2025-05 Pribilof Islands Blue King Crab Report TO CPT

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NOAA/NMFS/AFSC

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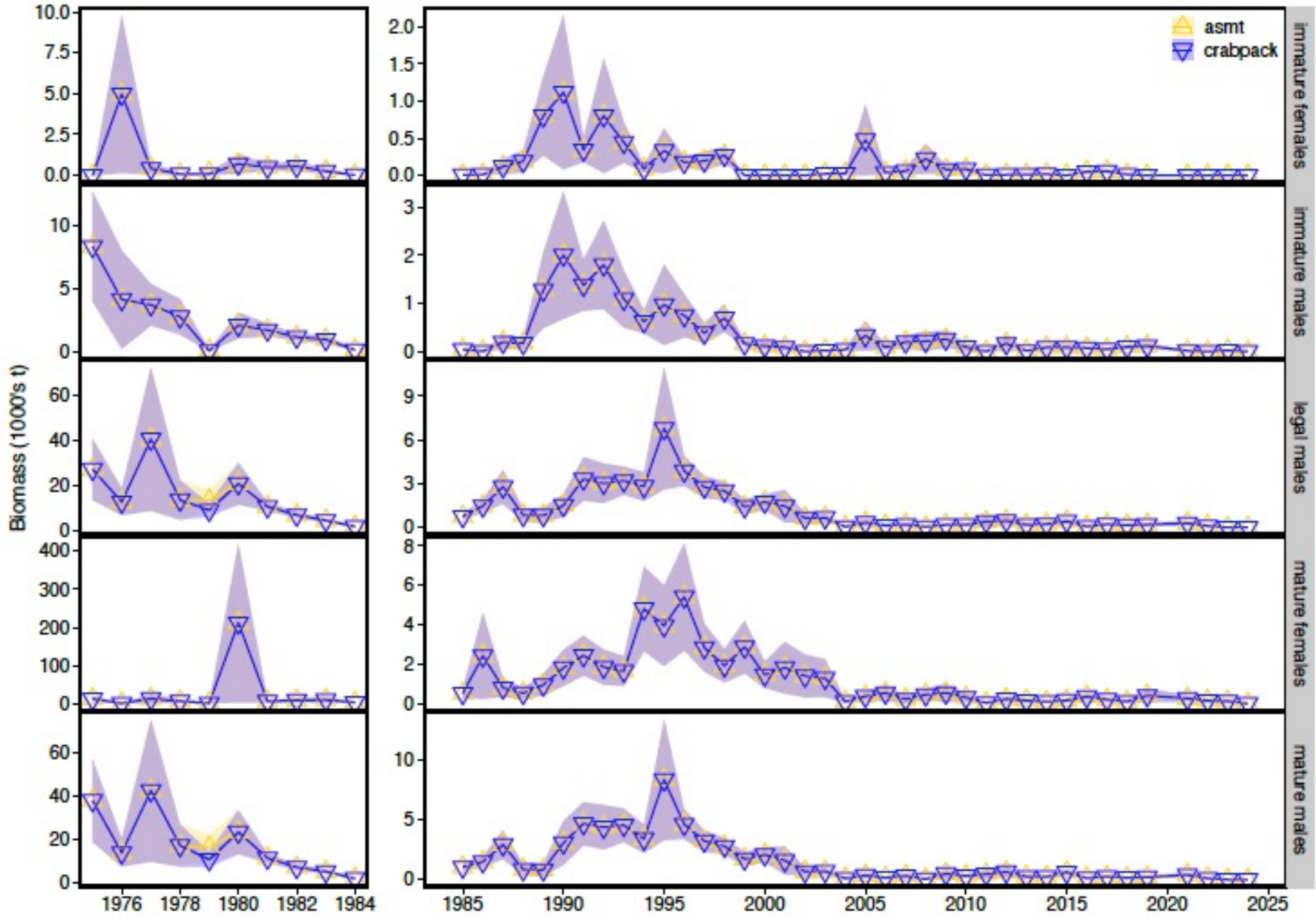
CPT and SSC Comments

- The SSC looks forward to the report on the blue king crab stock structure template in the near future.
- *response: staff capacity has not permitted progress on this request.*

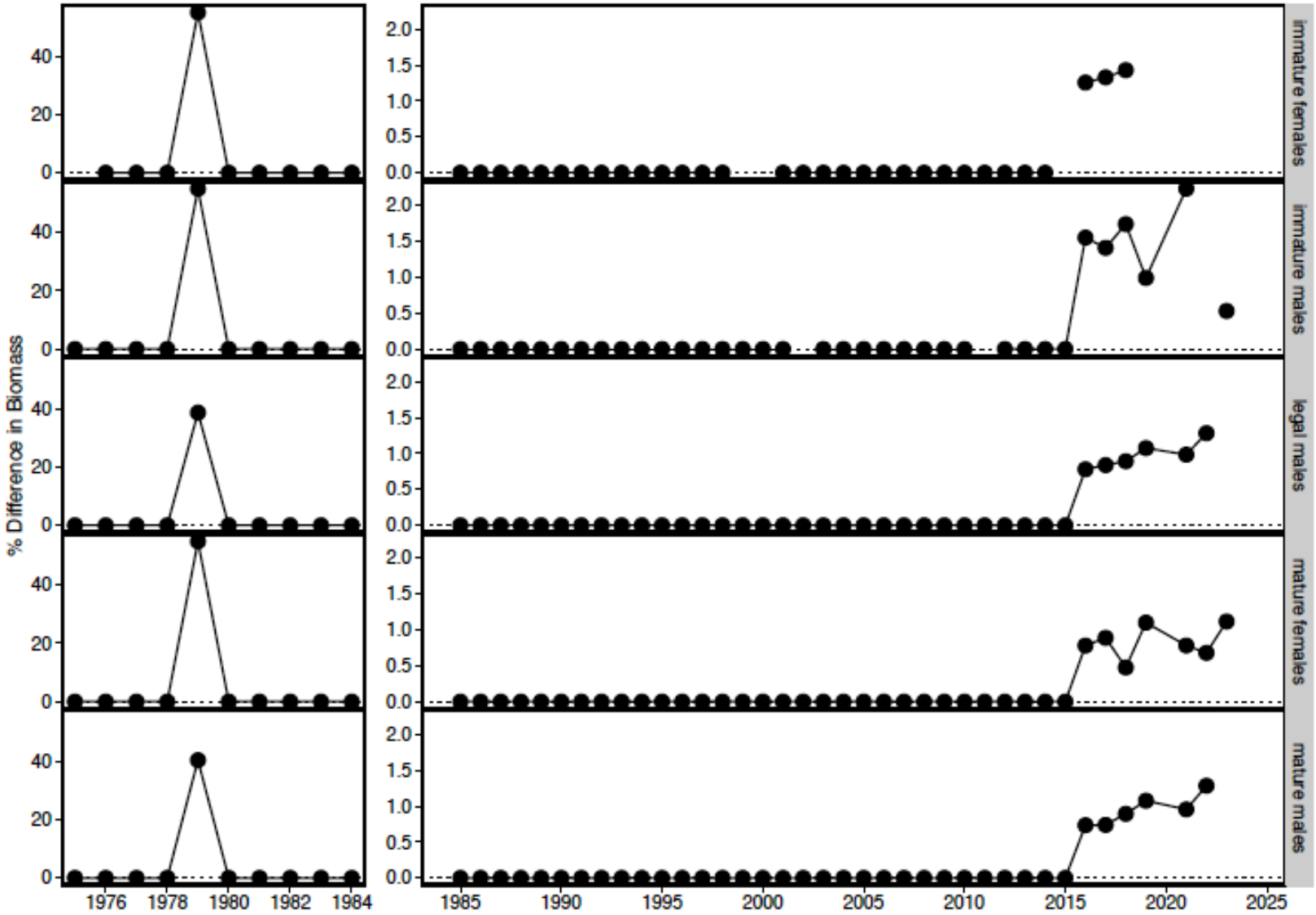
Topics

- crabpack comparisons
- loss of “corner” stations
- dealing with survey MMB time series 0’s

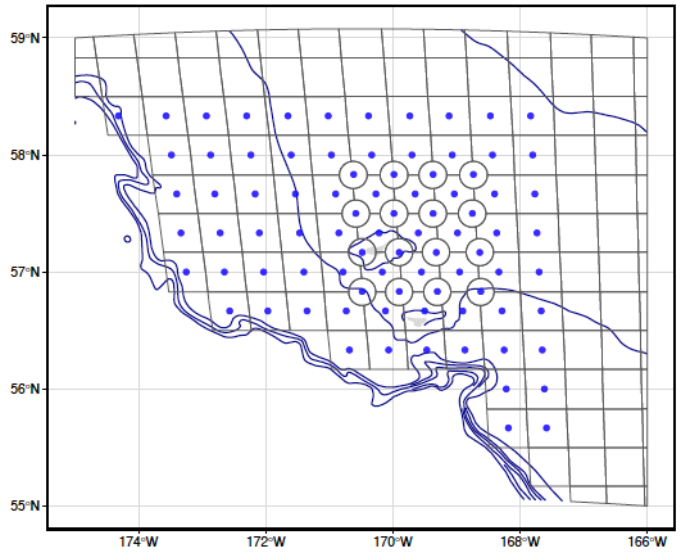
crabpack comparisons

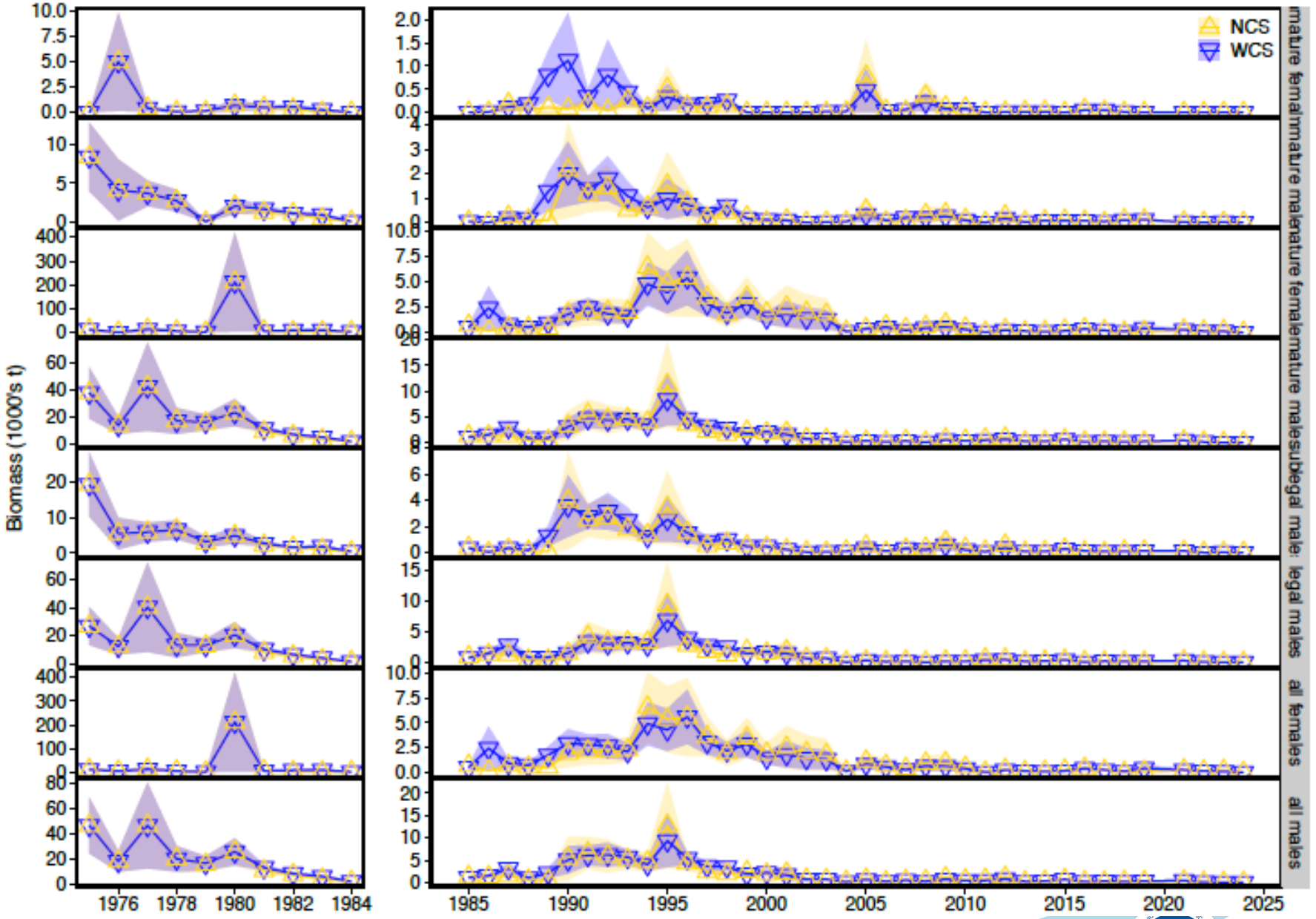


crabpack comparisons



no corner stations





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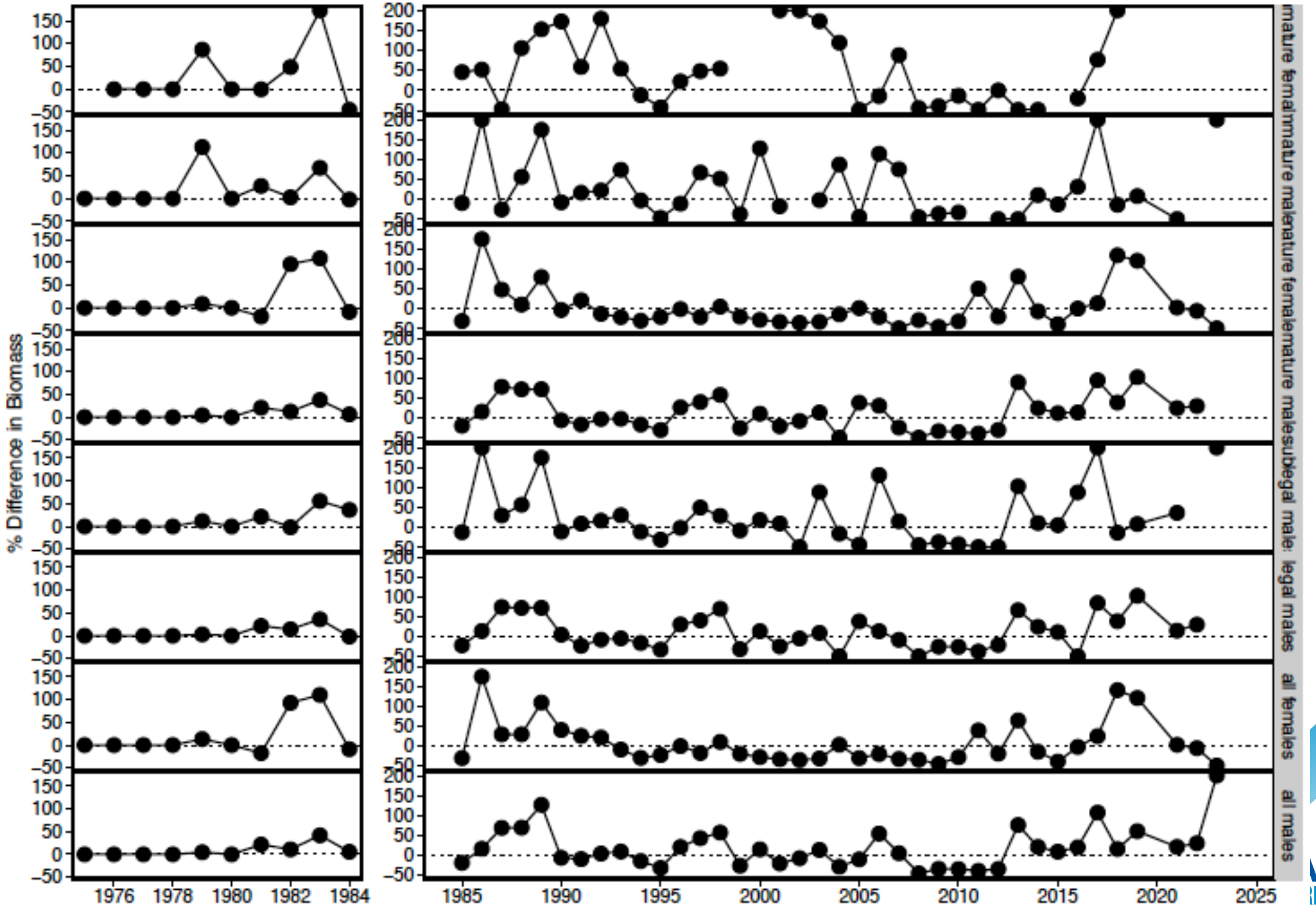

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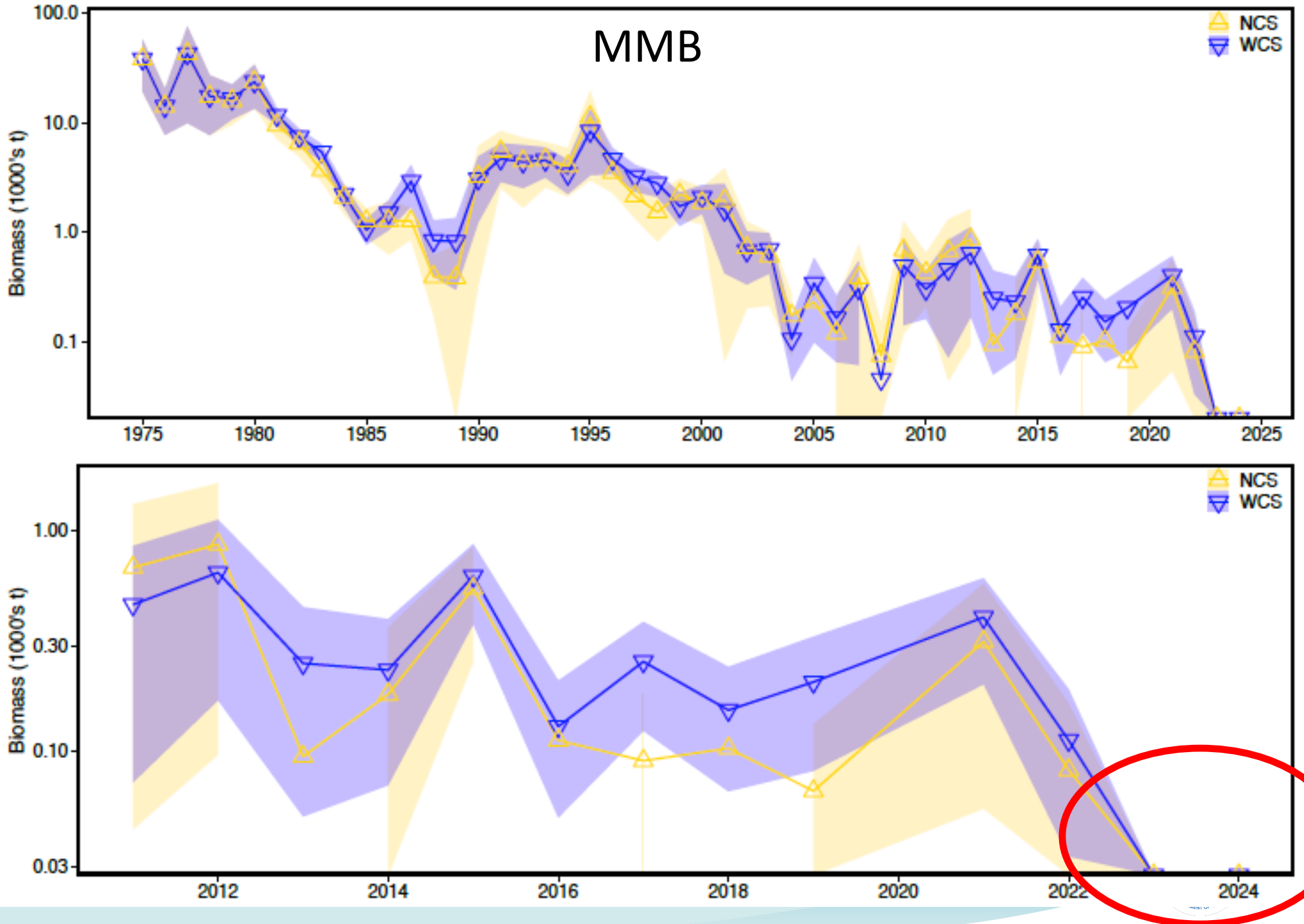
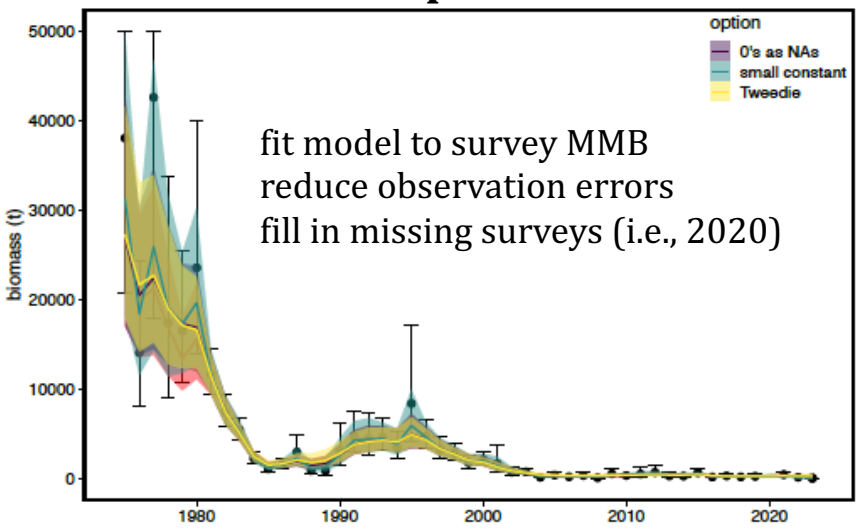
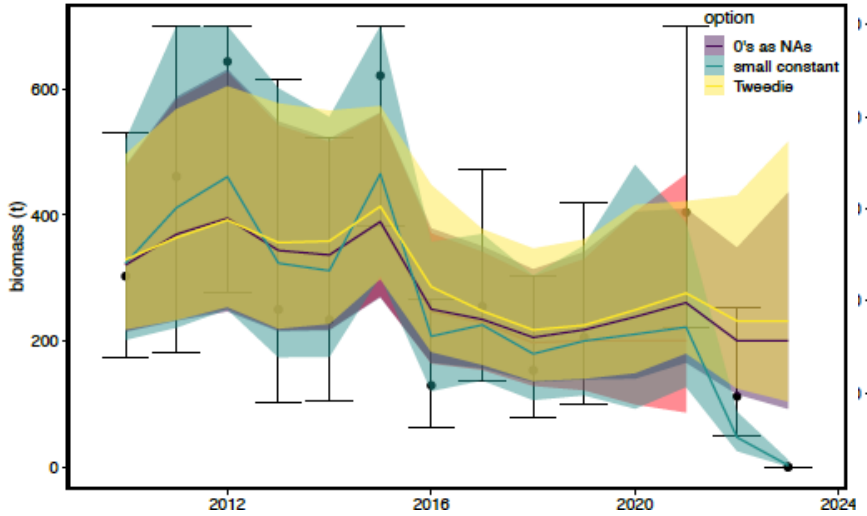


Tier 4 part of PIBKC Assessment: Determine B_{MSY}

Step 1

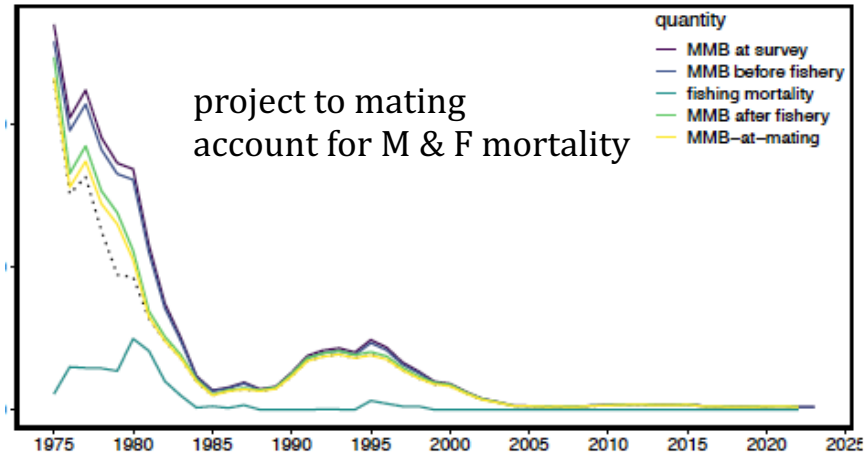


fit model to survey MMB
reduce observation errors
fill in missing surveys (i.e., 2020)

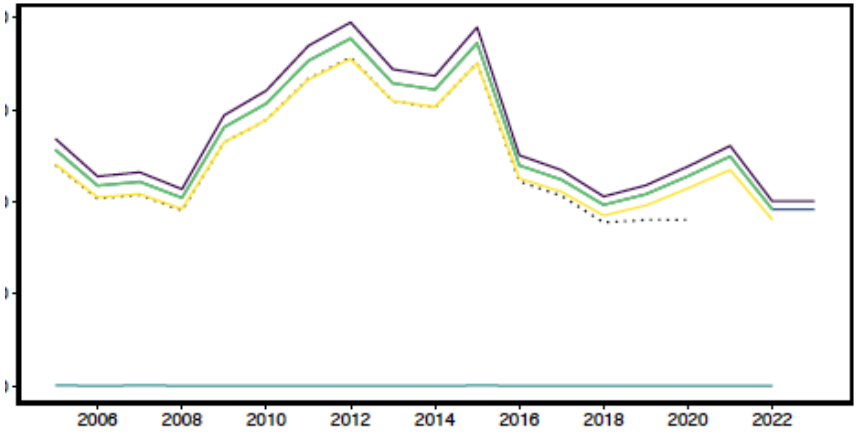


SS/RE RW rema model fit to Survey MMB

Step 2

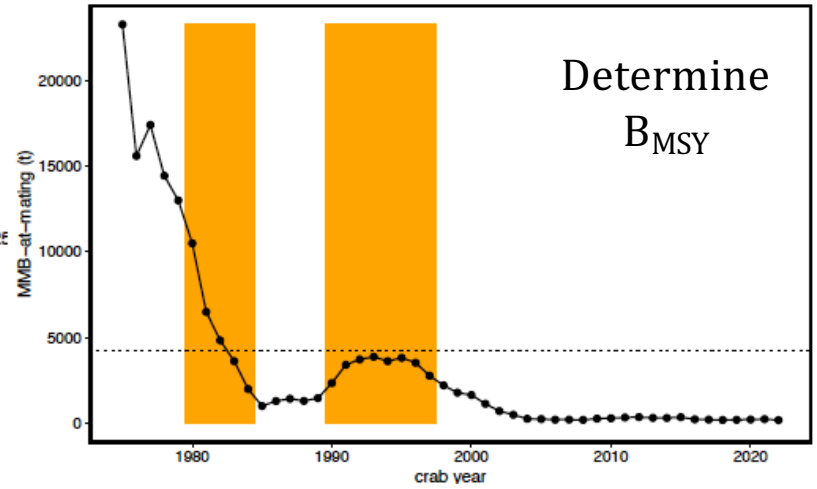


project to mating
account for M & F mortality



Projected to MMB-at-Mating

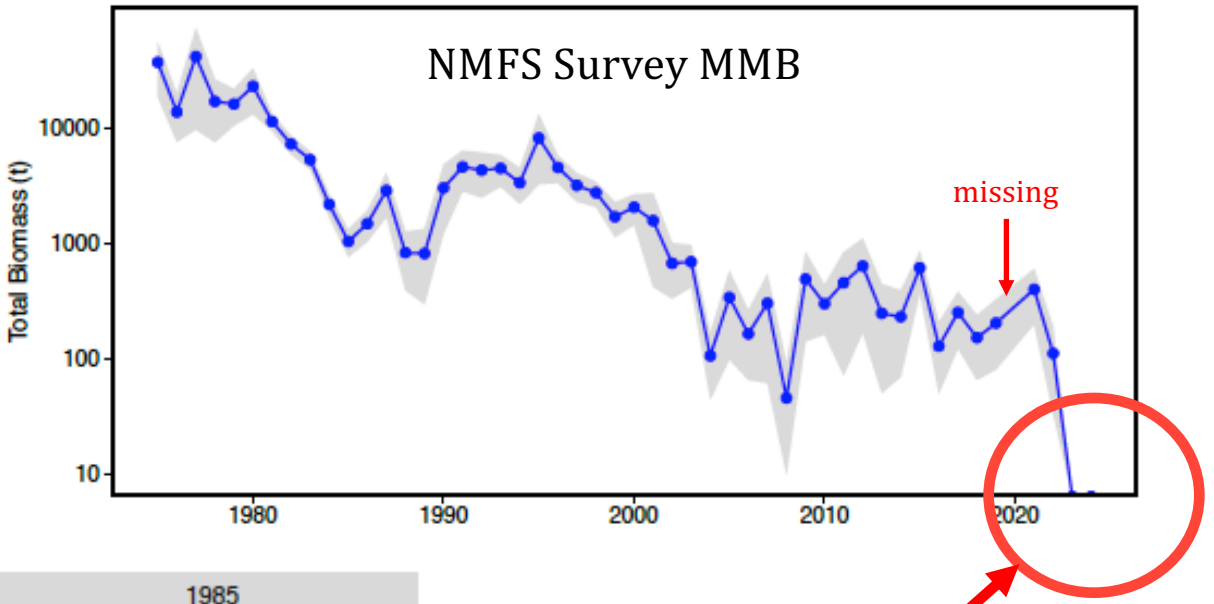
Step 3



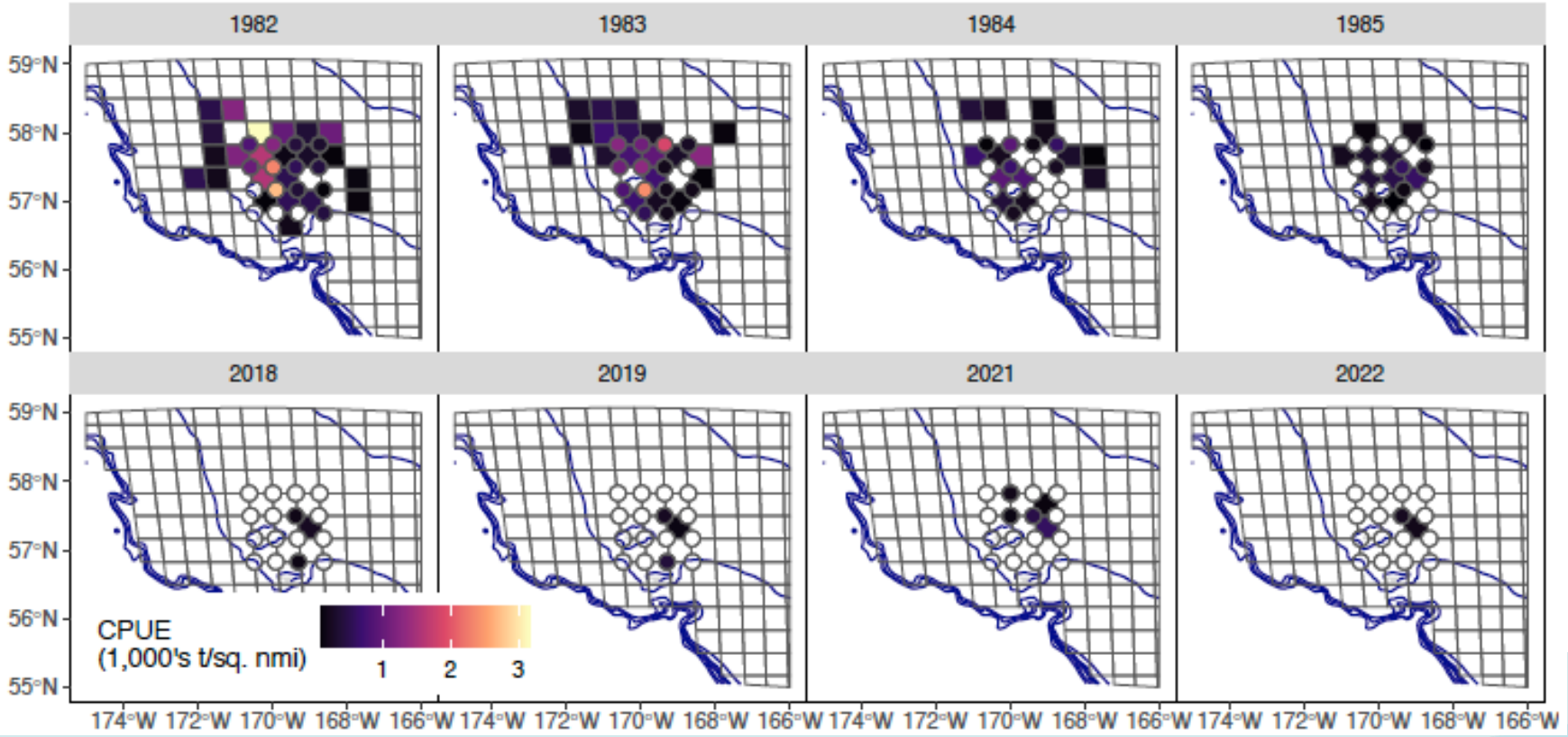
Averaged to get B_{MSY}

dealing with time series 0's

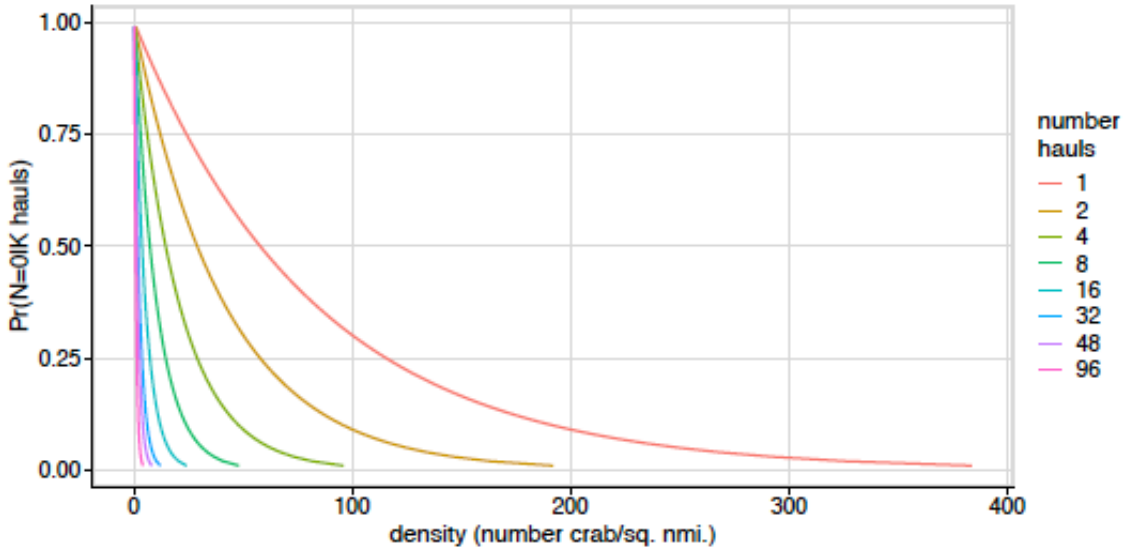
- MMB is basis for Tier 4/5 assessment
  - NMFS EBS survey provides "raw" data
  - `rema` provides "smoothed" time series
- recent 0's are problematic?

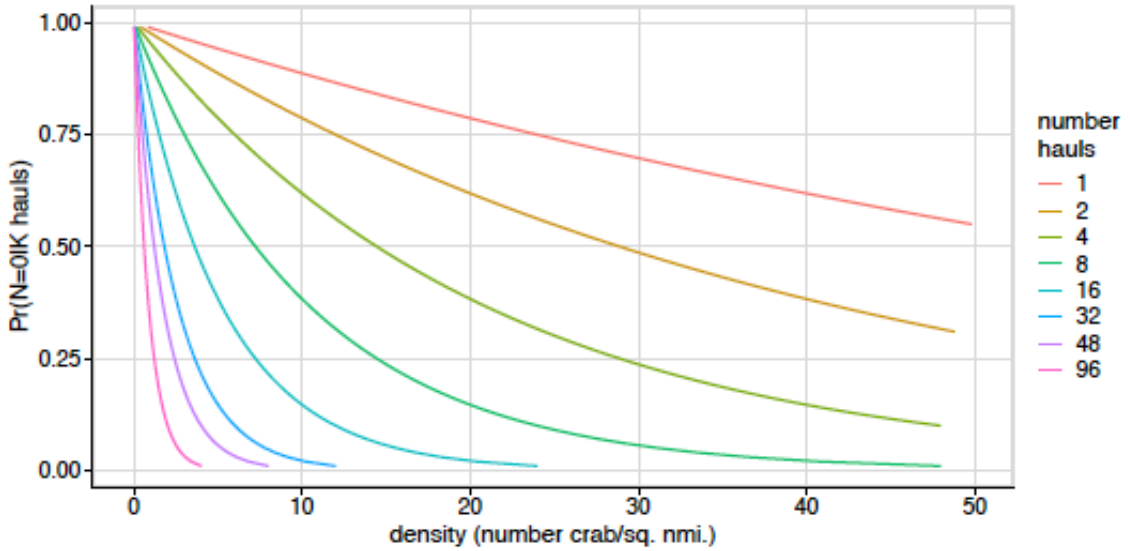


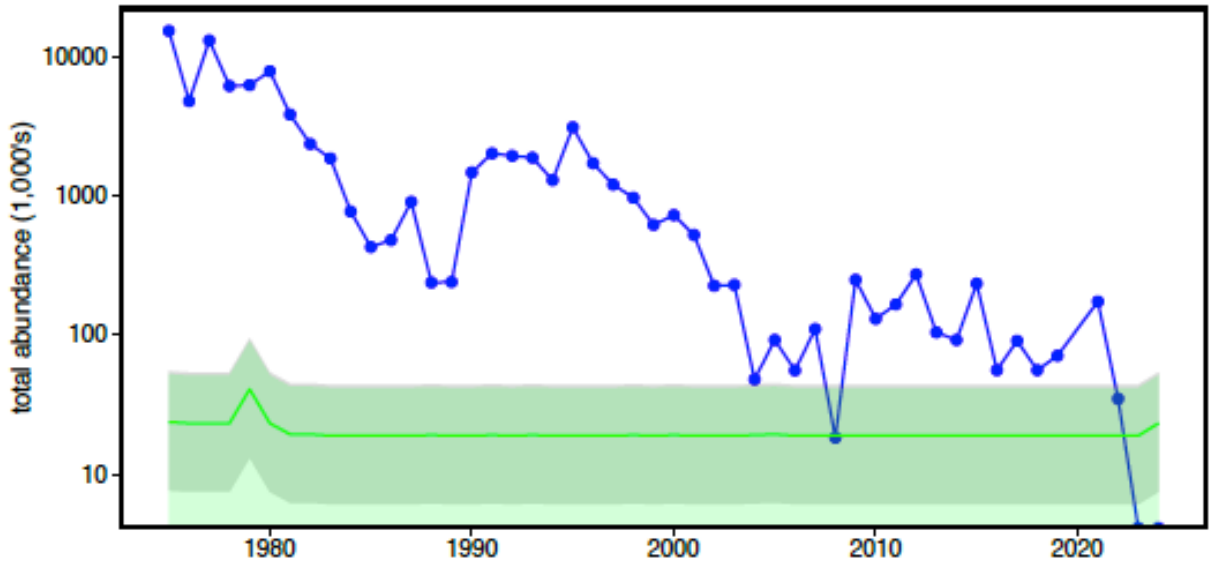
"Hard" 0's
2023, 2024

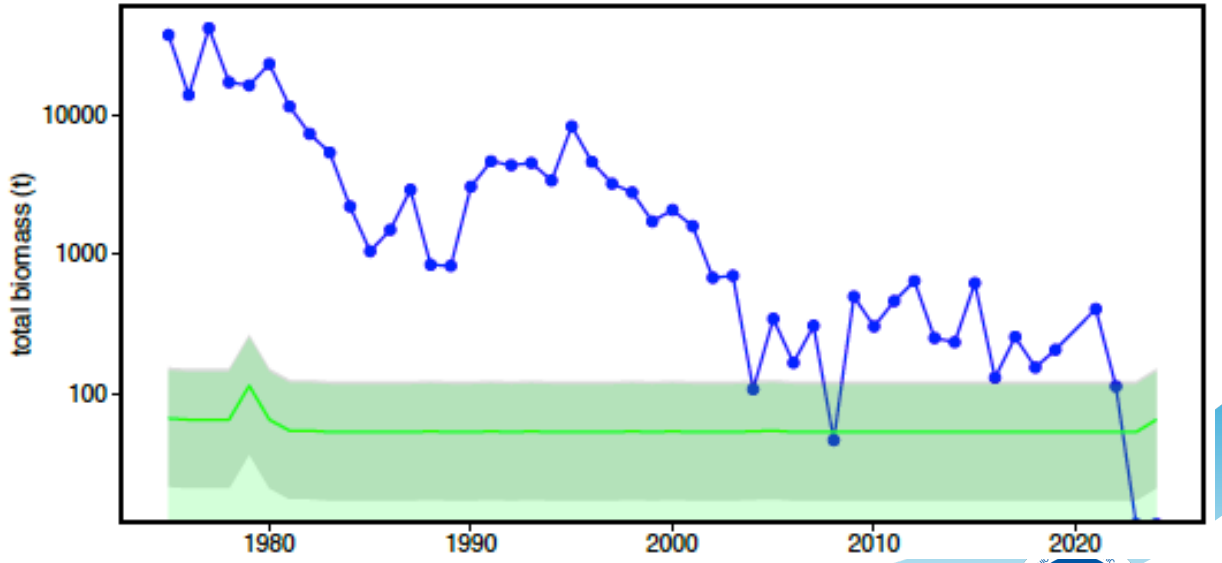


dealing with time series 0's: ad hoc approaches









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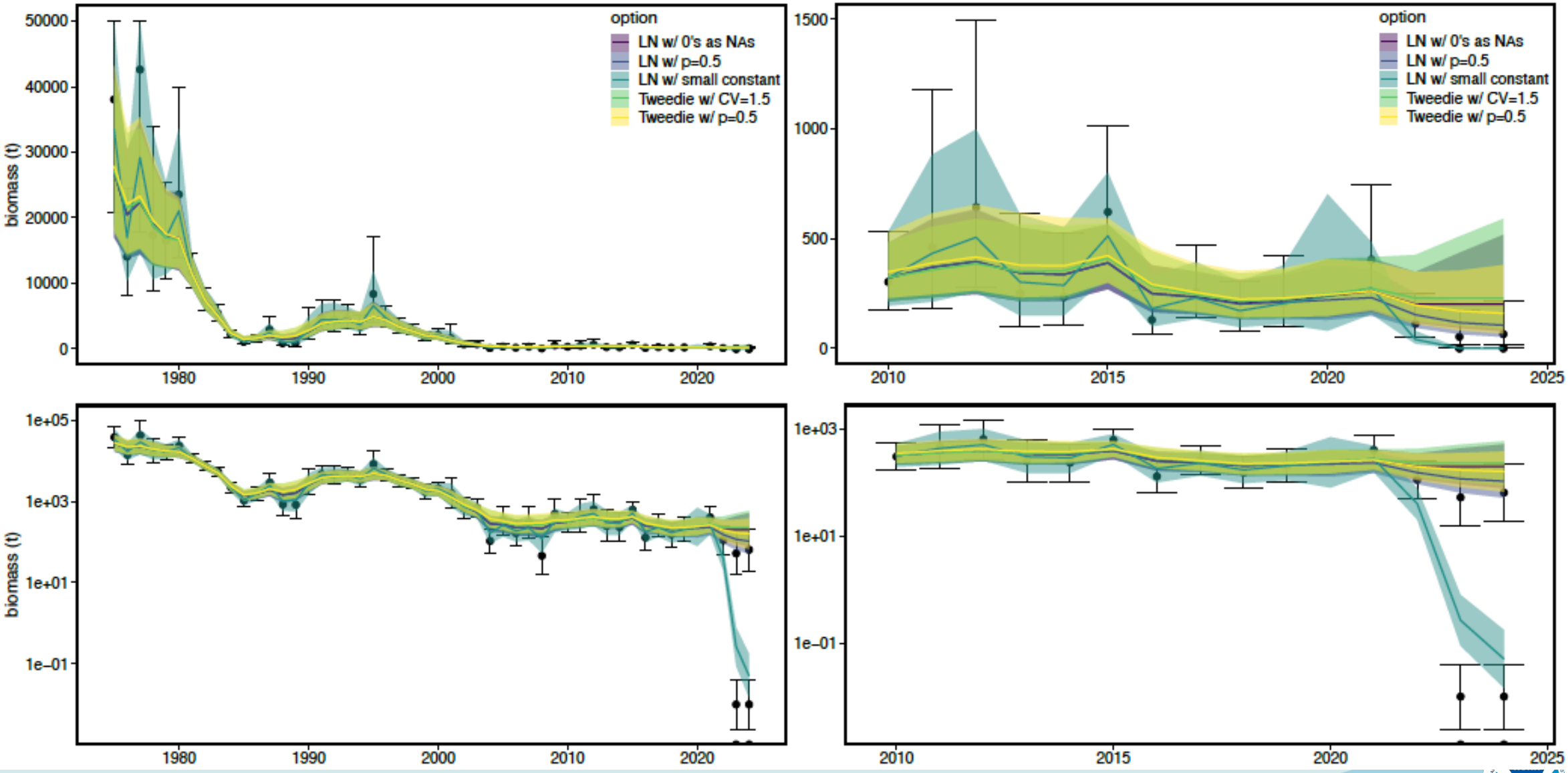
dealing with time series 0's: ad hoc approaches



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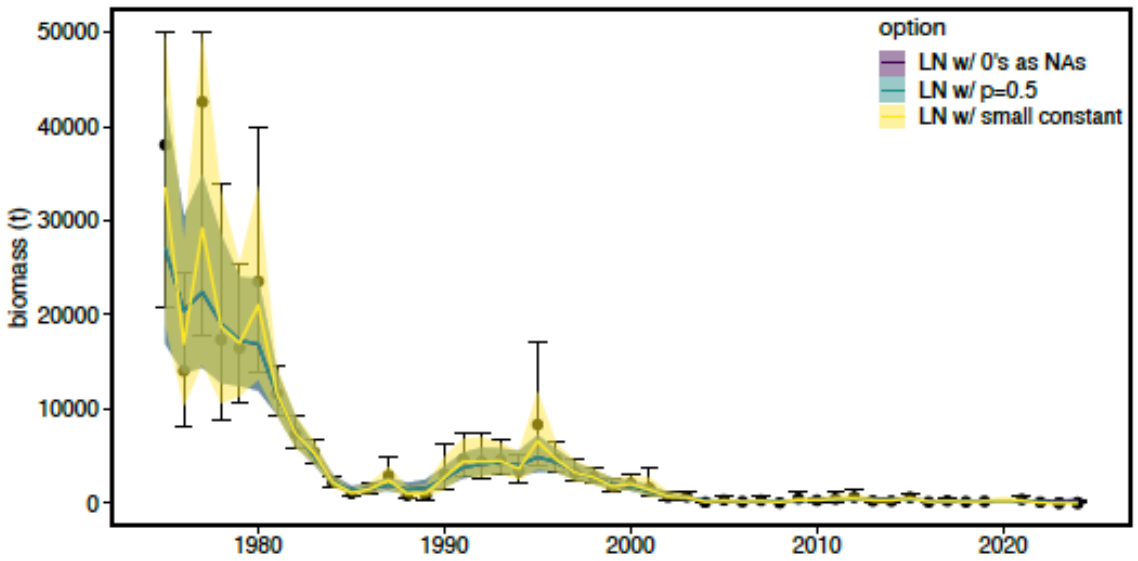

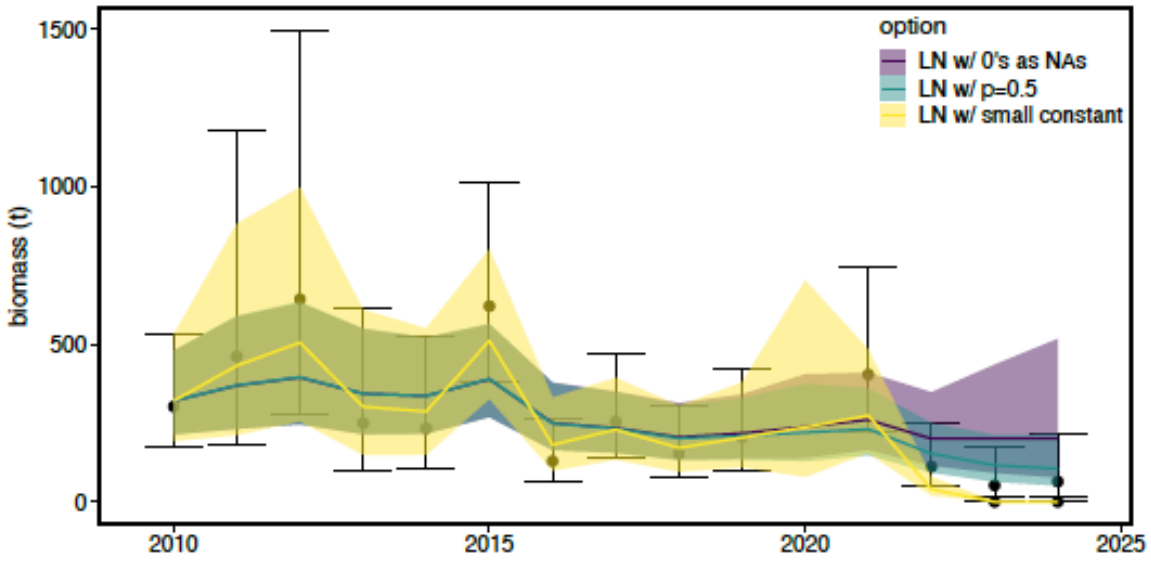

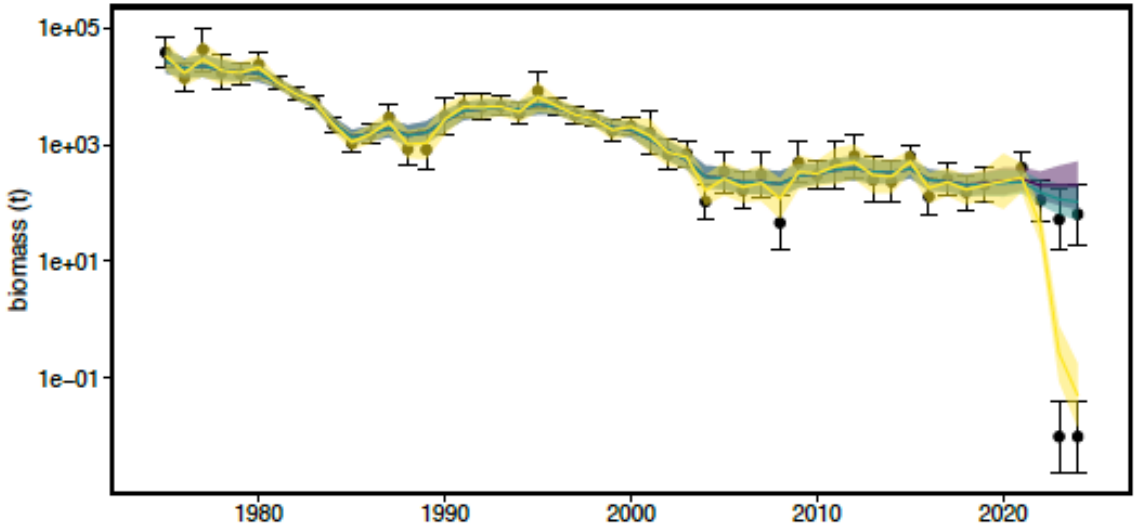

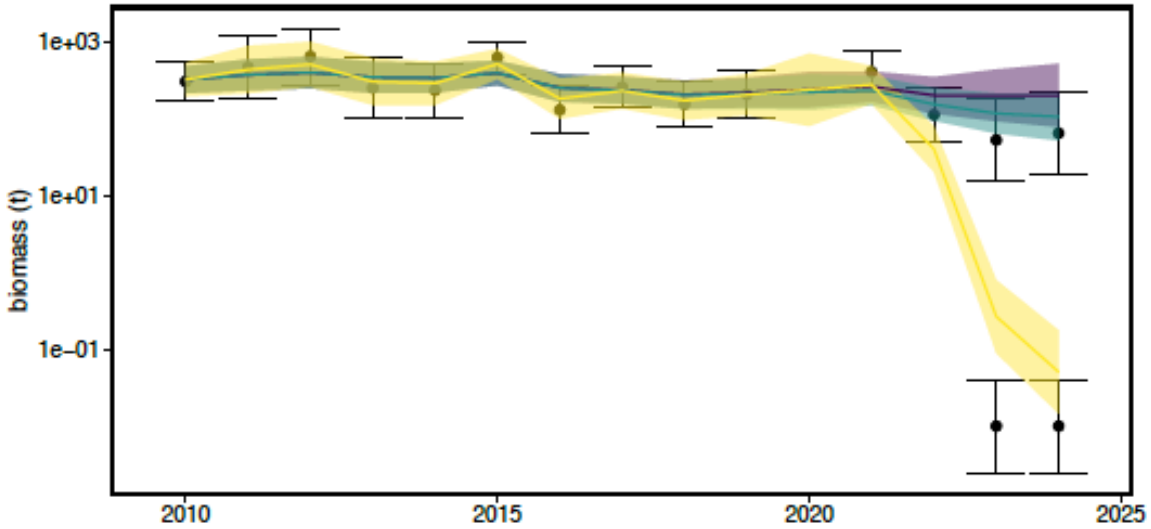

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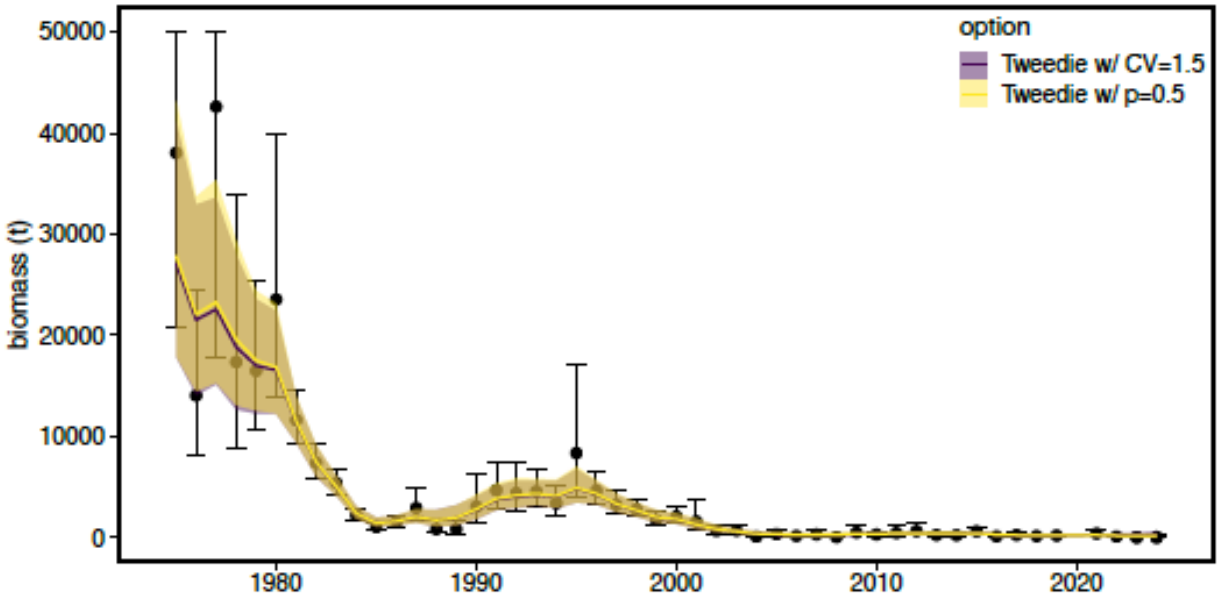
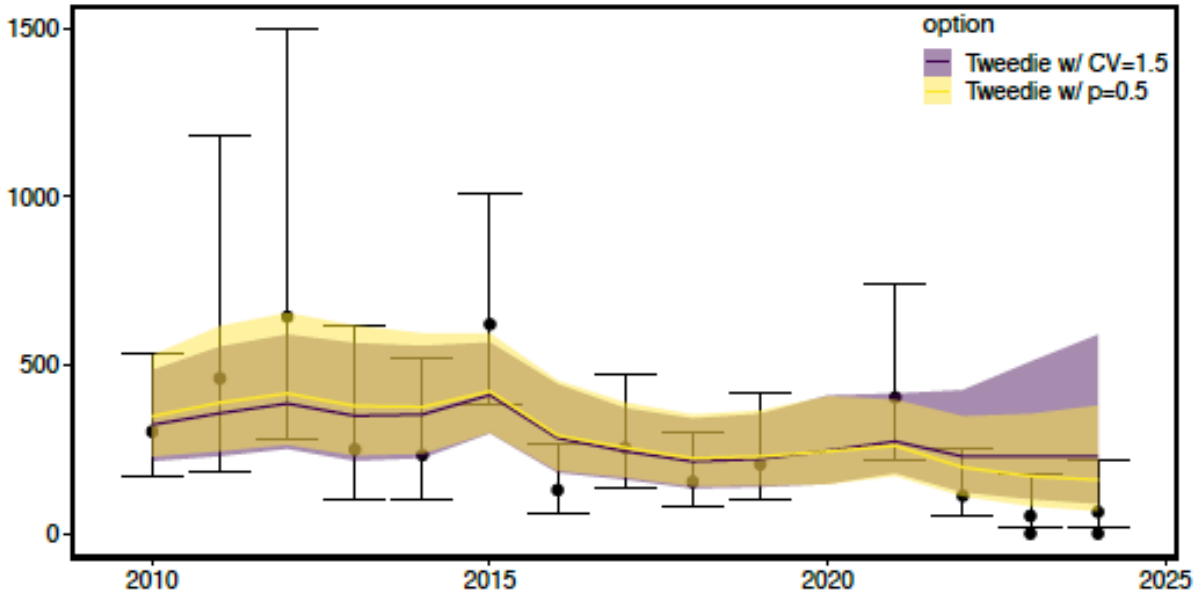
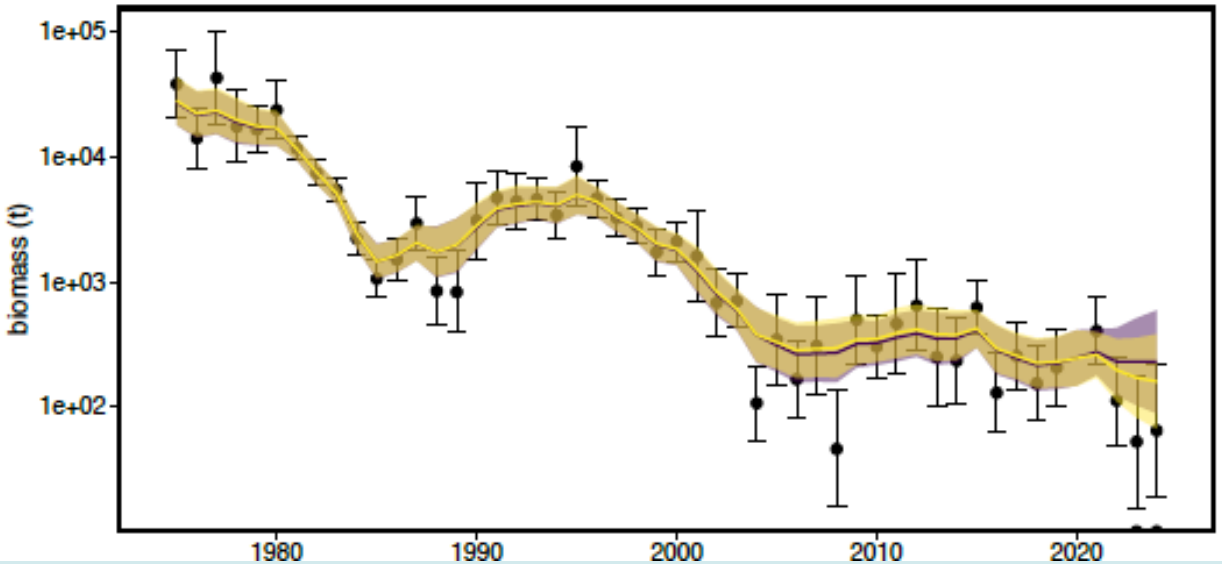
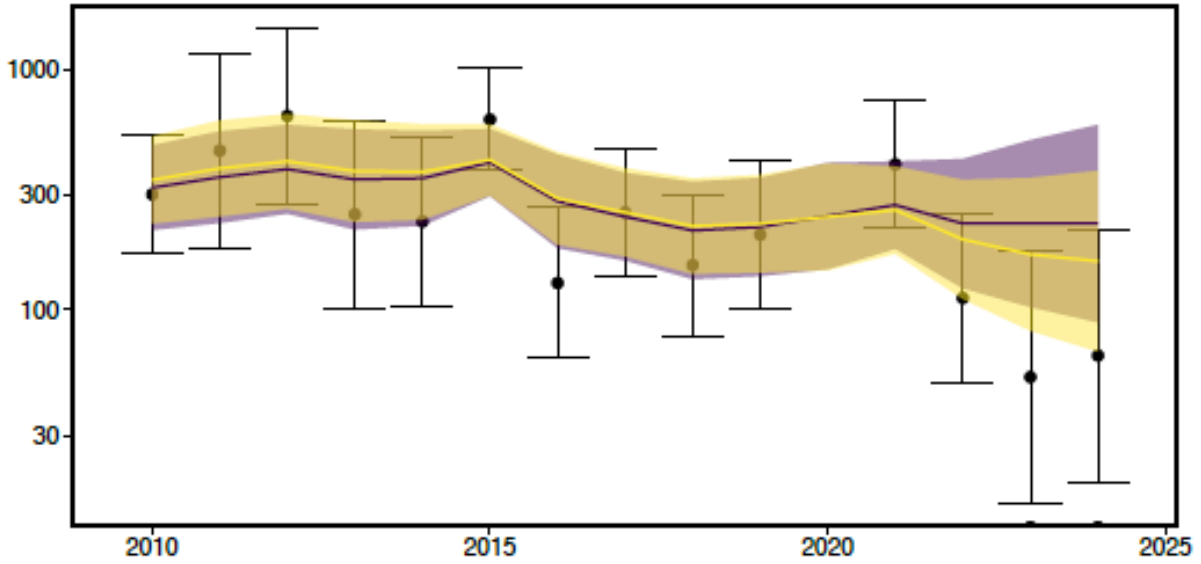






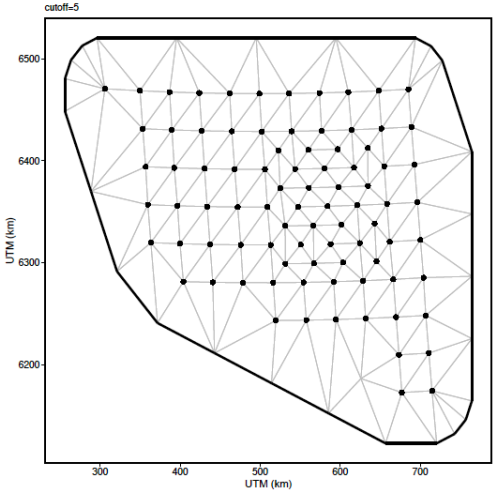


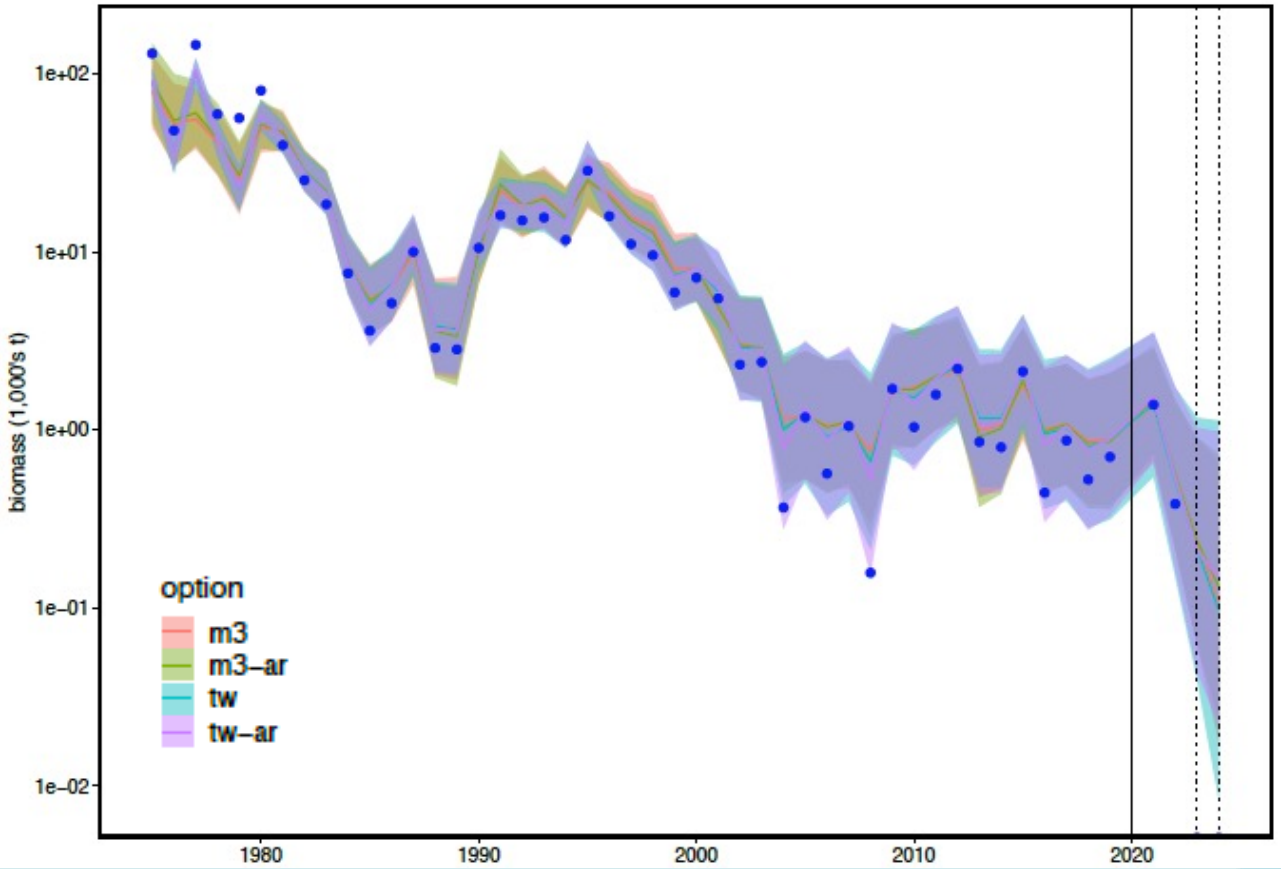
dealing with time series 0's: sdmTMB

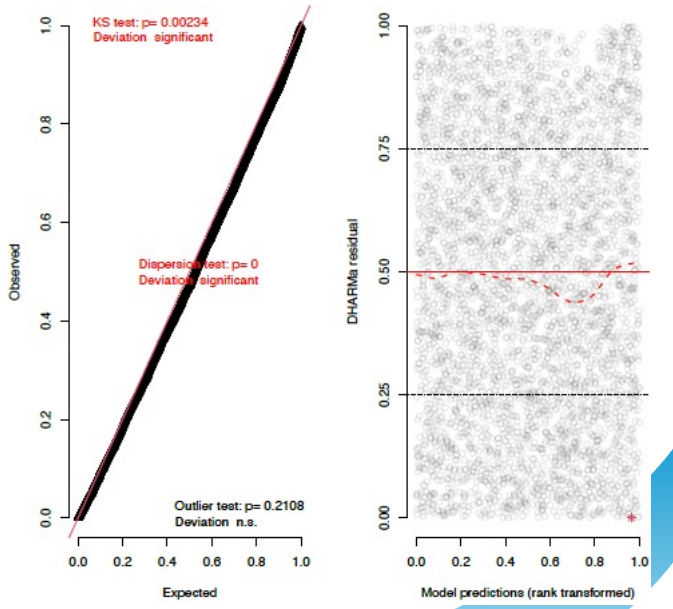
$$\ln(\text{CPUE}) \sim s(\ln(\text{bottom depth}))$$

model	distribution type	link(s)	residuals	covariates	anisotropic?	REML?
m3	delta-gamma	log	random walk	log(bottom depth)	true	true
m3-ar	delta-gamma	log	AR(1)	log(bottom depth)	true	true
tw	Tweedie	log	random walk	log(bottom depth)	true	true
tw-ar	Tweedie	log	AR(1)	log(bottom depth)	true	true

model	AIC
m3	2259.421
m3-ar	2241.808
tw	2267.339
tw-ar	2196.112







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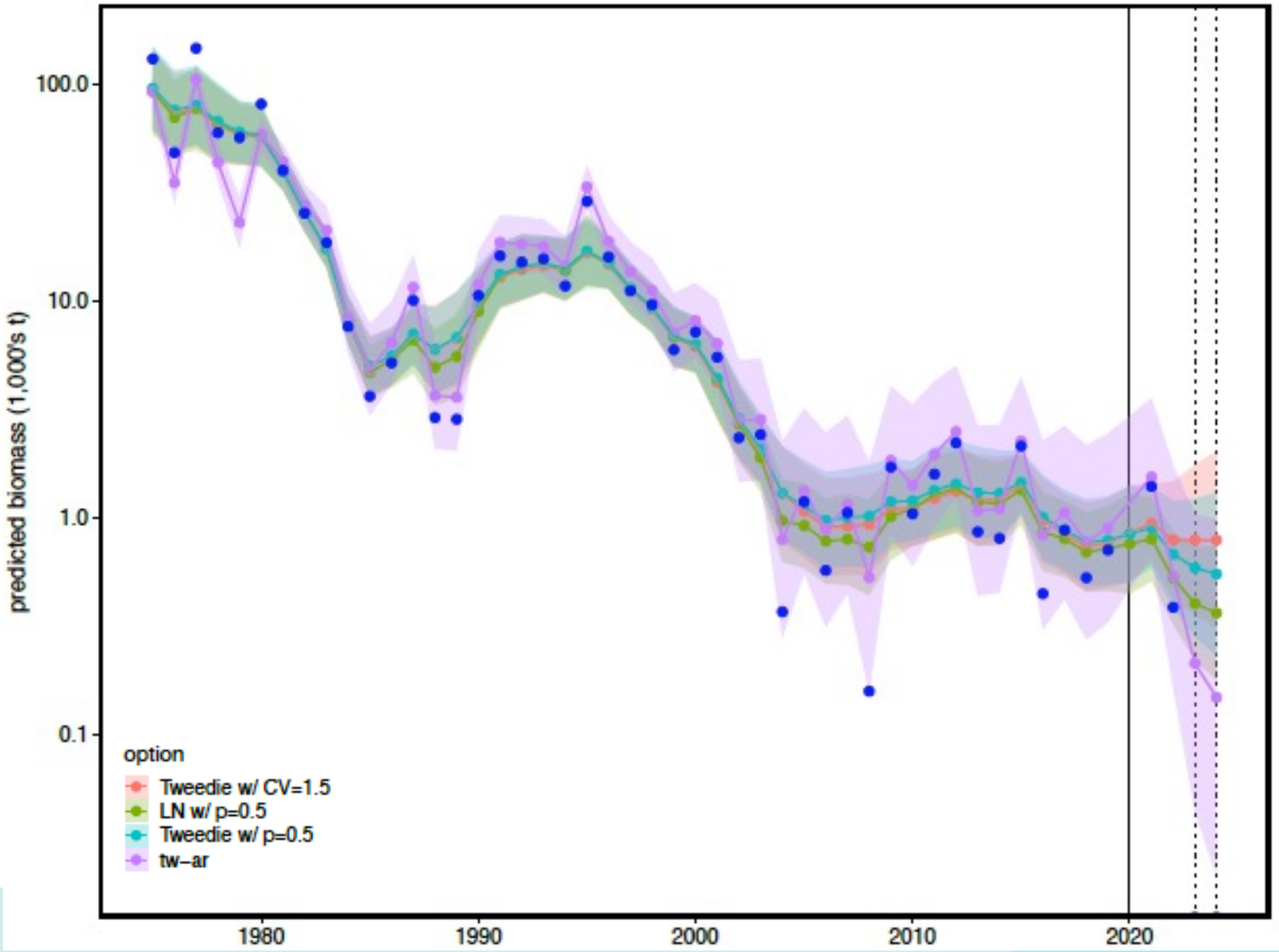

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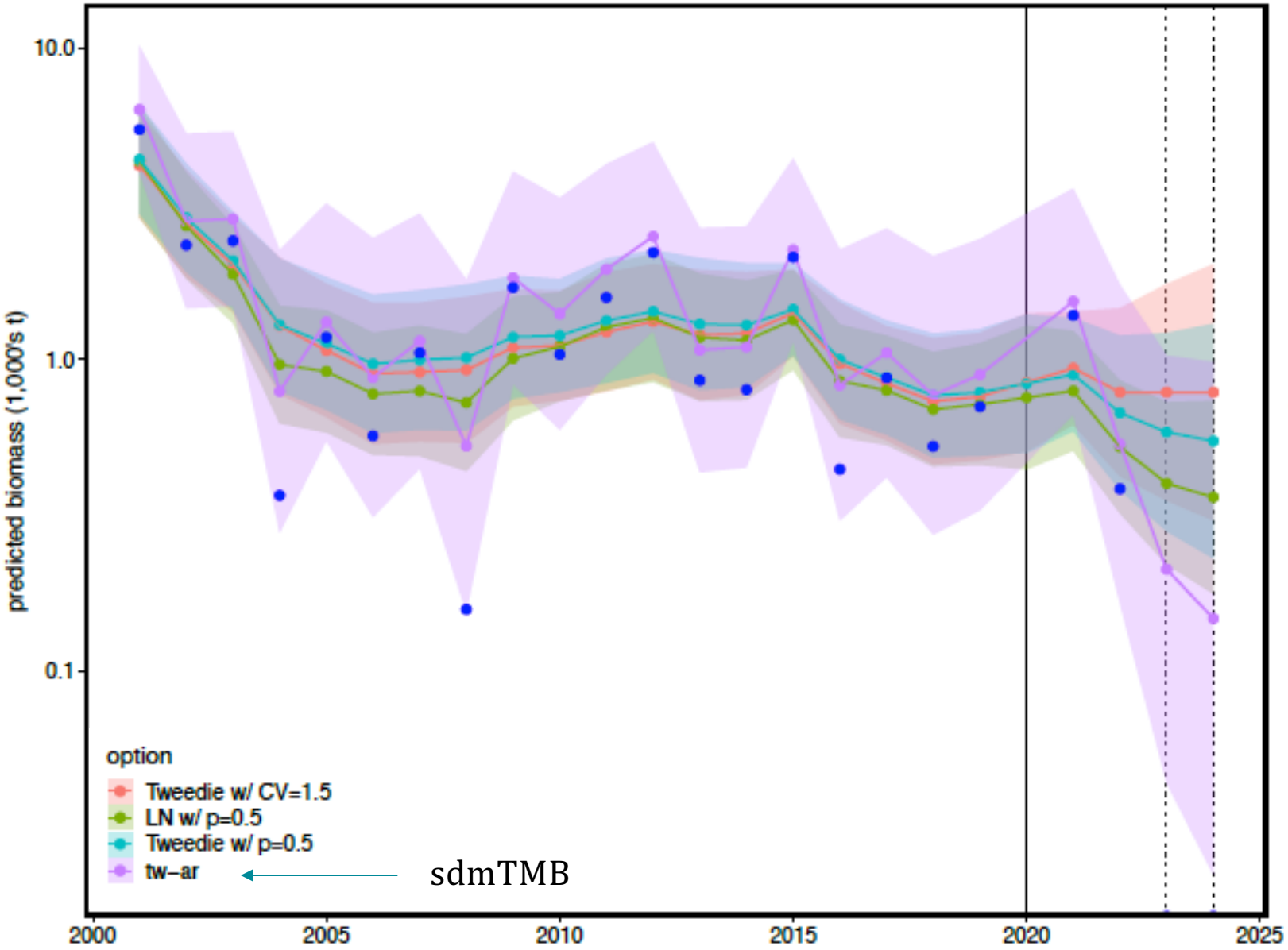

Recommendations

- dealing with 0's
  - use sdmTMB Tweedie AR1 model (tw-ar) to provide MMB-at-survey time series
  - diagnostics?

- corner stations
  - keep historical data from (discontinued) corner stations
  - use sdmTMB to reduce changes in survey design?

- crabpack
  - use full-precision CL measurements with length-weight regressions to determine biomass
  - drop "extra" stations in 1979

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