TARGET STRENGTH MEASUREMENTS ON SIX COMMERCIALLY IMPORTANT SPECIES CAUGHT IN TERENGGANU WATERS

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Introduction

Acoustic assessment of fish stock size using hydroacoustic is mostly based on statistical sampling of small portion of an area by accumulating echo intensity (or volume back scattering –SV) and average target strength value of individual fish species living in the area. This paper presents the results of target strength (TS) experiments on scads, Decapterus spp,; trevallies, Selar spp. (Carangidae); Indopasific mackerels, Rastrelliger spp. (Scombridae); sardines, Sardinella spp. (Clupeidae); and anchovies, Stolephorus spp. (Engraulidae), which were easily caught by purse seine nets due to its abundance in coastal waters.

Materials and Methods

Setup of Hydroacoustic System and System's Calibration: The steel ball, fish targets were hung by using a thin monofilament twine in a rectangular tank (4m by 2m and by 1.4m) filled with fresh water. A digital transducer (BioSonic DT6000) was setup at similar depth (70 cm) from the water surface so that the main axis points to the target position at a 2.8m apart. The system was calibrated using a standard ball (36.0 mm) of known target strength value of –39.6 dB. Experimental fish: The fish samples to be tested were collected from local purse seine boats operating in waters around Pulau Bidong. They were randomly sampled and measured for their total length, fork length, standard length, and the weight. 250 fish samples were used for the experiment. Target Strength Measurement: The target strength was measured by placing the fish samples in front of the axis of transducer. Each target fish was suspended snout up using a thin monofilament nylon so that dorsal side pointing to the main beam of the transducer. The fish was kept in a vertical position by tying a weight (100gm) on its tail and by another piece of nylon string. The fish was also insonified at different angles by manually rotating the fish.

Results and Discussion

The dorsal aspect TS of Indian mackerel (*Rastrelliger kanagurta*), Yellowtail scad (*Atule mate*), Round scad, Oxeye scad Yellow-banded scad and Longtail tuna (*Thunnus tonggol*) were -42.0 dB, -42.0 dB –42.4 dB, -43.3dB, -49.8dB and -37.0 dB respectively. The dorsal aspect TS to Length (total length) relationship found are as follows:

Rastrelliger kanagurta (Avg. length=18.8 cm)

$$TS = 20 \log TL - 67.5$$

Atule mate (Avg. length=20.0 cm)

$$TS = 24 \log TL - 72.4$$

Selar boops (Avg. length=18.1 cm)

$$TS = 20 \log TL - 82.9$$

Selaroides leptolepis (Avg. length=14.2 cm)

$$TS = 20 \log TL - 68.4$$

Decapterus maruadsi (Avg. length=18.6 cm)

$$TS = 20 \log TL - 77.3$$

Thunnus tonggol (Avg. length=39.6 cm)

$$TS = 20 \log TL - 68.9$$

The results of this study agree with Love's empirical formulas and that of Butterworth (1993) on the relationship between fish target strength and length.

Conclusions

The present results are very important for stock assessment, which is to be carried out in near future. The experiments have demonstrated the applicability of a scientific echo sounder for fast and easy determination of fish target strength.

References

Butterworth, A.J. 1993. A Feasibility Study of the Application of Hydroacoustics to Assess Fish Populations in Malaysian Reservoirs. ASEAN-EEC Aquaculture Development and Coordination Program. AADCP/WP/26. p. 1- 45.

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