TROPICAL ATLANTIC TUNA LARVAE COLLECTED DURING EQUALANT SURVEYS

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The EQUALANT surveys, which consisted of multiship oceanic investigations, provided an excellent opportunity to study the tuna larvae of the tropical Atlantic Ocean (considered here to be between lat. 20° N. and lat. 20° S.). The surveys were undertaken as part of the International Cooperative Investigations of the Tropical Atlantic (ICITA).

Dates of the surveys were chosen to coincide with the two oceanographic seasons which occur in these waters--EQUALANT I: February, March, and April 1963; EQUALANT II: August, September, and October 1963. Most of tropical Atlantic is characterized by higher surface temperatures in the northern spring than in the northern summer, but northward from about lat. 10° N. temperatures are higher in the northern summer.

The larvae considered include yellowfin tuna, Thunnus albacares (Bonnaterre); bigeye tuna, T. obesus Lowe; albacore, T. alalunga (Bonnaterre); bluefin tuna, T. thynnus (Linnaeus); and skipjack tuna, Katsuwonus pelamis (Linnaeus). The principal reason for collection of larval tunas is that their presence in an area is indicative of the recent spawning of adults; thus the date and place of spawning may be inferred from the distribution of the larvae. Besides distribution data, aspects of the relation of the distribution and abundance of the larvae to physical features of the environment were analyzed from temperature and salinity measurements.

Distribution

Total larvae collected for each species studied (EQUALANT survey number in parentheses) were: yellowfin tuna 158 (I), and 209 (II); bigeye tuna 53 (I), and 45 (II); albacore 1 (I); bluefin tuna 3 (I); and skipjack tuna 222 (I) and 181 (II). Distribution charts for yellowfin tuna, bigeye tuna, and skipjack tuna are shown in figures 1, 2, and 3. To facilitate comparisons, the numbers of larvae are expressed as the number occurring beneath 100 m^2 of sea surface area.

Differences in the distribution and relative apparent abundance of the larvae of yellowfin tuna (fig. 1) and bigeye tuna (fig. 2) were striking during EQUALANTS I and II. Both species were concentrated in large numbers off West Africa and scattered off South America in collections made during EQUALANT I; both were more abundant in collections made off South America than in those off West Africa during EQUALANT II. Water temperatures may explain the differences because the two species apparently "prefer" waters above 26° C. Skipjack tuna larvae were abundant throughout most of the tropical Atlantic during both EQUALANT surveys, but absent off Cape Verde during EQUALANT I (fig. 3). Their distribution closely paralleled that of larval yellowfin and bigeye tunas during EQUALANT I, but the latter two species were scarce south of the Equator during EQUALANT II. Apparently skipjack tuna larvae are more tolerant of cool water temperatures than are the larvae of the other species (see below).

Of the two other species of tunas obtained during EQUALANT I, the single albacore larva was collected at lat. 4°30' S., long. 33°30' W., on 5 March. One bluefin tuna larva was caught at lat. 7°56' S., long. 15°27' W., and one at lat. 5°00' S., long. 15°29' W., on 22 March; and one at lat. 6°11' N., long. 13°26' W., on 29 March. Neither species was caught during EQUALANT II.

Temperature and Salinity Relations

Tuna larvae are assumed to be confined predominantly to the mixed surface layer. Comparisons of temperature and salinity values of the mixed surface layer with the distribution of the larvae indicated that only temperature is significant. At most

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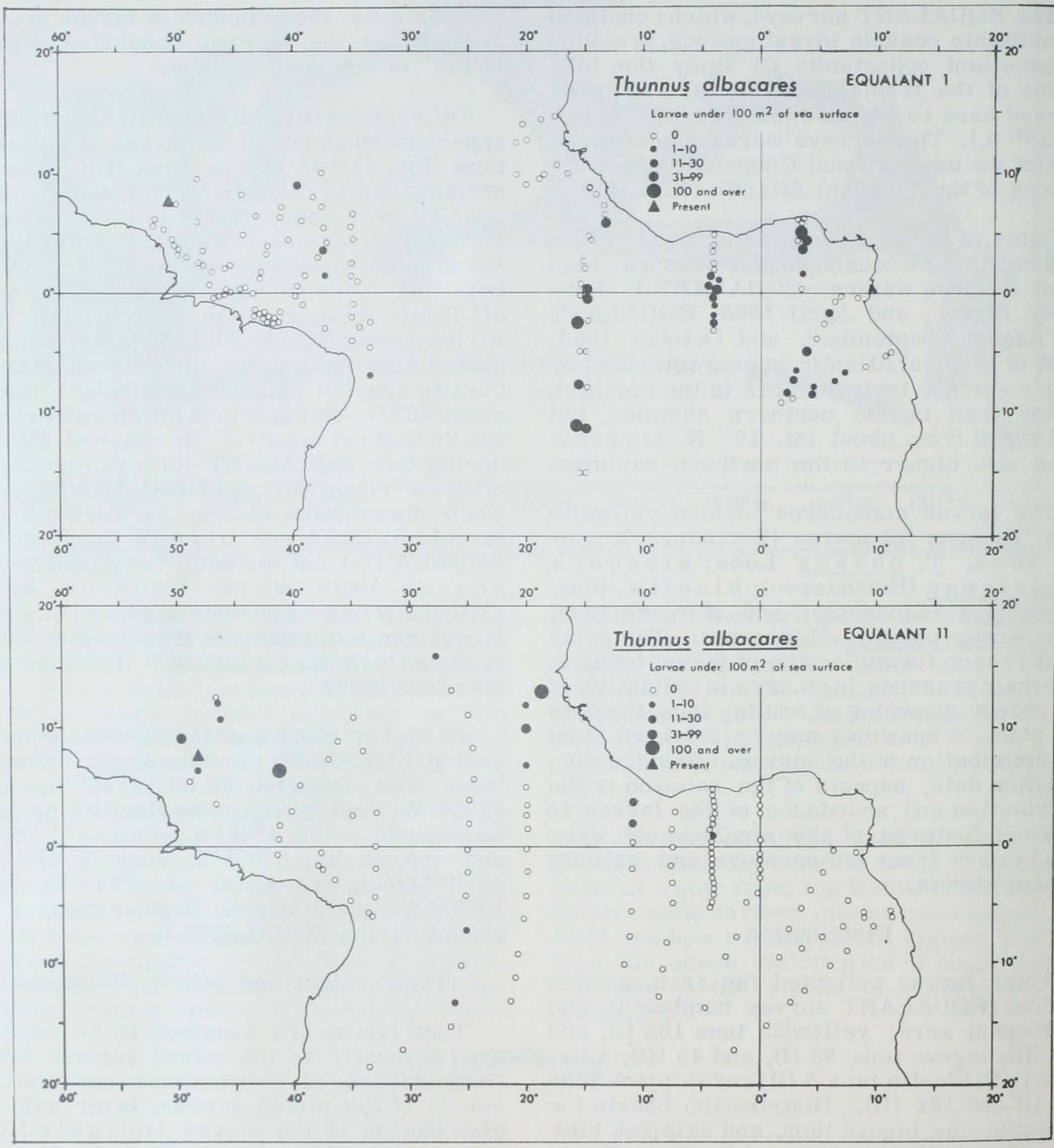

Fig. 1 - Distribution and relative abundance of yellowfin tuna larvae, EQUALANTS I and II.

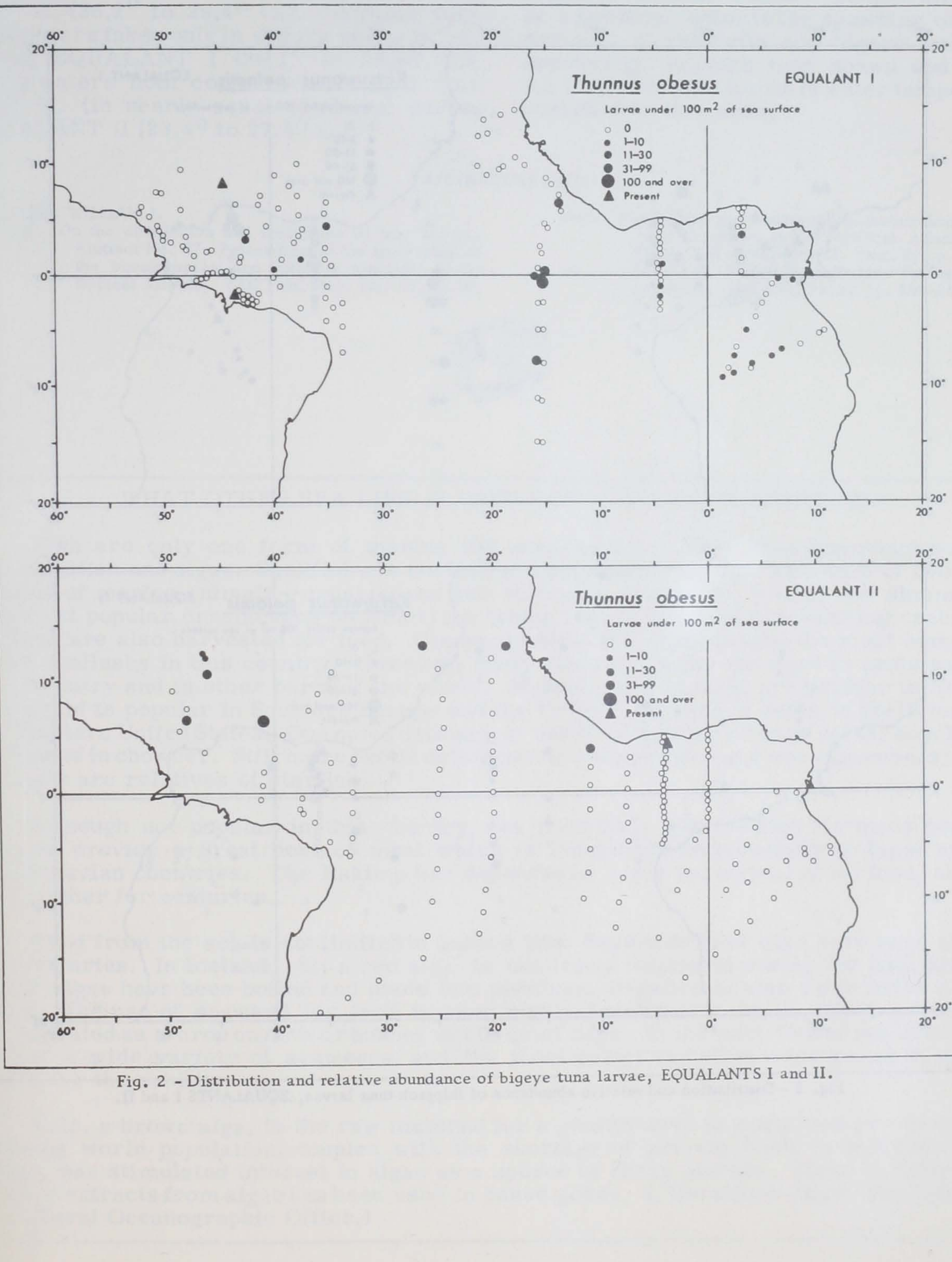

Fig. 2 - Distribution and relative abundance of bigeye tuna larvae, EQUALANTS I and II.

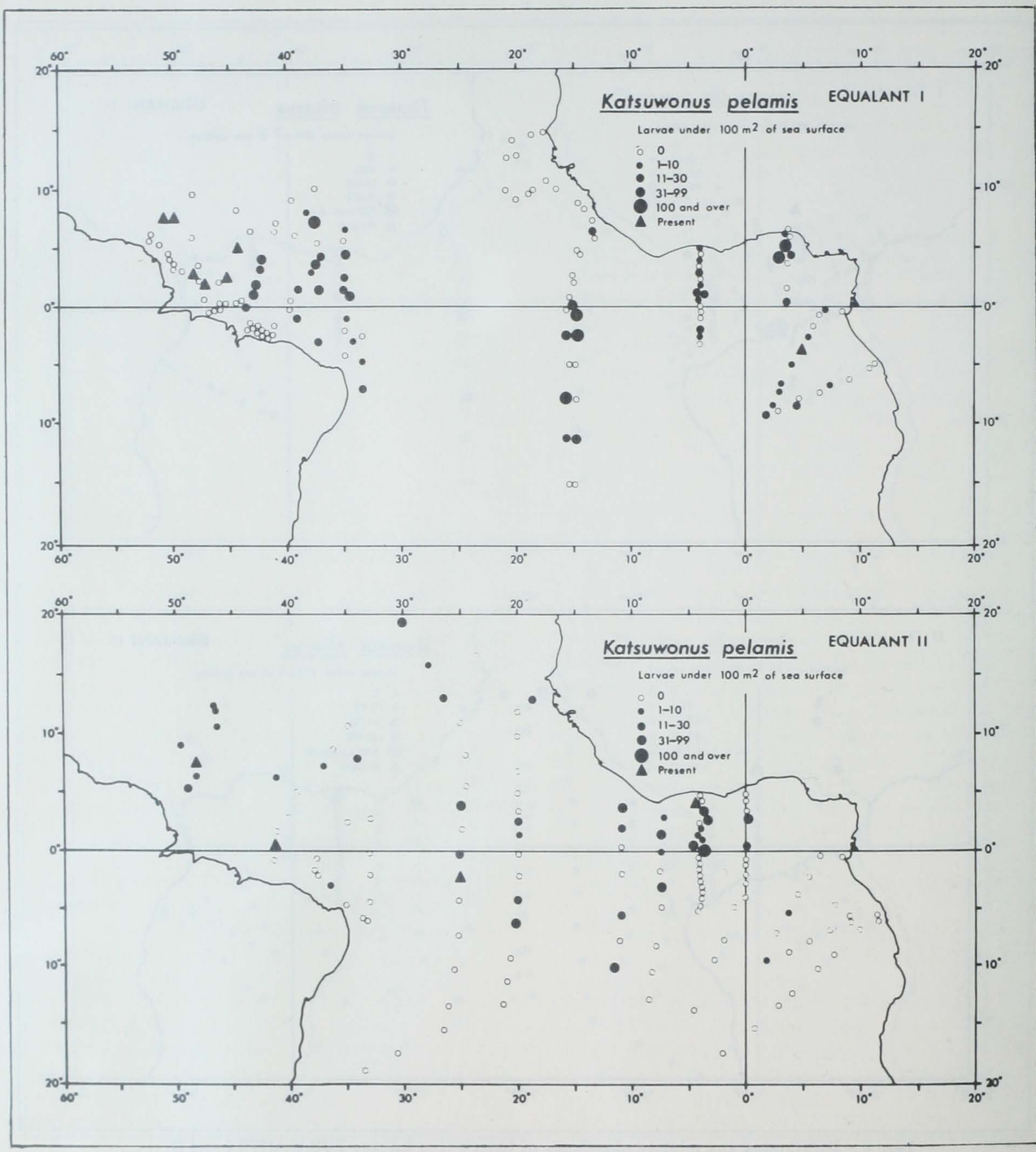

Fig. 3 - Distribution and relative abundance of skipjack tuna larvae, EQUALANTS I and II.

EQUALANT I stations, temperatures were between 26.0° and 29.0° C.; during EQUALANT II they were between 24.0° and 27.5° C. Yellowfin and bigeye tuna larvae were taken only where water temperature was greater than 26.0° C. (26.1° to 29.4° C.). Skipjack tuna larvae were taken only in waters above 26° C. during EQUALANT I (26.1° to 29.4° C.), but in waters both cooler and warmer than 26.0° C. (in nearly equal numbers) during EQUALANT II (23.4° to 27.5° C.).

Conclusion

Larvae of yellowfin, bigeye, and skipjack tunas are widely distributed throughout the tropical Atlantic Ocean. Temperature may be a limiting factor in the spawning or larval survival of yellowfin and bigeye tunas, but apparently skipjack tuna spawn and larvae survive within the limits of water temperature variation in this area.

LITERATURE CITED

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WHAT OTHER SEA LIFE IS USED FOR HUMAN CONSUMPTION?

Fish are only one form of marine life used for food. Two other important sources are shellfish and algae. Shellfish are not fish at all; rather, they are members of two large groups of marine animals--crustaceans and mollusks. Lobsters, crabs, and shrimp are the most popular crustaceans on American tables. Spiny lobsters, Alaskan king crabs, and prawns are also harvested for food. Clams, oysters, and scallops are the most commonly eaten mollusks in this country. However, many other mollusks are used in some parts of this country and in other parts of the world. Mussels and cockles are popular in Europe, and squid is popular in Southern Europe and the Orient. Abalone is eaten in the Orient and the Western United States. One noted delicacy of the West Indies is conch salad; conchs are also used in chowder. Still more exotic delicacies are sea urchins and sea cucumbers; these animals are relatives of starfish.

Although not popular in this country, sea mammals provide food for many peoples. Whales provide a great deal of meat which is marketed commercially in Japan and the Scandinavian countries. The Eskimo has depended on seals and walruses for food, oil, fur, and leather for centuries.

Food from the sea is not limited to animal life. Seaweeds have also been used as food for centuries. In Iceland, söl, a red alga, is used as a vegetable during the long winters. Other algae have been boiled and made into puddings. Seaweed is also eaten in the British Isles. The use of seaweed for food is most highly developed in Japan. Nori, a red alga, is cultivated as a crop on nets or bushes set in quiet bays. In the past, Hawaiians have made use of a wide variety of seaweeds, and the most select varieties were grown in special ponds for the nobility.

Kelp, a brown alga, is the raw material for a gelatin used in many food products. The growing world population, coupled with the shortage of protein foods in underdeveloped areas, has stimulated interest in algae as a source of cheap protein. Flour enriched with protein extracts from algae has been used in baked goods. ("Questions About The Oceans," U.S. Naval Oceanographic Office.)