# Topics at the nexus of climate change, fisheries, and blue foods

*A webinar series highlighting the impact of climate change on fisheries, aquaculture, and the communities who depend on them*

## November 2024 Webinar: Ocean Modeling to Support Decision Making

**Presentation 1: Developing a North Pacific Ocean Marine Ecosystem Model Ensemble (NOMEME) to support conservation and resilient fisheries management under climate change**

There is an urgent need to understand how climate change affects marine systems and species in the North Pacific, and coordinate efforts across nations particularly for transboundary or shifting species, to guide mitigation efforts and sustain fish populations. Considerable uncertainty however exists in climate projections, and in our knowledge of processes and impacts. BECI is a relatively new project that aims to support ocean and coastal management under increasing climate variability and uncertainty, through advanced transboundary ocean and climate change science. We are developing a North Pacific Ocean Marine Ecosystem Model Ensemble (NOMEME) that combines multiple models linked to climate drivers across the region, to evaluate short- and long-term impacts of combined climate change and fisheries management on key functional groups including small pelagics and forage fish, large demersal fish, and salmonids. Using multi-model inference is the best way to account for climate uncertainty and improve reliability of predictions. This collaborative effort brings together modellers, researchers, and practitioners to guide objectives and methods that can support conservation and fisheries decisions. We are in the process of developing a NOMEME protocol that includes a thorough review and skill assessment of existing models in the region, development of appropriate future management scenarios according to regional needs and values, and new simulations to fill knowledge gaps for fisheries management and conservation. This project is linked to global initiatives like Fish-MIP and NOAA's Climate Ecosystems and Fisheries Initiative (CEFI). The results can support both tactical management decisions (e.g., fisheries risk buffers and biomass reference points) and strategic decisions for fisheries and conservation using different climate forecast scenarios. Through this and other collaborative initiatives, BECI aims to support advanced, science-based decisions to address climate change in the North Pacific.

Webinar Presenter: **Dr. Vivitskaia Tulloch** is a decision scientist and ecological modeller, interested in the intersection of multiple stressors including climate change within and between complex dynamic systems, species and humans. Her research involves development of quantitative methods to support climate-informed Ecosystem Based Management and conservation, including methods to identify species persistence, climate risk, resilience and adaptive management in marine ecosystems. This includes ecosystem and food-web modelling, cumulative impact assessment, risk and vulnerability assessment, statistical models, threatened species and ecosystem assessment, and systematic conservation prioritisation, within a framework grounded in decision theory. Viv completed her PhD in 2016 at the ARC Centre of Excellence for Environmental Decisions at the University of Queensland, and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Australia, in marine ecological modelling and conservation decision science. Viv was granted the prestigious Banting Postdoctoral Fellowship in 2019 to work on ecosystem models of salmon and killer whales with the Conservation Decisions Lab at the University of British Columbia, Canada. Over the last 13 years she has worked in research, environmental consulting, and collaborated with government and non-government agencies worldwide, most recently with Fisheries and Oceans Canada (DFO) and the Wildlife Conservation Society Canada. Outside of work, Viv enjoys spending time with her two small kids out in nature and visiting Australia for family time and sunshine.

**Presentation 2: Cross-Regional Climate-Ecosystem Modeling Infrastructure Development**

How do we leverage climate models effectively for fisheries management if we do not dynamically downscale them, using the coarse resolution CMIP simulations? This new research project is synergistic with FishMIP and NOAA-CEFI in charting the way forward for climate-informed fisheries management, answering the above and other questions. This research project will develop a cross-regional climate-ecosystem modeling framework to enhance understanding of climate impacts on marine ecosystems and fisheries. Aiming to integrate climate and ecosystem models across U.S. marine regions, this study focuses on species distributional shifts, ecosystem dynamics, and the implications of climate change for fisheries management. The project includes four objectives: establishing best practices for climate model validation in ecosystem models, projecting future regional ecosystem conditions, analyzing fisheries management strategies, and constructing an operational framework for cross-regional ecosystem modeling. The framework will integrate NOAA's and other climate models with ecosystem models like Ecopath with Ecospace, enabling region-specific insights. The projected outcomes include a decision-support tool to guide climate-ready fisheries management, improve model transparency, and mitigate climate risk impacts on marine resources. This project will support national fisheries by developing methods for adapting fisheries management to anticipated climate-driven shifts.

Webinar Presenter: **Cheryl S. Harrison** is a biophysical oceanographer and assistant professor in the Department of Oceanography and Coastal Sciences (joint with the Center for Computation and Technology) at Louisiana State University. She is also an Earth System Model Coordinator for the Fisheries Model Intercomparison Project (FishMIP). Her research interests include physical and biogeochemical ocean modeling, applied mathematics, marine ecology, fisheries, climate change, and geoengineering.



*This webinar series is jointly hosted by the UN Ocean Decade Programs Blue Food Futures, Fisheries Strategies for Changing Oceans and Resilient Ecosystems (FishSCORE), Sustainability, Predictability, and Resilience of Marine Ecosystems (SUPREME), Sustainability of Marine Ecosystems through Global Knowledge Networks (SmartNet), and Fisheries and Marine Ecosystem Model Intercomparison Project (FishMIP) and endorsed project Basin Scale Events to Coastal Impacts (BECI).*

*This webinar series highlights current efforts and challenges at the climate-fisheries nexus. Presentations and discussions will range from data-driven efforts to better understand oceanographic and biological changes affecting fisheries, to how the results can be used to inform fisheries management, aquaculture, and sustainable food decisions, to the many ways people and broader communities are being impacted by and adapting to changes in marine ecosystems and marine resource use.*