

## DISTRIBUTION PATTERN OF UNDERWATER ILLUMINANCE FOR SQUID NET FISHERIES IN MALAYSIA

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### ABSTRACT

A study on the distribution pattern of underwater illuminance for squid net fisheries in Malaysia was conducted from April to September, 1996 in sheltered waters of Kapas Island off the coast of Terengganu, Peninsular Malaysia at Latitude 5° 13.6'N and Longitude 103° 15.8'E. Three sets of parameters were collected from three commercial squid fishing boats and underwater illuminance as estimated using a theoretical model. It was found that the underwater illuminance from the lighting systems of all the three boats managed to reach a depth of more than 40 m (maximum depth of the fishing ground is 22 m). High Pressure Mercury lamps were found to produce higher lighting efficiencies as compared to incandescent lamps. Squid net fishermen in the study area were found to be employing excess power for the fishing operation.

KEYWORDS: underwater illuminance, squid fishing, lighting systems.

### INTRODUCTION

Artificial light has long been used in exploitation of commercial fish species (including cephalopods) in all parts of the world. This method has been developed empirically and the intensity of light has been increased without any due consideration to the theoretical knowledge of fish attraction by light (Kawamura *et al.*, 1983; Hayase *et al.*, 1983). The increase in the power of light intensity over the optimum limitation has become a serious concern for marine biologists (Nomura, 1985). Squid fishermen argue that the increase of the power of fishing lights is necessary to attract more squid in their effort to compete with other fishermen operating in the same fishing ground.

In Malaysia, squid is mainly landed by trawls, squid nets, squid jigs, purse seines and traps (Sakri *et al.*, 1995). With the exception of trawls, other gears are usually operated at nighttime with the use of artificial light onboard the fishing boat as a means to aggregate squid for successful harvesting operations (Ashirin & Ibrahim, 1992). Squid nets are one of the most popular squid fishing gears in Malaysia especially in the states of Kelantan and Terengganu (on the east coast of Peninsular Malaysia). The gear is operated only at nighttime especially during moonless nights (after or before new moon) by taking advantage of the squid response to artificial light. This gear is very efficient at catching squids and has great potential in the near future. There are two types of lighting systems

installed onboard squid netting boats that are used with the squid net; the attracting and the controllable light systems. However, this study concentrated only on the attracting light system which is vital in aggregating squid before the harvesting operations. Knowledge of underwater light distribution patterns is important for the success and development of squid capture fisheries. Apart from the reaction pattern of squid to light, the physical factors such as water transparency that affect underwater illuminance should also be considered in order to improve the catching efficiency and reduce the energy consumption of the squid fishing boats. Underwater illuminance is often very difficult to obtain by direct measurement due to the problems related to sea conditions that researchers encounter during their study. However, under-water illuminance can be estimated theoretically using a model as has been described by Hajisamae (1996), Hamid (1990) and Ogura *et al.* (1985). The purpose of this study is thus to determine the distribution pattern of underwater illuminance of Malaysian squid netting boats using the theoretical model based on Ogura's method.

### MATERIALS AND METHODS

Ogura *et al.* (1985) described a theoretical model for the estimation of underwater illuminance. According to the model, underwater illuminance

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