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Study on the Relationship Between Acoustic Backscattering Strength and Density of Larval Anchovies

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The relationship between backscattering strength and fish density is a scaling factor of quick acoustic assessment method. It will affect the accuracy of estimating results. In fact, engraulid larva (anchovy) is so weak and small, it is impossible to form simulating school by using live fish. The dead fish used to simulate fish school by sinking through a 0.83 cm × 0.83 cm mesh size sifter in anechoic tank is described in this paper. Fish density ranging from 170 inds./m^3 to 14,226 inds./m^3 were insonified by a pressure pulse at a carrier frequency of 200 KHz. The received echo signals were recorded on magnetic tape, digitized and processed in a microcomputer to obtain the average backscattering strength of each model school. In a joint effort with underwater optical method to determine the instantaneous actual fish density of model school. The results are summarized as follows:

(1) The average backscattering strength is in proportion to the density of the model school under 1000 g/m^3. Below this critical density, it is possible to estimate the standing crop of engraulid larvae by quick acoustic assessment method.

(2) The individual target strength of engraulid larva is weak ranging more or less between − 101.8 dB and − 94.1 dB. Therefore, the fish density recorded on the echogram by echo sounder is very light.

(3) The regression line between the average target strength (Ts) and and the logarithm of mean body length (BL), Ts = 26.42 Log (BL) − 110.65, is obtained from this study, with a correlation coefficient of 0.98.

Key words: Acoustic estimation, Average backscattering strength, Schooling of engraulid larvae

關鍵詞：超音波評估，平均後方散亂反射強度，鯷科仔稚魚羣

INTRODUCTION

The "shirasu" fishery or "larval" fishery is one of the most important coastal fisheries in Taiwan. Its catches reach 3,165 tons with the value of about 572,605 thousand NT dollars in 1988. The catch species was mainly composed of Family Engraulidae (anchovies) and about 5% other economic species (Sun, 1988). Because of its importance in commercial catches and its possible effect on the inshore fisheries resources, abundance and biology of engraulid larvae have been paid attention for a few years (Chen, 1980, 1982, 1984). Owing to the lack of the information on the recruitment of engraulid larvae and the standardization of fishing gear and fishing method, it is difficult to standardize the fishing effort which

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