Climate change Adaptation Tools for California Current fisHeries

C A T C C H

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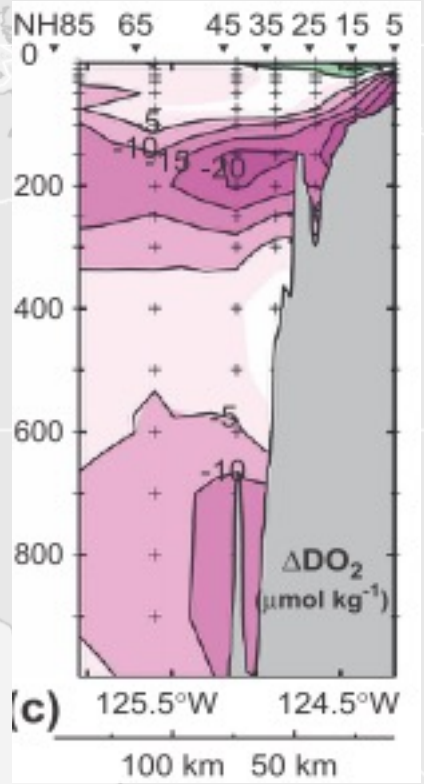
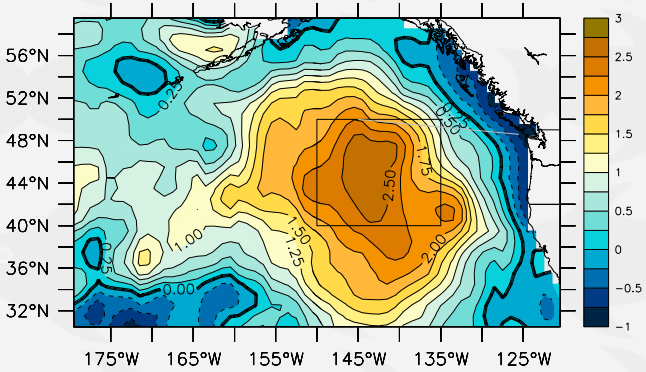
The problem

- Climate change is a fact!
- It affects all components of the linked earth system – land, ocean and atmosphere
- This will have effects on marine life, including fisheries (e.g., increase in low oxygen off WA, OR; changes in water temperature or pH)
- What will this mean for the California Current fishery in the next 50-100 years?



Changes in dissolved oxygen off OR between 1960-1971 and 1998-2009 (Pierce et al, 2012)

The economic impact



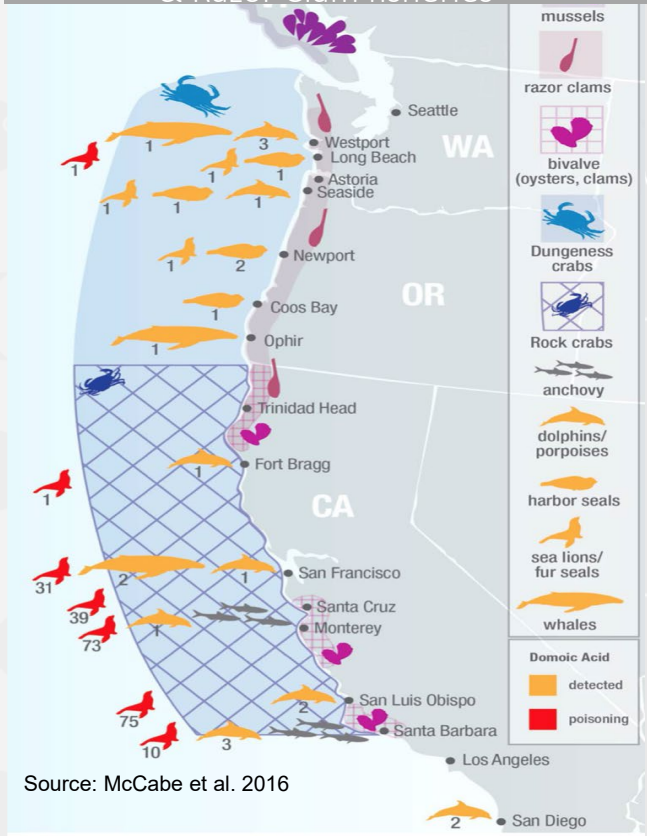
Bond et al. 2015

The “Blob” of 2013-14 resulted in SST up 3°C higher than normal across a large area of the North Pacific.

This led to various changes in the California Current ecosystem, including major losses in the Dungeness crab and razor clam fisheries, and changes to migration and spawning patterns in other species, including whales.

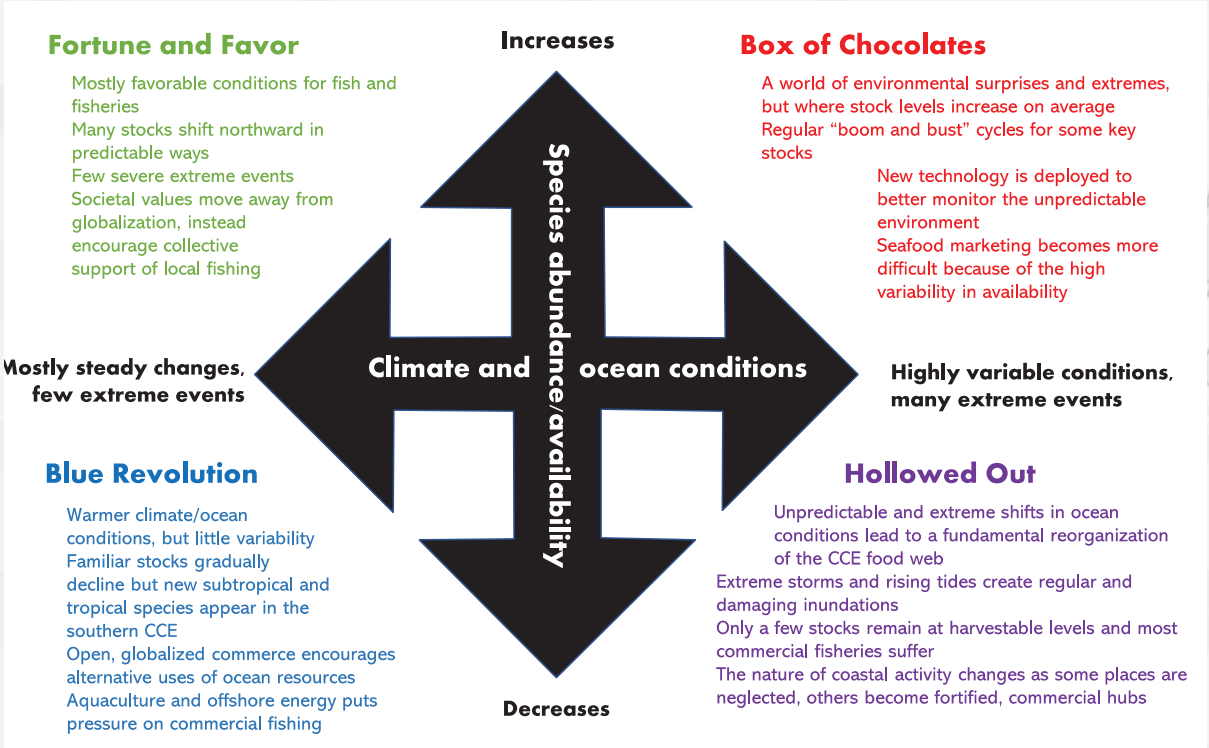
Similarly, increasing acidification has affected oyster spawning and survival in farmed oysters in WA and OR.

2014-2016 marine heatwave caused $70 million loss for Dungeness Crab & Razor Clam fisheries



Source: McCabe et al. 2016

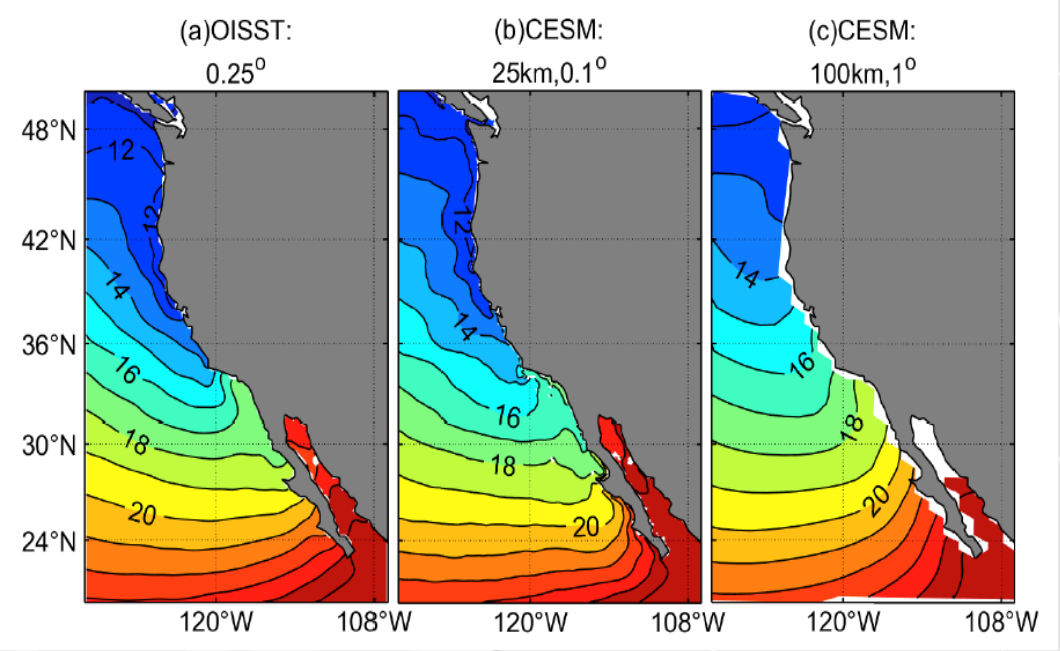
Potential changes (PFMC 2020)



CATCCH can help fill the gap between theory and practice

A possible solution (1)

- We rely on models for forecasting
- Most ecosystem models work at scales of 1° (~110 km) which is useless for fisheries (c)
- Latest models can run at 0.1° 10-12 km) (b)
- These give much better agreement with data (a)



Note cold water upwelling region visible in (a) and (b) but Not (c).

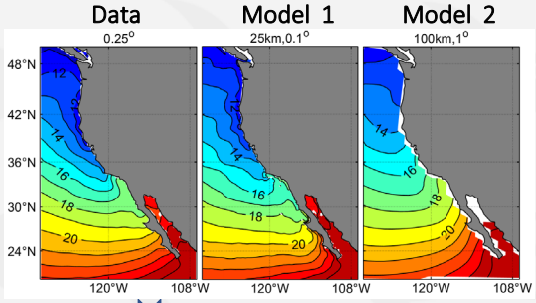
A possible solution (2)

- BUT
- While we have good physical oceanography/climate models, we still do not use all the available data.
- Present models do not consider biogeochemistry or biology at the same scale.
- CATCCH aims to combine the different data sets and use them to forecast likely future changes in the California Current LME
- The model outputs will drive a decision system, based on information from fisheries stakeholders, to help ensure the fishery remains resilient and sustainable over decades.

How does it work?

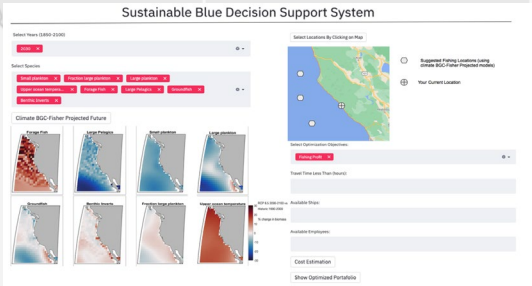
Our Convergence Science Approach

High-resolution climate and ecosystem models for predicting ocean conditions



Reciprocal interactions between scientists and fisheries stakeholders

Consequential and credible decision-making model (Sustainable Blue) to optimize fishery business portfolio



Deliverables

- Fisheries stakeholder participation for meaningful knowledge co-production
- Model results translated into information responsive to user priorities
- Tools for informed, intelligent and sustainable decision making for climate-ready fisheries management

What do we need?

- We have been funded by NSF for a one-year project to show the viability of our system at low resolution. If successful, we can apply for an additional 2 years of funding to produce the high-resolution version
- Acceptance of the idea by industry stakeholders
- Permission to approach individuals and groups to determine needs/wants for future forecasts to assist with designing decision system (Sustainable Blue)
- Iteration between scientists and stakeholders to ensure products are useful and relevant

What will you get?

- Early warning system
- Novel web-based system with forecasts for how the ecosystem will change over the next ~80 years
- Model results translated into information that responds to user priorities
- Tools for informed, intelligent and sustainable decision making for climate-ready fisheries management

Thank you

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