

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

Nov 2025: Understanding and reducing uncertainty in ocean modeling

Presentation 1: Understanding Ecological Uncertainty: Insights from Global and Arctic Marine Systems

Uncertainty estimates are a fundamental element of any ecological modeling approach, as their analysis helps prioritize efforts to reduce uncertainty and informs decision-making. In this presentation we focus on two main types of model uncertainty: structural (i.e., differences across models' structure) and scenario (i.e., differences between alternative policy prescriptions). Specifically, we will look at uncertainty related to water temperature and net primary production, which play critical roles in marine processes and models. We will present an approach to elucidate global pelagic fish sensitivity to changes in net primary production, leveraging model parameter uncertainty to explore how ecological traits and temperature mediate sensitivity response. We also present a regional case study of the Arctic Ocean, one of the fastest-warming regions of the planet and where ensemble of models shows different levels of variation. We finalize with recommendations for further research to reduce uncertainty and for decision-making under uncertain times.

Webinar Presenter: [Isabella Morgante](#) is a PhD candidate at the University of British Columbia in the Institute for the Oceans and Fisheries. Her research combines large-scale, global datasets, statistical modeling, and trait-based approaches to understand how changing ocean conditions affect fish populations and the fisheries that depend on them. Their PhD work uses a simulation modelling approach to investigate the sensitivity and vulnerability of fisheries catch to changes in primary production and other environmental variables. More broadly, Izzy is motivated by questions of ocean sustainability: how environmental change cascades through marine ecosystems, how uncertainty can be quantified and reduced, and how science can inform more resilient management of living marine resources.

Presentation 2: Forecasting global-scale marine species distributions: combining marine ecosystem models and Bayesian additive regression trees

Marine Ecosystem Models (MEMs) have been developed to analyse the past and future dynamics of the oceans. One of such efforts is EcoOcean, a complex, mechanistic and spatio-temporal explicit MEM of the global oceans based on a trophodynamic core. EcoOcean can be informed with the species native ranges and suitable habitats. For key environmental variables, species' functional responses and time-varying maps delivered by Earth System Models (ESMs) are needed. The different sources of uncertainty in these inputs may influence the validity and accuracy of EcoOcean results. For this reason, our study explores the use of global SDMs to reduce the uncertainty associated with these inputs. A promising new alternative to traditional SDMs classification tree methods is the Bayesian Additive Regression Trees (BART). BART is a non-parametric Bayesian regression approach based on a sum-of-trees model. Our hypothesis is that BART can be a powerful approach to inform global-scale Marine Ecosystem Models (MEMs). In this study, we compare the projected results of EcoOcean when incorporating the outputs of BART as inputs and compare them with runs without informing the global model. Specifically, we perform a study on the combination of BART and EcoOcean targeting several species of marine mammals and top predators (marine turtles, tunas, sharks, etc.).

Webinar Presenter: [Alba Fuster-Alonso](#) is a PhD student in Statistics and Optimization at the University of Valencia (UV) and the Institute of Marine Sciences (ICM-CSIC), funded by a Spanish government doctoral

fellowship. She graduated in Marine Sciences at the University of Alicante (UA) in 2020, where she discovered her interest in research and statistics. She then pursued a Master's in Biostatistics at UV, receiving a research grant (2020–2021) to collaborate with the Department of Statistics and Operations Research and the Spanish Institute of Oceanography (IEO-CSIC) on Bayesian modelling of complex correlated data. During her training, she completed two international research stays, at KAUST University (Saudi Arabia) and Griffith University (Brisbane, Australia). Her doctoral research focuses on developing Bayesian hierarchical spatio-temporal models to analyze the cumulative effects of global change and plausible future oceans.



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.