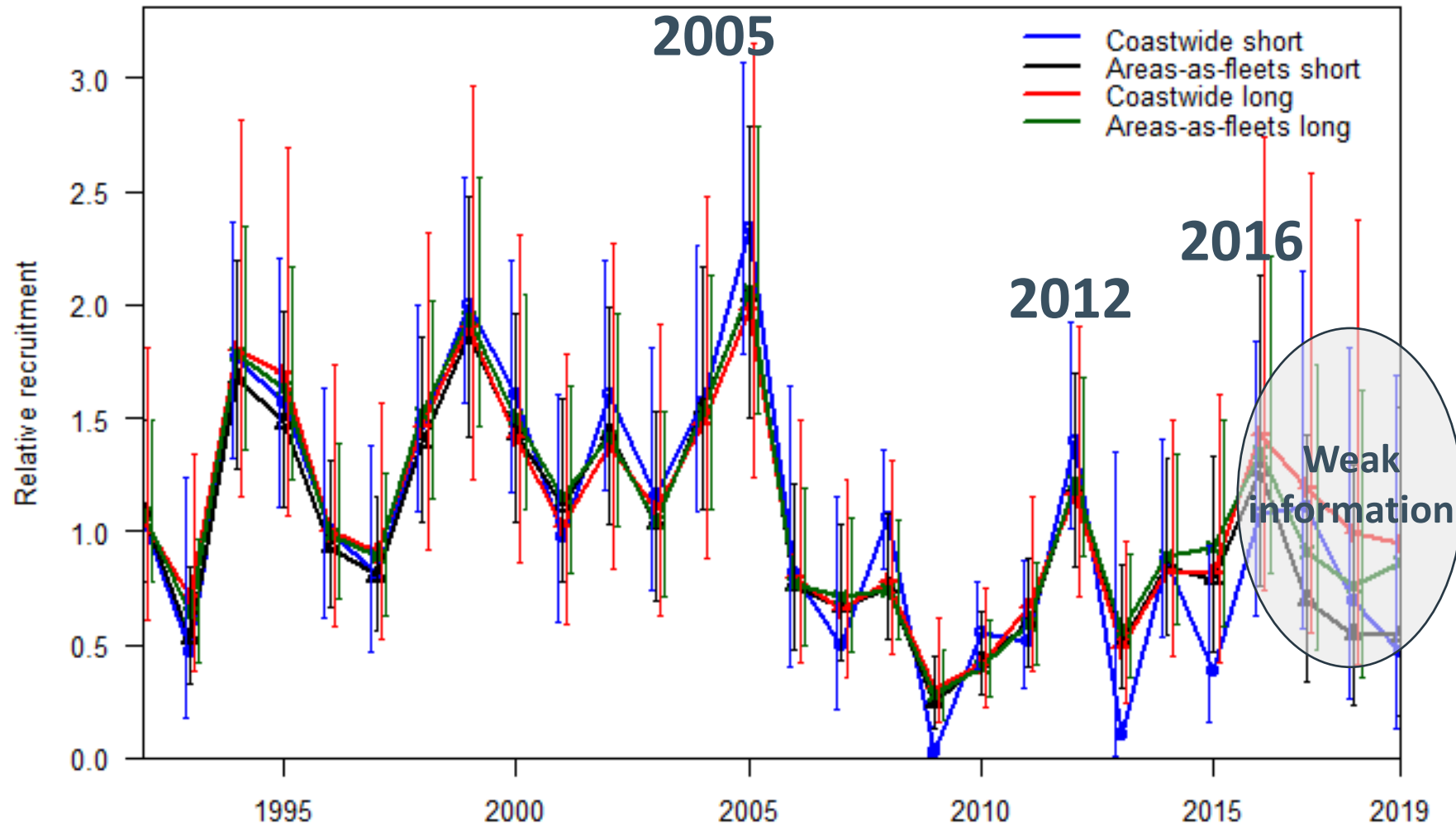


Effect of updated fishery data

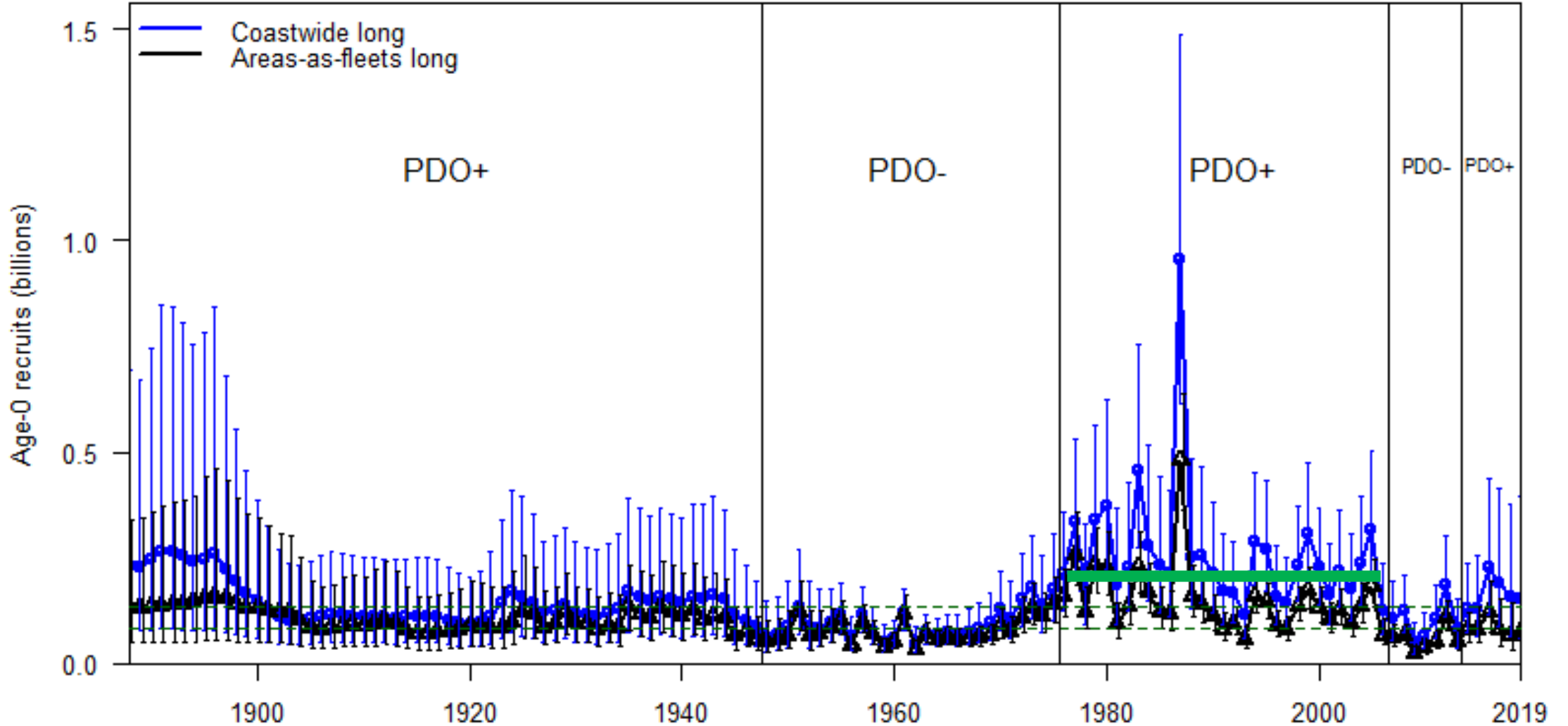
- The 2023 fishery catch-rate was very important last year. It is another 5% down when updated this year.
- Recent fisheries (since 2020) extend much later than has been common historically.
- Fishery data is providing some information not apparent (or lagged) in recent FISS data.
- This is not a model issue, but a data issue.
- Uncertainty in data updates is **not quantified** in the assessment.



Recent relative recruitment estimates



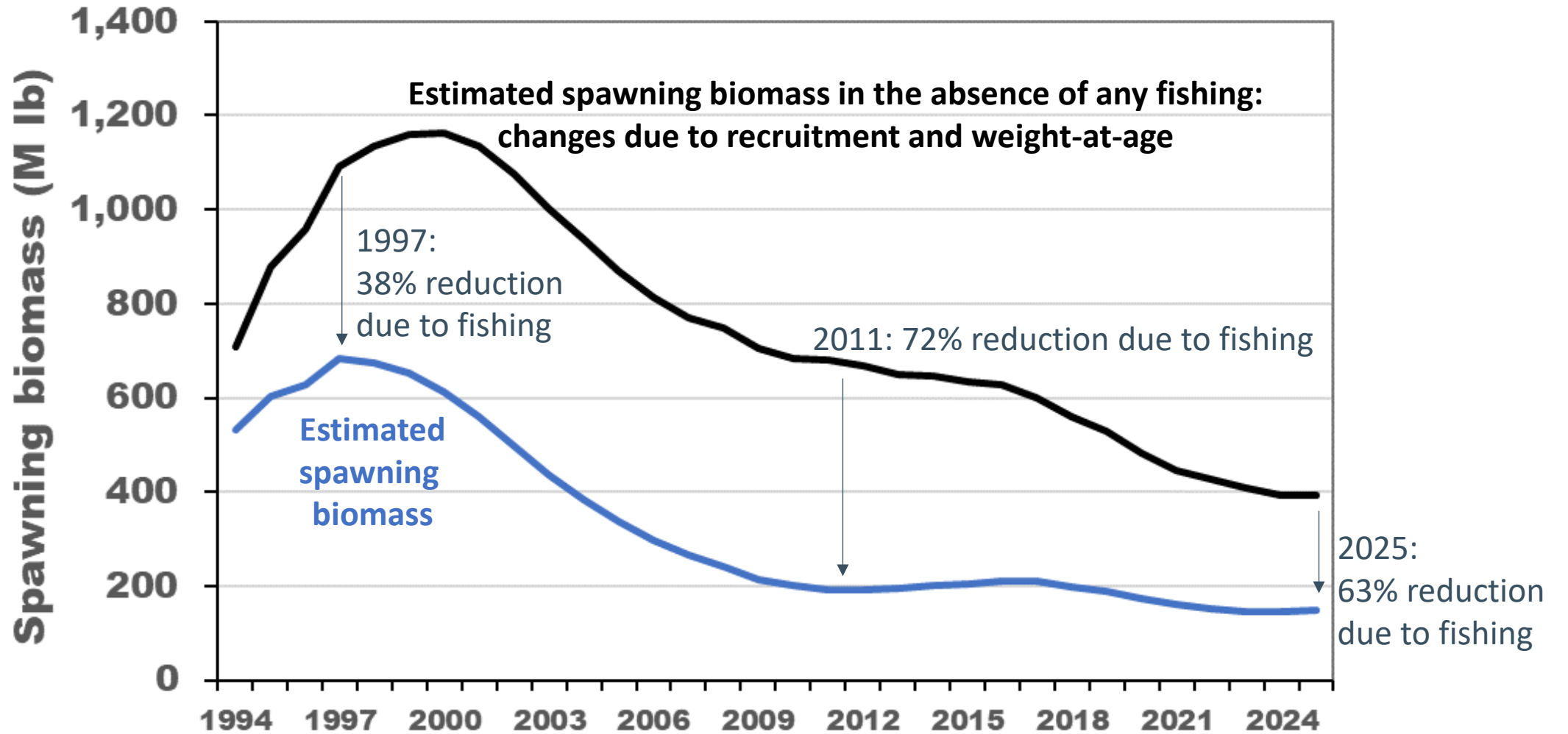
Historical recruitment estimates



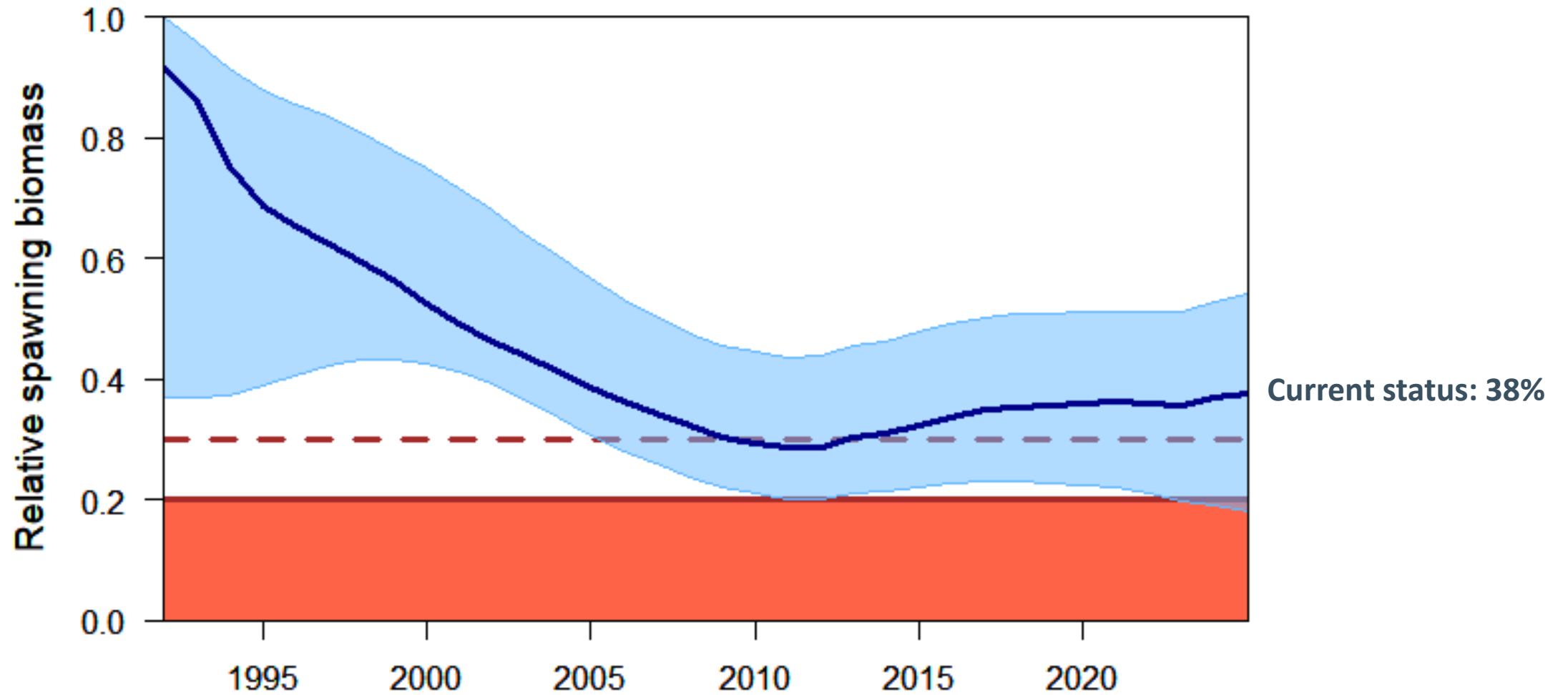
High productivity



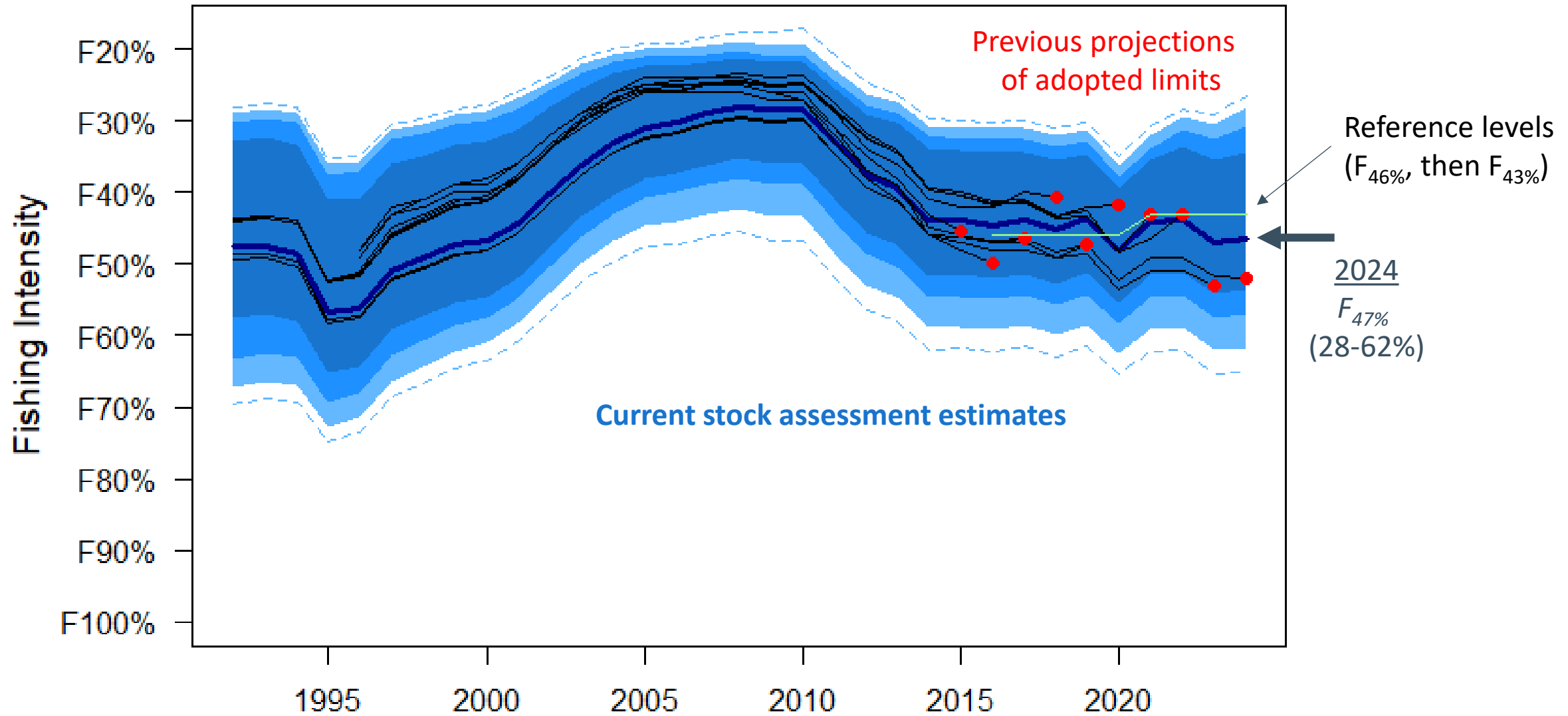
Stock status – measuring the effect of fishing



Stock status – measuring the effect of fishing



Estimated fishing intensity



Stock assessment summary table

Indicators	Values	Trends	Status
BIOLOGICAL			
SPR₂₀₂₄: P(SPR<43%): P(SPR<limit):	47% (28-62%) 40% LIMIT NOT SPECIFIED	FISHING INTENSITY UNCHANGED FROM 2023 TO 2024	FISHING INTENSITY BELOW REFERENCE LEVEL
SB₂₀₂₅ (MLBS): SB₂₀₂₅/SB₀: P(SB₂₀₂₅<SB₃₀): P(SB₂₀₂₅<SB₂₀):	147 (96–215) Mlbs 38% (18-54%) 30% 13%	SB INCREASED 2% FROM 2024 TO 2025	NOT OVERFISHED
Biological stock distribution:	SEE TABLES AND FIGURES	REGION 3 DECREASED, REGION 2 INCREASED FROM 2023 TO 2024	REGION 3 AT THE LOWEST OBSERVED PROPORTION
FISHERY CONTEXT			
Total mortality 2024: Percent retained 2024: Average mortality 2020–24:	35.63 Mlbs, 16,163 t 84% 36.25 Mlbs, 16,440 t	MORTALITY INCREASED FROM 2023 TO 2024	2024 MORTALITY NEAR 100-YEAR LOW



Summary of results

- Fishing mortality increased slightly from 2023, despite a lower TCEY in 2024
- Continued shift from older to younger fish in both the fishery and FISS
- Fish and fishery indices at historical low levels
- Fishery data (CPUE) again had the largest effect on the stock assessment results, decreasing the 2024 spawning biomass by 17% compared to last year's assessment
- The stock remains at a low productivity level due to low weight-at-age and low recruitment through at least 2016
- The spawning biomass is estimated to be above $B_{30\%}$ and the fishing intensity lower than $F_{43\%}$



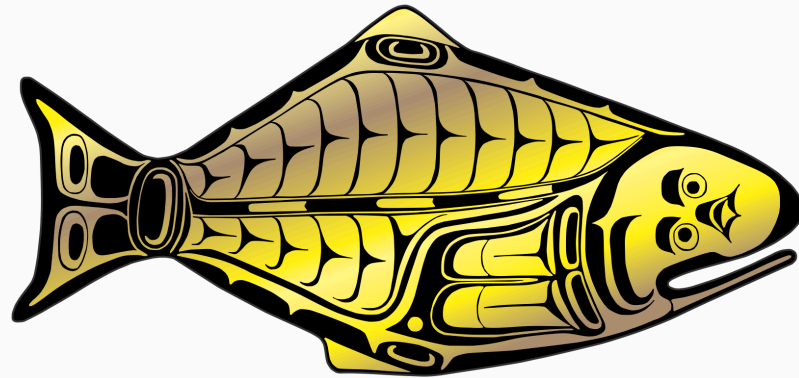
Recommendations

That the Commission:

- 1) **NOTE** paper IPHC-2024-IM100-11 Rev_1, which provides a summary of the data and the results of the 2024 stock assessment.



INTERNATIONAL PACIFIC



HALIBUT COMMISSION

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