Can we predict synchronous production dynamics? Applications to somatic growth.

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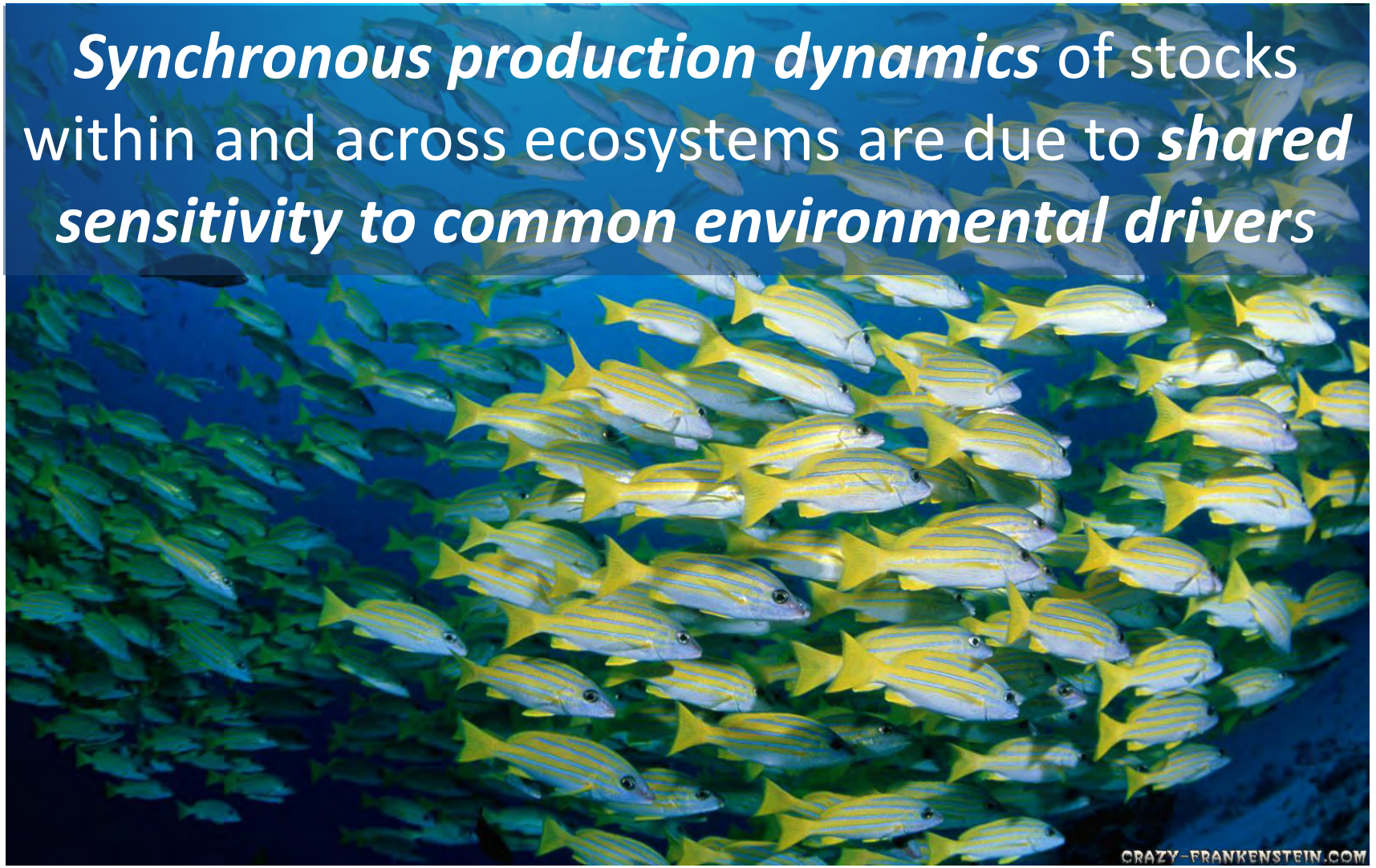
Central idea

Synchronous production dynamics of stocks within and across ecosystems are due to ***shared sensitivity to common environmental drivers***



Approach

Growth

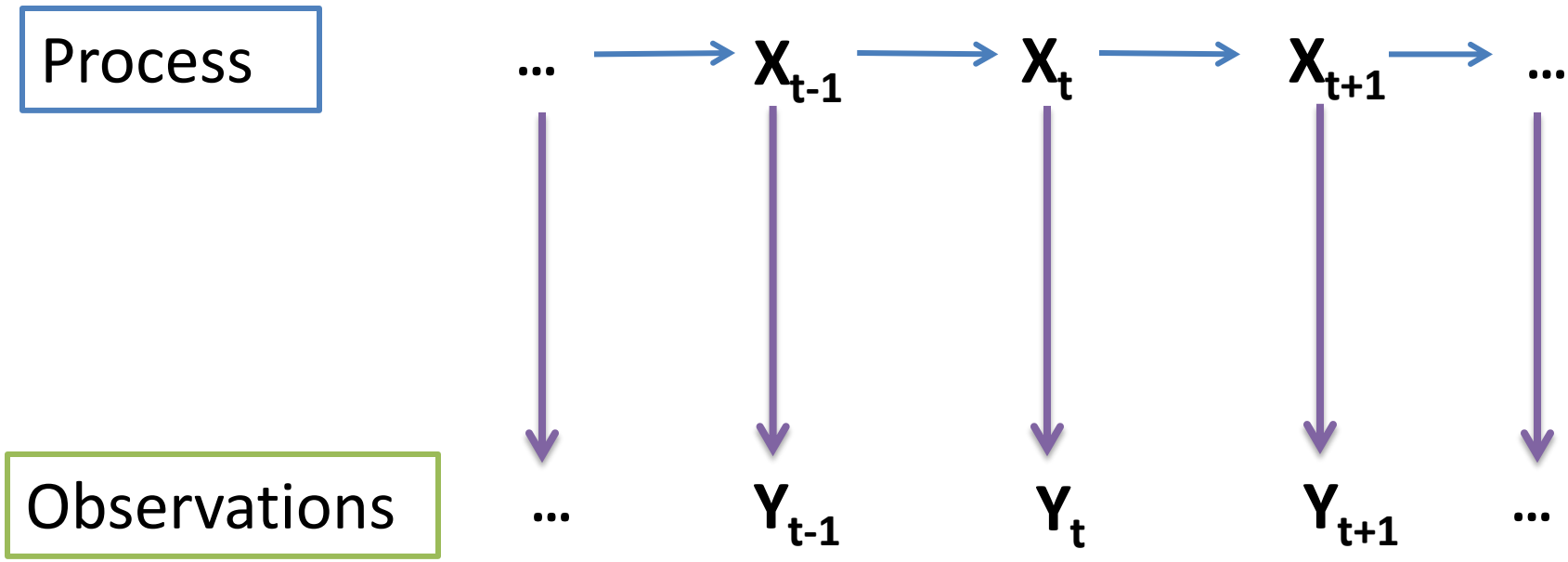
1. Quantify growth variation and trends
2. Evaluate synchrony within and between ecosystems
3. Build environmental covariates into the model

Recruitment

Overview

- Background
- Growth hypotheses & models
- Simulation testing
- Applications to Eastern Bering Sea and Aleutian Islands (BSAI) and Gulf of Alaska (GOA) data
- Summary

State-space model



Process model: Random walk with drift

Size anomaly =mean (age x fish in year)
– mean (age x fish in all years)

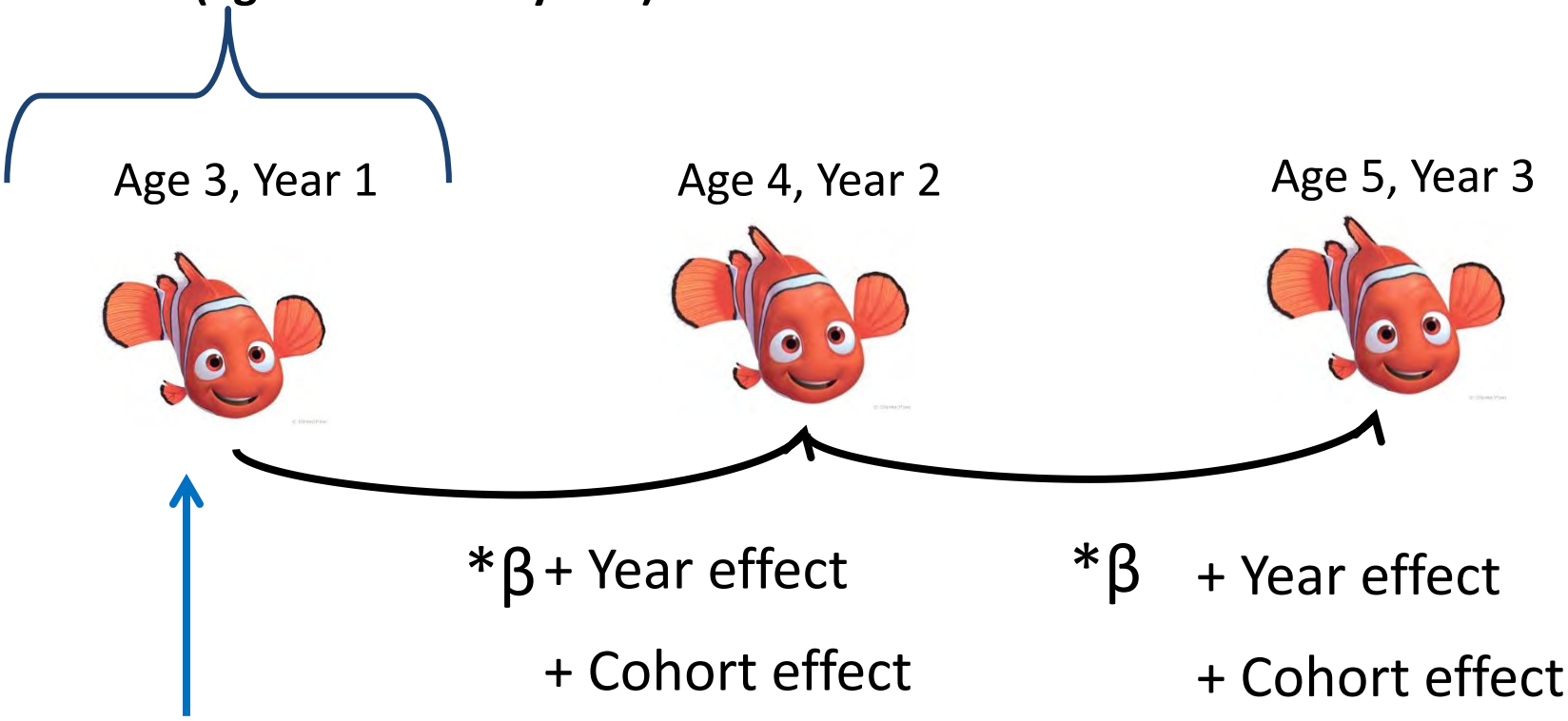
Age 3, Year 1

Age 4, Year 2

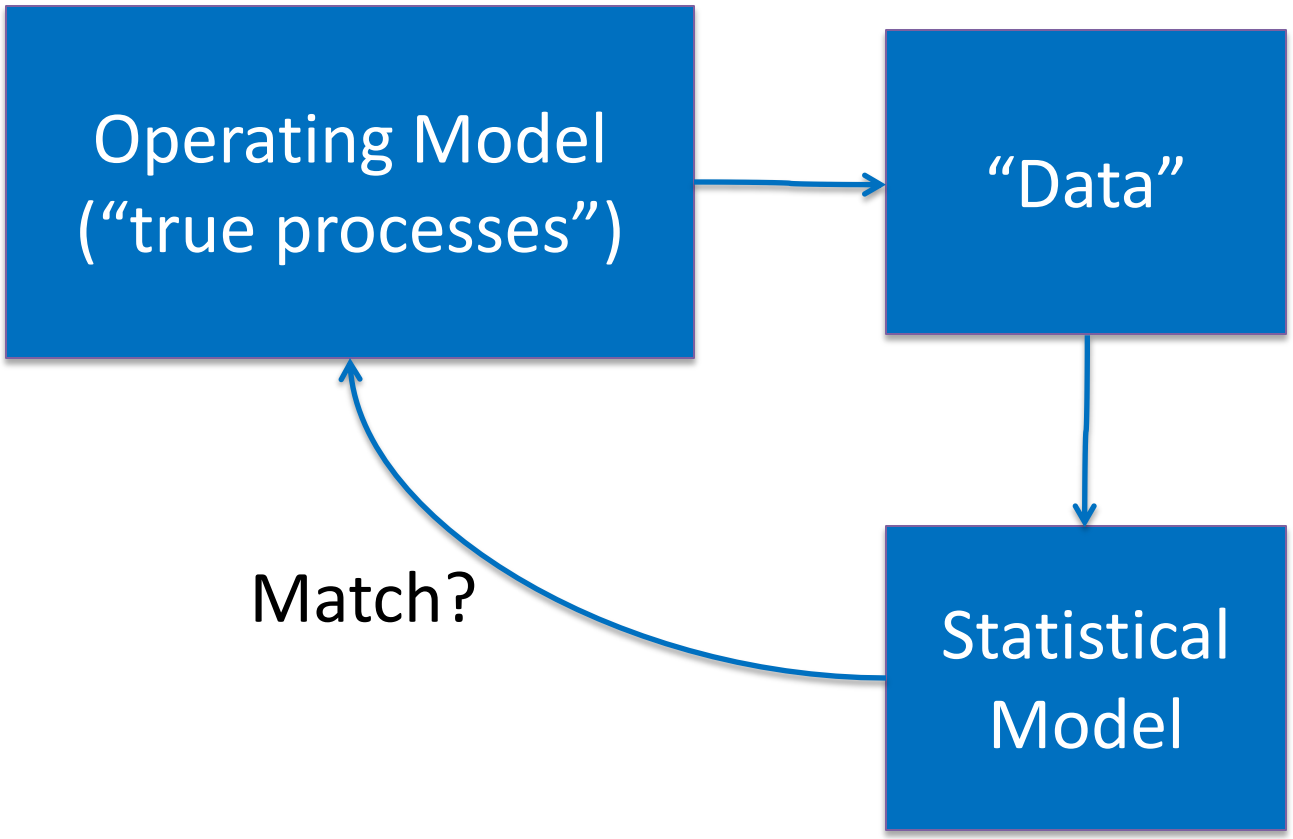
*β

Process model: Random walk with drift

Size anomaly =mean (age x fish in year)
– mean (age x fish in all years)



Process model: Simulation testing



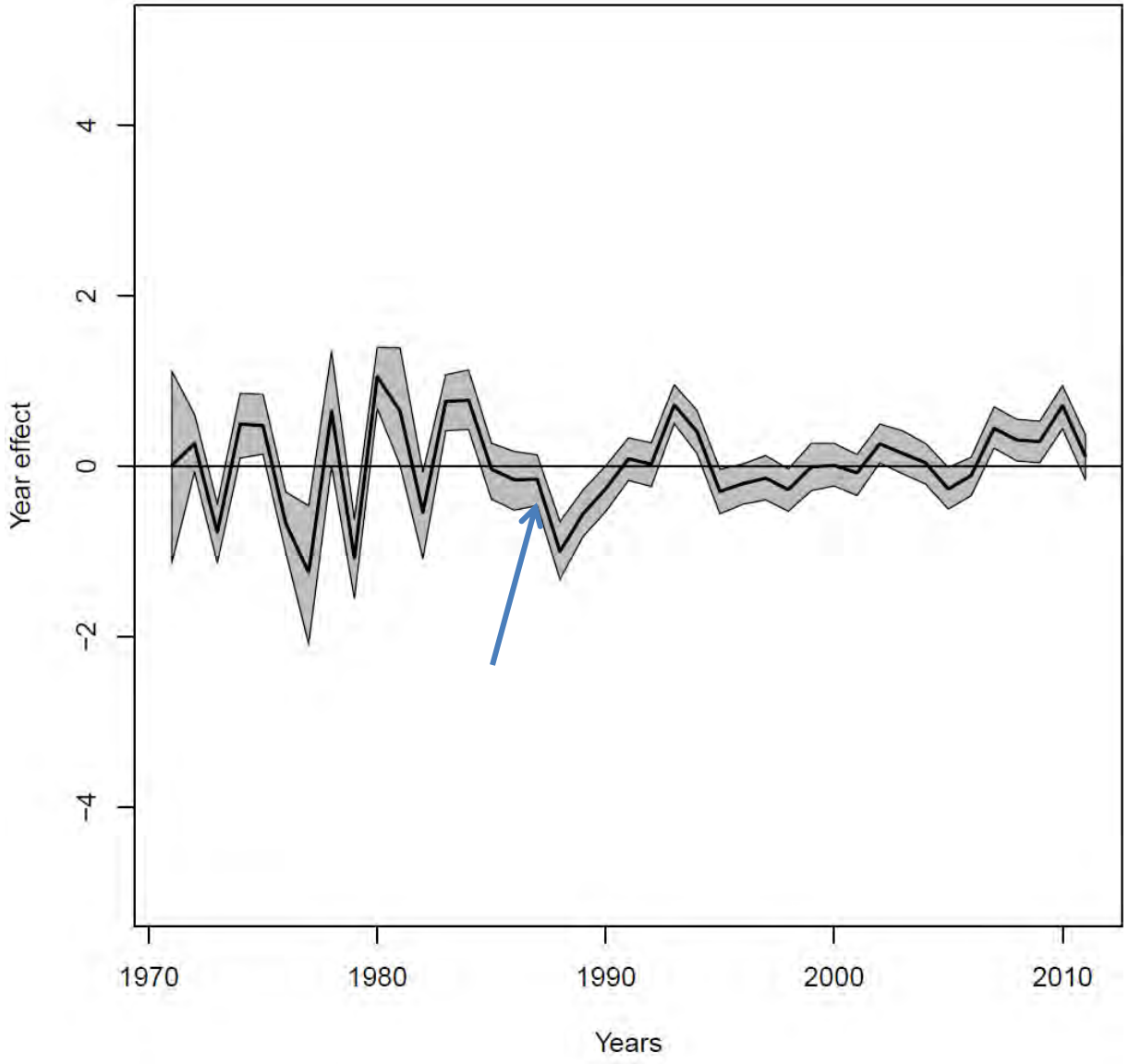
Process model: DIC weights

Chosen -> True v	Constant	Annual Growth Effect	Cohort Growth Effect	Initial Size Effect
Constant	**28%**	18%	36%	18%
Annual Growth Effect	0%	**96%**	4%	0%
Cohort Growth Effect	2%	8%	**82%**	8%
Initial Size Effect	18.12%	22.32%	9.54%	**50%**

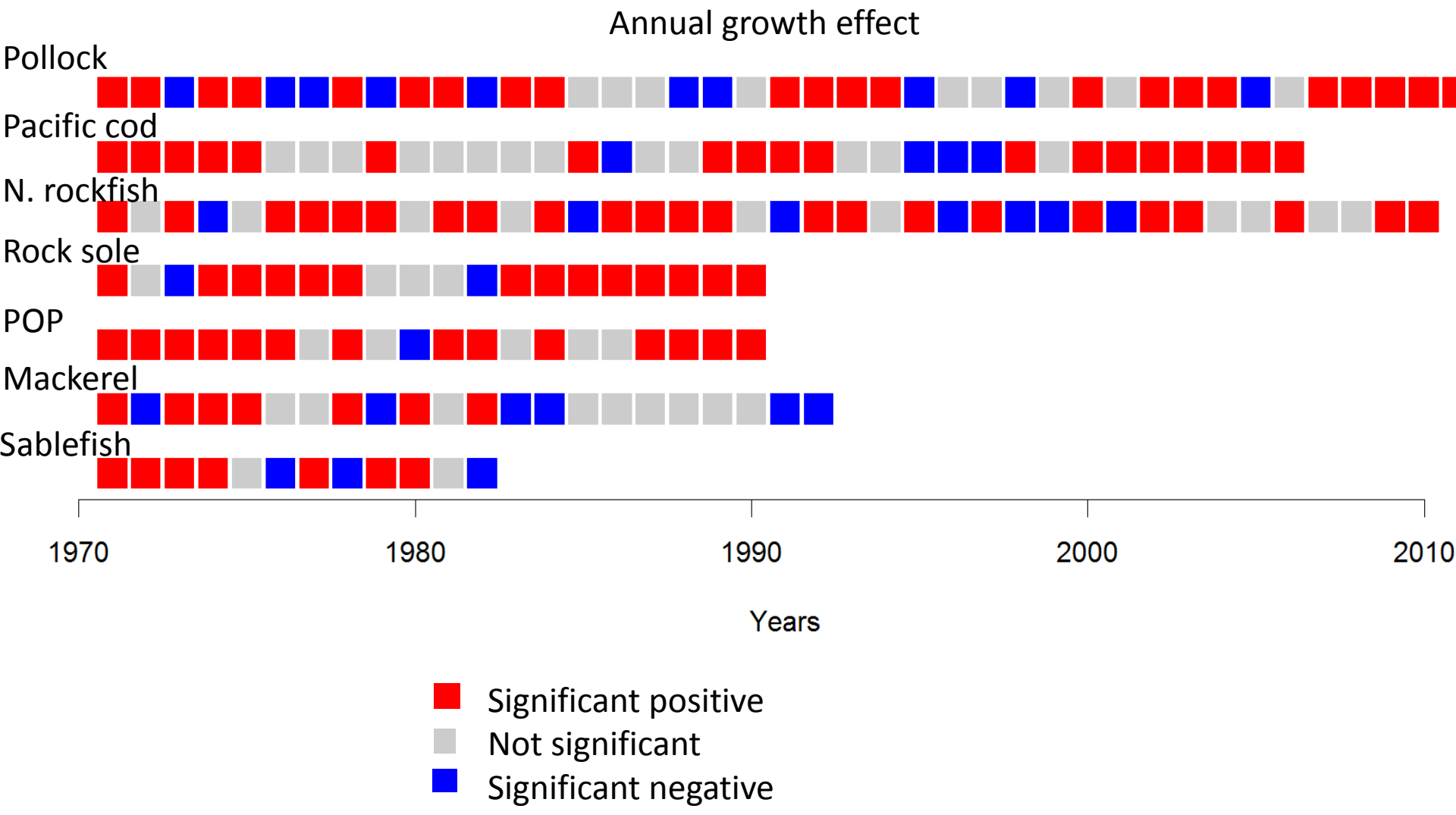
Observation model: covariates

- Potential variables to include:
  - Depth
  - Latitude
  - Age method
  - Date

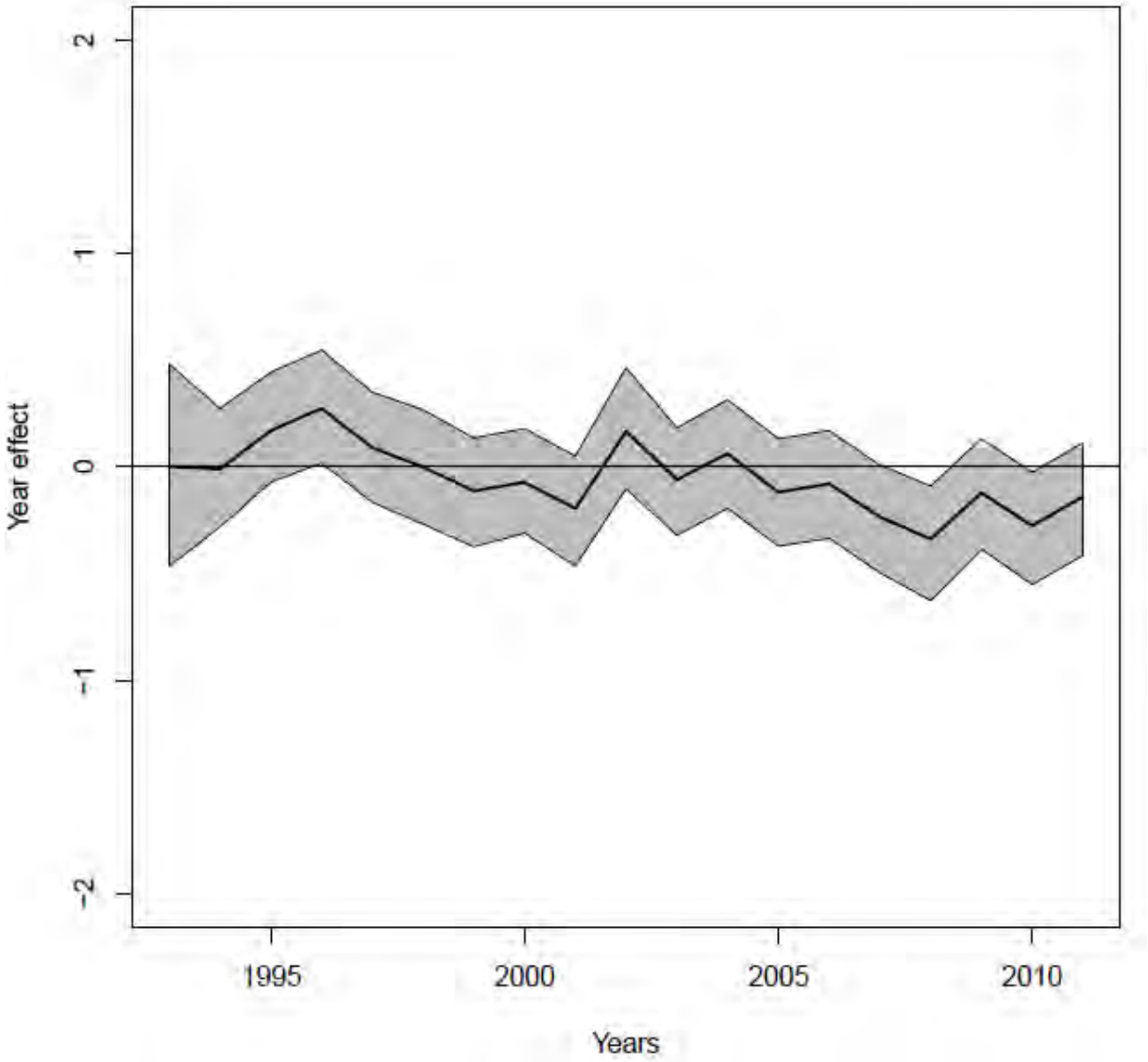
Annual growth effect model chosen for BSAI Pollock



Consistent model selection across BSAI



Annual growth effect model chosen for GOA Halibut



Summary

- Estimation framework working!
- Year effect model chosen for BSAI stocks
- Age method is the main covariate influencing length-at-age

- Next steps:
  - Apply to West Coast data
  - Incorporate environmental covariates

Acknowledgments

- NOAA NMFS, IPHC

Fisheries and the Environment (FATE)

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