AGE COMPOSITION OF THE COMMERCIAL CALIFORNIA BLUEFIN TUNA CATCH IN 1963

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ABSTRACT

Over 30 million pounds of bluefin tuna were landed at California ports in 1963, making it the third largest season in 46 years. The fishery was dependent on fish of age groups I, II, and III which comprised 89 percent by weight and 97 percent by numbers of the catch. Age group II was the largest age group by weight comprising 43 percent of the total quantity.

Good correlation was found between the means of age groups I, II, and III and length-frequency modes, strongly supporting the theory that checkmarks on scales are of annular origin.

INTRODUCTION

Between the years 1918 and 1963 the California commercial landings of bluefin tuna (Thunnus thynnus) have varied from about 0.5 million pounds in 1933 to over 31 million pounds in 1962. During the past 10 years bluefin tuna has placed among the top 10 commercial species in value and pounds landed. The past season, 30,400,087 pounds of bluefin tuna were landed at California ports, making 1963 the third largest season in 46 years.

Annual bluefin age and growth parameters are necessary before population dynamics ca be investigated. Due to the constantly increasing demand for fish as a source of food and a source of certain manufacturing industries, and because of the danger that even the apparently limitless stocks of the oceans might be depleted by the continuous removal of its resources, t dynamics of the population from which our commercial fishery draws its catch must be understood before realistic management judgments are possible. T aid in determination of maximu sustainable yield of the eastern Pacific bluefin stock, data was collected from the 1963 commercial bluefin landings at Termin Island, Calif., on both age and length frequency so that an esti mation of the age composition the catch could be made.

Table 1 - Calculated Percentage of Fish Landed Both by Number and by Weight for Age Groups 0 Through VI for the 1963 Season Year-Class Are Also Indicated

Age Group	0	I	II	III	IV	V	VI
Year-Class.	1963	1962	1961	1960	1959	1958	1957
Percentage Catch By Number. . .	0.29	47.30	40.27	10.02	1.45	0.48	0.19
Percentage Catch By Weight . . .	0.11	25.11	43.75	20.26	6.27	2.96	1.54

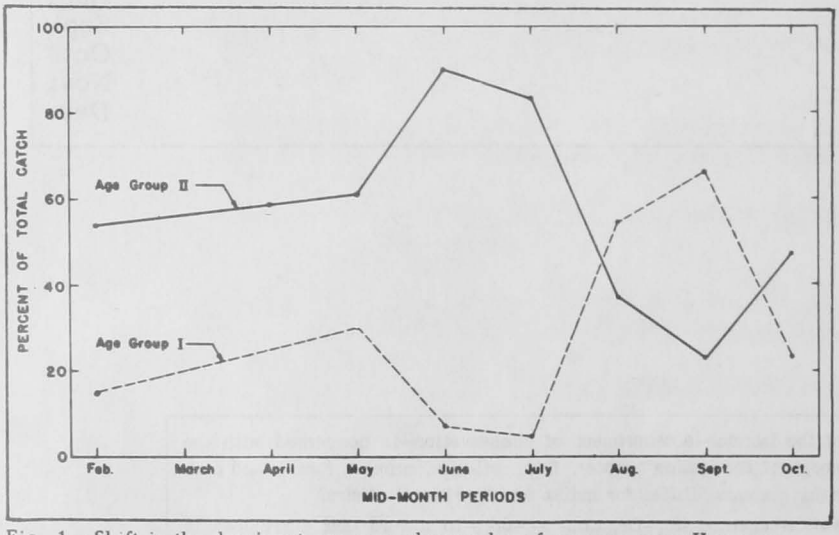

Fig. 1 - Shift in the dominant age group by numbers from age group II to age group I.

MATERIAL AND METHODS

The absolute age determin tion of tuna is difficult and the r sults obtained from some inves gations are problematic. The scale technique as used by Bell on the albacore, Thunnus alalun (1962) and bluefin tuna (1963) was sufficiently encouraging to justify the use of his methods

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Scale samples and length-frequency data were collected throughout the 1963 season. Length-frequency samples were collected randomly and consisted of 50 fish from each vessel in port. At times, conditions arose when all vessels could not be sampled; however, a concerted effort was made to sample as many vessels as possible. The fish were measured, to the nearest centimeter, from the tip of the upper jaw to the fork of the tail. A sample of approximately 50 scales was obtained from every fifth fish in the length-frequency sample for use in age determinations. Scales were taken from either the caudal peduncle or from an area below the second dorsal fin.

Bluefin scales are difficult to read and cleaning and staining the scales helped to distinguish the checkmarks (Bell 1963). Eleven percent (132) of the 1,170 scale samples were unreadable due to oil impregnation, regeneration, or other imperfections.

RESULTS

Of the 1,038 scale samples read, only 24 were from age groups 0, IV, V, and VI. Over 89 percent of the weight of the fish caught in 1963 consisted of age groups I, II, and III, with age group II contributing 43 percent of the quantity. Over 97 percent of the catch by number consisted of the same age groups with age group I the dominant age group (table 1.)

Table 2 - Ages of 1,038 Bluefin Tuna Caught in the Commercial Fishery in the 1963 Season

Age Group	0	I	II	III	IV	V	VI
Number.	3	491	418	104	14	5	2
Mean Length (cm.)	57.7	64.3	83.5	102.9	136.0	155.0	170.5
Standard Deviation	1.53	2.55	8.68	6.47	11.13	2.92	3.54
Standard Error of Mean.	0.89	0.15	0.42	0.63	2.87	1.30	2.50
Range.	56-59	54-88	60-109	71-135	120-155	151-158	168-173

From mid-July through mid-September there was a shift in the dominant age group by numbers from age group II to age group I (fig. 1). Ninety percent of the landings of age group I were made in those two months and contributed over 60 percent of the total catch by numbers.

The good correlation found between the means of age groups I, II, and III and length-frequency modes strongly support the theory that checkmarks on scales are of annular origin. Small samples sizes for age groups 0, IV, V, and VI gave inconclusive comparisons (table 2, fig. 2).

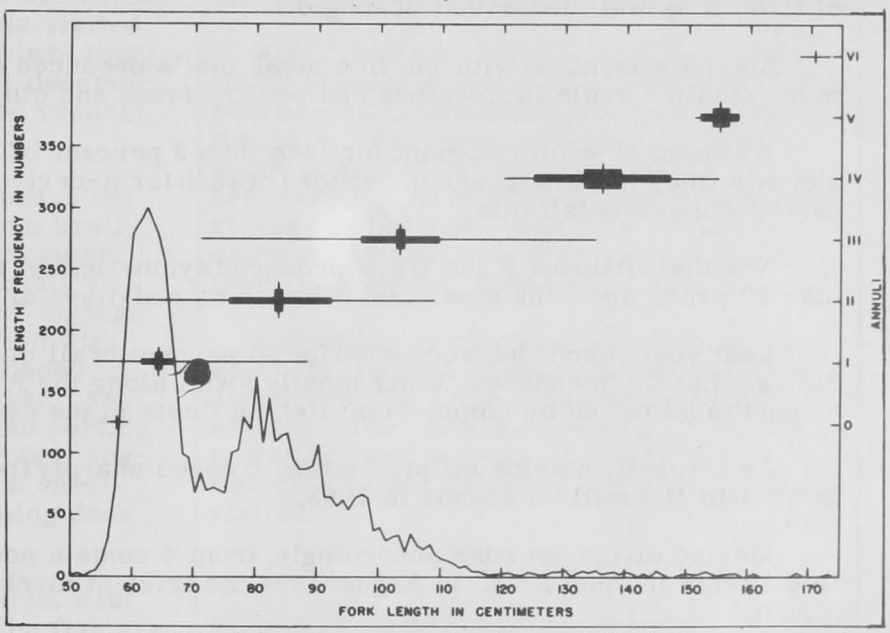

Fig. 2 - Age and length frequency relationship of sampled bluefin tuna. The fine line represents the range; the long solid box, one standard deviation on either side of the mean; and the short box, one standard error of the mean on either side of the mean.

SUMMARY

The 30.4 million pounds of bluefin tuna landed in California made 1963 the third largest season in 46 years. The fishery was dependant on fish of age groups I, II, and III which comprised 89 percent by weight and 97 percent by numbers of the catch. Age group II was the largest age group by weight comprising 43 percent of the total quantity.

A second movement of bluefin into our fishing area may be indicated by a shift in dominant year-classes by number in the later part of the fishery.

Only 11 percent of the 1,170 scale samples collected were unreadable for various reasons and the good correlation between length-frequency modes and means of age groups I, II, and III strongly indicate that checkmarks on the scale are of annular origin.

LITERATURE CITED

BELL, ROBERT R.
1962. Age Determination of the Pacific Albacore of the California Coast. California Fish and Game, vol. 48, no. 1, pp. 39-47.

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TODAY SMALL FISH USED TO MAKE LOW-COST MARINE OILS

If the fish aren't biting it costs the paint and varnish industry more than usual to manufacture its products.

What's the connection? It's a boney fish too oily to eat, weighing less than a pound, measuring less than a foot--the menhaden, the principal source in the United States of the marine oils used as drying agents in paints and varnishes.

Marine oils mixed with raw linseed oil are used in exterior house paints. They're used also in barn and roof paints, rust-proof coatings, and undercoat paints. In varnish, bodied fish oil is combined with tung oil, a use that will probably increase because the cost of fish oil is well under that of tung oil.

Marine oils, along with the fish meal that's produced at the same time, are used on a much smaller scale in livestock and poultry feeds and other products.

While marine oils account for less than 3 percent of the United States output of fats and oils, they are low-cost competitors of such farm-derived products as soybean, linseed, castor, tung, and tall oils.

Now that vitamins A and D are produced synthetically, another type of marine oil popular 30 years ago--the medicinal oil such as cod-liver oil--has all but vanished.

Last year menhaden accounted for 90 percent of all marine oil produced in the United States. But the menhaden, which mostly swim along the Atlantic and Gulf coasts, weren't around to be netted by commercial fishing fleets in the usual numbers last year.

As a result, marine oil production dropped sharply from a high of 266 million pounds in 1961 to 186 million pounds in 1963.

Marine oil prices rose accordingly, from 4 cents a pound (Baltimore) in January 1963 to 8.5 cents in April 1964. In August 1964 the price of menhaden oil had risen to 8.75-9.25 a pound.

At 4 to 5 cents a pound, fish oil is one of the lowest-priced oils on world markets. While manufacturers like the quality finish the marine oils give paint and varnish, it's basically price that gives fish a competitive edge over soybean, linseed, and other drying oils, both at home and abroad.

The United States is a net exporter of marine oils, selling menhaden and buying whale sperm oil which is used as a lubricant in fine precision instruments.

This favorable export position is relatively new. Up until 1950 we were a net importer. (The Farm Index, U. S. Department of Agriculture, August 1964.)