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Marine Life Protection Act Initiative

Spatial Bioeconomic Model Evaluation of the Round 3 North Coast Regional Stakeholder Group MPA Proposal

Presentation to the MLPA Master Plan Science Advisory Team
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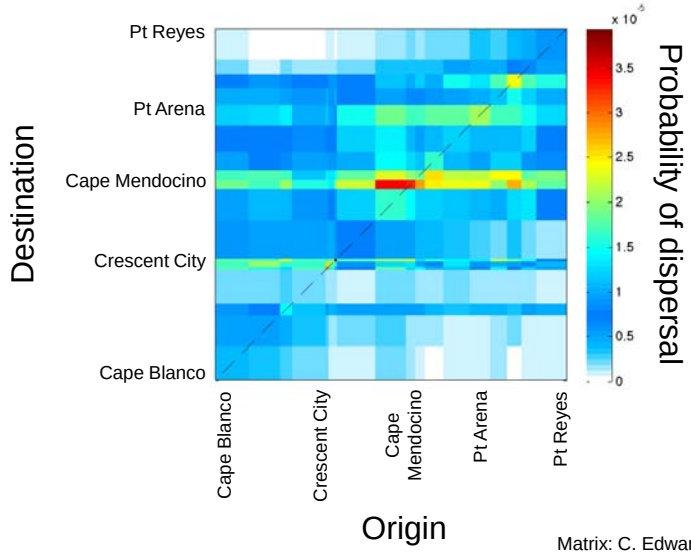
Model Description

- Models simulate population dynamics
- Model inputs include:
  - Life history characteristics of modeled species
  - Larval dispersal predicted by ocean currents
  - Habitat data
  - Spatial fishing effort
- Models consider outcomes of three management scenarios:
  - Conservative management
  - Maximum Sustainable Yield (MSY)-type management
  - Unsuccessful management

Model Input: Larval Dispersal

Matrix for black rockfish (2000-2006 average)



Matrix: C. Edwards & P. Drake, UCSC

Model Description

- For Round 3, six core species were modeled:
  - Black rockfish
  - Brown rockfish
  - Cabezon
  - Redtail surfperch
  - Red sea urchin
  - Red abalone
- Dungeness crab also modeled but presented separately because of characteristics of the fishery (only males are taken)

Round 3 Evaluations

A supplemental evaluation was requested by the MLPA Blue Ribbon Task Force (BRTF):

- **Standard Evaluation (NCP)**
  - includes consideration of all proposed uses, including non-commercial uses intended to accommodate tribal use
- **Supplemental Evaluation (SUP)**
  - includes consideration of only proposed uses intended for all users (and NOT proposed non-commercial uses intended to accommodate tribal use)

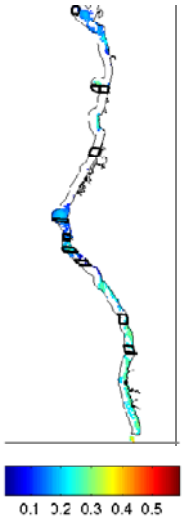
Model Outputs

- **Conservation metrics**
  - Spatial distribution of larval settlement and biomass
  - Total biomass (summed over study region, weighted sum across species), relative to unfished biomass
- **Economic metrics**
  - Spatial distribution of fishery yield
  - Total fishery yield (summed over study region, weighted sum across species), relative to maximum sustainable yield under Proposal 0

Model Outputs: Biomass

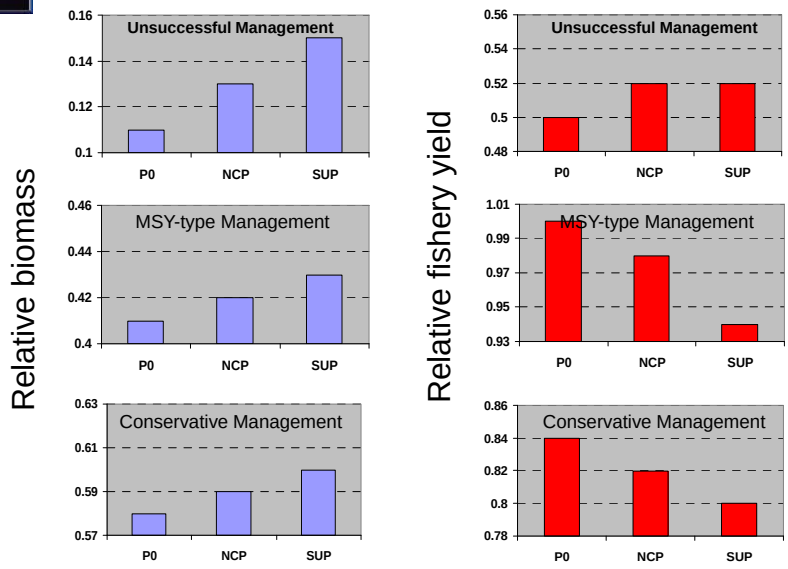
- Map represents predicted spatial distribution of biomass
- Outputs available for each:
  - Model species
  - Proposal
  - Management scenario
- Maps are posted online for:
  - Biomass
  - Fishery yield
  - Fishing effort
  - Larval production
  - Biomass for each MPA (deletion analysis)

Example (NCP): Black Rockfish Biomass

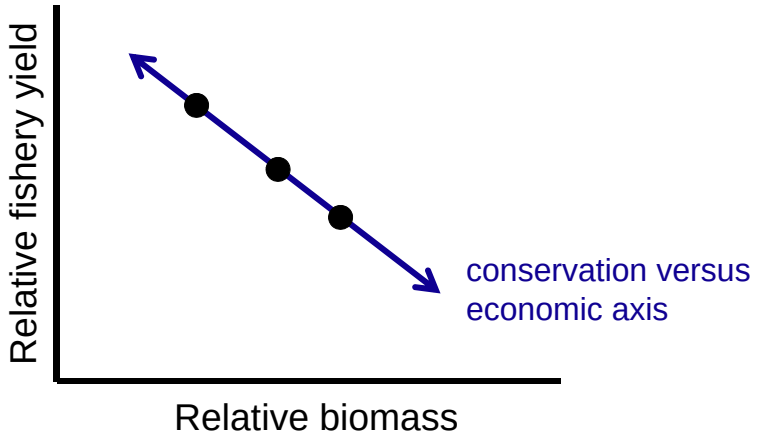


Biomass relative to unfished

Model Outputs: Proposal Rankings

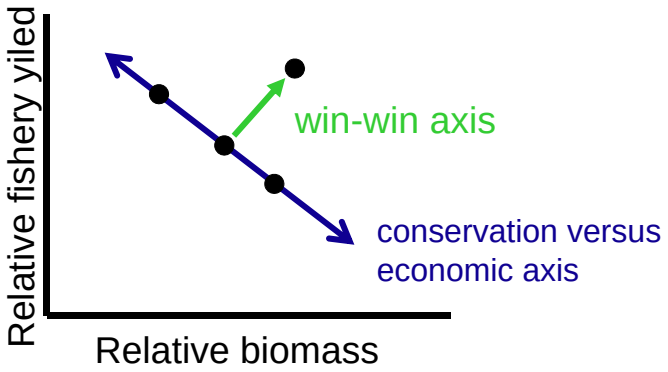


Model Results: Rankings in Context



- *Choice along this axis is a matter of priorities, not science*
- *Models can put the options in context*

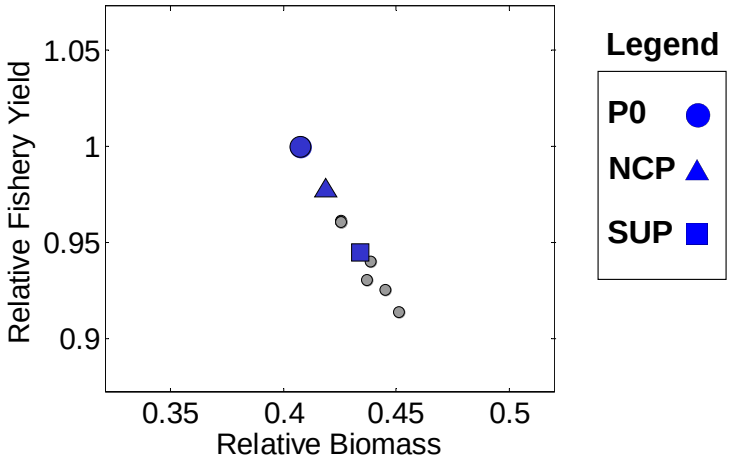
Model Results: Rankings in Context



- *Models can reveal where one proposal performs better than another for the species modeled*
- *Differences are most apparent under assumption of unsuccessful management*

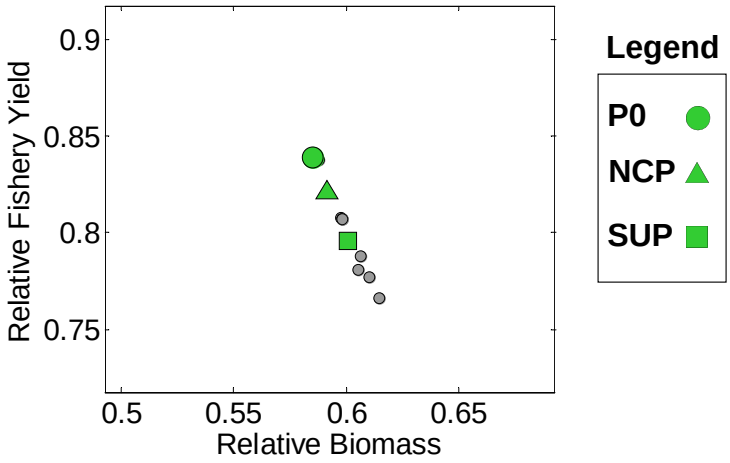
Results: MSY-type Management

*MSY is Maximum Sustainable Yield



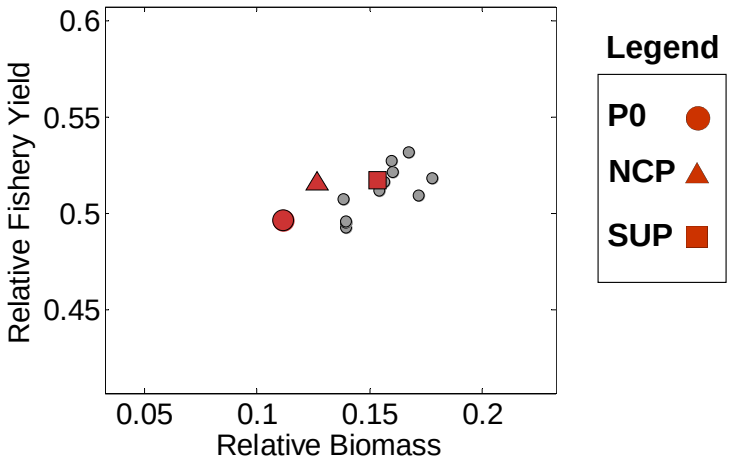
Smaller grey dots indicate proposals from rounds 1 and 2

Results: Conservative Management



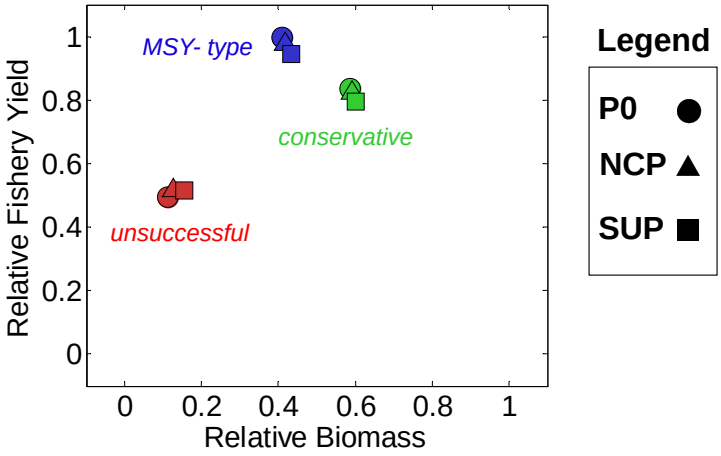
Smaller grey dots indicate proposals from rounds 1 and 2

Results: Unsuccessful Management



Smaller grey dots indicate proposals from rounds 1 and 2

Results: Comparing Scenarios



Conclusions

- The **supplemental evaluation of the Round 3 NCRSG MPA Proposal (SUP)** consistently had highest conservation value for all management assumptions
- **Proposal 0** (no action alternative) had highest economic value under MSY-type or conservative management
- The **standard and supplemental evaluations of the Round 3 NCRSG MPA Proposal** had highest economic value under unsuccessful management

Conclusions (continued)

- Deletion and larval production analyses suggest that **Sea Lion Gulch State Marine Reserve (SMR) and Ten Mile SMR** are especially effective; other SMRs less effective
- In the standard evaluation (NCP), SMCAs allowing non-commercial use in NCP offer no protection to any species in the model
- In the supplemental evaluation (SUP), **Vizcaino State Marine Conservation Area (SMCA) and Pyramid Point SMCA** are highly effective, but **Samoa and Reading Rock SMCA** less effective

All model outputs from the Round 3 evaluation are posted on the MLPA website (www.dfg.ca.gov/mlpa)