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The sspm R package: spatial surplus production models for the management of northern shrimp fisheries

Spatial Surplus Production Models (SSPMs) are spatially explicit models of fisheries productivity designed to inform stock management. Like other fisheries management tools, such models can be technically convoluted and their deployment is often limited by code availability, quality and accessibility. We present the R package sspm, a flexible framework aimed at making SSPMs easier for managers to apply in the context of the Northern Shrimp (Pandalus borealis) fisheries. Although one of the most economically important stocks in Canadian waters, the Northern Shrimp in shrimp fishing areas (SFAs) 4 to 6 currently lack a population model to predict how fishing pressure and changing environmental conditions may affect future shrimp abundance. To fill this gap, we developed a lag-1 autoregressive SSPM that included predictors such as Atlantic Cod (Gadus morhua) density, alternate predator density, temperature, and Northern Shrimp biomass. This model was later adapted into the sspm package. We will show how the model design is effectively abstracted by the package design and further demonstrate how the package can be easily used by managers to forecast fisheries productivity under different management regimes. Finally we will discuss choices in the design of the user interface and reflect on best practices when it comes to adapting research code into management tools.