

Species Synopsis No. 23
FAO Fisheries Biology Synopsis No. 66
(Distribution restricted)

FIb/S66
SAST - Tuna

SYNOPSIS OF BIOLOGICAL DATA ON ALBACORE Thunnus alalunga
(Gmelin) 1788 (WESTERN ATLANTIC)

Exposé synoptique sur la biologie du germon Thunnus alalunga
(Gmelin) 1788 (Atlantique Ouest)

Sinopsis sobre la biología de la albacora Thunnus alalunga
(Gmelin) 1788 (Atlántico Occidental)

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Rome, 1963

1 IDENTITY

1.1 Taxonomy

1.1.1 Definition

Phylum Chordata
 Subphylum Craniata
 Superclass Gnathostomata
 Series Pisces
 Class Teleostomi
 Subclass Actinopterygii
 Order Perciformes
 Suborder Scombroidei
 Family Scombridae
 Genus Thunnus
 Species Thunnus alalunga

1.1.2 Description

- Genus Thunnus South 1845

"Body oblong, robust, with very slender caudal peduncle. Head conical. Mouth wide, with one series of small, conical teeth in the jaws and bands of minute multiform or sand-like teeth on the vomer and palatines. Scales present, those of the pectoral region forming an obscure corselet. First dorsal of 12 to 15 spines which grow gradually shorter backward, the interval between last spine and second dorsal slight; second dorsal and anal short and rather high, each with 8 or 10 finlets; ventrals moderate; pectorals moderate, inserted rather below the level of the eye. Vertebrae normal, 39 to 41 in number, the lower foramina small." (Jordan and Evermann, 1896:869-70).

- Thunnus alalunga (Gmelin) 1788

"Body rather slender, head and eyes comparatively large, caudal portion short. Scales rather large, about 210 in the lateral line. Pectorals sabre shaped, very long, reaching to the first anal finlet. Lower margin of these fins is a little concave at the proximal part. Height of the second dorsal is equal to or a little shorter than that of the first dorsal.

"The roof of the abdominal cavity is remarkably convex. So the cavity is very narrow and the flesh very rich in amount. Three lobes of the liver are connected with each other by very narrow portions, and the lateral lobes are divided into many lobules at the margin, as well as the inner side. On the outer side of the liver we find very fine parallel venules, covering nearly the whole

surface of the liver. On the inner side of the liver bulbous and more or less conical masses of vascular plexus of both arterioles and venules are found.

"Venules to the cutaneous vein are arranged in two alternate rows, and are more numerous than the arterioles. These venules pour to the inner side of the vein. Arterioles from the cutaneous artery are arranged in one row, and on the inner side of the artery. Venules are very minute and numerous, forming thick sheets in the lateral muscle, before pouring into the cutaneous vein. These venules form numerous small bundles by uniting just at the root. Each of the numerous branches from the cutaneous artery is minutely divided as soon as it emerges from the main blood-vessels, and running along the venules supplies fresh blood to the dark red portion of the lateral muscle. The cutaneous artery originates just behind the pharyngeal muscle in the levels of the fifth vertebra and runs obliquely backward.

"Air-bladder present, rounded at the anterior end, and its wall is rather thin. It is narrow, but long, running the whole length of the abdominal cavity. Kidneys of both sides are united to form a flat, ring-shaped body round the pharyngeal muscles. The ring-shaped kidneys are slightly prolonged backward. Ureters of both sides meet in a nearly straight line, thick at the junction. In this thick junction, we find a short longitudinal septum from the anterior wall. Posterior to this septum the ureters are joined to a median tube.

"Skull rather narrow. Vertebral column more or less slender. Height of the vertebrae nearly uniform. Parapophyses well developed. Parapophyses of the ninth vertebra are almost horizontal as in the preceding vertebrae; but in the tenth vertebra the haemal arch is formed and is turned forward leaving only a little space between the centrum and the arch. In each of the following precaudal vertebrae the haemal spine is formed, and it is remarkable that it is nearly uniformly elongated. These precaudal haemal spines are remarkably longer than in other tunnies. The head of the second and third ribs is very thick, and the distal portion of these ribs is broad, thin, and gradually narrow. The part between the head and the broad distal portion is very narrow to admit the passage of the cutaneous blood-vessels.

"The colour is blackish blue in the dorsal part, with a greenish lustre near the tail. Sides and belly are silvery. In young specimens, ca. 60 cm in length, we find some five or six dark, irregularly longitudinal bands, running near the ventral median line. These bands are more distinct at the caudal region, and are more or less united in the form of irregular net-work. First dorsal nearly colourless, except the dusky border. Pectorals black, ventrals and the second dorsal are dusky, but the anal is nearly colourless. The dorsal finlets are dusky, washed with yellow, while the ventral finlets are more or less dusky. Iris silvery, tinted with light blue." (Kishinouye, 1923:434-436).

1.2 Nomenclature

1.2.1 Valid scientific name

Thunnus alalunga (Gmelin) 1788

1.2.2 Synonyms

Ala-lunga Getti, 1777
Scomber alatunga Gmelin, 1788
Scomber germo Lacépède, 1802
Scomber germon Lacépède, 1802
Thynnus pacificus Cuvier and Valenciennes, 1831
Orcynus germo Lütken, 1880
Germo alalunga Jordan and Evermann, 1896:871
Germo germo Jordan and Evermann, 1926
Thunnus (T.) alalunga
 Fraser-Brunner, 1950

1.2.3 Standard common names, vernacular names

Standard Common Name^{1/}

U.S.A., Canada	Albacore
Cuba, Dominican Republic, Mexico	Albacora
Brazil	Albacora blanco cachorra
Martinique	Germon
Other Common Names and Vernacular Names	

U.S.A., Canada	Long-finned albacore, longfin tuna
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These names are taken from Rosa (1950).

1.3 General variability

1.3.1 Subspecific fragmentation (races, varieties, hybrids)

Meristic counts, shown below, are given by Bullis and Mather (1956) for four specimens:

Table I

Counts of Thunnus alalunga from the northwestern Caribbean.

First dorsal spines	14	14	13	13
Second dorsal spines and rays	15	15	15	15
Dorsal finlets	8	8	8	8
Anal spines and rays	15	15	15	14
Anal finlets	7	7	7	8
Pectoral fin	33	34	34	33
Upper gill rakers	8	9	8	7
Lower gill rakers	19	20	19	20

Proportional measurements on these fishes are as follows:

Table II

Measurements (in percentage of fork length) of Thunnus alalunga from the northwestern Caribbean

Fork length in mm.	958	969	1025	1050
Snout to first dorsal	.322	.326	.310	.327
Snout to second dorsal	.576	.591	.563	.576
Snout to anal	.625	.641	.630	.626
Snout to ventral	.326	.340	.342	.325
Head	.287	.302	.296	.288
Maximum depth	.279	.282	.270	.277
Maximum width	.219	.221	.212	.212
Largest first dorsal spine	.111	.123	.119	.113
Base first dorsal	.252	.262	.239	.246
Length second dorsal	.132	.127	.140	.139
Base second dorsal	.094	.094	.101	.101
Length anal	.127	.130	.128	.137
Base anal	.074	.093	.094	.077
Pectoral	.409	.412	.428	.450
Ventral	.109	.103	.099	.097
Caudal spread	.336	.369	.361	.369
Longest dorsal finlet	.031	.033	.032	.034
Ventral insert to vent	.310	.312	.309	.313
Least depth caudal peduncle	.023	.024	.024	.024
Max. width at caudal keels	.079	.073	.079	.074
Snout	.094	.102	.098	.100

^{1/} Since the albacore is rare in the western Atlantic, these names probably also are used for the yellowfin tuna (Thunnus albacares) and blackfin tuna (T. atlanticus)

2 DISTRIBUTION

2.1 Delimitation of the total area of distribution and ecological characterization of this area

In the western Atlantic Thunnus alalunga has been caught from waters off the middle Atlantic States of the United States as far south as the coast of Brazil. Rivas (1951) said that up to that time there were "no authentic records of Thunnus alalunga from the western North Atlantic" and reports of the occurrence of this species there were "not supported by actual specimens and almost certainly are based on the ever confused T. atlanticus." Since then, however, a number of authentic records have been made which definitely establish the presence of T. alalunga in the western Atlantic (Bullis & Mather, 1956); Mowbray, 1956; Mather & Gibbs, 1957). It has not yet been reported from the Gulf of Mexico.

2.2 Differential distribution

- 2.2.1 Areas occupied by eggs, larvae and other junior stages: annual variations in these patterns, and seasonal variations for stages persisting over two or more seasons. Areas occupied by adult stages: seasonal and annual variations of these

There is no information available on areas occupied by eggs, larvae and other juvenile stages.

- Areas occupied by adults

Thunnus alalunga has been caught in the western Atlantic in the following areas: Off the coast of New Jersey at 39° 45' N, 73° 00' W (Mather & Gibbs, 1957).

This specimen was 81 cm in fork length. It was caught by trolling on September 12, 1956. Off Bermuda, Mowbray (1956) caught it on experimental longlines. An earlier record of an albacore reported by Goode & Bean (1879) from off Nova Scotia at about 44° N, 58° 30' W about Banquereau, is questionably identified. Bullis & Mather (1956) report the capture of 11 specimens "at seven stations in the area south of and between western Hispaniola and eastern Cuba and north and east of Jamaica". Their lengths ranged from 95 to 105 cm. A commercial fisherman using longlines "had been catching albacore --- south of Ponce, Puerto Rico and in the vicinity of St. Croix ---. Thus this valuable species appears to have been fairly abundant and widely distributed in the northern Caribbean ---". Rosa (1950) says T. alalunga in the western Atlantic occurs on the " --- coast of the United States, rarely found north of Florida but straggles as far as Cape Cod on the coast of Massachusetts along the Gulf Stream, Bahama Islands --- Caribbean Sea, Cuba, Leeward, Windward, Tobago and Trinidad Islands --- coast of Brazil", but some of these areas and identifications may be questionable. The northernmost substantiated record is given by Mather & Gibbs (1957:243).

2.3 Behavioristic and ecological determinants of the general limits of distribution

Studies on the Pacific albacore reviewed by Yoshida and Otsu (1962) show that temperature and other factors are important in determining its distribution. Its occurrence in cool waters of the Pacific (58° - 68° F), and its apparent presence in only deeper strata of the western Atlantic, suggest that the Atlantic form prefers cool water. Mather (1962b) reported albacore taken in water below 60° F in the western Atlantic.

5 EXPLOITATION

Springer (1957) reports that commercial longline vessels landed albacore at Ponce, Puerto Rico early in 1955, along with other species of tunas. Quantities and other particulars are not given. Since that report these vessels have ceased fishing in the Caribbean, their operations in 1955 being experimental. Mowbray (1956) lists albacore as a potential commercial species in Bermuda. It is caught by anglers there.

The only commercial fisheries of consequence in the western Atlantic for albacore are by Japanese vessels off the coasts of Brazil and in the Caribbean Sea, including waters off the Dominican Republic and Venezuela (Anon, 1957). Areas in the northern Caribbean were abandoned, and fishing activity has been concentrated off Brazil and Venezuela.

5.1. Fishing equipment

5.1.1 Fishing gear

The gear used by the Japanese for albacore in the western Atlantic is the longline. This is the same as described by Shimada (1951).

5.2 Fishing areas

During Japanese exploratory fishing operations in 1957 yellowfin and albacore were the principal species caught. The best grounds for yellowfins were located north of 4° S, and for albacore, south of this boundary. Fair catches of albacore were made as far south as 22° S.

The Atlantic grounds opened up in 1957 extended in a narrow belt along the Equator from Africa to South America and are not extensive. Albacore were reported to be abundant offshore between Cabo Frio (60 miles east of Rio de Janeiro) and Santos (Anon, 1959b).

Albacore were reported caught in greatest numbers in waters off the northeastern Brazilian coast, south of the Equator, in an area including the Rocas Reefs and Fernando de Noronha Islands. In other areas off Brazil yellowfins have dominated catches with albacore ranking second (Pinto, 1961).

In 1958 Japanese longline vessels tried tuna fishing in the Caribbean, with poor results (Anon, 1959a). However, Japanese longline vessels are reported to be fishing out of Venezuelan ports, in areas about 150 miles north of Venezuela. Catches include yellowfin and albacore.

5.3 Fishing seasons

In 1958 Japanese longline catches of albacore in the Brazil Current were best in winter and poorest in summer (Nagai & Nakagome, 1958). In that year the catches per 100 hooks of longline gear in December were 9.28, and in February 9.12. Catches in the North Equatorial Current were much lower than those in the Brazil Current in winter, the catch rate in the former area being 1.82 fish per 100 hooks. In spring the South Equatorial Current area showed a catch rate of 1.3 - 2.6. The Brazil Current catch rate in spring was 2.47 fish per 100 hooks.

In 1959 Japanese vessels in the period from June to January were fishing in an area starting about 200 miles north of the Amazon, and seaward several hundred miles. This narrow fishing ground was believed to be supported by upwelling.

From February to June fishing took place south of Fernando de Noronha, between Cabo São Roque and the São Francisco River (Anon, 1959d).

5.4 Fishing operations and results

5.4.1 Effort and intensity

The numbers of boats operating in the Japanese longline fishery off Brazil were 1959, 9; 1960, 35; 1961, 52. In December 1961, of the 52 Japanese tuna vessels fishing in the Atlantic, 40 were operating in the albacore grounds off South America; this was 14 fewer than in 1960.

In the spring of 1959, 3 Japanese firms were operating 9 longliners off Brazil.

5.4.3 Catches

When Japanese boats first fished off Brazil in the spring of 1957 catches of tuna were about 13 tons a day; late in 1957 this had fallen to 7 - 9 tons and in

early 1959 to 5 - 7 tons. These catches were about 80% yellowfin, the rest being made up of big-eye tuna, albacore, and bluefin.

Catches were already showing marked signs of decline in early 1959 (Anon, 1959c).

Albacore and other tunas caught off Brazil were landed in various Caribbean countries as well as in Brazil. These countries included Puerto Rico, Cuba, Haiti, Trinidad and Panama (Anon, 1959c, 1959e).

In 1958 Japanese albacore landings at countries in the western Atlantic were as follows (Anon, 1959e):

	1,000 metric tons
Brazil	1,119
Cuba	91
Trinidad	24
Panama	394
Haiti	219
Argentina	28

Substantial drops in catches of tunas in the western Atlantic were reported late in 1959 by Japanese boats. These catches consisted mostly of yellowfin, but included some albacore. In 1957 an average daily catch of 4,000 kan (16.6 metric tons) was reported per vessel. In 1958 this dropped to half, and in 1959 it fell still further (Anon, 1960a).