Table I. Catch by bottom vertical handline fishing in the eastern part of the Andaman Sea in February, 1973.

Date	Location	Time Start	Time End	Operation Time (min)	Total catch (kg)
24 Feb.	997a	12:05	12:33	28	72.2
25 Feb.	1097a	13:15	13:33	18	96.8
26 Feb.	1097a	10:33	13:47	125	622.4
27 Feb.	1097c	15:27	17:28	67	149.8
28 Feb.	1097c	12:10	17:21	100	384.1
1 Mar.	1097a,c	07:01	07:48	47	79.8

4. CONCLUSION

From the above results and discussion it appears that the combination and interaction of environmental factors may determine to a certain extent the distribution of demersal fisheries resources and may contribute towards the formation of good fishing grounds. In this connection environmental factors should not be analysed separately but as a whole. However, in fishing ground along the edge of continental shelf and banks of submarine ridges the distribution of fish may depend to topographic condition primarily and hydrological condition secondarily.

In view of our limited knowledge further studies need to be carried out on the relationship of environmental factors and the distribution of demersal fisheries resources before such resources can be fully exploited.

ACKNOLEDGEMENTS

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SEAFDEC/SCS.73: S-21

Brief Note on the Relationship of Scattering Layer and some Hydro-Biological Factors*

by
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Abstract

The analysis of echo-sounding records obtained from the South China Sea showed that scattering layer is caused by a concentrated layer of zooplankton and is related to thermocline. The occurrence of scattering layer may be used to indicate either the depth where thermocline occurs or the vertical movement of zooplankton.

Fish schools were reorded at the vicinity of the scattering layer and this phenomenon is probably associated with the feeding habits of the fish.

1. INTRODUCTION

A scattering layer as recorded on an echo-sounder paper (PLate 1) is caused by the presence of zooplankton. During the survey cruises of the research vessel CHANGI the depth of the scattering layer has been observed to be related to the depth of the thermocline as recorded by the bathythermograph. Since zooplankton is an important source of food for juvenile and plankton-feeding fishes, studies on the relationship of scattering layer and some hydro-biological factors are of some importance to fisheries development in the Southeast Asian region.

2. MATERIALS AND METHODS

CHANGI conducted an oceanographic survey cruise and occupied 21 stations in the South China Sea in April 1971 (Fig. 1). Three additional surveys were also carried out in April–May, June and September of 1972. The echo-sounder used was a SR-11 type (Kaijo-Electric Co. Ltd.) with 200 KC frequency. Continuous graphical records of water temperature in the sea were obtained by the bathythermograph (BT). Zooplankton samples were collected by vertical hauling with a closing net (mouth diameter = 25 cm, mesh size = 24/cm) from various strata of the sea and the wet weight of zooplankton biomass (mg/m^3) was recorded.

* We regret that it is not possible to publish the original "plates" as their condition is no longer suitable for printing.

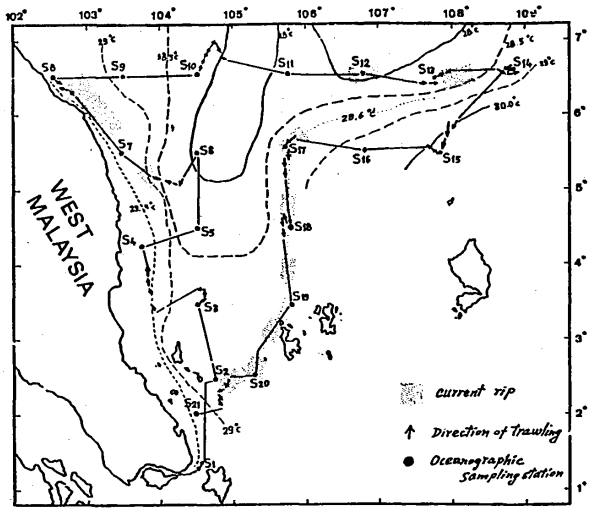

Fig. 1 Oceanographic sampling stations of the survey cruise in April 1971.

3. RESULTS AND DISCUSSION

The relationship between the depth where scattering layer and thermocline occurred are shown in Fig. 2. All the echo-sounding records showed that the scattering layer occurred within the depth range of thermocline. Thus, the occurrence of scattering layer may indicate the depth where the thermocline occurred. The tracing of the scattering layer is darker when the temperature range of the thermocline is wider.

Table I. Variation of plankton biomass in relation to the presence and absence of scattering layer.

Time (hr)	Depth stratum without scattering layer		Depth stratum with scattering layer		
	Depth (m)	Biomass (mg/m³)	Depth (m)	Range (m)	Biomass (mg/m³)
18:09	0–40	76	40–80	50–65	124
97:05	0–40	98	40–73	47.5–58	386
15:00	0–40	97	40–71	46–68	314
09:25	0–40	136	40–68	41–60	221
19:38	0–40	131	40–66	41–60	146
20:19	0–40	113	40–69	30–55	134

Table I shows the relationship between the scattering layer and zooplankton biomass. The results indicated that zooplankton biomass at the depth stratum where the scattering layer occurred was higher than those collected outside the layer. Plate 2 shows the movement of the scattering layer. This layer, moving from the bottom towards the surface, was recorded soon after sunset and became stable on reaching the thermocline 90 minutes after sunset. The scattering layer recorded here is probably formed by concentration of zooplankton. Thus, the movement of scattering layer may indicate the vertical movement of zooplankton, as reported by Moore (1950), Suzuki (1963 & 1969), Suzuki & Tsujizaki (1961) and Shirota (1967).

Plate 3 shows traces of fish schools in the vicinity of the scattering layer. It appears that their presense in the congregation of zooplankton is probably associated

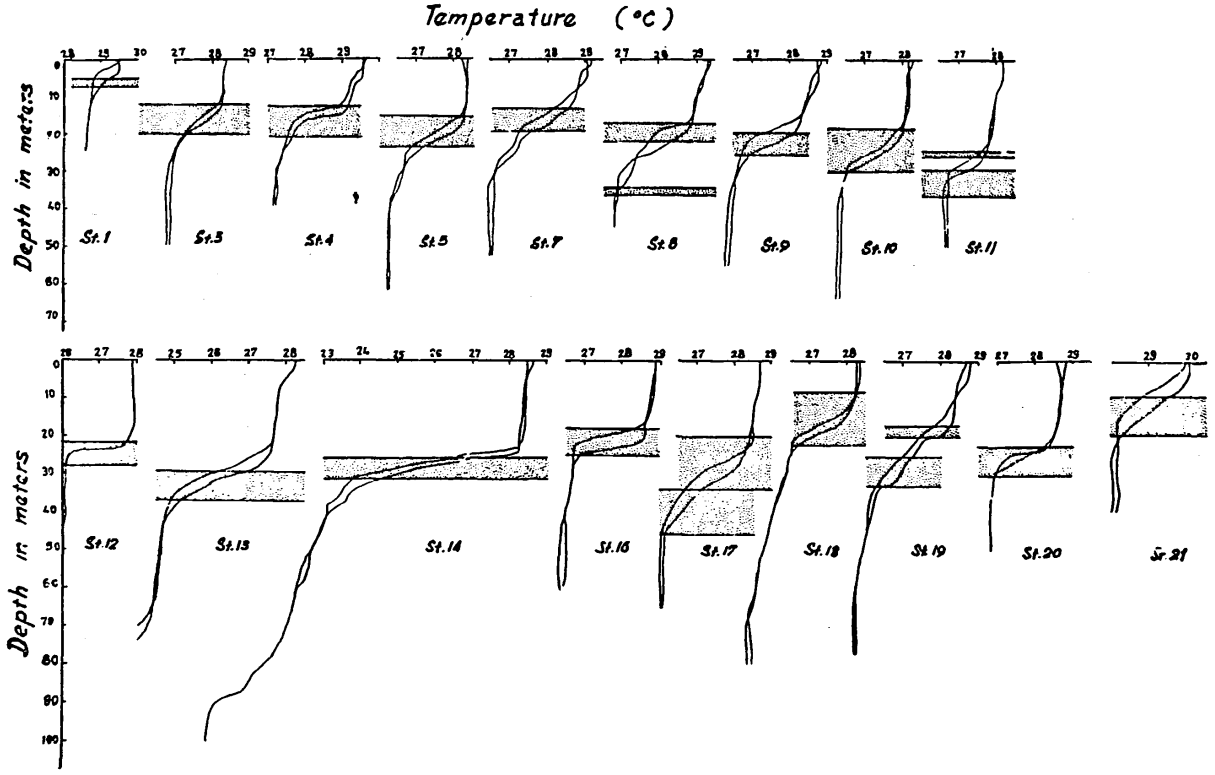

Fig. 2 Relationship between the depth of scattering layer and thermocline in April 1971.

with their feeding habits. The above analysis confirms that scattering layer recorded in the South China Sea is usually a concentrated zooplankton layer. The occurrence of scattering layer may be used to indicate either the depth where thermocline occurs or the vertical movement of zooplankton, the knowledge of which has important application to the development and exploitation of fisheries resources.

4. ACKNOWLEDGEMENTS

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CURRENT STATUS OF FISHERIES INCLUDING STATISTICS

SEAFDEC/SCS. 73: S-1

Current Status of Fisheries Development in South China Sea Area

by

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Abstract

A brief review of current status of fisheries development in South China Sea is made based on fishery statistics currently available. The results are summarized as follows:

(1) During the past decade the number of inboard powered boats operating in South China Sea area increased by 470%. Furthermore, a good number of fishing boats exceeding 100 gross tons have also appeared.

(2) During the same period there appeared a massive explosion of trawl fishery in every country.

(3) The present level of marine fishery production in the area is supposed to be some 4 million metric tons valued at about US$800 million. Although numerous fisheries exists trawl, purse seine and drift gill net fisheries have played a leading role and these three fisheries alone produced 55% of the total marine catch in the area.

1. INTRODUCTION

The present paper briefly reviews the current status of fisheries development in South China Sea area with a hope that it could serve, to some extent, as a background paper to the Technical Seminar on South China Sea Fisheries Resources. However, the author admits that due to scarcity and unreliability of national fisheries data currently available various reviews made in the paper are undoubtedly not conclusive.

Owing to the nature of the seminar various reviews made in the present paper are referred to marine fisheries in South China Sea and those in Malacca Strait and the southern half of Formosa Strait.

2. ENLARGEMENT OF FISHING FLEET DURING THE PAST DECADE

Fishing boats in the area under study are broadly classified into three categories, i.e. (1) Non-powered boat, (2) Outboard powered boat and (3) Inboard powered boat. Table 1 shows how the number of fishing boats for each of those categories has been changed during the past decade.

Although nothing can be clearly mentioned due to the incompleteness of data comparable among countries, the structural change of fishing fleet in the area can be summarized as follows:

(1) As for non-powered boat and outboard powered boat there is a clear sign that the number of these boats is decreasing although the tempo is rather slow. Whereas, as for inboard powered boat a marked increase of such boats is noted. As a matter of fact, during the past decade the number of non-powered boats increased by 22%, whereas that of inboard powered boat increased by 470%.

(2) However, an increasing rate of the number of inboard powered boat differs among countries.