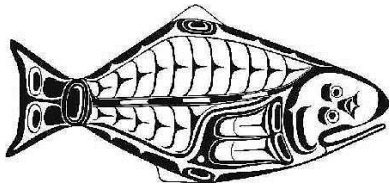


Management Strategy Evaluation (MSE) development

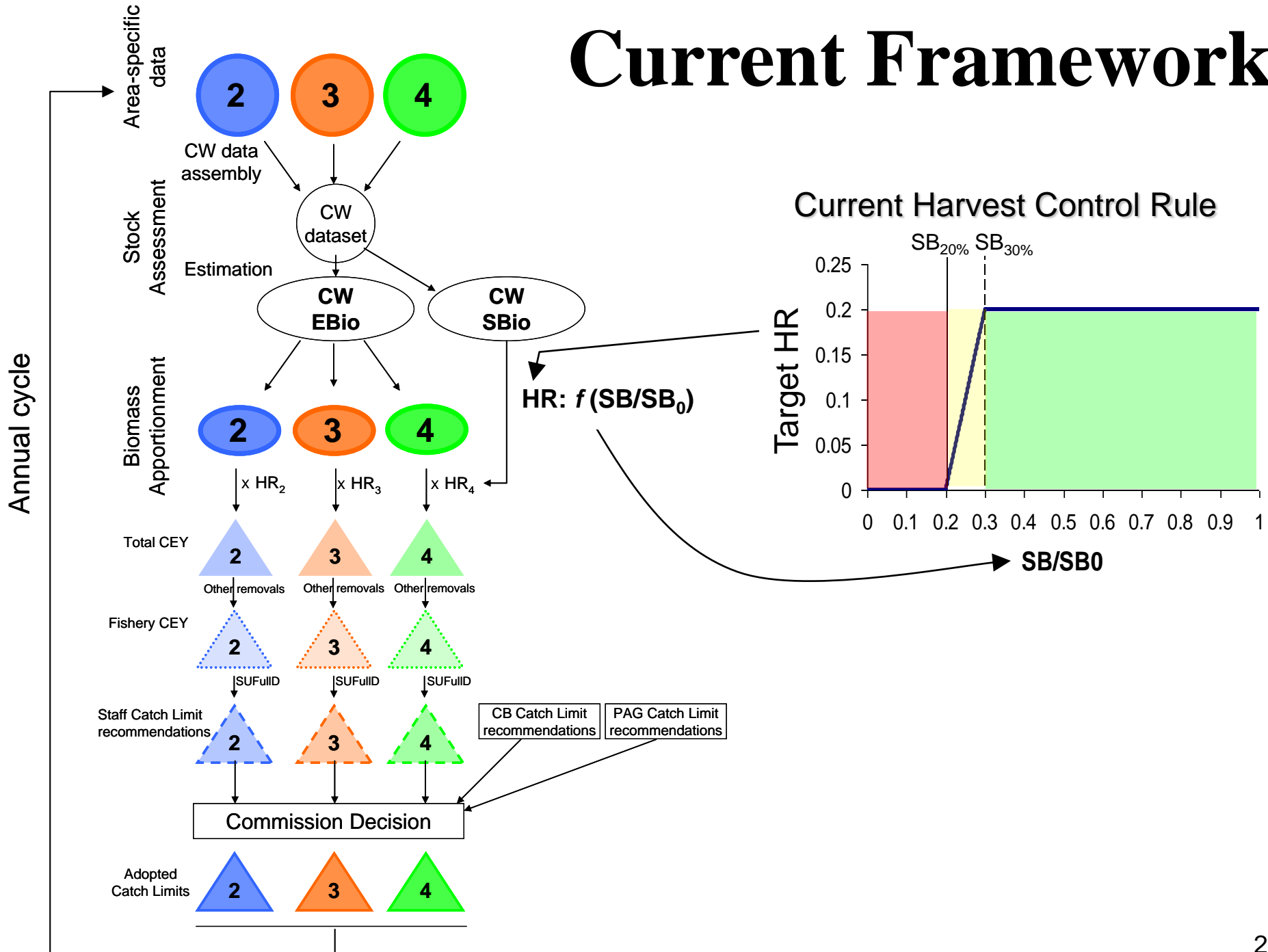
Juan Valero

Blue Book (p. 78) and RARA (p. 281) related reports

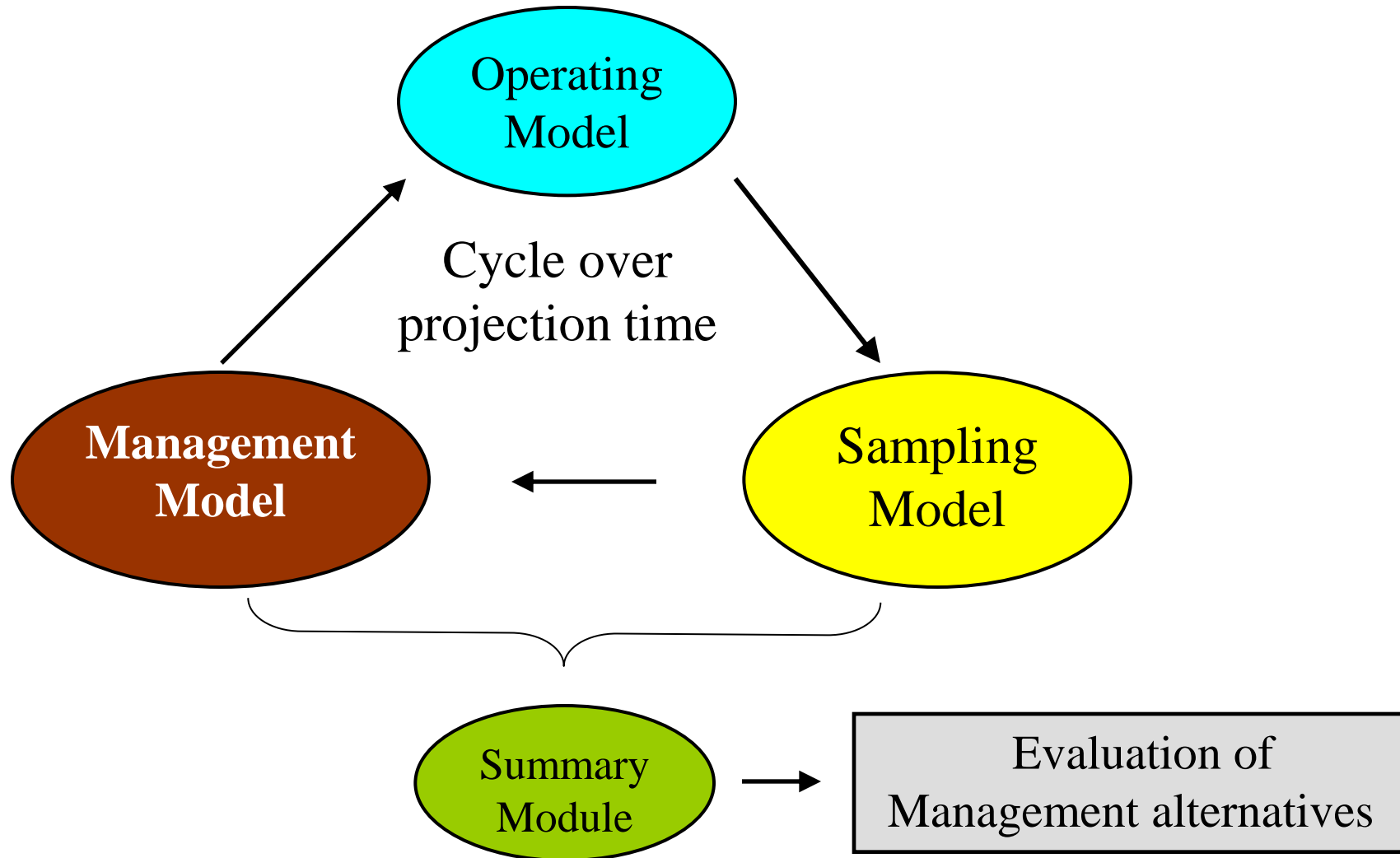


88th IPHC Annual Meeting, Anchorage January 23-27, 2012

Current Framework



MSE Approach



MSE Increasingly being used

Some examples

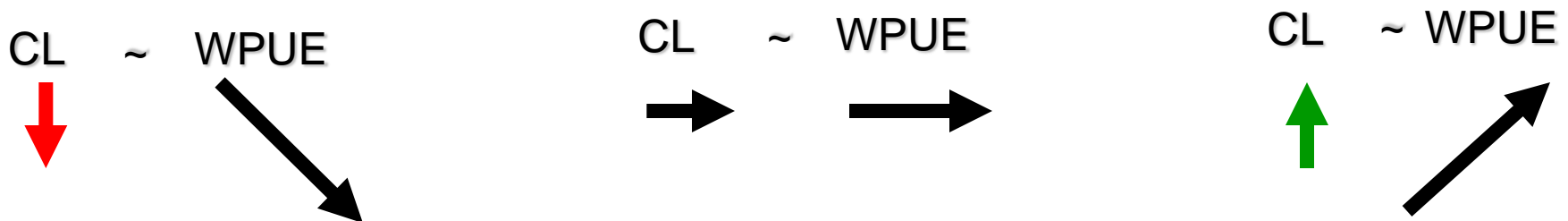
- International Whaling Commission
- South Africa – small pelagics, lobster, etc
- Namibia – small pelagics
- New Zealand – rock lobster, Hoki
- Australia – gemfish, trawl fisheries, tuna
- CCSBT (under development) – Bluefin tuna
- Canada – Sablefish

Advantages of this approach over the conventional approach

- Depends on monitoring & feedback
- Use decision rules driven by data rather than models/assessments
- Evaluate alternative management strategies through simulation of the entire system (biology, fishing process and data gathering)
- Decision rules based on simple calculations, even if the procedures are evaluated through complex simulations

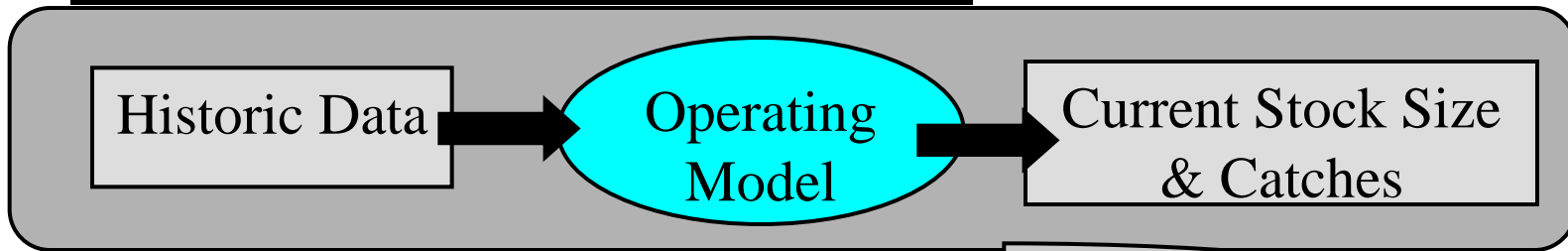
CL rule: adjust catch limits (CL) based on *WPUE* trend

$$CL_{t+1} = \omega CL_t + (1 - \omega) CL_t \left[1 + k \frac{\text{slope}(CL_{t-10:t})}{CL_t} \right]$$

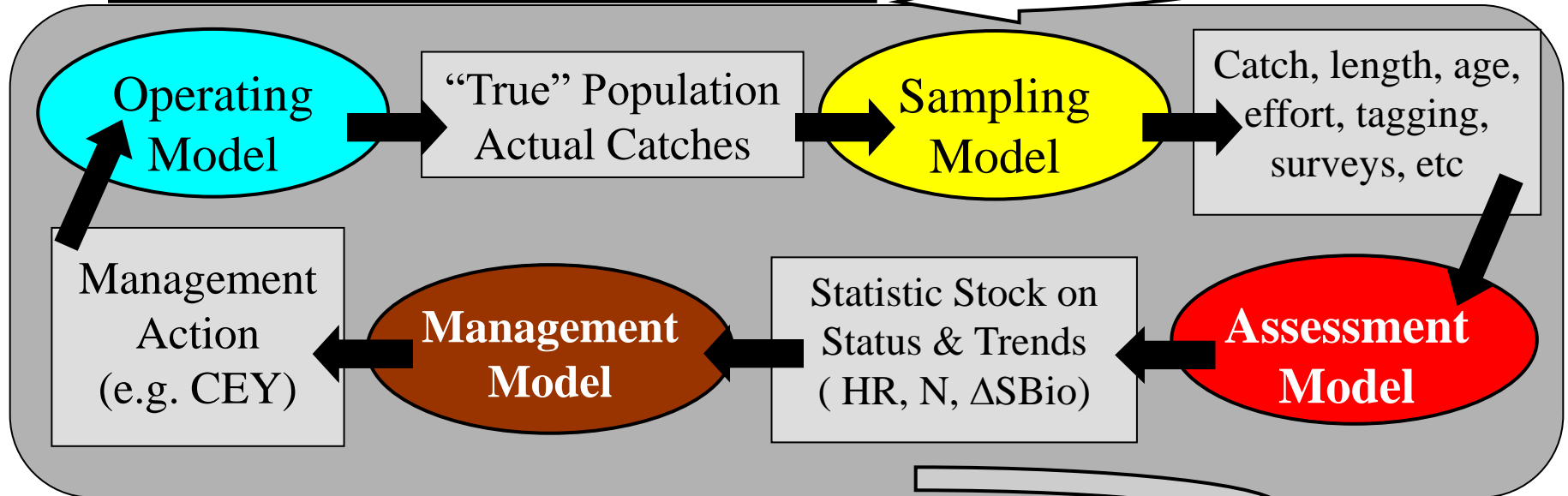


MSE Framework

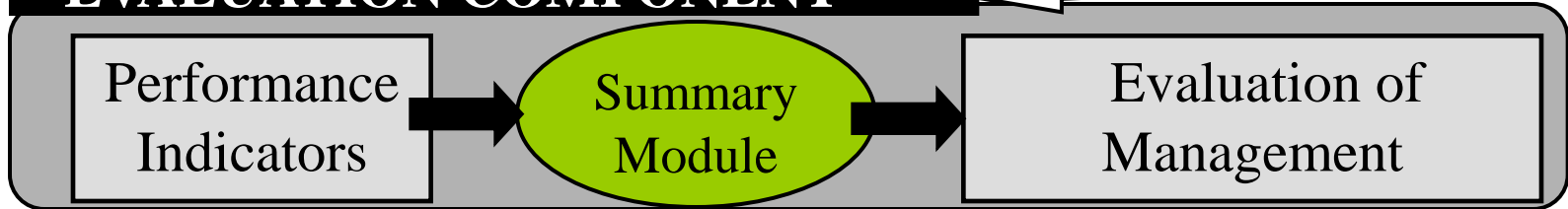
CONDITIONING COMPONENT



PROJECTION COMPONENT

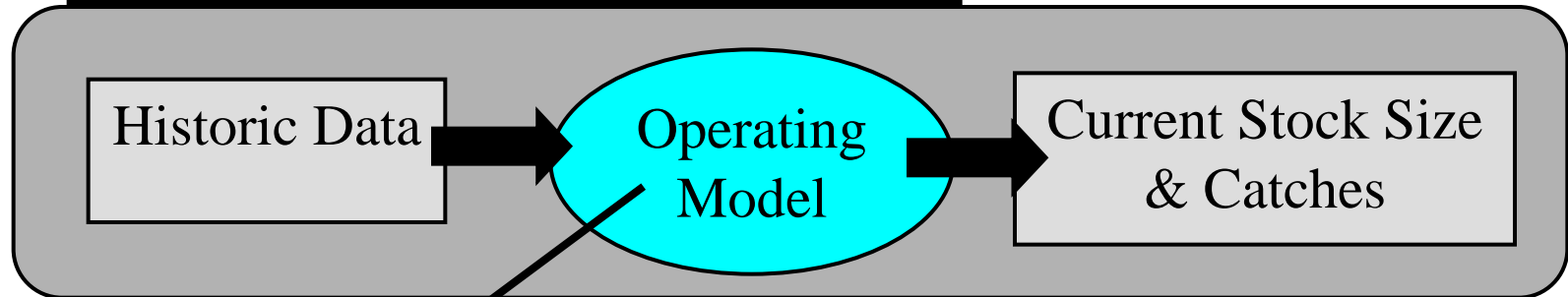


EVALUATION COMPONENT



Operating model and conditioning

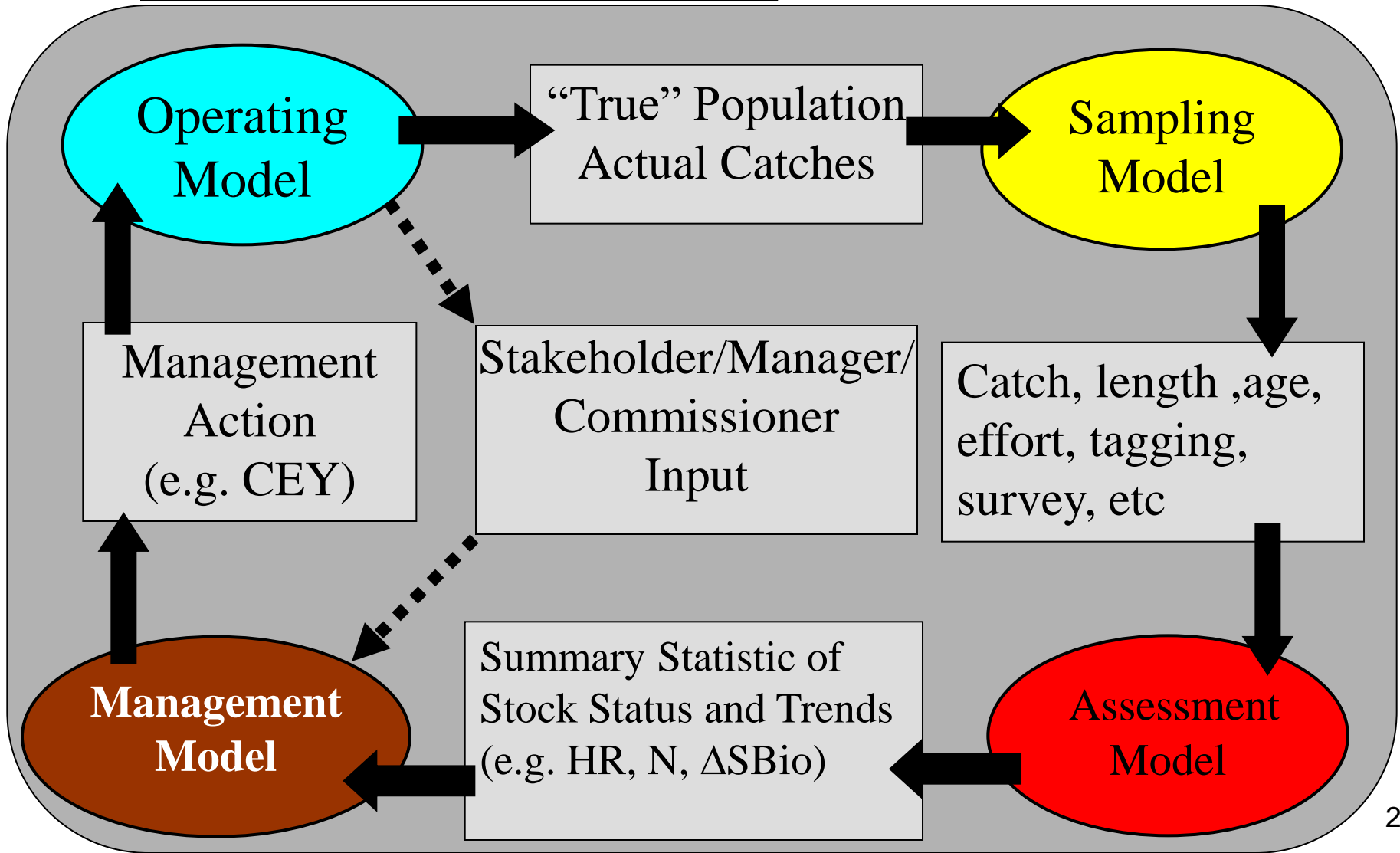
CONDITIONING COMPONENT



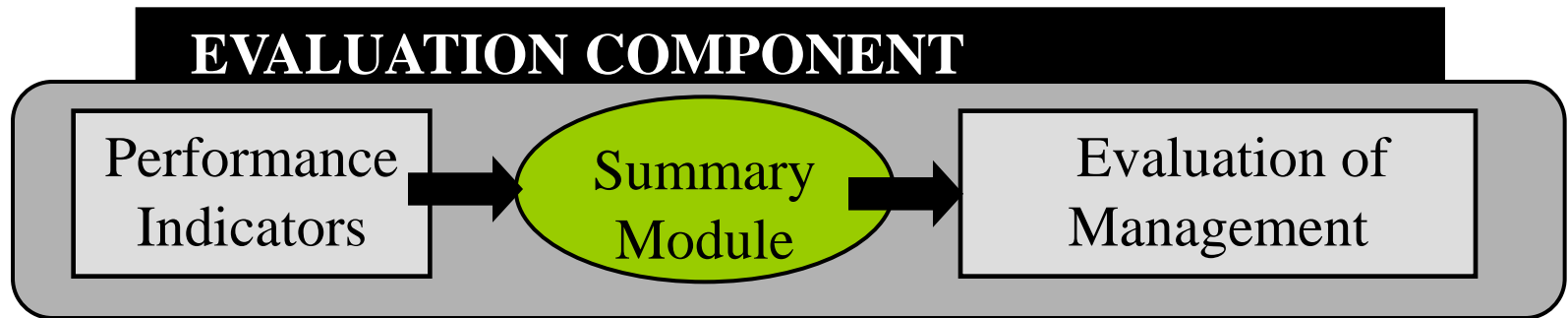
- Population and Fishery Dynamics
- Stochastic in dynamics
- Alternative Hypotheses/Model Formulations to Capture Real Uncertainty; e.g.:
 - Spawning stock/recruitment
 - Δ selectivity/ Δ catchability
 - Changes in size at age
 - Spatial structure
 - Migration scenarios

Projection component

PROJECTION MODEL



Evaluation component

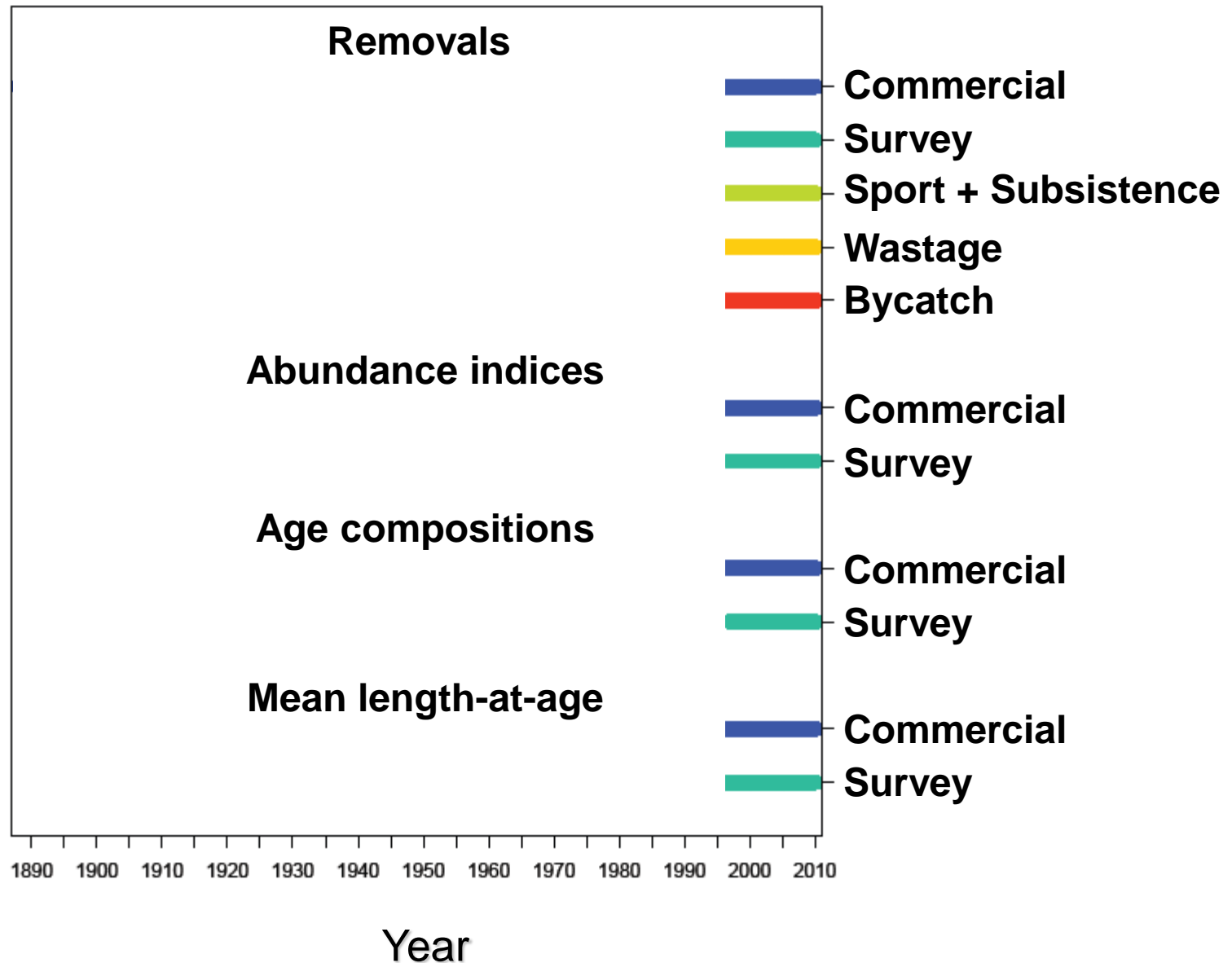


Typical steps on MSE development

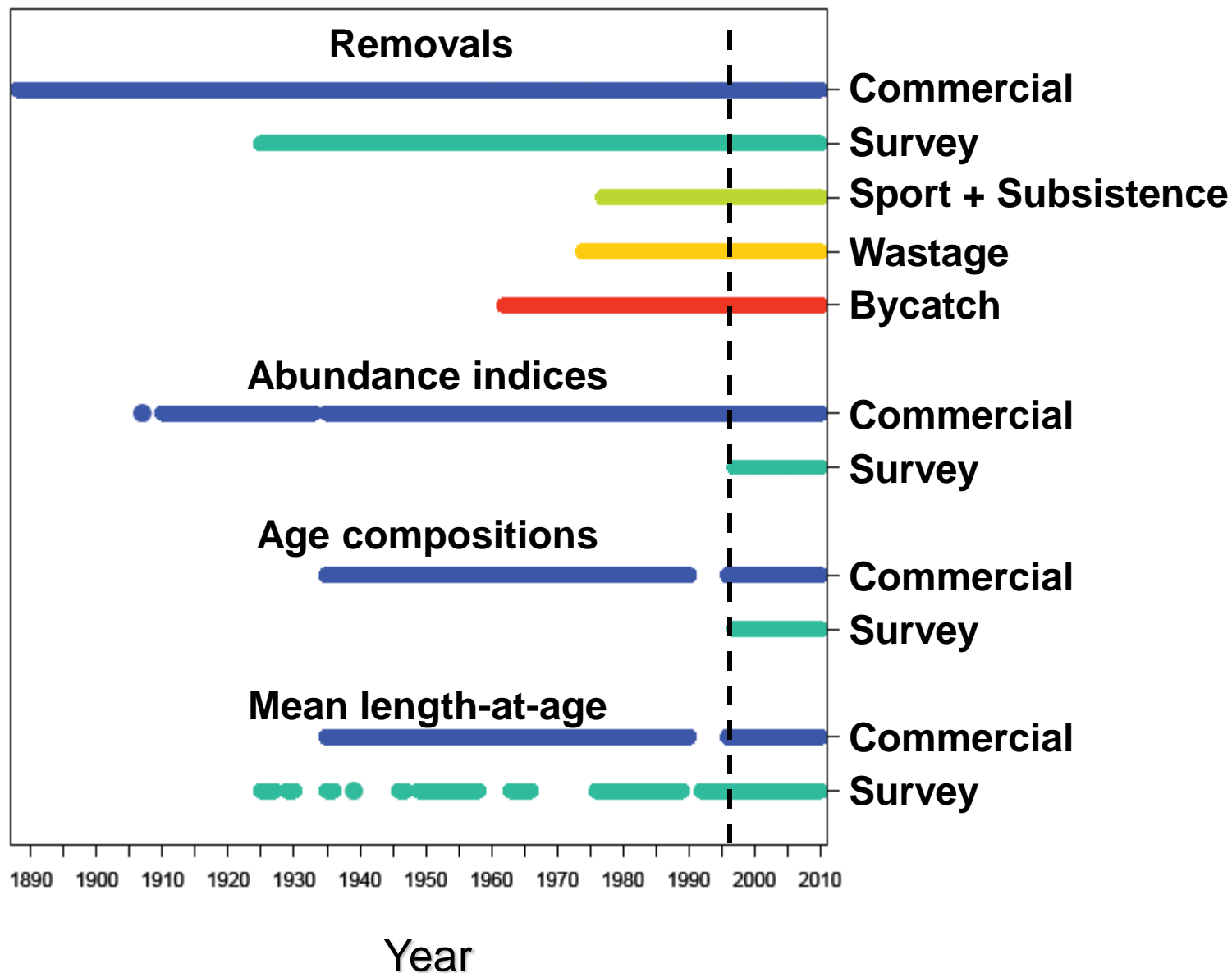
(typically iteratively revisited)

- Define objectives and performance metrics
- Develop candidate harvest strategies and harvest control rules
- Develop operating models and condition them to historic data
- Simulation test of candidate harvest strategies
- Select harvest strategy
- Implement harvest strategy

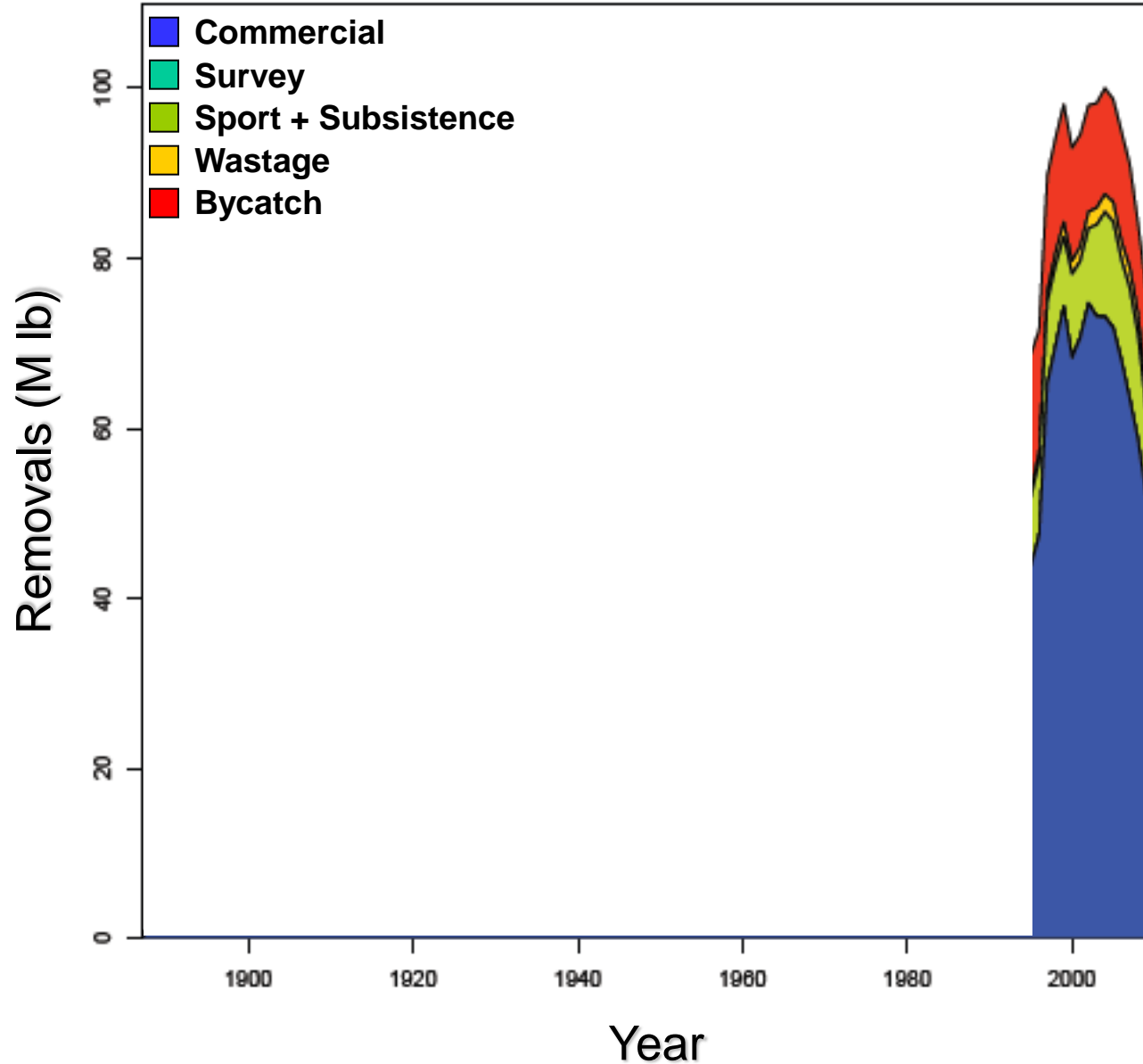
Data used in recent stock assessments (1996-2010)



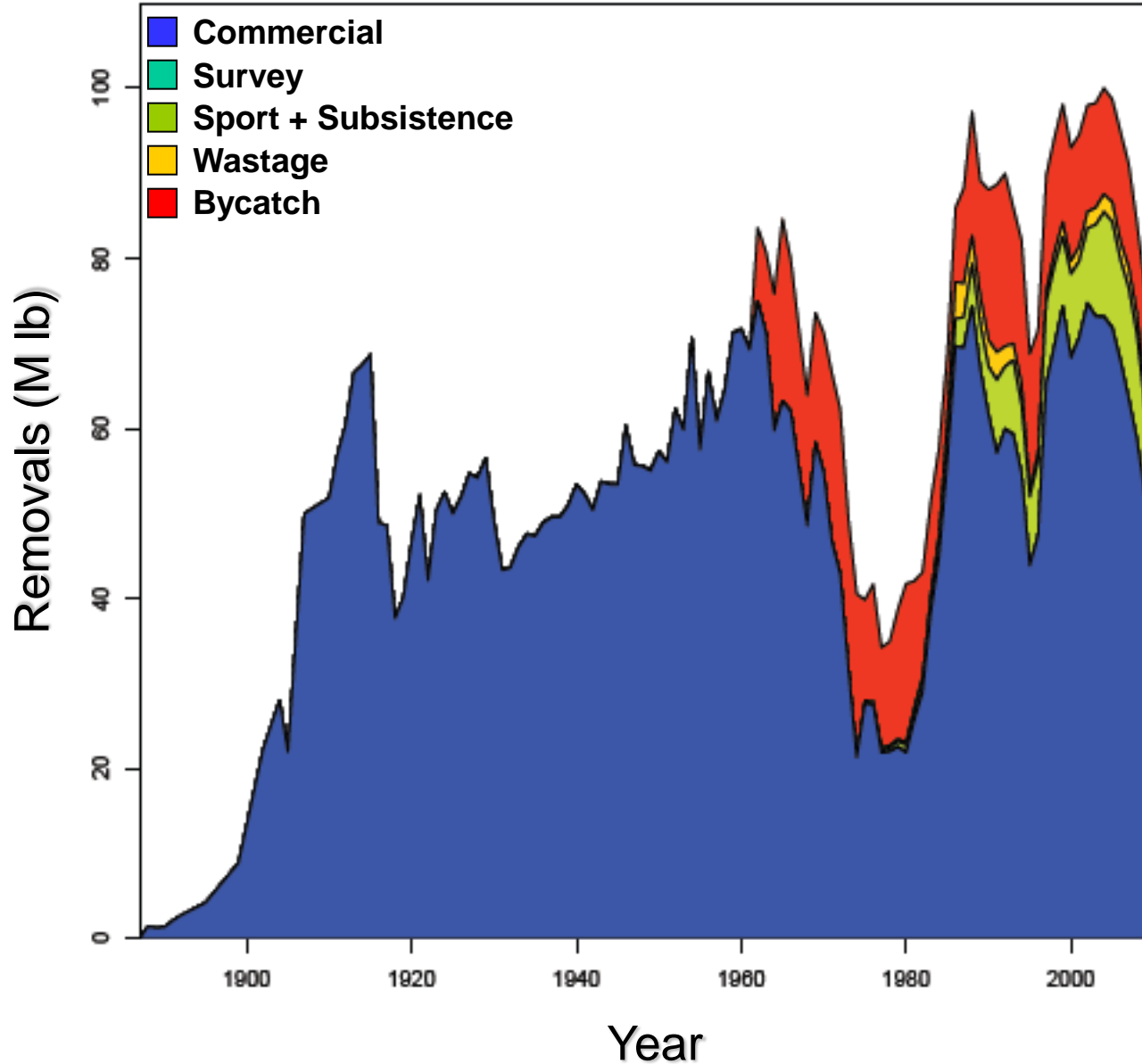
Conditioning: Historical data (1888-2010)



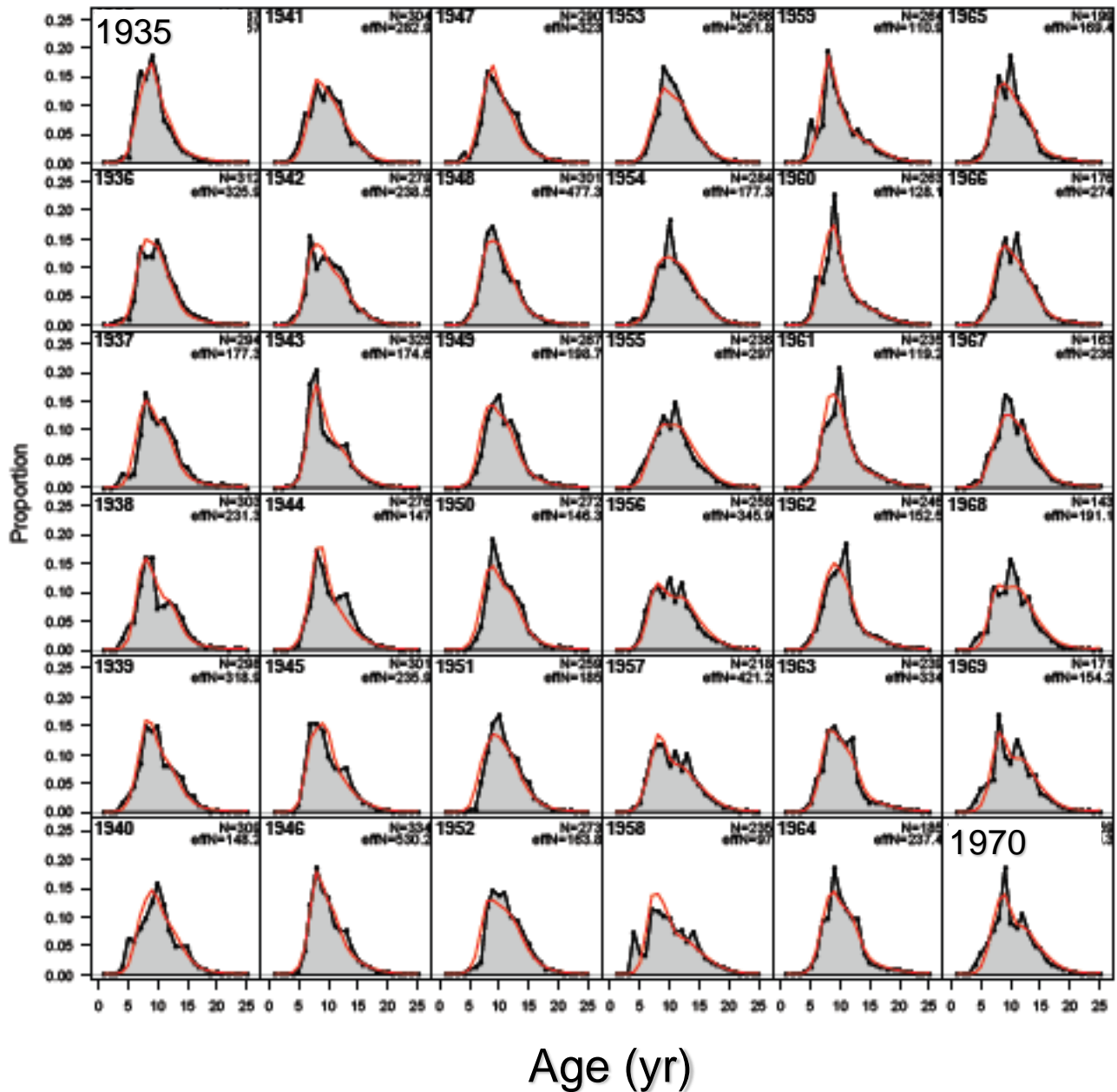
Removals in recent stock assessments (1996-2010)



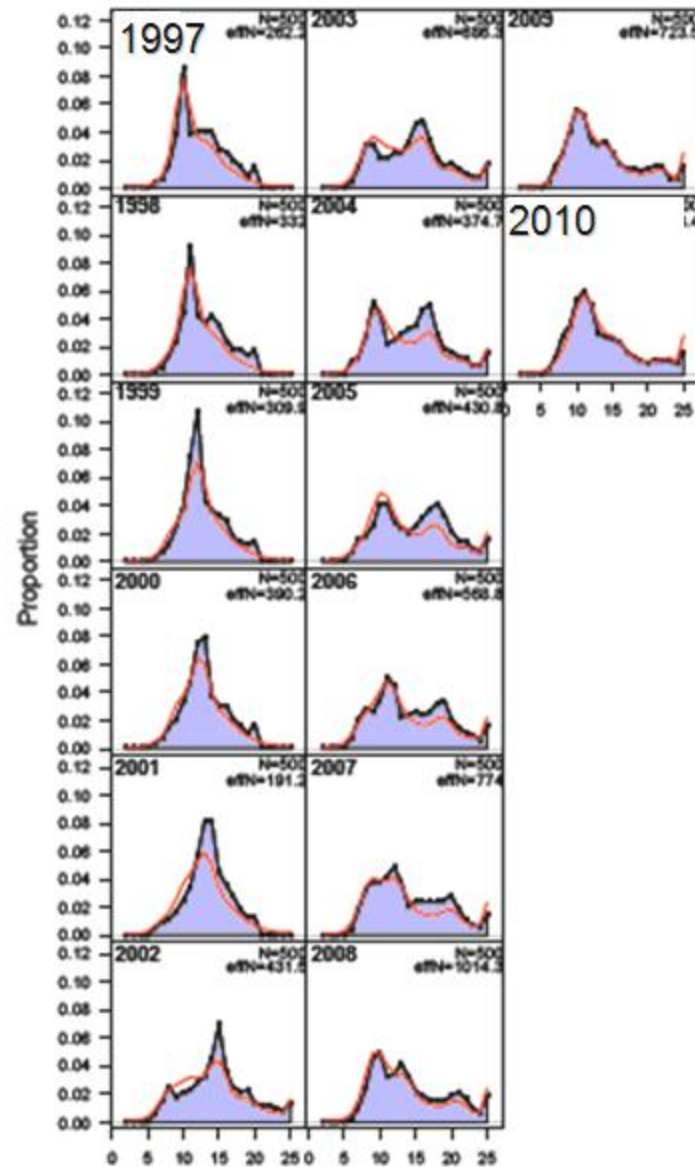
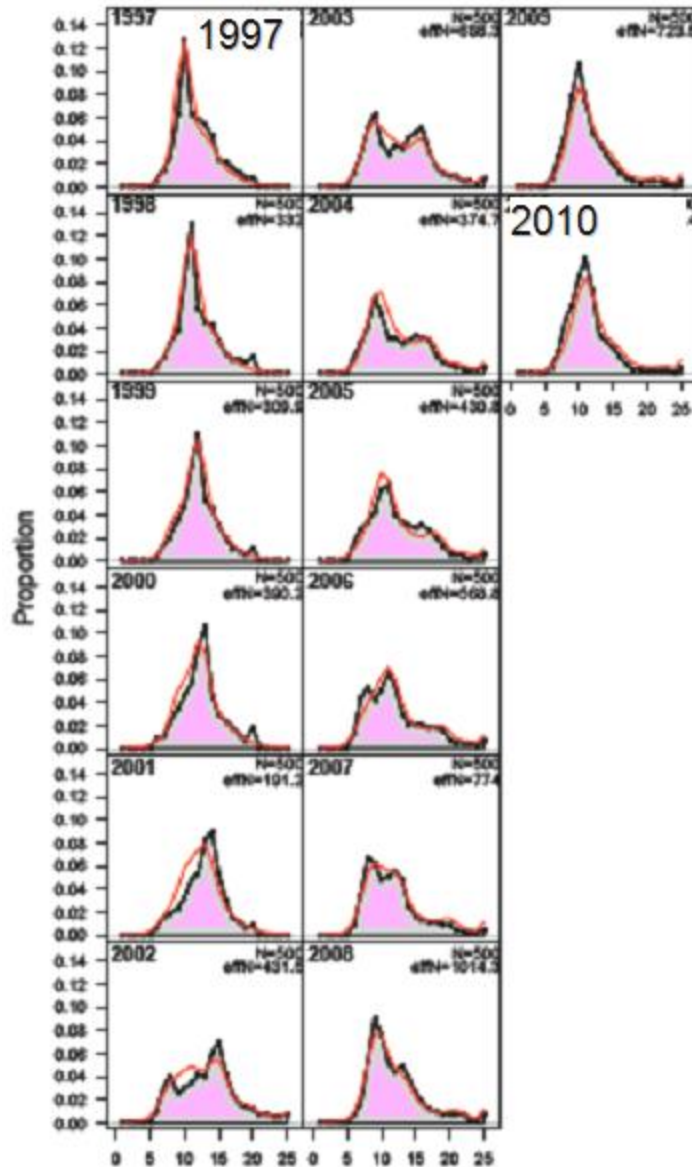
Conditioning: historical removals (1888-2010)



Commercial age composition (sexes combined)

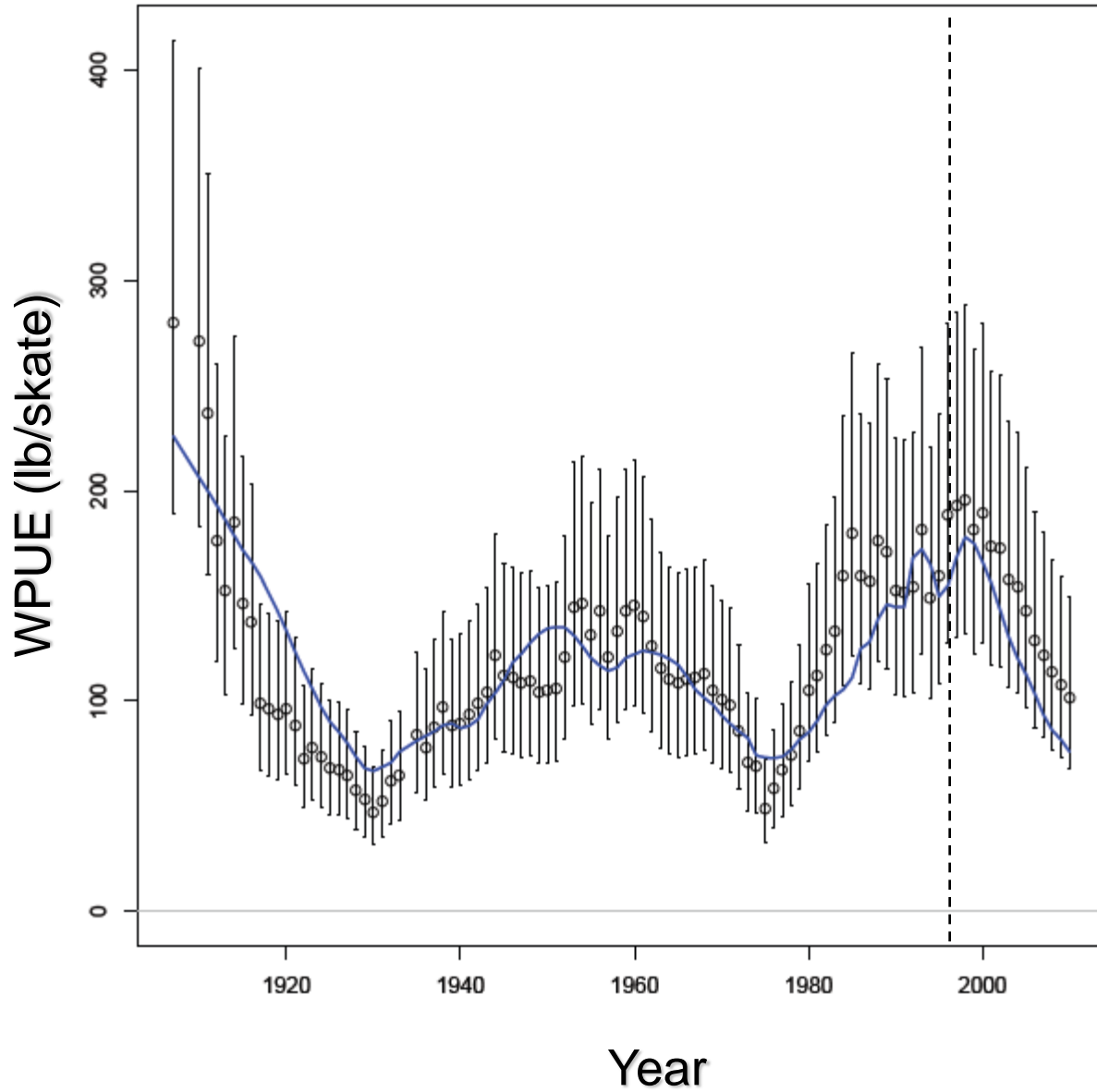


Survey age composition by sex

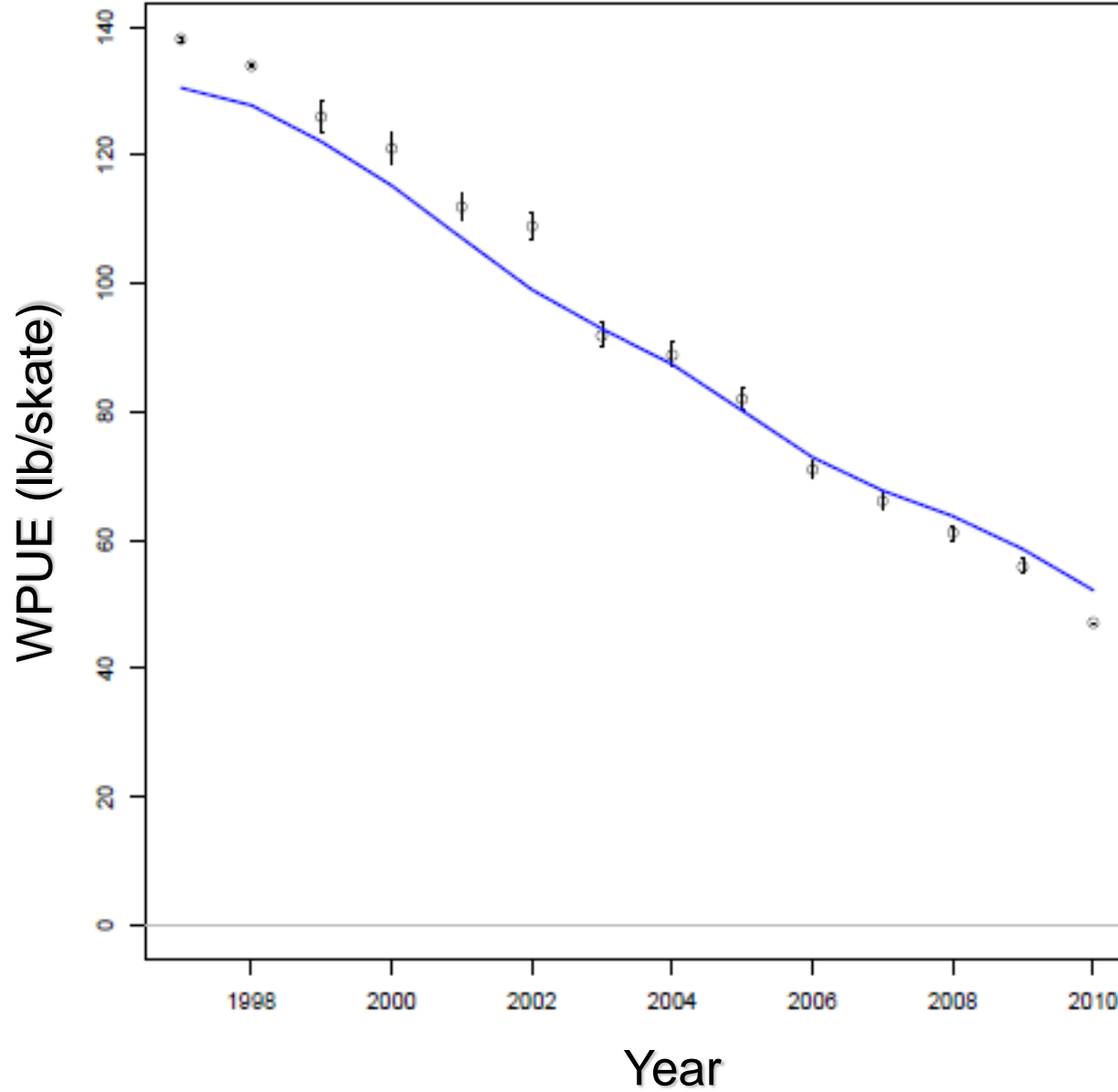


Age (yr)

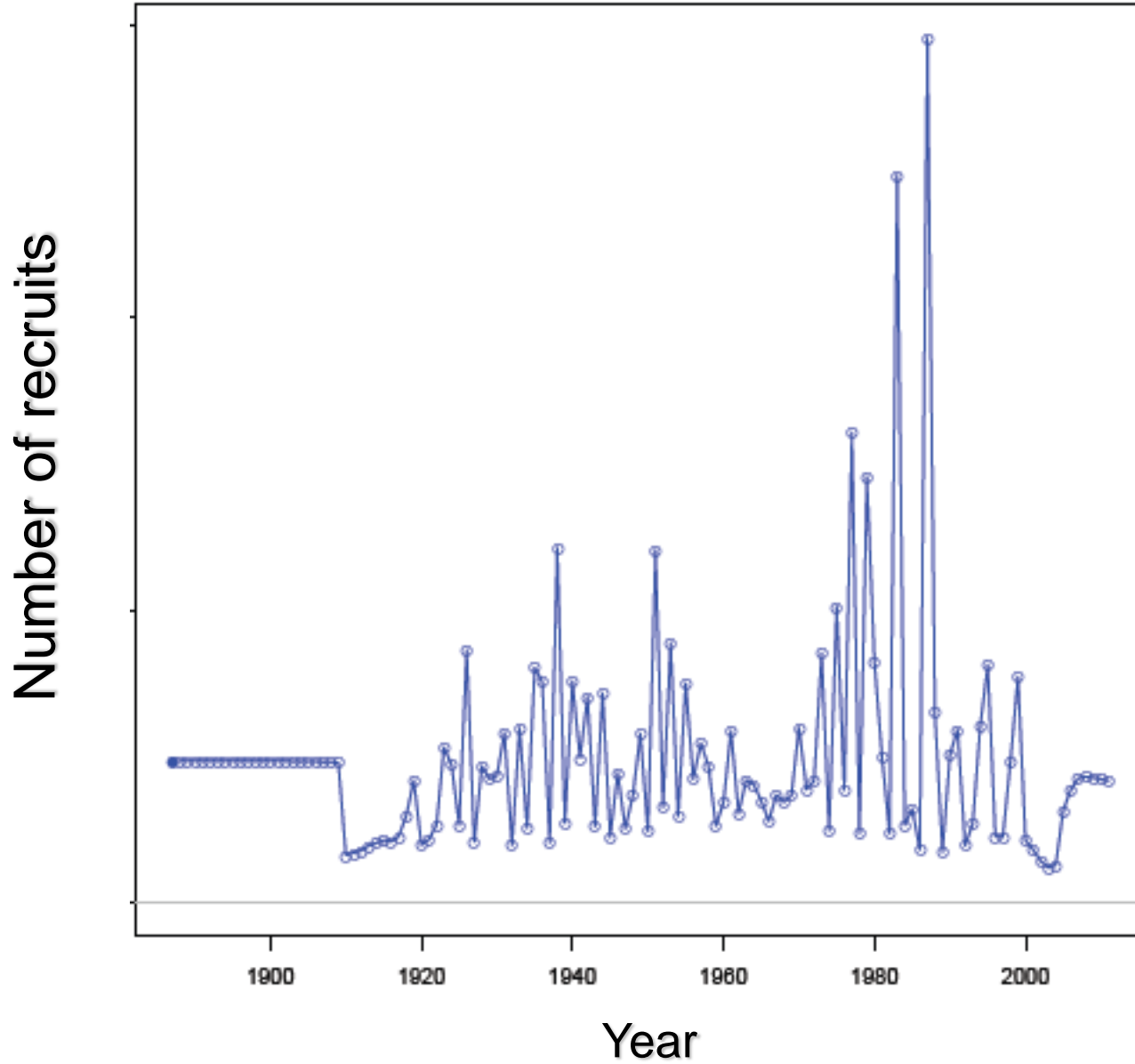
Commercial WPUE



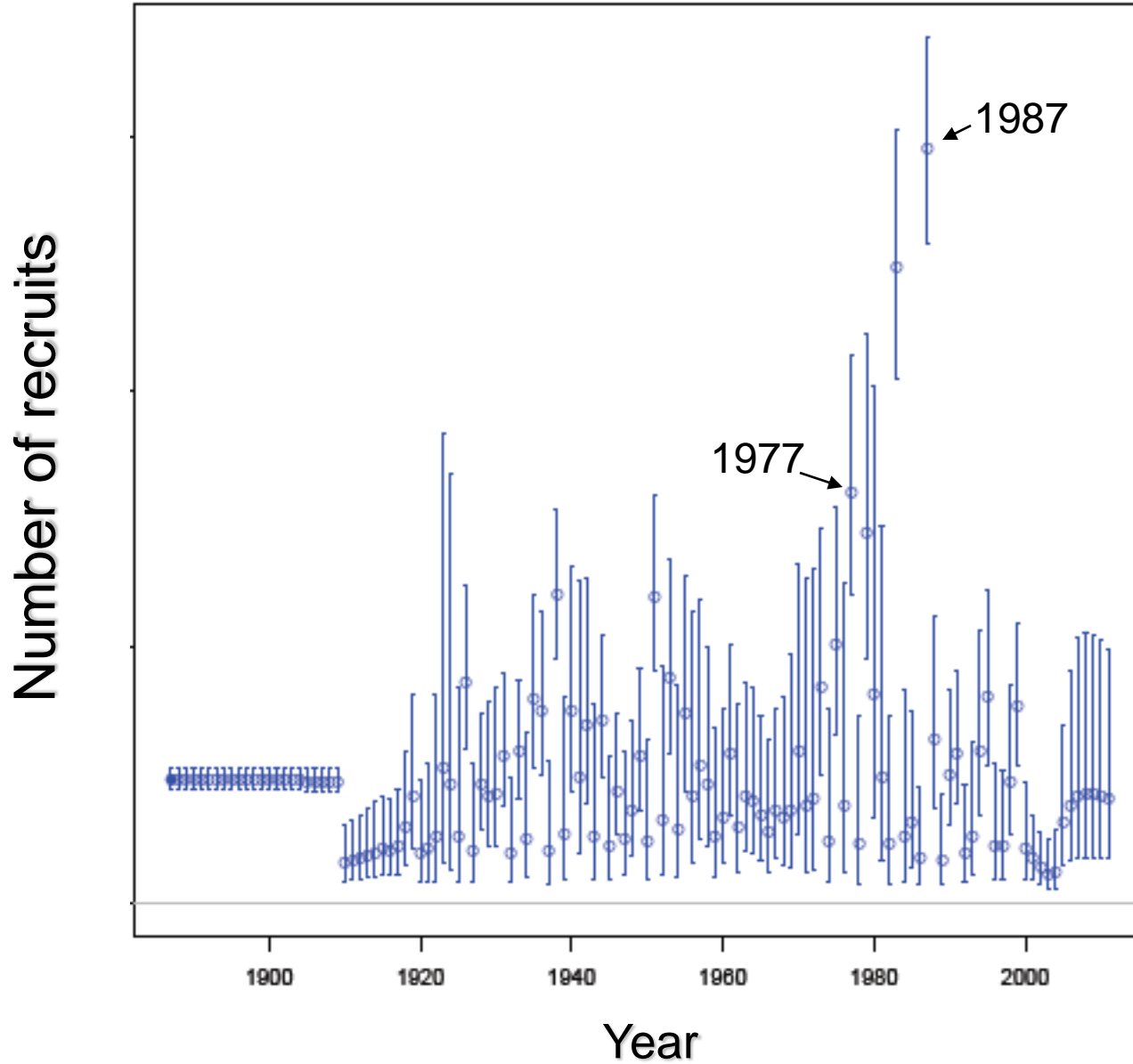
Survey WPUE



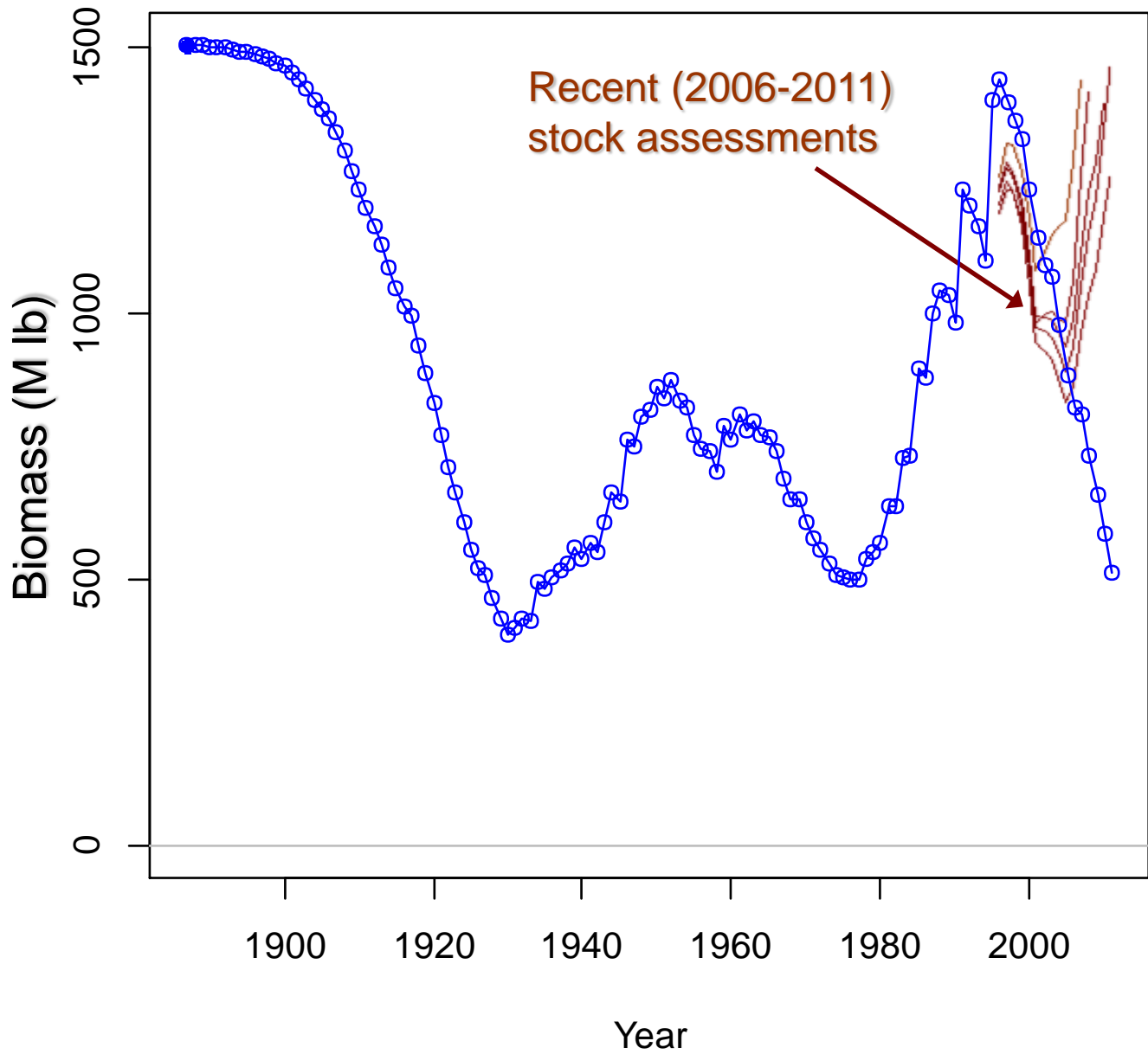
Recruitment



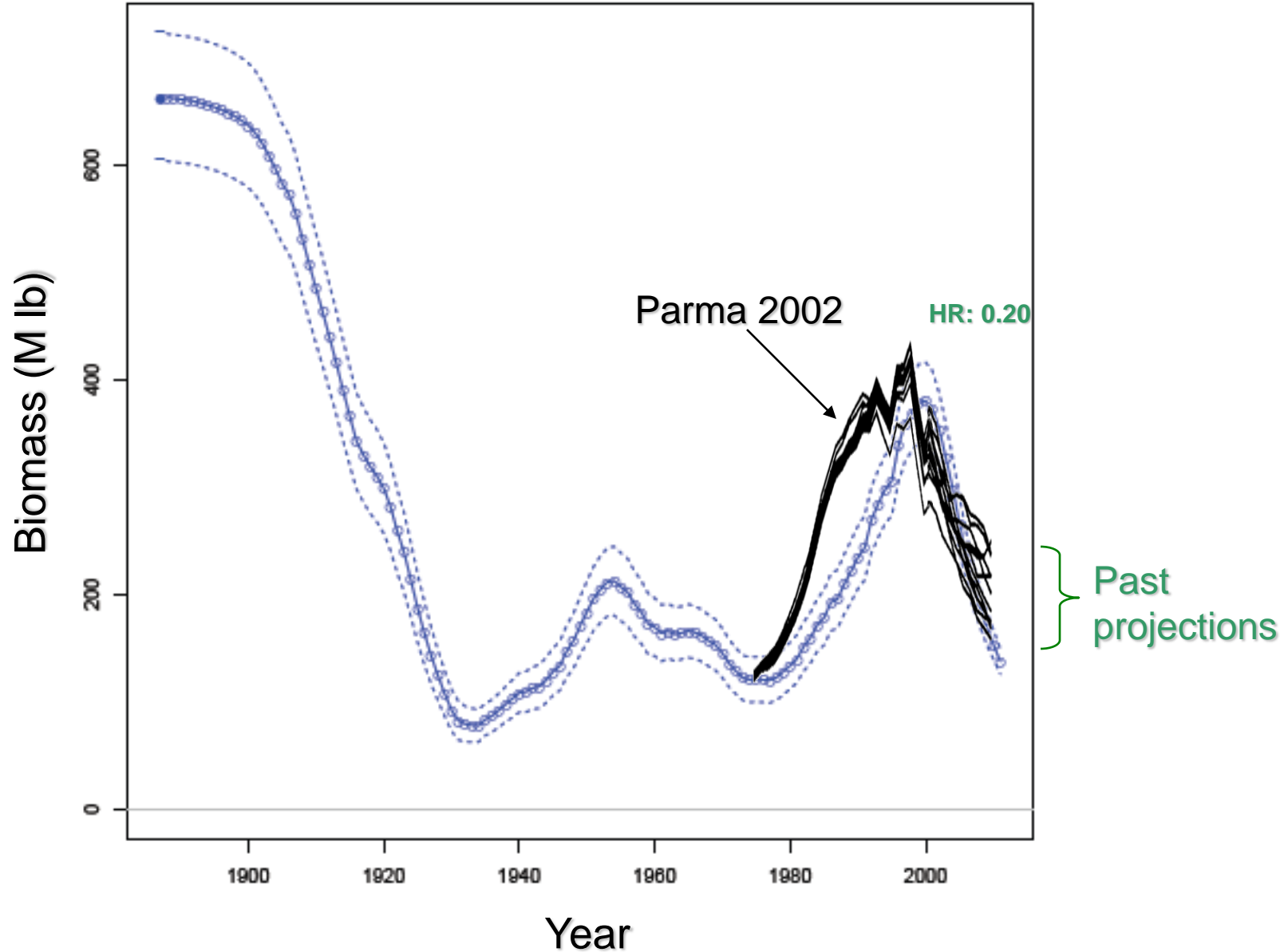
Recruitment and 95% CI



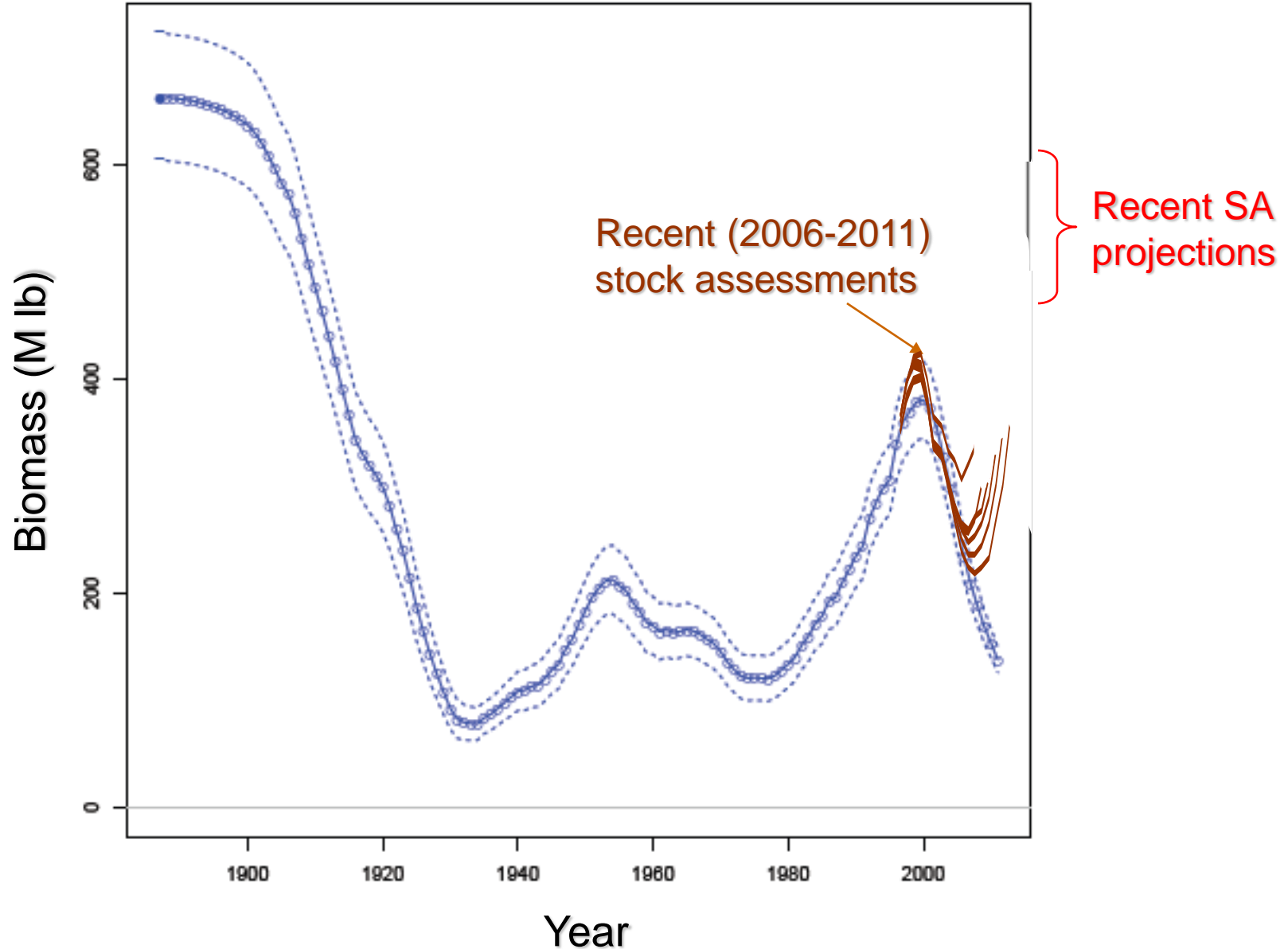
Total biomass (Age 8+)



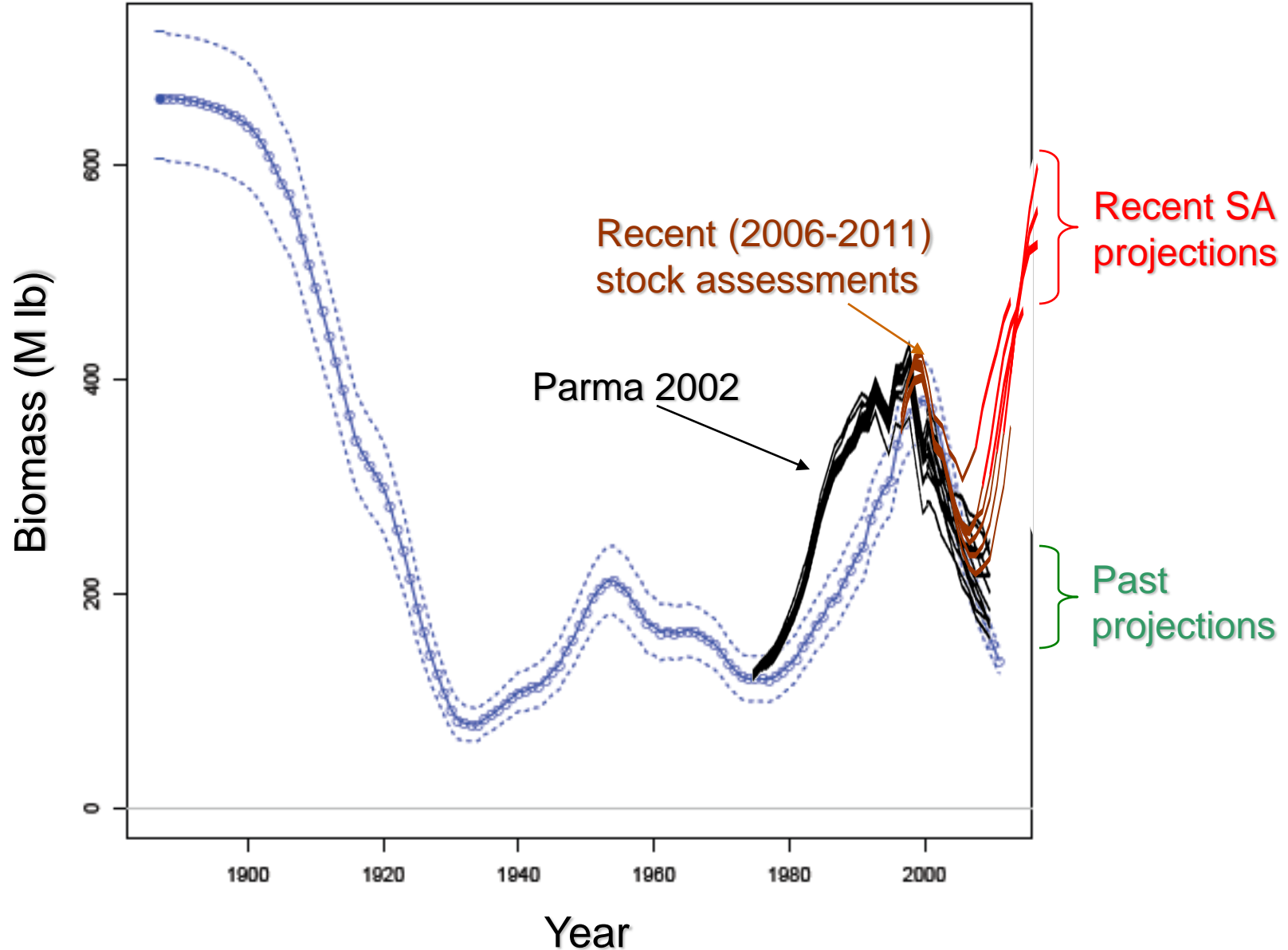
Female spawning biomass (M lb) and 95% CI



Female spawning biomass (M lb) and 95% CI

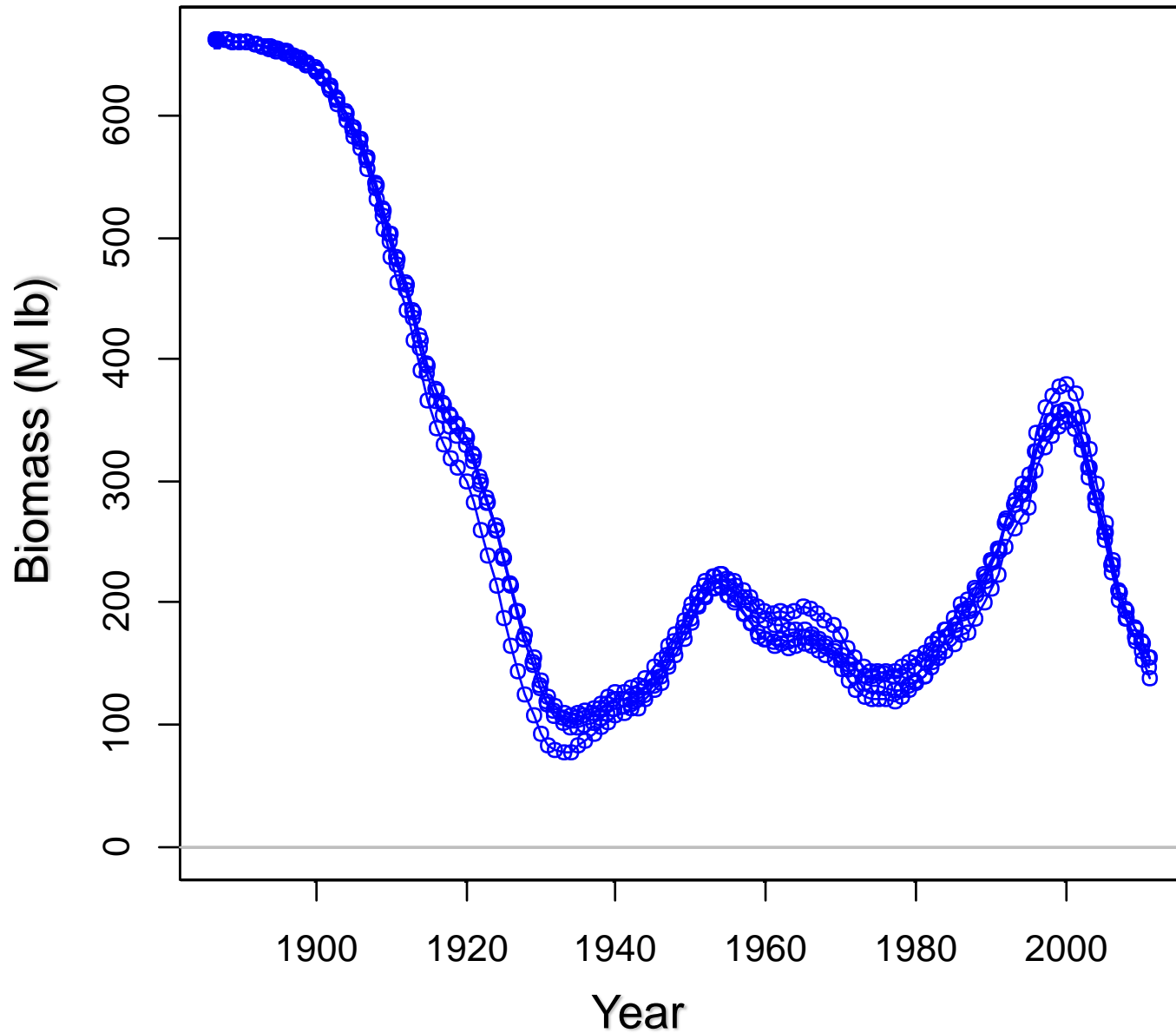


Female spawning biomass (M lb) and 95% CI



Simulation: 1888-2010

Simulated Female spawning biomass (n=4 samples)



Where are we now?

(2011 RARA report)

- Define objectives and performance metrics
 - Only available from *status quo* harvest strategy. Level and type of stakeholder participation need to be discussed and determined
- Develop candidate harvest strategies and harvest control rules
 - Current candidates need to be discussed and expanded
- Develop operating models and condition them to historic data
 - Set of operating models under development and conditioning
- Simulation test of candidate harvest strategies
 - Awaiting previous steps
- Select harvest strategy
 - Awaiting previous steps
- Implement harvest strategy
 - Awaiting previous steps

Input needed for MSE

- Objectives that the MSE should achieve
- Performance indicators to use
- Uncertainties that should be considered

