

A BRIEF DESCRIPTION OF PERUVIAN FISHERIES

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INTRODUCTION

As is true of nations with access to the sea, fishing in Peru has deep roots in history. Yet, despite its antiquity, the industry showed little sign of progress until the last 3 decades of the present century beyond the simple utilization of species in fresh state and in the salted and sun-dried forms.

The turn of the 1930's ushered in the beginning of fishery industrialization. The first attempts were at fish canning, which remained on an extremely small scale until the early 1940's. Then, with the construction of the Frigorífico Nacional, experiments began in fish freezing. However, failure to find acceptance for the product derived, both at home and abroad, led to the discontinuation of this operation, only to be resumed by other interests after the Second World War.

The outbreak of the war in 1939 opened up new product and market outlets. The canning industry especially underwent great expansion when the United States entered the war, since a sudden, great demand was created for fish in hermetically sealed containers. Salted fish was also greatly sought, and Peru began its exports of this commodity with the creation of UNRRA. Another product also exported during this period was fish liver and oil (from *tiburón*, *bonito* and *atún*).

The end of hostilities in 1945 brought with it the end of Peru's export boom of war-sought fishery products. Foreign sales of salted fish and fish liver and oil ceased completely. Even canned fish (*bonito*) exports were threatened, as the United States imposed restrictions to protect its domestic production. Despite this, however, the Peruvian canning industry managed to retain a sufficient share of markets to allow it to continue in operation without an alarming cut-back in production. Subsequently, the investment of U.S. capital in canning operations led to further expansion of this industry (1947 onwards). At the same time, a few freezing plants were installed to produce for the U.S. market. Such, briefly, is the story until the "anchoveta rush".

The relatively recent blossoming forth of the anchoveta fishery for fish meal reduction overshadows all past fishery performance and, indeed, exemplifies a growth pattern hardly equalled in the history of industrial development. During less than a decade (1955-1963), the industry emerged from a position of obscurity to occupy first place among the world's fish meal producers. Concurrently, it became the country's leading exporter and principal earner of foreign exchange, excelling the performance of such basic Peruvian export industries as cotton, copper, and sugar.

The impact of the "anchoveta wonder" on the Peruvian economy was little short of explosive both in time and scope. In the short lapse of time previously

mentioned (less than 10 years), there emerged a fleet of over 1,700 modern purse seiners, a processing industry consisting of upwards of 150 meal and oil reduction plants, and a number of auxiliary and ancillary establishments for boat building and repairing, machinery manufacturing and the production of other fishing requisites. As a consequence, the economy registered a sudden upsurge in employment; and, by the end of 1962, upwards of 100,000 people were engaged directly or indirectly in the anchoveta fishery, more than 20 times the number employed in similar activities 10 years previous.

From the beginning of fisheries industrialization, as late as the 1930's, development was conditioned upon production for export, with but minor reliance on the domestic market. This growth pattern has been even more prevalent during the birth and expansion of the anchoveta industry. In effect, industrialization has led to the separation of the fishing industry into two distinct sectors, one catering to foreign demand, the other reliant on domestic needs; and unfortunately, advances in technology and general efficiency took place in the former almost in complete isolation of the latter. In consequence, the consumable fish industry catering to the national market scarcely felt the wave of industrialization.

This industry, upon which the domestic fish market is dependent for supplies, is typically a conglomeration of small boat enterprises decentralized throughout the country's coastal zones. There are close to 8,500 fishermen fishing in craft ranging from "caballitos" to motor boats of 22' to 30' in length. Except for the widespread substitution of nylon for cotton nets, and the gradual acceptance of outboard and marine engines, there is little evidence of modernization in the industry. Productivity per man is low and many species are greatly underexploited.

FISHING GROUNDS

Fishing operations are carried on throughout most of the Peruvian coast, which extends for 1,400 miles, with a calculated area within the 100 fathom curve of about 26,800 square miles, although the commercial fishery is concentrated in the central and northern zones. This concentration seems to stem from the influence of purely physical factors, namely, the characteristics of the coast and the width of the continental shelf.

The topography of the coast, as well as the location of the fishing base relative to population and business centers, has a known vital influence on fishery development—industry normally locates where natural conditions are least adverse. Where the coast is rugged and exposed, with little or no shelter for boats and poor landing and shipping facilities, where easy access to market is wanting, etc., the obstacles to fishery development are difficult if not economically undesir-

able to overcome. To a large extent, this is the situation which prevails along a large segment of Peru's south coast, particularly from Pisco to Camaná; and many of the resident fishermen of the area have little more than risen above the economic status of fishing for their own nutritive sustenance. By contrast, the central and northern sections of the coast are better endowed to meet the requisites of fishermen in the pursuit of their trade; and here is where the best fishing harbours have been developed (although still deficient in facilities), and where the largest number of processing plants and concentrations of fishermen are to be found.

The influence of the characteristics of the coast on fishery exploitation is of course linked with the availability of the resource and the nearness of fishing grounds. Traditionally, Peru's fishery is inshore. Except for a limited number of vessels that occasionally pursue tuna in its offshore or deep sea habitat, fishing is confined to the continental shelf. And since this shelf varies greatly in width from north to south, it is not surprising that the greatest fishery concentration occurred in the shelf's widest zones, namely, the central and northern areas. (In the extreme north, around Punta Folsa, the shelf is 5 nautical miles wide while in the south, around Punta Pescadores and Punta Islay, its width is but 2 to 3 miles. Between these extreme points, the shelf varies greatly in width, reaching a maximum of 70 miles in and around Sechura Bay.)

While fishermen are largely concentrated in the central and northern sections of the coast, with fishery exploitation also centered in these areas, there is considerable movement of fishermen and boats to the Southern Region at certain seasons of the year. Fishing, therefore, is not regional—it takes place in varying degrees of intensity along the entire shore.

LANDINGS AND PROSPECTS

According to the Fisheries Direction of the Ministry of Agriculture, total registered landings of fish and shellfish in 1963 amounted to 6,794,408 metric tons. In order of importance the principal species which featured in this catch were:

Anchoveta	<i>Engraulis ringens</i> (Jenyns) -----	6,634,835.8
Bonito	<i>Sarda chilensis</i> (Cuvier and Valenciennes) -----	90,652.9
Barrilete	<i>Katsuwonus pelamis</i> (Linnaeus) ---	16,911.3
Atún	<i>Neothunnus macropterus</i> (Schlegel) -----	11,230.8
Caballa	<i>Pneumatophorus peruanus</i> (Jordan and Hubbs) -----	7,911.4
Machete	<i>Ethmidium chilcae</i> (Hildebrand) ---	7,863.0
Lorna	<i>Sciaena deliciosa</i> (Tschudi) -----	7,184.3
Cojinoba	<i>Neptomenus crassus</i> (Starks) -----	6,126.4
Tollo	<i>Mustelus mento</i> (Cope) -----	4,333.7
	<i>M. maculatus</i> (Kner and Steindachner)	
	<i>M. dorsalis</i> (Gill)	
Cabrilla	<i>Paralabrax callaensis</i> (Stark) ----	3,850.3
Corvina	<i>Sciaena gilberti</i> (Abbott) -----	3,508.2
		6,794,408.1

Other species, more than 50 in number, accounted for less than 27,000 tons.

The preponderance of the anchovy in the above statistics is obvious without scrutiny. It represents more than 97% of total landings (for conversion into fish meal and oil), leaving less than 3% for human food use. Indications are that this pattern will not change appreciably in the immediate future—the anchoveta fishing fleet is expanding, the country's fish meal production capacity is being increased, either through new plant construction or extension, and little is in sight by way of development in other sectors of the fishing industry.

The rapid pace at which the anchoveta fishery developed from 1955 on did not permit growth according to those criteria considered most consistent with rational exploitation. The main emphasis was on quick investment, production and sale, which was feasible and quite understandably pursued in the natural and institutional environment which prevailed—an obviously immense resource, nearly ideal fishing conditions (closeness to grounds and good weather), free entry into the industry, and a favourable and growing market. In the circumstances, expansion in the first phase of development proceeded without much concern over the effects of the fishing pressure on the anchoveta stock.

Gradually, preoccupation developed over the limits of expansion, and a marine research institute was established in 1960 with the principal aim of studying the anchoveta resource and the complex of biological, oceanographic, technological and economic factors affecting conditions of catch and utilization. These studies are continuing, with primary emphasis on biology and oceanography, because of industry demands for better knowledge of the resource. This alone, of course, will not suffice for a complete rationalization of operations. More attention must be given to the technological and economic aspects of the fishery.

Apart from the anchoveta fishery, the best prospects for expansion or development appear to be in the exploitation of mullet and certain pelagic species, such as bonito, herring, mackerel and sardine. Some bottom fish may also be exploited more extensively as the Government directs more attention to meeting some of the country's protein requirements. The need with respect to the expansion of these relatively minor fisheries centers principally in the delimitation of resource distribution and in improving the technology and economics of operation.

STATISTICAL TRENDS IN THE ANCHOVY FISHERY

The fishing events presented graphically in the appended diagrams are largely self-explanatory. Only short comments are therefore given here.

Development of the Industry

Basic information on the development of the anchovy fishery in Peru is given in Tables 1 and 2. Here are recorded the number of fishermen, number

TABLE 1

Year	Fishermen (N°)	Anchovy Boats (N°)	Fishmeal Plants (N°)
1955	1,800	175	16
1956	2,400	220	27
1957	2,800	272	39
1958	3,400	321	53
1959	5,200	426	63
1960	8,600	731	89
1961	12,000	846	105
1962	17,000	1,070	120
1963	23,000	1,756	150

TABLE 2

Year	Total Anchovy Landings (Metric Tons)	Fishmeal Production (Metric Tons)	Fishmeal Exports ('000, Soles)
1955	58,707.0	20,069.1	37,805.7
1956	118,726.0	30,968.8	67,211.0
1957	325,623.8	64,479.5	135,035.2
1958	737,019.5	126,909.4	271,052.4
1959	1,942,385.5	332,352.3	861,592.8
1960	3,310,156.7	553,256.5	1,056,443.2
1961	5,010,930.0	863,766.0	1,328,567.2
1962	6,691,520.7	1,120,796.0	2,678,265.4
1963	6,634,835.8	1,159,233.0	2,809,572.1

of fishing boats, number of fishmeal plants, total anchovy landings, fishmeal production and the value of fishmeal exports for the period 1955-1963. (This is also supplemented with Figure 1, which shows monthly anchovy landings during recent years).

Geographical Distribution of Landings

As shown by the map and graphs in Figure 2, industrial fishing centers are not evenly distributed in Peru. This distribution is in the first place dependent upon harbour facilities, communications and access to fresh water. Weather conditions are also quite important and are more stable in the northern area, where the fishing industry is largely concentrated. However, it is by no means certain that the location of the industry corresponds to the actual distribution of the anchovy stock. Better geographical distribution may be the next step in the development of the anchovy industry, and it appears that modern fishing methods (Sonar) can make this possible.

Seasonal and Yearly Trends in Fishing Success

The seasonal and yearly trends are described in two ways. In Figure 3, the percentage distribution of landings by months is shown, (based on the annual total). With slight variations fishing events have occurred in a very regular manner, with low catches during winter. In Figure 4, a more detailed analysis

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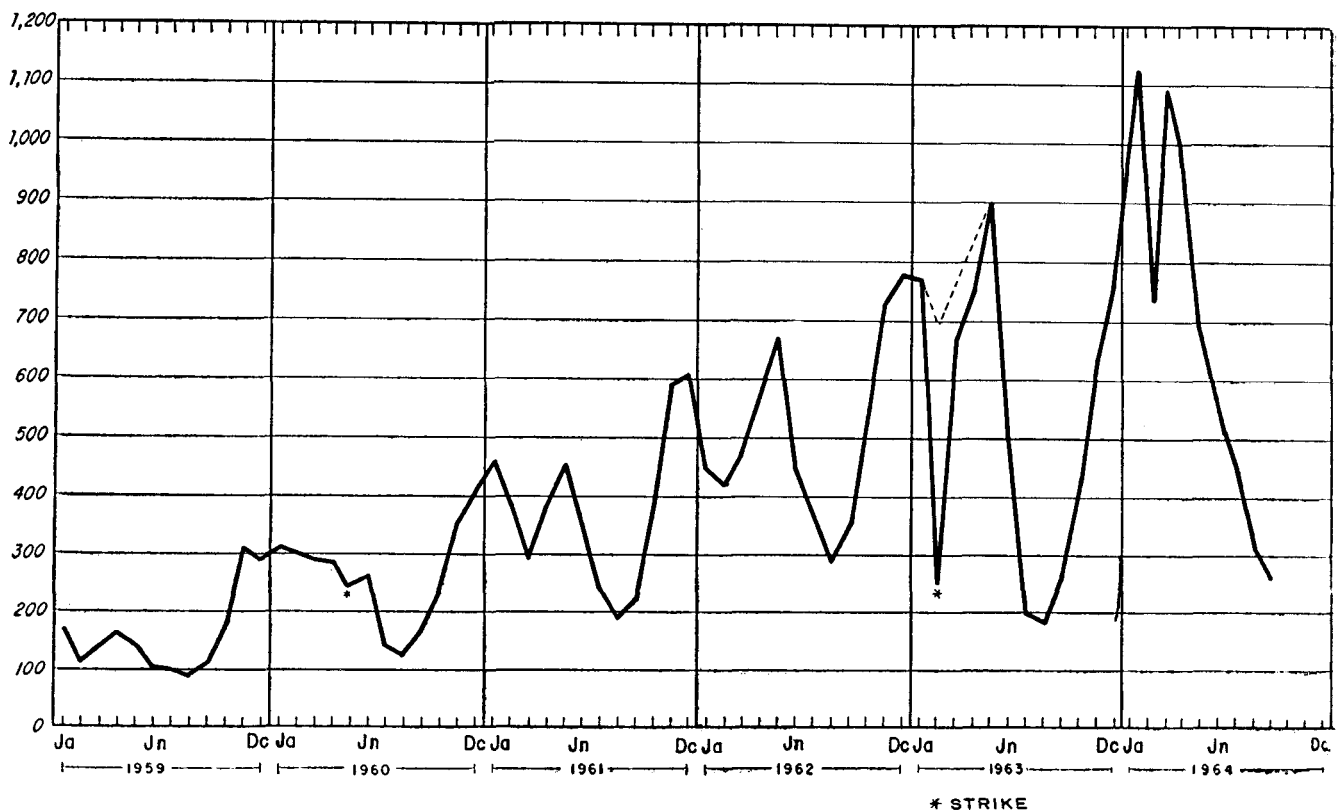


FIGURE 1. Monthly landings of the Peruvian anchovy during 1959 to 1964.

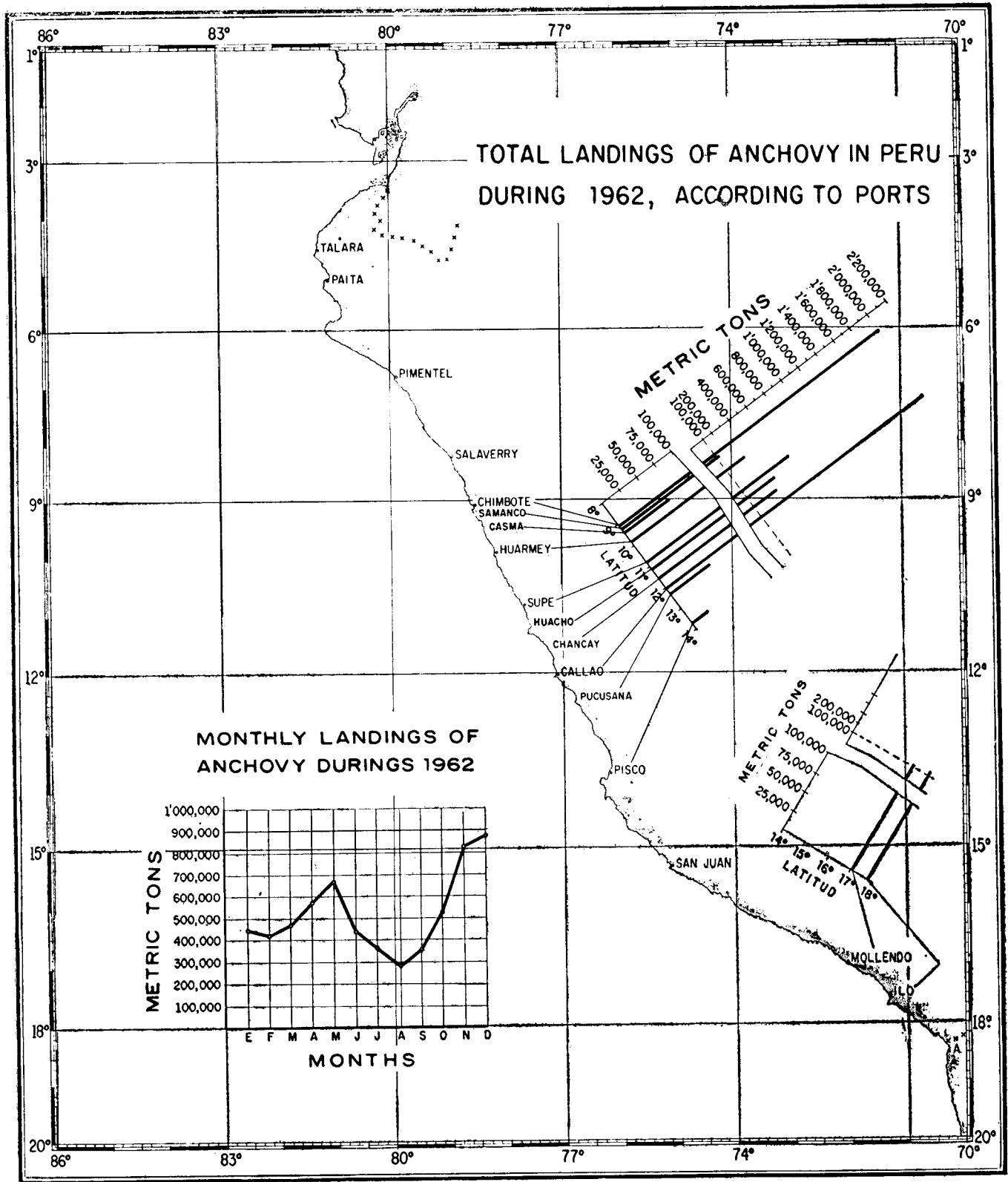


FIGURE 2. Geographical distribution of anchovy landings during 1962. Inserted are landings by ports and by months.

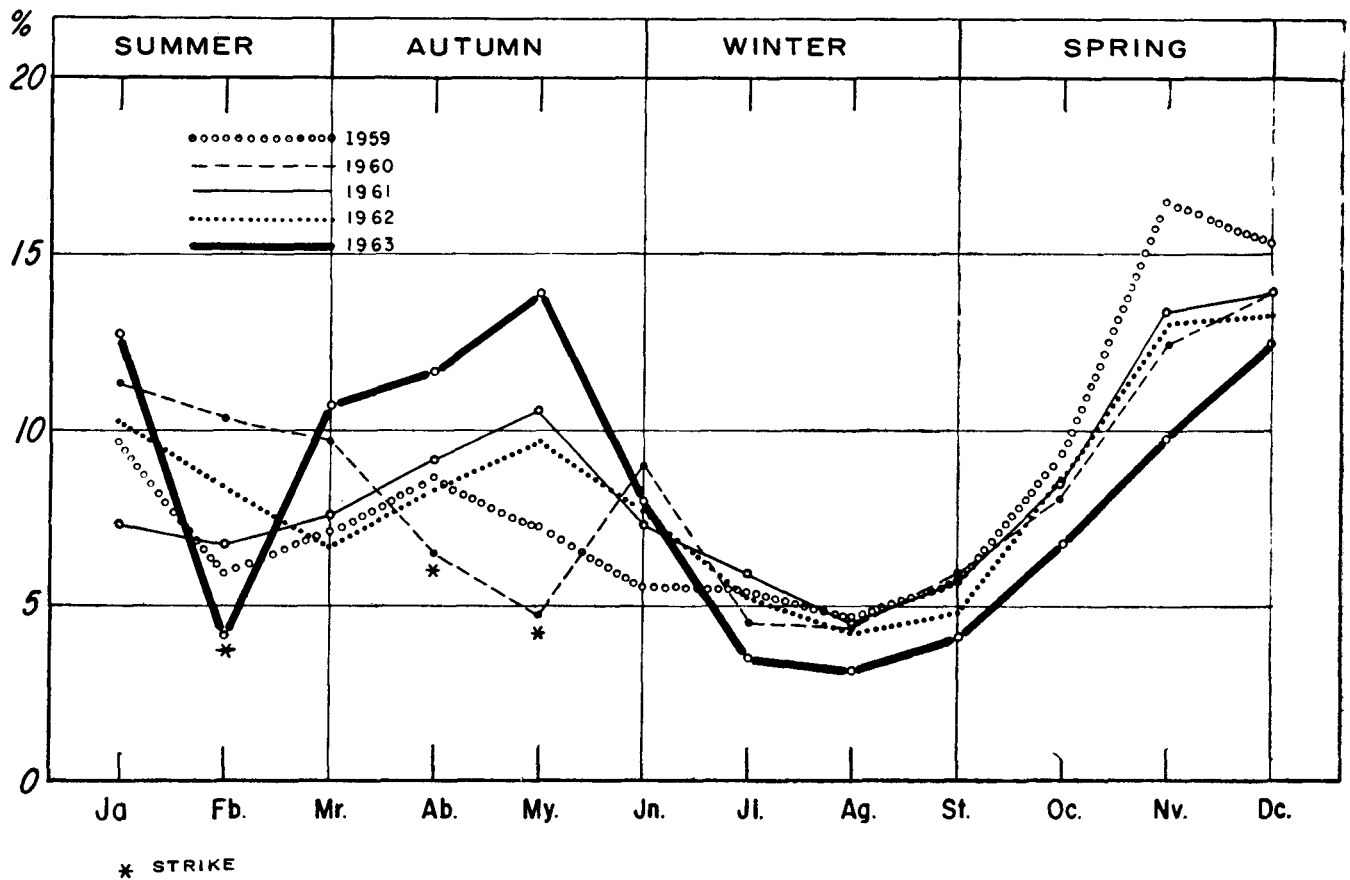


FIGURE 3. Monthly percentages of landings for the years 1959 to 1963.

of fishing success is given by using catch per unit of effort data. The graph shows monthly deviations from the overall mean per gross registered ton for the period 1959-1962.

The events in different fishing areas show a strikingly similar pattern. The drastic changes taking place during the last year are clearly evident, but this is treated in another paper and lies outside the scope of the present treatment.

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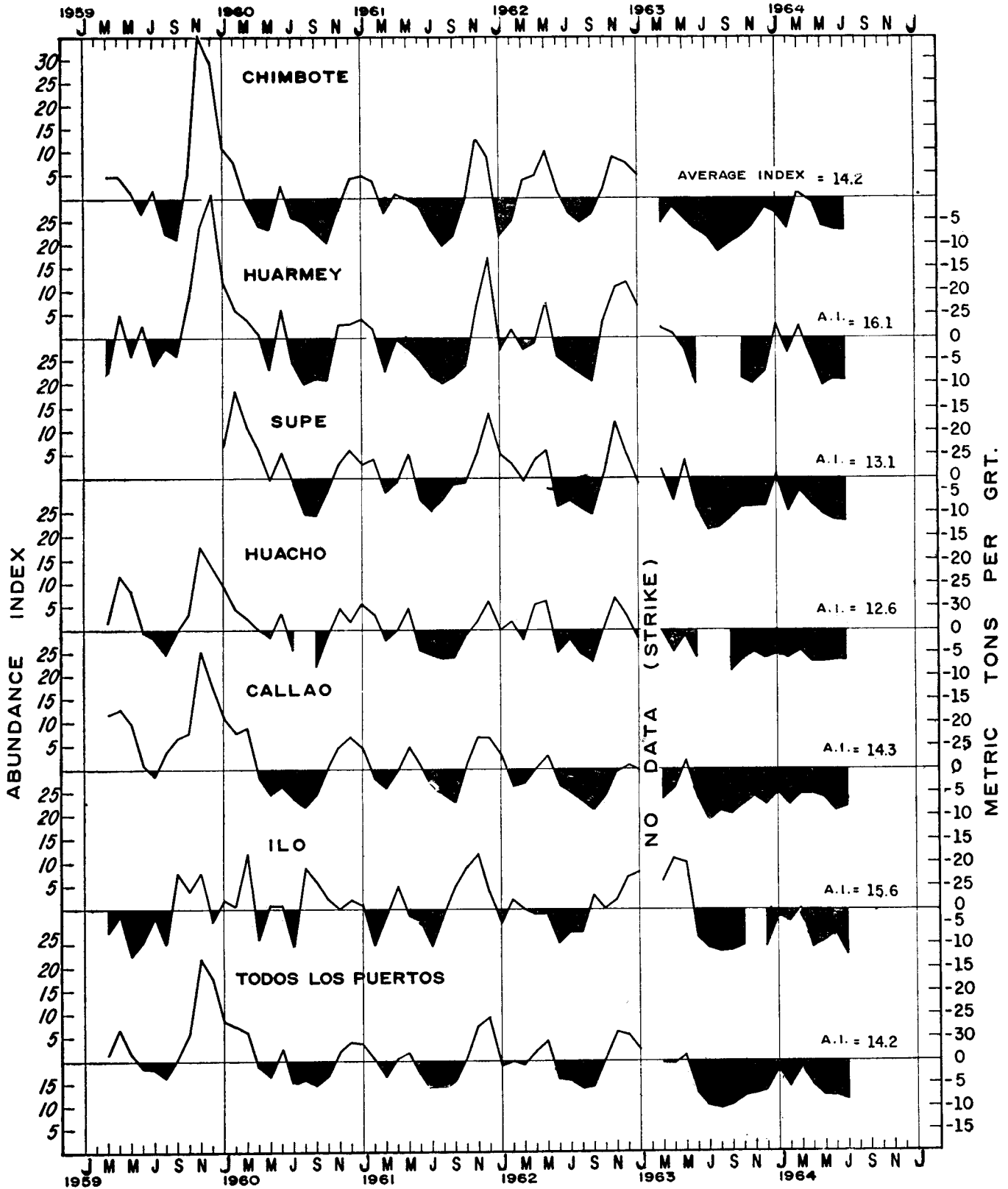


FIGURE 4. Monthly deviations of catch in tons, per GRT vessel calculated from the mean of 1959 to 1962, for different ports.