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Assessing the Fishing Grounds and the Influence of Oceanographic Variables on Skipjack Tuna (*Katsuwonus pelamis)* Distribution and Abundance Along the Southern Coast of Sri Lanka

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Abstract

Skipjack tuna (*Katsuwonus pelamis*) is one of the most economically and ecologically important species in Sri Lankan fisheries and world fisheries. Within the Indian Ocean, the southern coast of Sri Lanka has long been recognized as a prime fishing ground for Skipjack tuna. This region is affected by monsoonal cycles and produces rich upwellings that serve as productive fishing zones. Using 30-day processed and merged remotely sensed satellite data of the year 2019, this research focuses on the south coast of Sri Lanka (latitudes 0°N-6.5°N and longitudes 76°E–85.6°E), targeting offshore and high seas longline, gill net, and ring net Skipjack tuna fisheries catch data. Environmental data including sea surface temperature (SST), sea surface chlorophyll (SSC), sea surface height (SSH), eddy kinetic energy (EKE), sea surface salinity (SSS), and mixed layer depth (MLD) derived from the remote sensing satellites (RSS) were extracted from two Copernicus marine services products and spatially converted to a 1/3° spatial resolution. Then the catch data obtained from the Department of Fisheries and Aquatic Resources (DFAR), were merged with the satellite data. The effect of these oceanographic factors on Skipjack tuna abundance and distribution was studied using histogram analysis, generalized additive model (GAM), and empirical cumulative distribution function (ECDF). Skipjack tuna high catch rates were observed at 26.5°C-29.0°C of SST, 0.00 $mg.m^{-3}$-0.50 $mg.m^{-3}$ of SSC, 0.35 m–0.55 m of SSH, 0.00 $m^2.s^{-2}$-0.90 $m^2.s^{-2}$ of EKE, 31.5 PSU–35.25 of PSU SSS, and 10.00–27.50 m of MLD. The catch per unit effort (CPUE) shows variability in the main monsoon seasons of Sri Lanka, with peaks observed in March and October. The variability of the oceanographic conditions directly influences the distribution and abundance of Skipjack tuna. These results showed SST, EKE, and SSC are important environmental parameters affecting the abundance of Skipjack tuna resources in Sri Lankan southern coastal waters. The EKE showed a strong association with the Skipjack tuna catch rates when paired with the SST, suggesting that ocean eddies and sea surface temperature patterns play an important role in Skipjack tuna distribution and abundance along the Sri Lankan southern coastal region.

Keywords: *Fishing grounds, Longline, Catch data, Relationship, Oceanographic conditions*