

# Spatio-temporal Dynamics and Population Structure of Swordfish (*Xiphias gladius*) in Kenya's EEZ Amid Declining Stocks

## INTRODUCTION

Swordfish (*Xiphias gladius*) is a commercially and ecologically important large pelagic species in the Western Indian Ocean (WIO). It contributes significantly to regional fisheries production and supports coastal livelihoods within Kenya's Exclusive Economic Zone (EEZ). However, knowledge of its biological characteristics, population structure and spatial distribution patterns in Kenyan waters remains limited, constraining effective stock assessment and sustainable management. Size composition data indicate that 93% of landed swordfish are immature individuals, while regional stock assessments show a declining biomass in the Western Indian Ocean.

## OBJECTIVES

- Improve understanding of swordfish population structure and spatio-temporal dynamics in Kenya's EEZ
- Identify potential priority areas for conservation

## MATERIAL AND METHODS

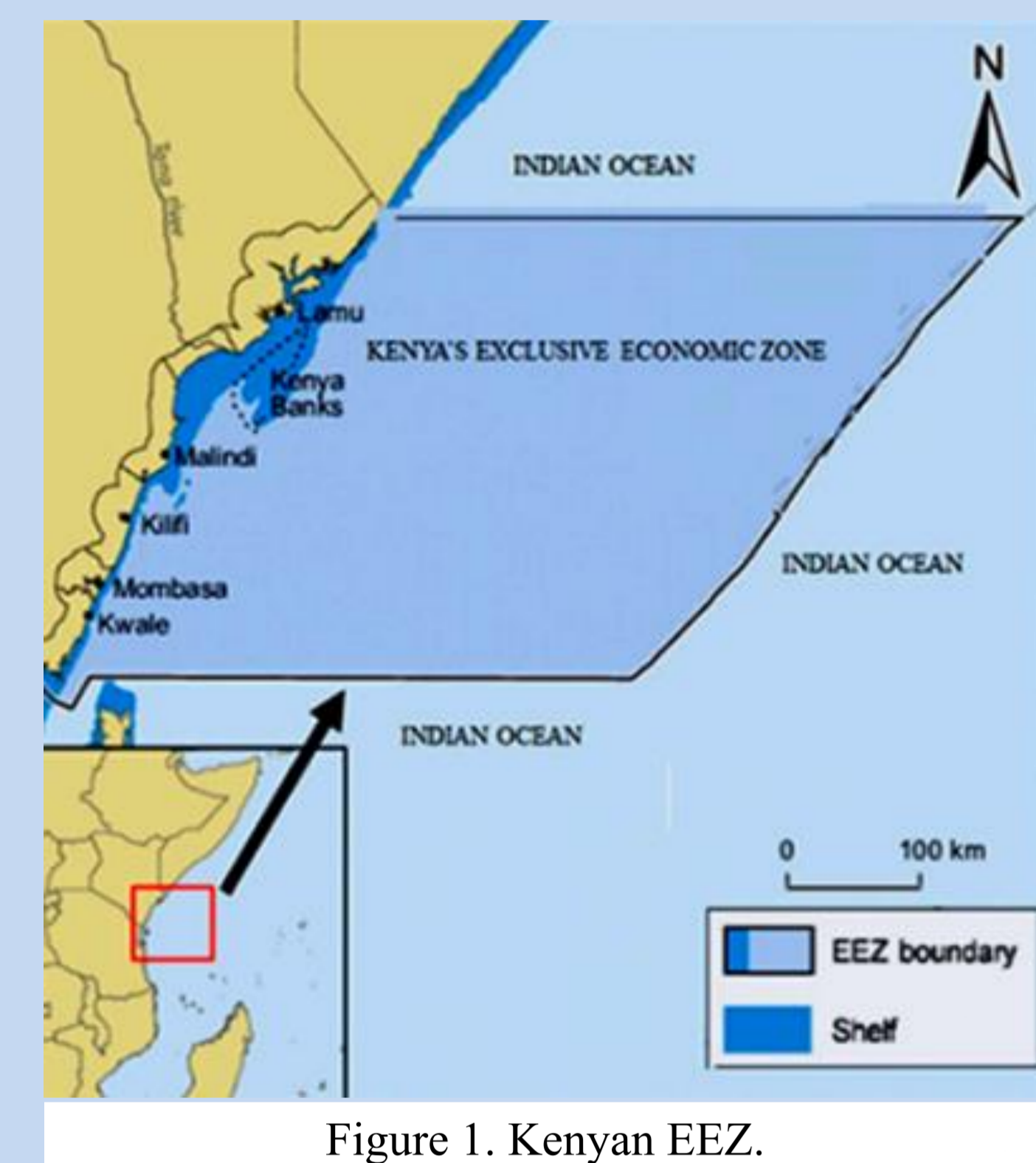


Figure 1. Kenyan EEZ.

Study location: Kenya's EEZ

- Fisheries-dependent data (2016-2025)
- Fisheries-independent surveys (2020, 2023, 2025)
- Key variables: lower jaw fork length (LJFL), sex, maturity, gonad weight

## ANALYTICAL FRAMEWORK

Survey data were used to characterize three key biological relationships:

- Maturity ogives
- Sex ratio ogives
- Weight-length relationship

## RESULTS

### BIOLOGICAL RELATIONSHIP

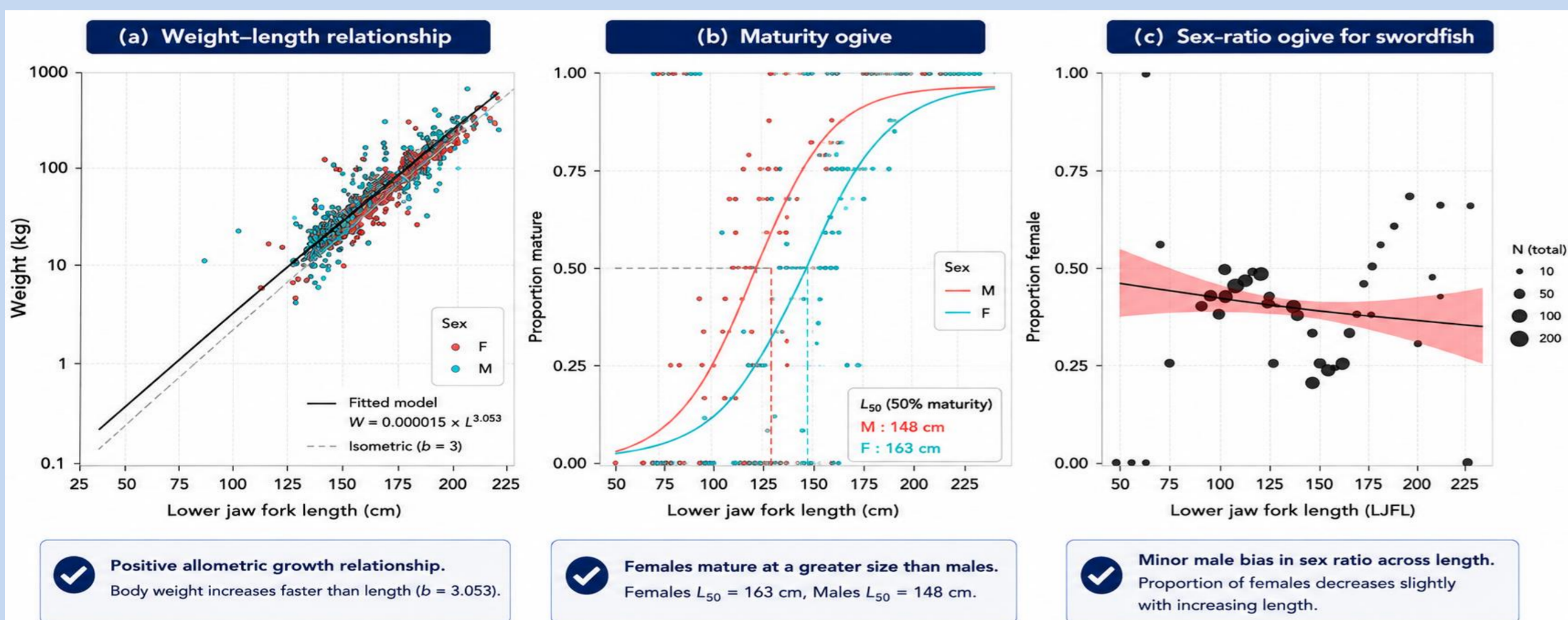


Figure 2. Weight-length relationship, maturity ogives and sex ratio plots

- Females attain larger sizes than males
- Females mature at a larger size (L50 = 175-185 cm LJFL) compared to males (L50 = 140-150 cm LJFL)
- Growth follows a positive allometric relationship
- Minor male bias observed in sex ratio across length

**KEY MESSAGE:** Over 90% of landings consist of immature individuals, indicating growth overfishing and an urgent management need.

## RESULTS

### SIZE DISTRIBUTION

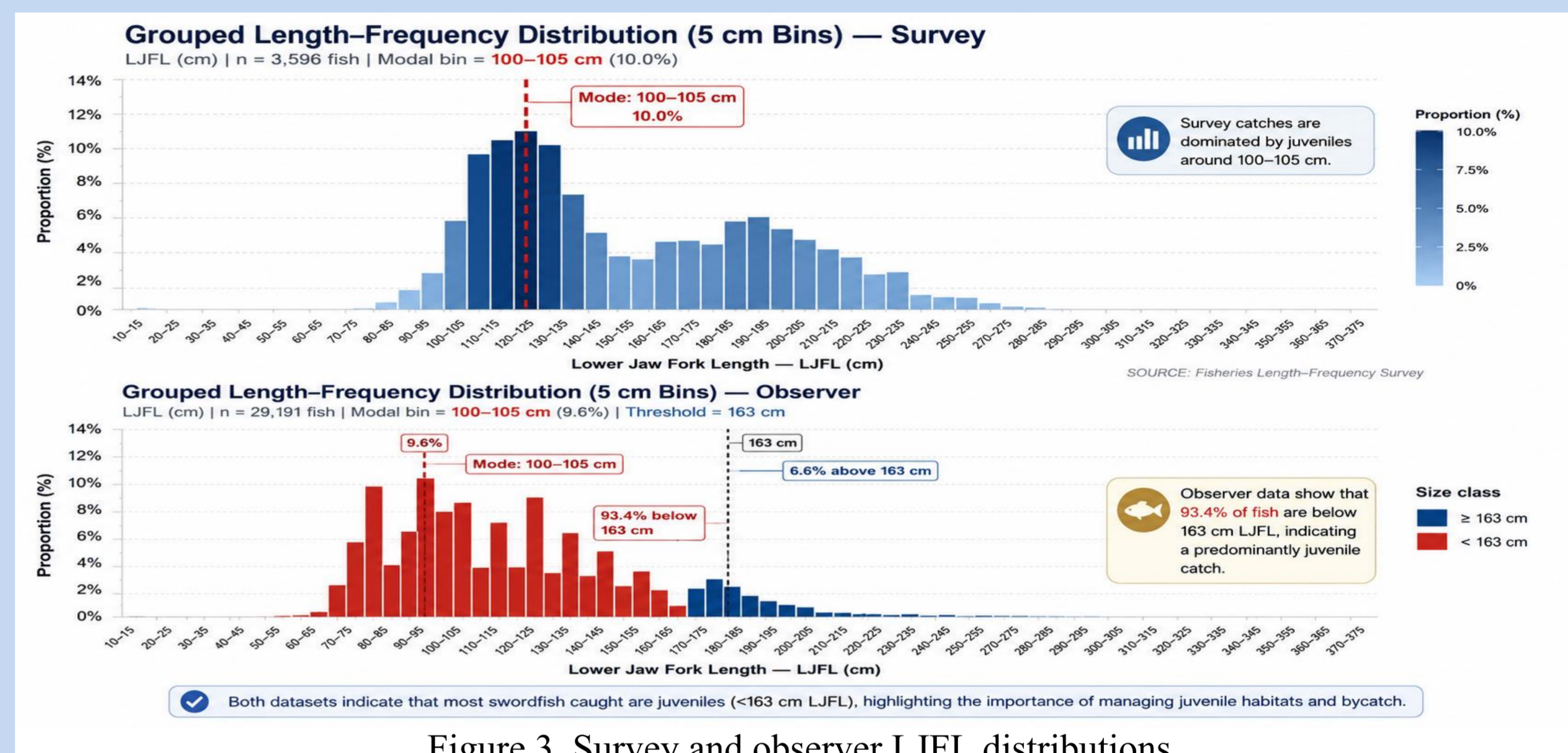
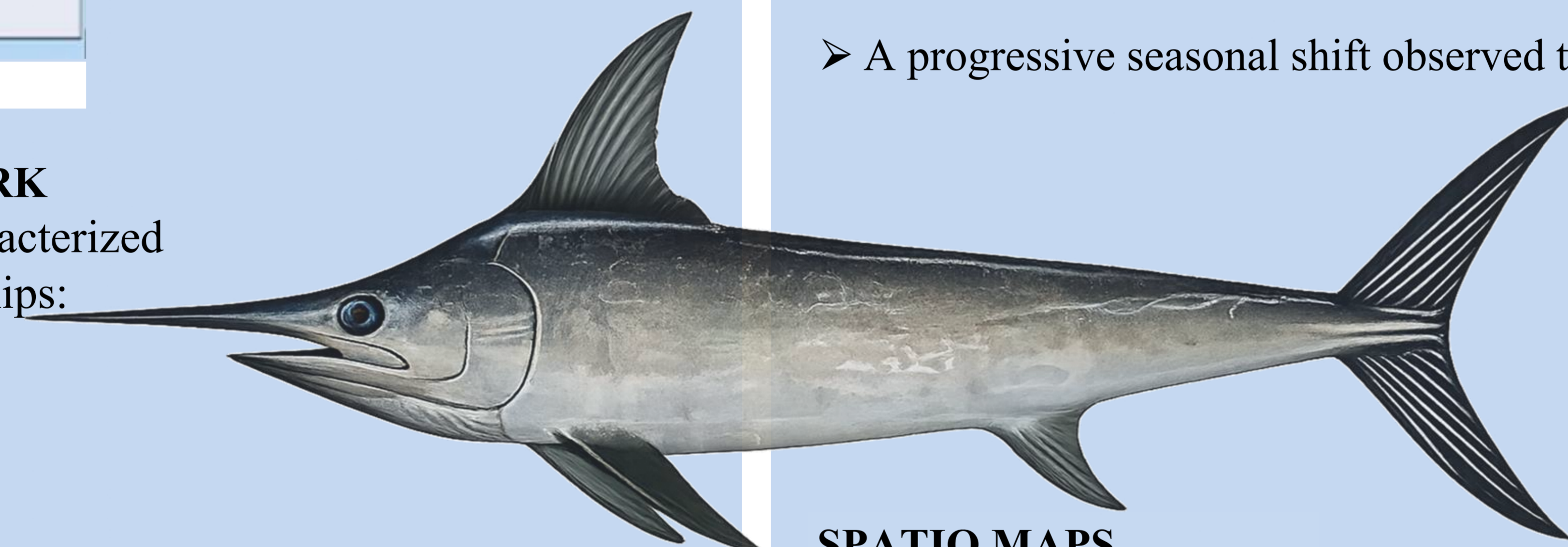


Figure 3. Survey and observer LJFL distributions.

- Catches dominated by 80-120 cm LJFL, below maturity threshold
- 94 % of catches were immature, below 163 cm L 50 value
- Higher proportions of juveniles occur during Northeast Monsoon (NEM) and First Intermonsoon (FIM) periods
- A progressive seasonal shift observed toward larger individuals



### SPATIO MAPS

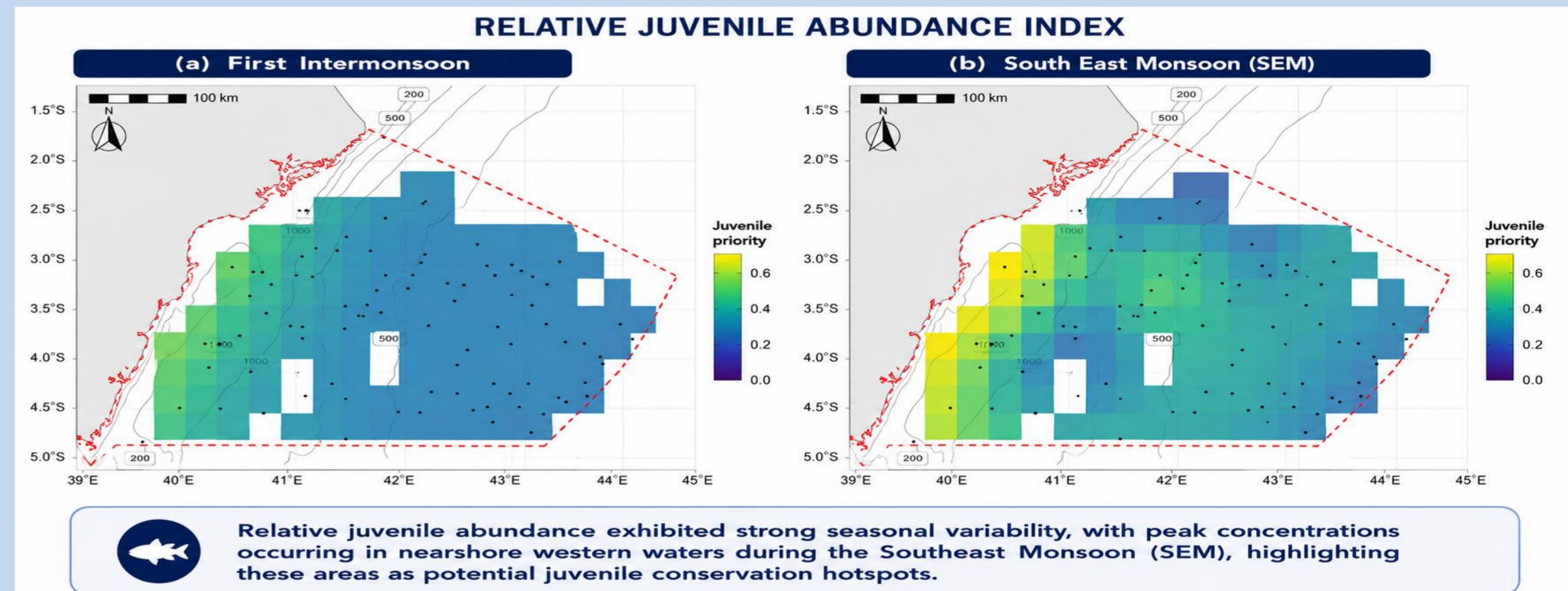


Figure 4. Spatial distribution of relative juvenile abundance.

Relative juvenile abundance exhibited strong seasonal variability, with peak concentrations occurring in nearshore western waters during the Southeast Monsoon (SEM). These areas represent potential juvenile conservation hotspots.

## RECOMMENDATIONS TO IOTC

- Implement seasonal closures in areas of high juvenile proportion.
- Regulate gear (hook, size, type and branch line)
- Increase observer coverage to more than 20%
- Introduce a minimum landing size

