World Academy of Science, Engineering and Technology
International Journal of Marine and Environmental Sciences
Vol:18, No:03, 2024

Exploitation Pattern of Atlantic Bonito in West African Waters: Case Study of the Bonito Stock in Senegalese Waters

Authors : Ousmane Sarr

Abstract : The Senegalese coasts have high productivity of fishery resources due to the frequency of intense up-welling system that occurs along its coast, caused by the maritime trade winds making its waters nutrients rich. Fishing plays a primordial role in Senegal's socioeconomic plans and food security. However, a global diagnosis of the Senegalese maritime fishing sector has highlighted the challenges this sector encounters. Among these concerns, some significant stocks, a priority target for artisanal fishing, need further assessment. If no efforts are made in this direction, most stock will be overexploited or even in decline. It is in this context that this research was initiated. This investigation aimed to apply a multi-modal approach (LBB, Catch-only-based CMSY model and its most recent version (CMSY++); JABBA, and JABBA-Select) to assess the stock of Atlantic bonito, Sarda sarda (Bloch, 1793) in the Senegalese Exclusive Economic Zone (SEEZ). Available catch, effort, and size data from Atlantic bonito over 15 years (2004-2018) were used to calculate the nominal and standardized CPUE, size-frequency distribution, and length at retentions (50 % and 95 % selectivity) of the species. These relevant results were employed as input parameters for stock assessment models mentioned above to define the stock status of this species in this region of the Atlantic Ocean. The LBB model indicated an Atlantic bonito healthy stock status with B/BMSY values ranging from 1.3 to 1.6 and B/B0 values varying from 0.47 to 0.61 of the main scenarios performed (BON_AFG_CL, BON_GN_Length, and BON_PS_Length). The results estimated by LBB are consistent with those obtained by CMSY. The CMSY model results demonstrate that the SEEZ Atlantic bonito stock is in a sound condition in the final year of the main scenarios analyzed (BON, BON-bt, BON-GN-bt, and BON-PS-bt) with sustainable relative stock biomass (B2018/BMSY = 1.13 to 1.3) and fishing pressure levels (F2018/FMSY= 0.52 to 1.43). The B/BMSY and F/FMSY results for the JABBA model ranged between 2.01 to 2.14 and 0.47 to 0.33, respectively. In contrast, The estimated B/BMSY and F/FMSY for JABBA-Select ranged from 1.91 to 1.92 and 0.52 to 0.54. The Kobe plots results of the base case scenarios ranged from 75% to 89% probability in the green area, indicating sustainable fishing pressure and an Atlantic bonito healthy stock size capable of producing high yields close to the MSY. Based on the stock assessment results, this study highlighted scientific advice for temporary management measures. This study suggests an improvement of the selectivity parameters of longlines and purse seines and a temporary prohibition of the use of sleeping nets in the fishery for the Atlantic bonito stock in the SEEZ based on the results of the length-base models. Although these actions are temporary, they can be essential to reduce or avoid intense pressure on the Atlantic bonito stock in the SEEZ. However, it is necessary to establish harvest control rules to provide coherent and solid scientific information that leads to appropriate decision-making for rational and sustainable exploitation of Atlantic bonito in the SEEZ and the Eastern Atlantic Ocean.

Keywords : multi-model approach, stock assessment, atlantic bonito, SEEZ
Conference Title : ICFA 2024 : International Conference on Fisheries and Aquaculture
Conference Location : Miami, United States
Conference Dates : March 11-12, 2024