

Research on Stock Assessment of Argentine Shortfin Squid

Abstract

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Argentine shortfin squid (*Illex argentinus*) is r-strategist and greatly affected by climatic and hydrological conditions, further resulting in large variations of annual catches. This project first explored potential annual cycles of the Argentine shortfin squid based on a time-series analysis, and analyzed the latest annual changes, for better assessing and forecasting the resources of the Argentine shortfin squid fishery and achieving sustainable use. During the period of 1997-2023, the results showed that 1999, 2000, 2007, and 2015 had the highest annual catches, more than 245 kilotons, and the lowest in 2004 and 2016, merely 9.8 and 12.1 kilotons, respectively. Over the 27 years, range of annual catches was 253.6 kilotons, median was 95.0 kilotons, average was 113.5 kilotons, and standard deviation was 80.9 kilotons. The recent year, i.e. 2023, was a middle-low catch year and decreased the catch comparing to the previous years, i.e. 2021-2022. The fishing areas were mainly around the northeastern waters of the Falkland Islands and at the 200m isobath off the coast of Argentina. The main fishing season started from the third biweek, which had an average daily catch of more than 8 t and even few areas with the highest daily average catch of 30-40 t in this year. Since the fourth biweek, the abundance distribution shifted to the waters northeast of the Falkland Islands but dropped slightly compared to the previous biweek. The fishing vessels went to the waters east of the Falkland Islands and left around the end of the eighth biweek. Although there were slightly high abundance at the ninth biweek, especially along the 200m isobath in the north. However, due to limited catch throughout the year, the fishing season in 2023 was finally ended. The reference database was divided the collected literatures into four categories (biology, management, stock assessment and anthropogenically-induced impacts), and the major categories were then subdivided into 6-14 subcategories. A total of 354 references were collected, covering the period from 1990 to 2023. The total number of collected articles in each category was the highest in biology, reaching 272 articles. When using Generalized Bayesian Linear Model (GLBM) as an example of the stock resource assessment models, in most years based on the monthly assessment, the Argentine shortfin

squid CPUE peaked from March to May, and then decreased. Using the Surplus Production Model (Schaefer) for the stock assessment of Argentine shortfin squid, there was a significant positive correlation between catch and CPUE. However, when time lag existed for CPUE by 4 years or 5 years, the correlations with catch were both negative. The results of the stock assessment varied considerably, with a relatively reasonable estimate showing no time lag effect, Maximum Sustainable Yield (MSY) being between 100,000 and 160,000 tons, and the estimated sustainable biomass (BMSY) being at 740,000 tons. However, due to various limitations, the model applicability of stock assessment of Argentine shortfin squid still needs further investigation.