MPA design

Easton R White

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Here are notes on a number of key papers in marine reserve design and management. It was difficult to keep this list short as this field has exploded in the last two decades. Here * designates a paper specifically requested by a committee member.

I still need to include papers suggested by Marissa and Loo

1 General MPA papers

- *[?]
  - broad brushstroke paper examing global goals on marine protection
  - argue that we are no where near targets and won't be for a long time
  - a lot of protection is concentrated in only a few areas
  - in 2016, 7% of EEZ protected, with an additonal 6% proposed
- [Lester et al., 2009]
  - this is a meta analysis of the effects of marine protected areas
  - they find that biomass, fish size, and species richness all increase inside no take areas
- [Gaines et al., 2010]
  - make case and lay out recommendations for the design of marine reserves for both fisheries and conservation
  - make point that replication helps avoid disasters
- [Babcock et al., 2010]
  - this paper examined the few cases of long term MPA examples instead of using space for time substitions
  - they found that organisms that had previously been fished showed signs of recovery after implementing marine reserves, species not directly by fisheries took much longer to respond to marine reserves
- [Edgar et al., 2014]
  - argue importance of at least 3 of 5 key features of MPAs: no take status, enforcement, old, large, and isolated
- [Hilborn, 2014]
  - broad introduction to MPAs and use in fisheries management
- *[Baskett and Barnett, 2015]
  - examine population, community, and evoluttionary responses to marine reserves
  - increases in body size and age, and biomass of previously fished species
  - increased genetic diversity in marine reserves
  - inconistent results for resistance to disturbace, but fish biomass was less variable in reserves
- [Fulton et al., 2015]
  - paper reviews different types of MPA modeling work

2 Reserve size and spacing

- [Botsford et al., 2001]

- 2003 special issue of ecoloigical applications
  - [Hastings and Botsford, 2003]
  - [Gerber et al., 2003]
- *[?]
- [Hastings and Botsford, 2006]
  - this paper looks at idealized metapopulation scenario (or an MPA network) and establishes that every patch could be a sink while the metapopulation still persits
  - they point out that loops throughout connectivity diagram are important, not just fraction of individuals remaining in their natal site
- [White and Rogers-Bennett, 2010]
- [White et al., 2010]
- [Williams and Hastings, 2013]
- [White et al., 2014]
- [Brown et al., 2015]

3 Connectivity papers

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- [?]

4 California specifically

- California Master Plan document
- [Gleason et al., 2013]
- [Botsford et al., 2014]
  - presents history of California marine planning and current status
  - explains what may happen b/c of reserves in future, but it is too early to tell

5 Uncertainty in MPA planning

- [Mangel and Tier, 1993]
- [Allison et al., 1998]
- [Mangel, 2000]
- [Allison et al., 2003]
- [Halpern et al., 2006]
- [Wagner et al., 2007]
- [Game et al., 2008]
- [McGilliard et al., 2011]
- [Mumby et al., 2011]
- [Fabina et al., 2015]
- [Cabral et al., 2016]

6 Adaptive management and assessment

- *[?]

- [Moffitt et al., 2013]

7 Reserves and disease dynamics

- [Lamb et al., 2016]
- *[Baskett and Barnett, 2015]
  - point out cases when disease prevelence is higher (density-dependen transmission present), lower (fishing facilates disease spread), or has no effect (disease susceptibility depends on environmetnal factors like temperature) in protected populations

8 Other case study

Marine organisms can face high levels of variability that affect key vital rates. For example, it is well-documented the high level of variability and uncertainty in recruitment of marine fishes. In addition to variability in recruitment, organims with a larval stage are particurly sensitive to variable oceanographic conditions. Ocean currents play a large driver in where larval stages move and where they can settle. However, most work documents larval dispersal, and the resulting connectivity between areas, for an average year. In reality, this connectivity varies from year-to-year depending on oceanographic conditions and more infreqeunt activity like El Nino.

In California, there are X important oceanographic processes. The California current... Strong upwelling occurs in California and peaks in the summer. However, the strength of upwelling can vary from year-to-year.

In planning marine reserve locations... How will predicted MPA placement change if variability in recruitment or connectivity, or if catastophes (density-independent mortality) are included into models.

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