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An Aerial Survey for Surface Tuna Resources in the Seas Around Ceylon

By

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INTRODUCTION

Longline fishery for tunas is contributing less and less while surface fisheries (Purse seine and live bait) are expanding rapidly. High prices of raw tuna meat in 1969 and 1970 have stimulated construction of purse seiners and live bait boats and the resulting competition among these vessels for a limited supply of fish in the Eastern tropical Pacific and Atlantic areas will result in great commercial interest in the surface tunas in the Indian Ocean. Aeriel surveys have been adopted for quick evaluation of surface resources for exploitation and this survey method has proved successful in many parts of the world, particularly off Australia and recently off the Phillipine Islands. Around Australia rippling schools of tuna provide much of their tuna catches and aeroplanes are used for spotting schools for commercial vessels, plotting thermographs and locating thermal fronts for the guidance of fishing vessels.

An aerial survey of the off-shore range around Ceylon, for a quick evaluation of the potential surface tuna resources, for commercial exploitation, was organised by Mr. Manuel R. Cintas of Ocean Blazer Inc. (Commercial tuna), San Diego, California and his associate Mr. R. Perera. The organisers offered, through the Hon'ble Minister of Fisheries, to take an officer of the Fisheries Research Station, Ceylon, as an observer and the author participated in that capacity. Dr. V. Arkely served as the photographer.

The aircraft was a De Havilland 89 No. 4R-AA I, belonging to Rapid Air Service Ltd., Ceylon, under Capt. Emil Jayawardena.

Flight Plan

Five trips were carried out between the 27th and 29th of July, 1970. The location of the airports along coastline, was the basic factor on which these trips were planned.

Trip No. 1—*27th morning—Ratmalana Airport.*—60 miles South-West and a zig zag course (every 30 miles) Northwards. Ratmalana Airport.

Trip No. 2—*28th morning—Ratmalana Airport.*—North-North East 5–10 miles off shoreline (parallel to shoreline) due to bad weather. Jaffna Airport.

Trip No. 3—*28th afternoon—Jaffna Airport.*—60 miles North-East zig zag course Southwards to Trincomalee airport.

Trip No. 4—*29th morning—Trincomalee Airport*—60 miles zig zag course Southwards. Batticaloa airport.

Trip No. 5—*29th afternoon—Batticaloa Airport.*—30 miles South-east and along South coast parallel to shore (7–10 miles off shoreline) due to bad weather. Stop over at Koggala air strip abandoned. Proceeded to Ratmalana, over the shoreline.

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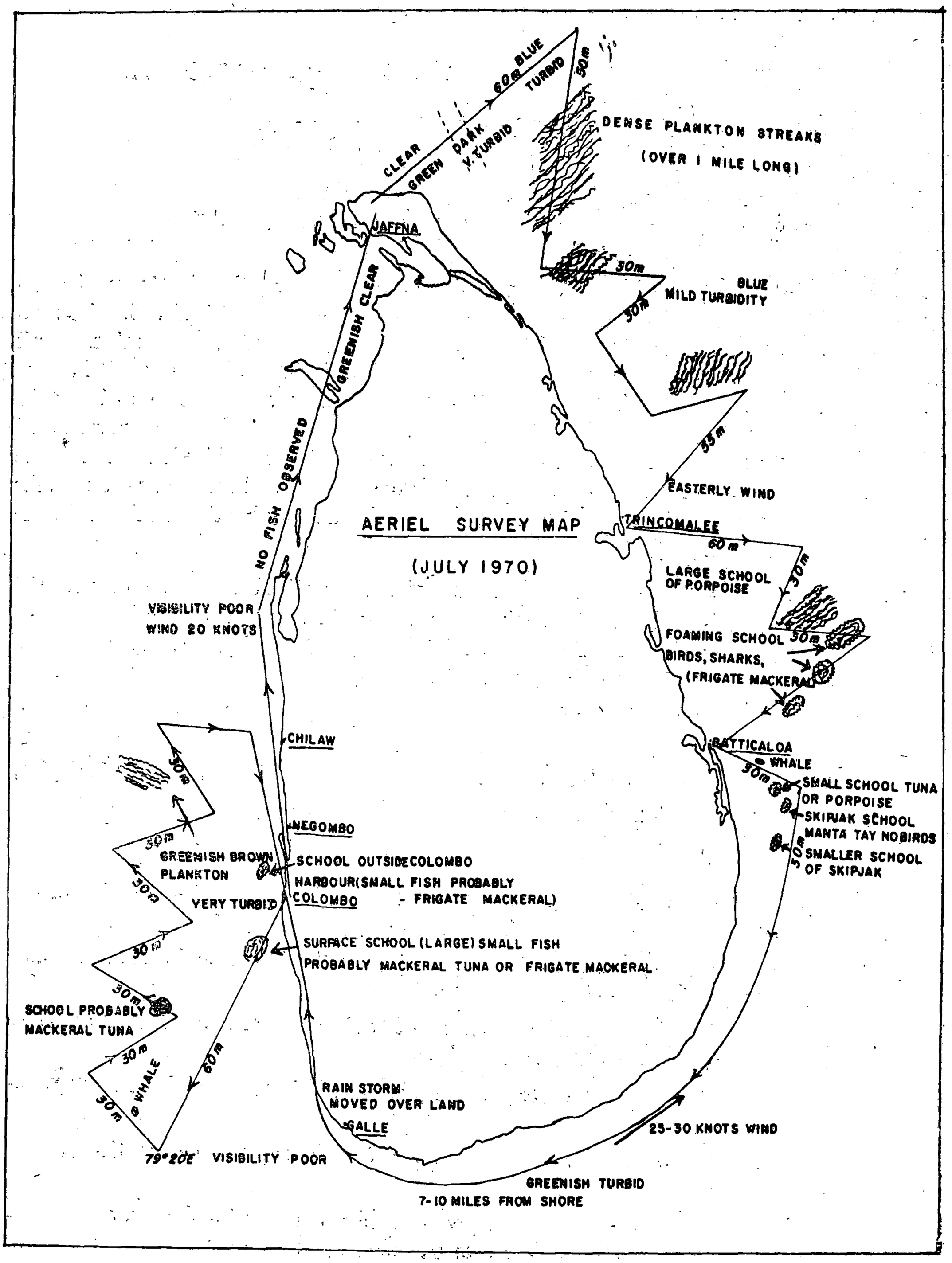

Fig. 1. Map showing of light plan and positions where fish schools were observed

The survey period was within the South-West monsoon season and extremely bad weather with high speed winds were experienced particularly off the North-West and South coasts. Except during these two trips, an average altitude of 1,000 ft. and a flying speed of 110–115 m.p.h. were maintained. The programme was to cover the off shore range between 15 miles and 50 miles, from shore. The total number of hours of flying was eighteen. Details of the flight plan are shown in figure 1.

Observations

The observations made are given in Table 1. Very few schools of tuna were met within the South-West region and they were mainly composed of smaller tuna or tuna like fishes. During this time of the year schools of mackerel tunas (Euthynnus affinis) and frigate mackerel (Ausix thazard & A rochei) appear in this region and is exploited heavily by trolling line fishery. In the eastern region relatively more schools of fish and of slightly larger size fish like skipjack or medium size yellowfin tuna were observed. No fish schools were observed in the North, and North-eastern region. In the North-West and Southern region observation could not be made due to unsatisfactory weather condition and poor visibility.

The schools observed in the South-West region appeared to be drifters whereas most of those on the eastern side were " foamers " and hence location of schools in the latter area was much easier than in the former. Birds were seldom observed in the off shore range and on two occasions birds were seen over foaming schools, on the eastern side. In one particular case a large number of sharks were observed around the school and a manta ray was distinctly noted to be in association with the tuna school (probably skipjack) . Large number of porpoise or Dolphin were observed on the eastern side swimming in a northerly direction. The tuna schools were observed behind these mammalians.

Dense, yellowish, plankton ribs were observed almost over the entire North-east coast and gradually decreased south-wards. The colour of the water as it appeared from the air, showed drastic differences between regions. In the North-east, a clear cut band of seperation of water masses was observed in the off shore. Such a phenomenon was not clearly noticeable in other regions.

Out-trigger canoes with sails, were observed just outside the 10 miles range, in the West coast. Mechanised boats were observed beyond this range, both on the west coast as well the east coast.

Discussion

The evidence indicate that these waters could be rich and that the South-west monsoon influence the productivity of the waters on the eastern side. However, the number of schools observed were much below expectation based on the tuna productions from these waters. During the South-west monsoon large numbers of schools of little tuna and frigate mackerel appear in the inshore waters particularly in the West and South-west region and are exploited by trolling, but a few were seen during this survey. Examination of the performance of the 11 ton class of drift netters, on the days and in areas corresponding to those covered by the aerial survey flight, plan, indicated a very good fishery for tunas in Western and South-western regions and reasonable catches from the other regions (Table 2).

TABLE 1

Observations made during the aeriel survey, in the different regions

Observations	*South-West*	*West*	*North-West*	*North*	*North-East*	*East*	*South-East*	*South*
Tuna schools	Two. One small probably mackerel tuna or frigate mackerel	One. Small M. tuna or F. mackerel	Nil	Nil	Nil	Two large foamers Skipjack or M. tuna	Three. One large probably Skipjack	Nil
Dolphin/Porpoise Schools	Nil	Nil	Nil	Nil	Nil	One. sparsely scattered, moving northerly	Two. Very large ahead of tuna shoals	Nil
Whales	One	Nil	Nil	Nil	Nil	Nil	One	Nil
Birds	Nil	Nil	Nil	Nil	Nil	Few over one school	V. few over one school	Nil
Plankton patches	Nil	Dense greenish yellow	Nil	Yellowish streaks	Dence yellow streaks over a mile long	V. light yellowish streaks	Nil	Nil
Colour of water surface	Blue-turbid	Bluish-turbid	Greenish clear	Green to Blue clear	Blue turbid	Blue-turbid	Blue to Green mild turbidity	Dark turbid poor visibility
Fishing vessels	Nil	Mech. boats and out-trigger canoes	Nil	Nil	Nil	Mech. boats	Nil	Mech. boat (one)
Others	Nil		Heavy blowing N. easterly	Nil	Nil	Easterly wind	Manta ray with school Sharks around school	Poor visibility heavy wind and rain

TABLE 2

Date	*Region*	*Station*	*Average Catch per operation (in lbs.)*			
			Skipjack	*Yellowfin*	*Mackerel tuna*	*F. mackerel*
27/7 ..	West ..	Colombo ..	2,312	194	79	26
27/7 ..	South-West ..	Beruwala-Galle ..	2,408	86	10	28
29/7 ..	South ..	Tangalle ..	300	93	—	—
29/7 ..	East ..	Trinco-Batticaloa	375	72	—	—

This probably means that tunas are present in these waters but without forming surface schools. If such is the case, an aerial survey would not be a satisfactory method of evaluation, in these waters. It has been found that the same species of tuna behave differently in different regions and even within a region, behavioural differences could occur according the variation in the thermal structure of the environment. Hynd (1968) has shown that in Australian waters blue fin tuna forms rippling schools only between 16·7°—20° c., below which the tuna disperses and feeds and above this range, the fish may form schools but will not bite well. Above 21·1° c. blue fin are rarely seen. It is generally accepted that tunas concentrate at thermal fronts and such fronts occur commonly of any coast with upwelling (Raymond 1963, Hynd 1968). Fronts are located from the air either by looking for changes in colour of the water or by plotting temperature maps (Robins 1952, Hynd 1968). Though it was conjectured that formations of thermal fronts possibly contribute to the concentration of tuna in the surface layers of the Ceylon seas, there was no clear cut evidence of it during this survey except for the separation of water masses observed in the north-eastern region. This evidence is not conclusive and the subject is presently under investigation.

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