**The distribution, growth and population parameters of Swordfish (Xiphias gladius-Linnaeus, 1758) in the Coastal Waters of Kenya**

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**Abstract**

Broadbill Swordfish (Xiphias gladius) is one the pelagic species found in the tropical oceans, including the Kenya waters. The species is targeted by longline fishers, both offshore and inshore waters. There is paucity of information and data on the Swordfish fishery in Kenya coastal waters. The study was conducted in five sites along the Kenya coast in Lamu, Kilifi, Mombasa, Malindi and Watamu between August 2015 and December 2016. Data was collected on a monthly basis from the catches landed by artisanal fishers employing different methods of fishing. A total of 319 individuals were sampled. The objective of this study was to investigate the spatial and temporal distribution, length frequency distribution, growth parameters, catch rates, mortality rates, biomass and fishing gear selectivity for the Xiphias gladius. The Lower Jaw Fork Length (LJFL) to the nearest centimetre (cm) and weight (W) to the nearest Kilogramme (Kg) was used to plot length/weight relationship curves to estimate a and b. The Length-Frequency data and gear selectivity were analyzed using FISAT (ELEFAN) and von-Bertalanffy. Virtual Population Analysis (VPA) using FISAT II was performed to show survivors and the losses due to natural and fishing mortalities, steady state biomass, yield and Maximum Sustainable Yield (MSY). Catch per Unit Effort (CPUE) was computed by dividing mean weight of fish caught (Kg) with the mean number of fishing crew for every fishing trip. There is evidence of temporal and spatial variation of fish catch rates in the Kenya coastal waters. A total of 8785Kg of Swordfish was landed during this sampling period with Old Town (Mombasa) accounting for 94.6% of the catch. High catches were recorded from May to December. October 2015 recorded the highest catch of 1621 Kg. The weight ranged from 4kg to 101 Kg with an average of 27.53 Kg. Combined fishing gears show that Swordfish ranged from 79 cm to 245 cm LJFL with most individuals in the length class of 66cm. The growth parameters were; Asymptotic Length, $L_\infty = 208$cm; Growth coefficient, $K = 0.28$/ year; the theoretical age at length zero, $t_0 = 0.18$; and growth performance index, $\phi = 4.08$. Mortality rates were; Total mortality, $Z = 1.13$/ Year; Natural mortality, $M = 0.44$/ Year; Fishing mortality, $F = 0.69$/Year; Exploitation rate, $E = 0.61$/ Year. The selectivity of all fishing gears combined; Lc 25 = 89.9 cm LJFL, Lc 50 = 98.3 cm LJFL, Lc 75 = 106.7 cm LJFL. Mortality rates and fishing gear selectivity for longline; $Z = 1.29$/ Year, $M = 0.44$/ Year, $F = 0.85$/Year, $E = 0.66$/ Year. The selectivity of all fishing gears combined; Lc 25 = 91.4 cm LJFL, Lc 50 = 99.6 cm LJFL, Lc 75 = 107.9 cm LJFL. This suggests that longline is highly selective of larger individuals as opposed to other fishing gears. Virtual Population Analysis (VPA) shows that mortality due to fishing pressure is experienced between 75 cm – 135 cm midlength. Steady state biomass = 63.38 tonnes/year; Yield = 7.16 tonnes/Year and Maximum Sustainable Yield (MSY) = 15.3 tonnes/Year. The yield is lower than the biomass and MSY indicating that the stocks are healthy, hence under exploited. Potentially this artisanal longline swordfish fishery
can be developed and sustainably managed to improve the socio-economic wellbeing of the local fishing communities.

**Key Words:** Kenya, Coastal waters, Swordfish (*Xiphias gladius*), length, weight, distribution, mortality, growth, sustainable, management