Editors of XYZ Journal,

I am writing to submit an original research paper, titled "How might climate change affect indices of abundance? A simulation study starting point.," for consideration in JOURNAL NAME. I believe that our study aligns closely with the journal's focus and would be of interest to its readership.

Our paper considers the challenge of accurately monitor fish population in the context of increasing water temperature. More specifically, we compare the effectiveness of stratified random samples to accurately track fish biomass trends as warming waters cause the population to change its spatial distribution. We compare biomass index estimates derived from a design-based approach to those derived from a model-based method that allows for the inclusion of environmental covariates.

Key highlights of our paper include:

1. \*\*Simulation Model\*\*: We developed a discrete, spatial, data-driven simulation model for 3 species of fish on Georges Bank in the Atlantic ocean, where fish movement preferences respond to water temperature. This modeling framework allowed us to create a dynamic representation of how fish populations might behave under varying temperature conditions.

2. \*\*Climate Change Scenarios\*\*: The fish in our population models respond to oscillating spatial temperature patterns. A repeating yearly temperature pattern produces repeating spatial biomass distributions in a given week, while a temperature gradient that increases on average over time results in spatial preferences that evolve throughout a given simulation. Using this approach we created simulated spatial time series datasets for each species for several temperature scenarios and population trends.

3. \*\*Sampling and Estimation\*\*: We conducted stratified random sampling of the model's output and calculated both design-based and model-based estimates of biomass. This sampling approach allowed us to evaluate the performance of each methodology in estimating fish biomass accurately under different temperature patterns, population trends, and sampling scenarios.

4. \*\*Comparative Analysis\*\*: We then systematically compared the results obtained through design-based and model-based approaches to the true biomass values within our simulation model. This comparison provides valuable insights into the strengths and limitations of each approach, particularly in the context of varying environmental conditions and the impact of including environmental covariates in the model-based estimates.

We believe that our study contributes significantly to the field of fisheries management and has the potential to inform decision-makers on the most suitable methodologies for tracking fish population trends, especially in a changing climate. Thank you for considering our submission. We look forward to the opportunity to contribute to the ongoing discourse in your journal.