ABSTRACT

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An investigation into the influence of the environment on spawning aggregations and jig catches of Chokka Squid *Loligo Vulgaris Reynaudii* off the south coast of South Africa.

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Erratic and highly variable catches in the South African chokka squid *Loligo vulgaris raynaudii* fishery, cause socio-economic hardship for the industry and uncertainty for resource managers. Catch forecasting can reduce this problem as it is believed that catch variability is strongly influenced by environmental factors.

In this study, data was collected at varying temporal and spatial scales. Data for the hourly time-scale study was collected from 1996-1998, aboard commercial vessels, whilst for the longer time-scales, data was extracted for Kromme Bay (a single fishing area) from existing databases (1991-1998) that were comprised of compulsory catch returns and oceanographic data. The environment-catch relationship for chokka squid on the inshore spawning grounds was then investigated using multiple correlation and regression analysis, analysis of variance, contingency table analysis and cross-correlation techniques. The simple, direct, 'black-box' statistical approach was relatively successful in developing a predictive capability. On a short time-scale (hourly), the regression model accounted for 32% of the variability in catch, with turbidity the main determinant (13%). On a daily-monthly time-scale, the best prediction model was on a monthly scale, accounting for 40% of the variability in catch. The principle determinant, bottom temperature anomaly (11%), was found to lag one month forward. Seasonal and diel catch variations induced changes in the relative importance of turbidity, water temperature and wind direction on catches. A strong, positive relationship was found between easterly winds (which cause upwelling) and catch, particularly in summer. Catch rates, however, decreased with increase in turbidity. The correlation between temperature and catch was generally negative, however, higher catches were associated with a temperature range of 13 - 18°C. Highest catch rates were associated with easterly winds, zero turbidity conditions and sea surface temperatures from 15.0 – 16.9°C. Selected case studies (*in situ* observations) suggested that upwelling and turbidity events act as environmental triggers for the initiation or termination of the spawning process, respectively.

A holistic approach is required to improve predictive capability of chokka squid abundance. Although short-term predictability remains essential (i.e. hourly scale), future research should concentrate on long-term prediction models (e.g. monthly time-scales) involving greater spatial variation, which are the most important for management.