



RESEARCH TO UNDERSTAND VULNERABILITY OF WEST COAST FISHING COMMUNITIES TO CLIMATE CHANGE

The California Current Ecosystem (CCE), which brings cold, nutrient-rich waters to the U.S. West Coast, supports a wide range of important fisheries off California, Oregon, and Washington. In recent years, climate-driven changes in the CCE – from warming temperatures to ocean acidification and toxic algal blooms – are disrupting ocean habitats and species, and by extension the social and economic fabric of fishing communities on the coast. Thus, the Lenfest Ocean Program is funding Dr. Phillip Levin, The Nature Conservancy/University of Washington, and Dr. Alison Cullen, University of Washington, to assess the social and ecological vulnerability of fishing communities along the U.S. West Coast to changing ocean conditions.

WHAT CLIMATE CHANGE MEANS FOR ECOSYSTEMS & FISHING COMMUNITIES

The CCE supports commercial and recreational fisheries for albacore tuna, salmon, crab, squid, shrimp, and dozens of different groundfish species, including sablefish, various rockfish, and halibut. The health of the CCE provides not only economic benefits to the region through jobs and income, but also affects the social well-being of fishing communities on the coast. Social relationships, cultural values and practices, and tangible and intangible connections to nature form the foundation upon which people pursue their livelihoods and thrive in their environment.

Environmental stressors are interacting to affect fisheries in the CCE, including warming temperatures, ocean acidification, and declining oxygen. For example, in 2014-2015 a large mass of warm water in the Northeast Pacific Ocean known as the “warm blob” resulted in a 41% decrease in salmon and a 61% decline in Pacific hake landings revenue (Bond, Cronin et al. 2015, NMFS 2017). The warmer waters also triggered toxic algal blooms that forced the closure of crab fisheries. The combination of the “warm blob” with El Niño reduced revenue of the squid fishery by 65% (NMFS 2017, Santora, Hazen et al. 2017).

Increasingly, fisheries managers, fishermen, NGOs, and others are discussing plans to address risks posed by increasing change and uncertainty. The Pacific Fisheries Management Council (PFMC), which manages federal fisheries in the region, launched the Climate and Communities Initiative as part of their Fisheries Ecosystem Plan process. This initiative aims to improve

RESEARCH TEAM

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management flexibility and responsiveness to climate effects, and to bolster the resilience of fish stocks and fisheries. Achieving this goal starts with scenario planning to identify tools, products, and processes that can help the PFMC plan.

RESEARCH APPROACH

Better understanding how changing ocean conditions will propagate through ecosystems to fishing communities could help target investments in mitigation and adaptation. In this project, the research team will conduct social-ecological vulnerability assessments based on existing data and information with a focus on federally managed fisheries off California, Oregon, and Washington.

Understand Vulnerability of Fishing Communities and Ecosystems

The researchers will use a combination of qualitative and quantitative approaches to estimate three components of vulnerability:

- magnitude of climate impacts on ecosystems;
- extent to which those impacts will be felt by fishing communities; and
- capacity of communities to respond or adapt.

For the qualitative analyses, they will explore local knowledge and perceptions of these three components by surveying fishing communities on the West Coast. They will also conduct focus groups with stakeholders from the major fisheries sectors, including the commercial and recreational fishing industry, tribal communities, the public, and conservation interests. Through these steps, the researchers will capture insights from a cross-section of participants knowledgeable about fisheries management, science, and fisheries governance and policy.

The researchers will also quantitatively assess vulnerability by identifying where key climate change metrics overlap with fisheries. For example, the researchers can use existing data to identify where projected changes in sea surface temperature will affect the distribution of fish and invertebrates targeted by different fishing communities. They will then investigate community sensitivity and adaptive capacity using established metrics of community resilience from the Pacific Fisheries Information Network and the U.S. Census' American Community Survey.

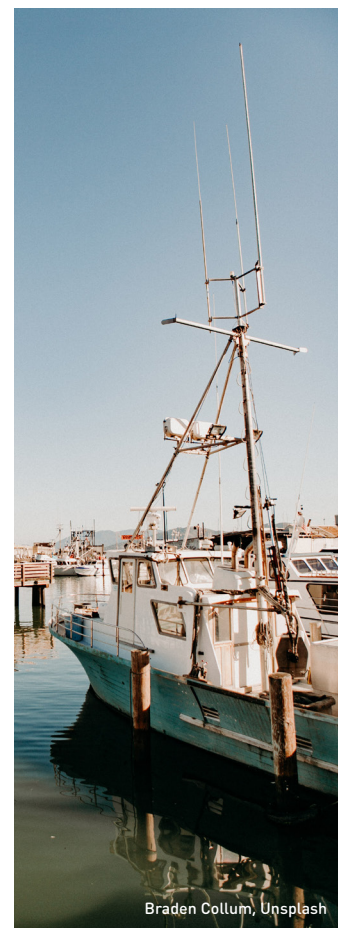
Develop Information to Help Managers Evaluate Responses to Climate Change

Finally, the researchers will take the results of the vulnerability assessments and evaluate the potential outcomes of different management actions for ecosystems and communities. They will use existing models to examine scenarios under multiple projections of future climate, and explain how factors such as fish catch, economic activity, community well-being, and ecosystem health may change and ways in which they can be preserved.

The researchers aim to align their work with the scenarios currently being developed under the PFMC Climate and Communities Initiative. This research project began in April 2019 and will continue for two years.

CONTACT

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CITATIONS

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