

Marine Life Protection Act Initiative



Draft Spatial Bioeconomic Model Evaluations of Round 1 External Proposed MPA Arrays for the MLPA North Coast Study Region

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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 four management scenarios:
 - Conservative management
 - Maximum Sustainable Yield (MSY)-type management
 - Unsuccessful management



Model Description

- For Round 1, two models were used:
 - University of California, Davis (UCD)
 - University of California, Santa Barbara (UCSB)
- For Round 1, four species were modeled:
 - Black rockfish
 - Cabezon
 - Redtail surfperch
 - Red sea urchin



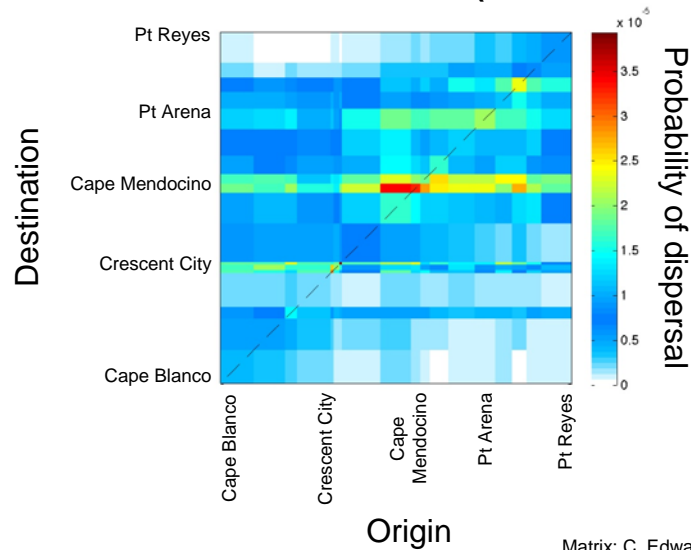
Updates for Round 2

- Additional fine-scale habitat data will be included
- Three (3) more species will be modeled:
 - Red abalone
 - Brown rockfish
 - Dungeness crab
- UCSB and UCD models will be combined
- External proposals will be rerun with updated data and model before next round



Oceanographic Dispersal Matrix

Matrix for black rockfish (2000-2006 average)



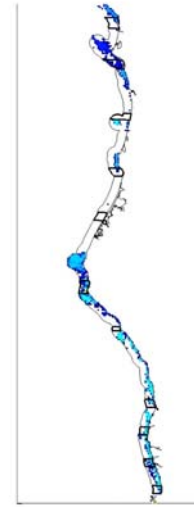
Model Outputs

- **Conservation Value**
 - Spatial distribution of larval settlement and biomass
 - Total settlement and biomass (summed over study region, weighted sum across species)
- **Economic Value**
 - Spatial distribution of fishery yield
 - Total fishery yield (summed over study region, weighted sum across species)



Model Results: Black Rockfish Biomass

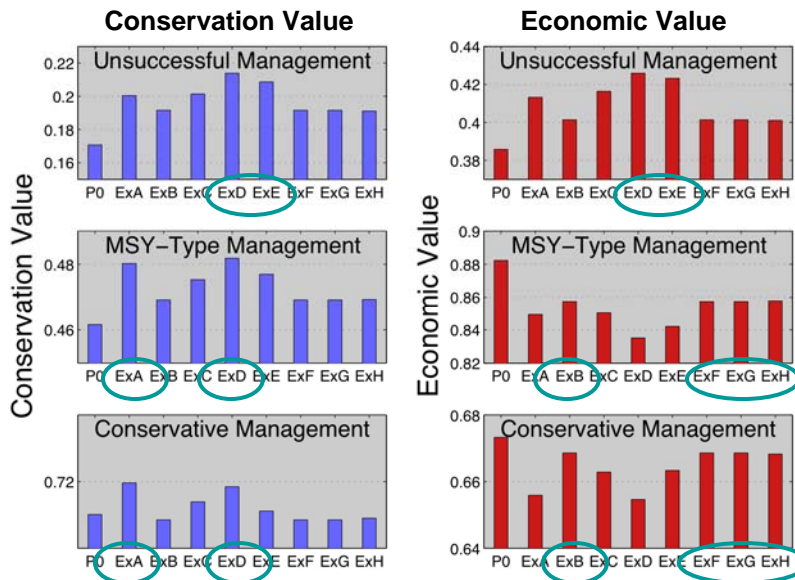
- Map represents predicted spatial distribution of biomass
- Outputs available for each:
 - Model species
 - Proposal
 - Management scenario
- Maps are posted online for:
 - Biomass
 - Fishery yield
 - Fishing effort
 - Larval production
 - Biomass for each MPA (deletion analysis)



0 0.2 0.4 0.6
Biomass relative to unfished

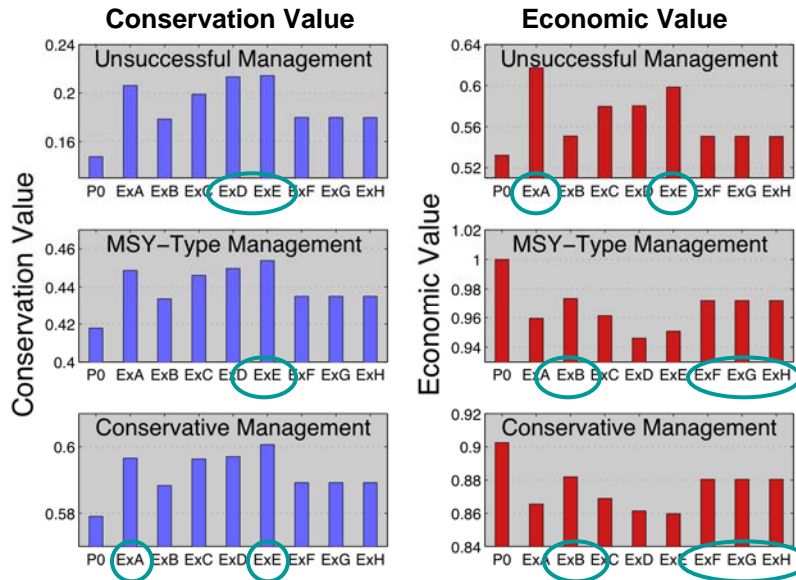


Model Outputs: Proposal Rankings



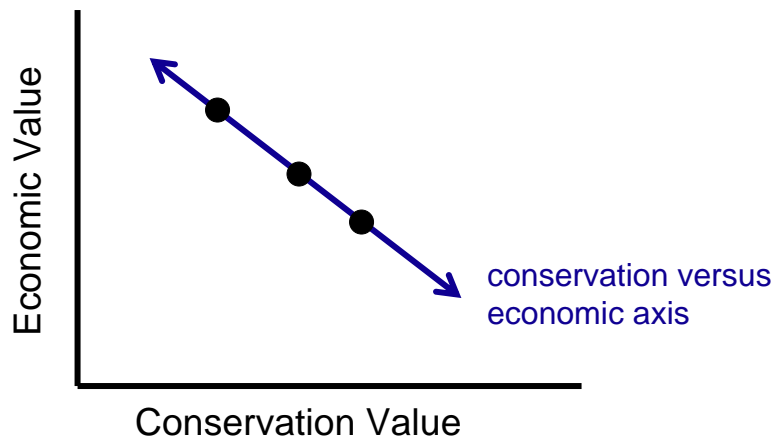
Round 1, UCSB Model

Model Outputs: Proposal Rankings



Round 1, UCD Model

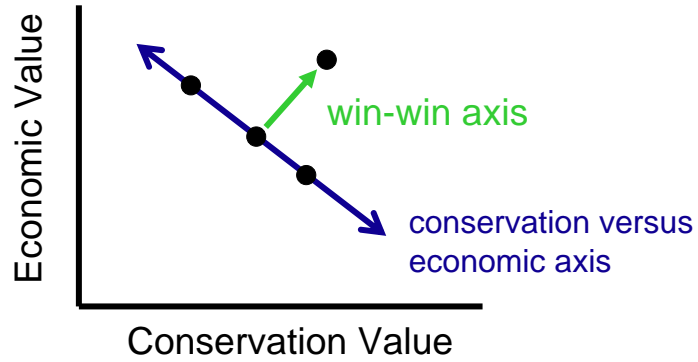
Model Results: Rankings in Context



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



Model Results: Rankings in Context

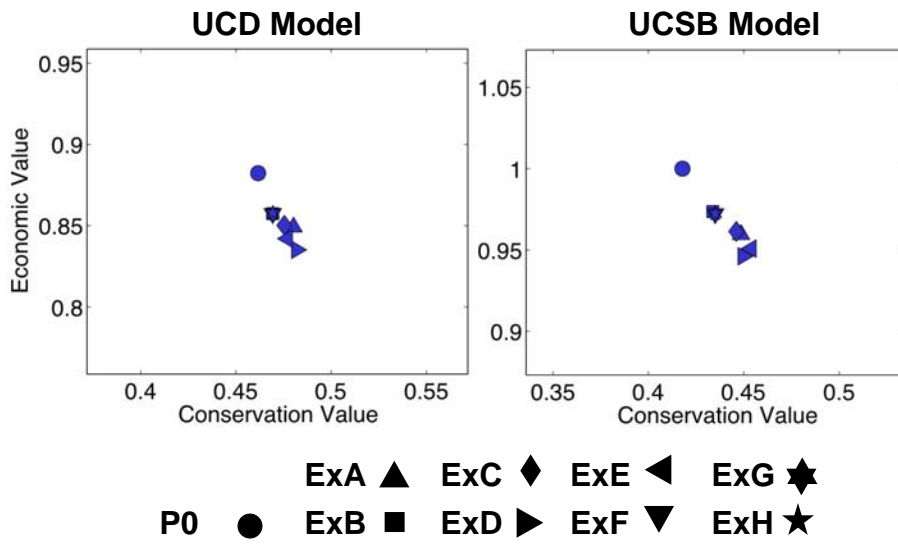


- Models can reveal where one proposal performs better than another for the species modeled
- Differences are most apparent under assumption of unsuccessful management



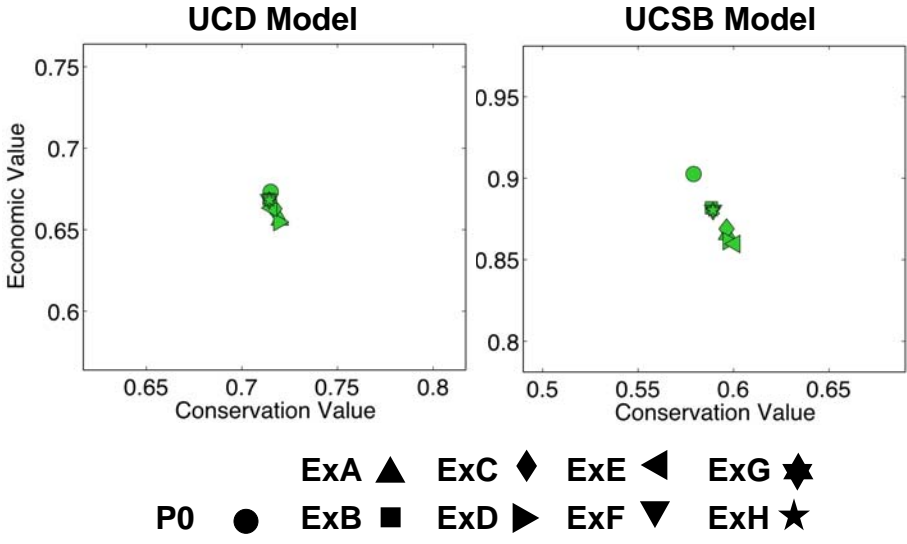
Results: MSY-type Management

*MSY is Maximum Sustainable Yield

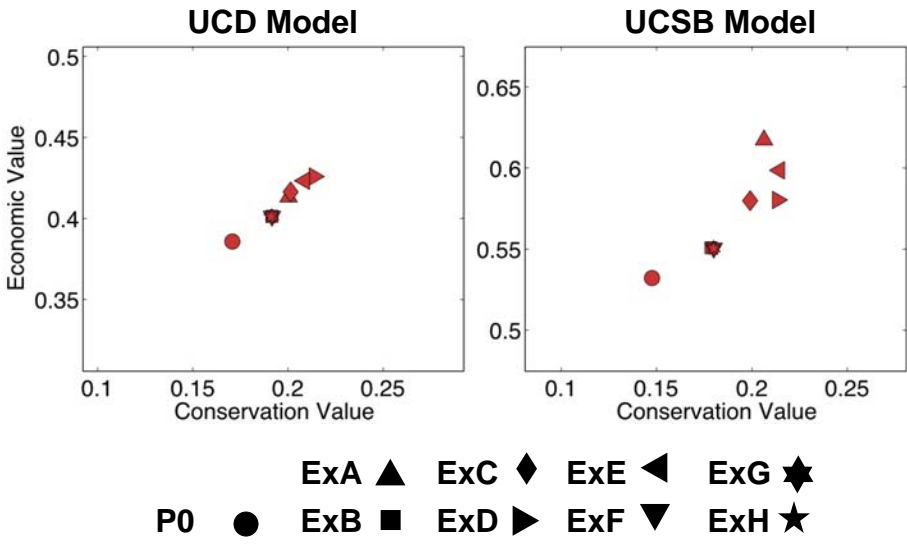




Results: Conservative Management



Results: Unsuccessful Management





Conclusions

- **Proposals ExA, ExD and ExE** consistently had highest *conservation value; rank order varied among models and management assumptions
- **Proposals ExB, ExF, ExG and ExH** had highest *economic value for all models under MSY-type or conservative management, and all had similar results under unsuccessful management
- **Proposals ExA and ExE** (UCD model) or **Proposals ExA and ExD** (UCSB model) had the highest *economic value.
- All model outputs from Round 1 evaluations at MLPA website (www.dfg.ca.gov/mlpa)

**Outputs focus on 4 species: Black rockfish, cabezon, redtail surfperch, and red sea urchin.*