Finding suitable weather indices for novel fisheries index insurance using machine learning

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Index insurance is a financial tool gaining traction for application in fisheries. It will cover fishers losses under extreme weather events that impact fishery productivity. This is the first assessment to determine the feasibility of such programs and whether suitable indices exist.

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1 Introduction

Predicting fishery output from weather variables is notoriously difficult. It is widely established that climate and weather affect fishing populations (Lehodey *et al.* 2006), but most stock assessment models use little to no year to year environmental data (Privitera-Johnson and Punt 2020). Variations in environmental conditions are now the leading cause of fishery closures and disaster relief payouts in the United States (Bellquist *et al.* 2021). Disaster declarations are becoming more frequent straining a slow, inequitable system (Holland and Leonard 2020; Jardine *et al.* 2020). Calls for new financial tools to alleviate fisher income shocks have grown (Mumford *et al.* 2009; Sethi 2010).

Index insurance has risen as a prime candidate tool to protect fishing communities during disasters (**Watson2023?**). Index insurance is a financial product that pays out when an independently verified index, such as rainfall or temperature, falls below a predetermined threshold. The index is chosen to be highly correlated with the asset being insured. Index insurance has been successful in agriculture, but has not been widely adopted in fisheries. The main reason is that suitable indices for fisheries are not well understood. This study aims to identify suitable indices for fisheries index insurance using machine learning.