Implications of Transient Dynamics and Stochasticity for Adaptive Management of Marine Reserves

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IB 599: Analytical Workflows
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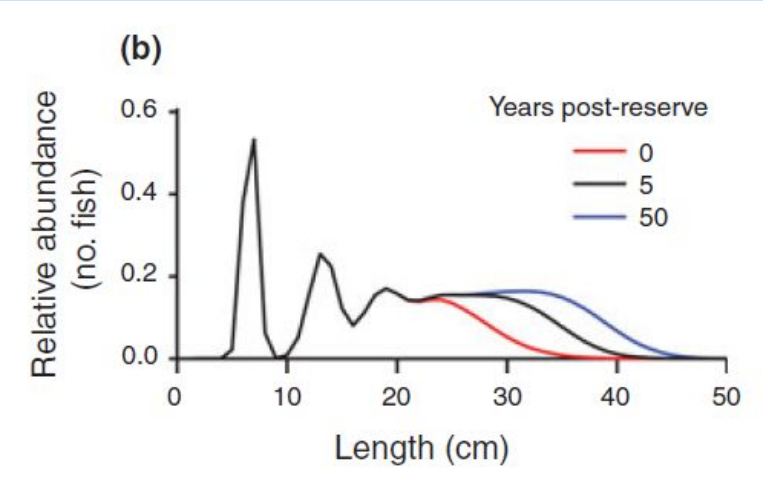
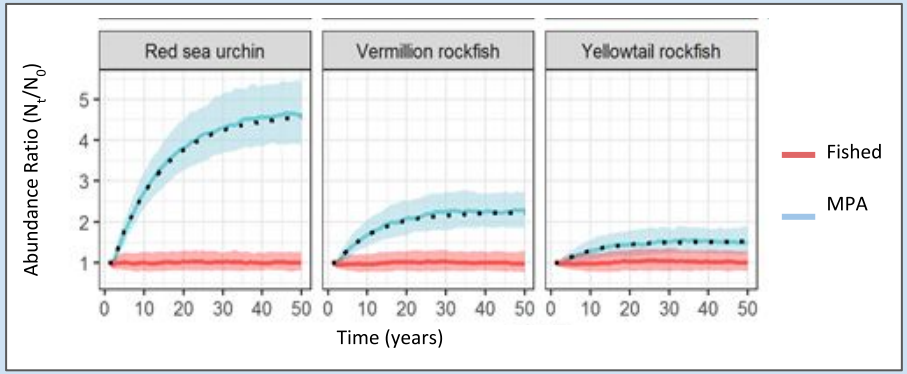
Introduction - Oregon

- ODFW has implemented 5 marine reserves off the coast of OR in last 10 years
- Need some way to assess reserves
  - Promote biodiversity (ergo population persistence)
  - Minimize costs to communities

Transient Dynamics and Stochasticity



White et al., 2013



Adapted from Kaplan et al., in review

$$\sigma_{total\,(t)} = \left[\sum_{a=0}^{t}\left(\sigma_R e^{-M(a+a_c)}\right)^2\right]^{0.5}$$

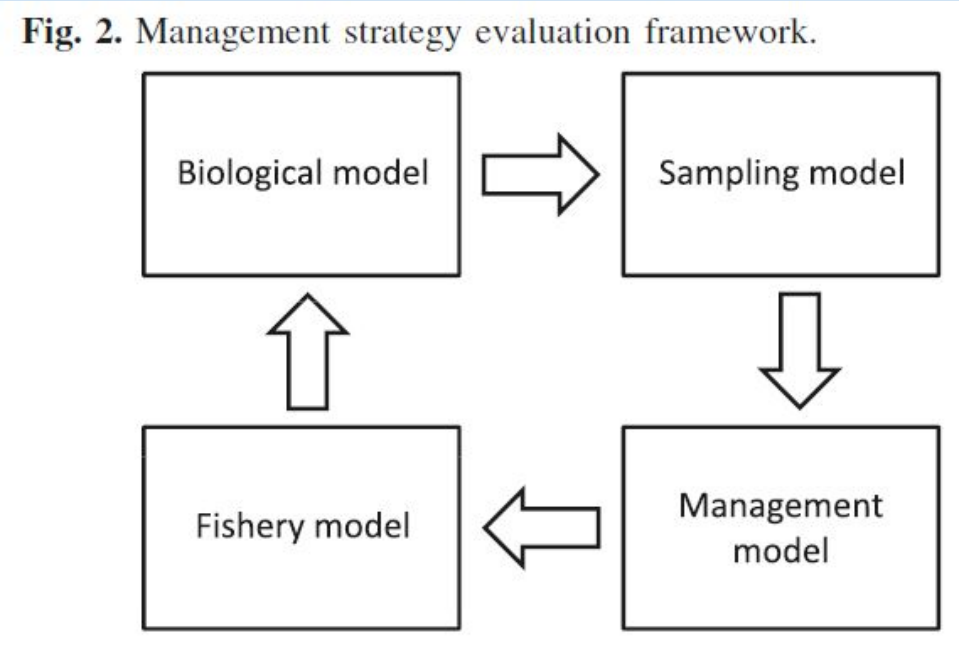
Base Model and Control Rules

- **Density ratio** as metric to assess level of depletion:

  # ind./ area outside reserve

  # ind./ area inside reserve

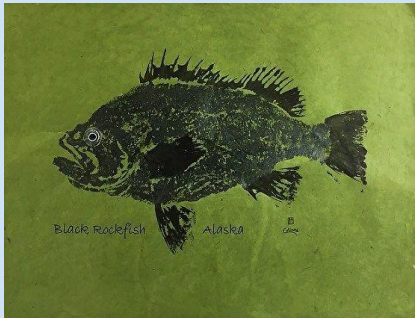
- Current west coast groundfish fishery has 40-10 control rule



Babcock & MacCall 2011

Methods - Chapter 1

- **Replicate base model**
- Incorporate variability and stochastic recruitment
- Explore timescales
- Compare control rules



Hypotheses and Outcomes

Hypotheses

- Different species will have different timescales
- Improved adaptive management

Lowest M

Highest k

Outcomes

- Improved methodologies for assessment and management of fisheries populations in marine reserves following implementation
- Open-access base model in R