Quantifying tradeoffs between ecology, economy and climate in the Northern California Current Ecosystem

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PART 1

Quantifying ecosystem interactions and tradeoffs from economic and ecological perspectives

PART 2

Evaluating equilibrium properties of the system when subjected to different fishing effort levels
Northern California Current Ecosystem (NCCE)
PART 1
Quantifying ecosystem interactions and tradeoffs from economic and ecological perspectives

Increased individual fleet’s effort by 10% for 1960-2000 time period

Calculated % change of revenue and biomass from average 1960-2000 baseline
PERTURBED FLEET

percent change revenue per fleet

AFFECTED FLEET

- perturbed fleet
- bottom trawl
- fixed gear
- hake trawl
- salmon troll
- crab pot
- shrimp trawl
PART 2

Evaluating equilibrium properties of the system when subjected to different fishing effort levels.

Change effort in all fleets simultaneously for 100 years to allow system to equilibrate

Effort changes range from -50% to +50%
Thanks to...
Are we measuring RESILIENCE?

Not quite...we are pressing the system, not pulsing it. Model has strong equilibrium behavior, therefore will return to original state if the pressure is removed. Thus, thresholds are not observed. This analysis is to examine the level of change experienced before possibly hitting a threshold (press v pulse)
The NCCE Model (Field 2004)

Static, mass-balance model (Ecopath)
• based on NCCE in the 1960s
• 63 groups, 6 fisheries

Dynamic model (Ecosim)
• 1960-2004
• forced with time series of fishing effort for each fleet
• top-down and bottom-up climate impacts included
CONCLUSIONS

• BT-FG tradeoff
• Hake-shrimp-salmon
• 60s ability to absorb change > 00 ability
• Crab fleet, fixed gear merit more attention