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## THE UNITED STATES FISHERY MISSION TO VENEZUELA

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### INTRODUCTION

The Venezuelan Ministry of Agriculture requested a fishery mission from the United States primarily to study the sardine canning industry, which accounts for from 25 to 30 percent of the entire fishery production of the country.

Although a small sardine canning industry has existed in Venezuela for 10 years, it became of real economic importance only during and after the war. Prior to then, the production was largely exported to other countries of the Caribbean area. During the war, considerable production was assigned to Lend-Lease, and

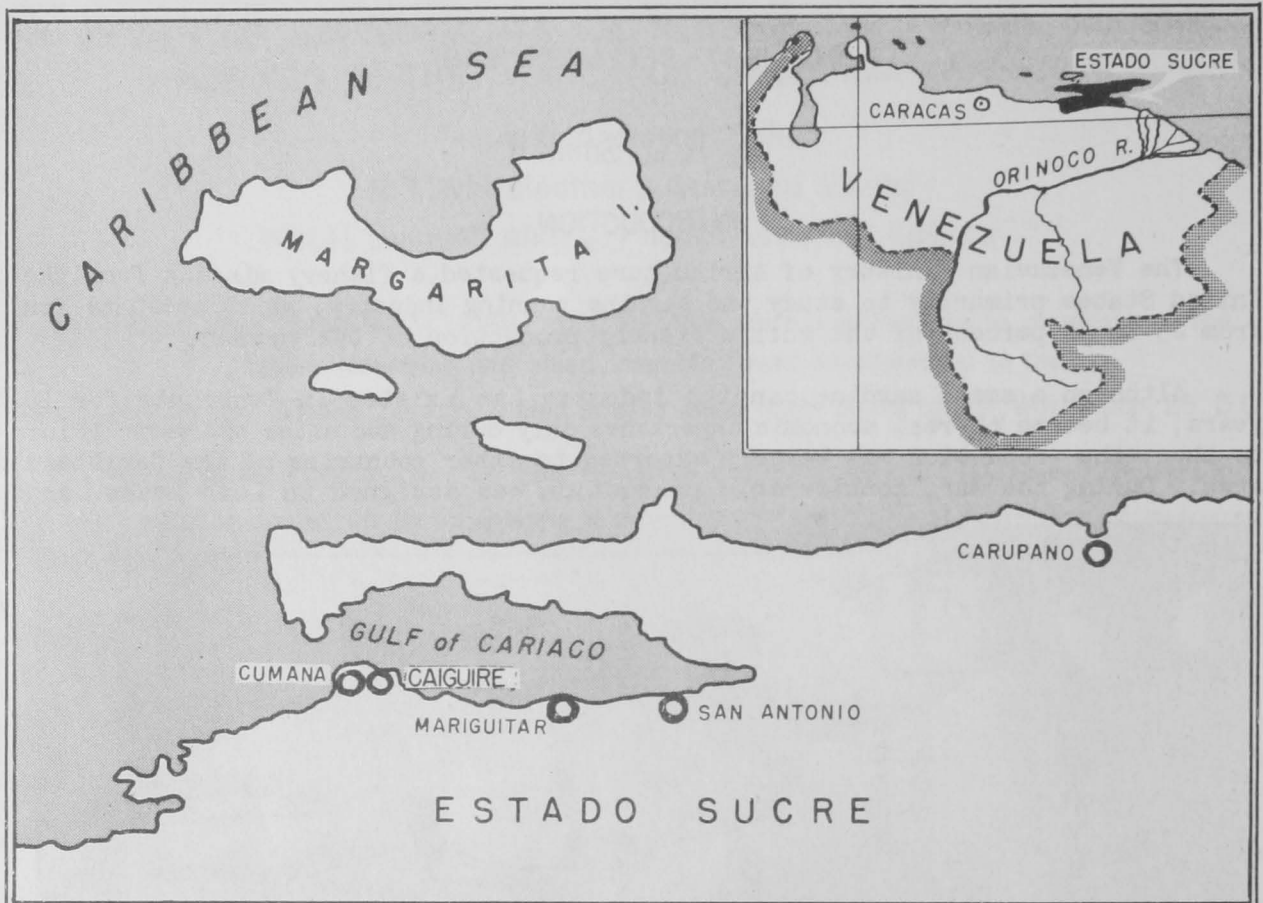


UNLOADING SARDINES AT CANNERY LOCATED AT CUMANA, VENEZUELA

until the end of the war, relatively little was consumed locally. Since then, the rapid change from a barter economy to a money economy has made increased demands on processed foods of all kinds, so that, since 1948, about 70 percent has been consumed in the country.

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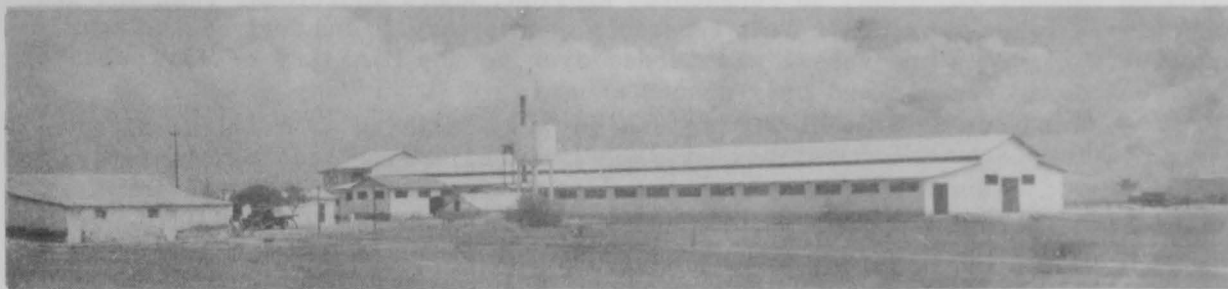
The importance of the fishery resources of Venezuela from the standpoint of the United States is not a matter of quantity production, for these resources are insufficient either for exploitation by United States fishermen or as a source of competition to United States fisheries. Nevertheless, important strategic and diplomatic elements are involved because of the position of Venezuela in world oil production.



Although oil has been produced in Venezuela for over 25 years, the country remained an agricultural nation until the advent of World War II. Before that, Venezuela was an exporter of food commodities to other countries of the Caribbean area. These exports included such basic items as beef, rice, beans, fish, and some edible fats and oils. But the tremendous increase in demand for crude oil coincident with the beginning of the war created a demand for labor which could be supplied only from rural areas. The movement away from the land was accelerated not only by higher wages, but by the attraction of improved working conditions, better housing, medical attention, and social security benefits. With a rapidity scarcely to be equalled elsewhere, Venezuelans became, except for crude oil, a nation of consumers instead of producers. By the end of the war, it was necessary to import not only the items formerly exported, but many others.

However, the majority of people in the lower income brackets are not able to purchase meats to fill all their protein requirements. They still must depend to a large extent on fish. The national consumption of fish amounts to 35 pounds per capita annually, but fish taken for personal use by commercial and casual fishermen are not included, and much of the population in the interior, especially

in cattle growing sections, rarely have access to fish. It is believed that consumption of fish along the coast is more nearly 100 pounds per capita annually.



SARDINE CANNERY LOCATED AT CUMANA, VENEZUELA.

Important as the fisheries are during peace time, they take on even greater value during a war, particularly in the case of Venezuela, whose main fishery production is obtained close to shore.

#### HISTORY OF THE MISSION

In October 1946, the Venezuelan Ministry of Agriculture (Ministerio de Agricultura y Cria) requested, through diplomatic channels, the loan of fishery specialists for biological and technological studies of:

- A. The sardine canning industry.
- B. Methods of dry-salting fish.

At the time, personnel was not available, and it was not until May 1947 that an aquatic biologist could be assigned to Project A. After a preliminary survey of the fisheries in Venezuela, plans were prepared for approval by the Venezuelan Government.

Approval was transmitted in August 1947, following which the process of assembling supplies and equipment began. In November, the Chief of the Fisheries Section, Ministry of Agriculture, arrived in the United States to complete the purchases, particularly that of a vessel to be used for exploratory and experimental fishing. The ves-



RAW FISH READY FOR PRECOOKING

sel selected was a 65-foot steel shrimp trawler, Gulf Coast type, which was re-named Golfo de Cariaco. After reconditioning and refitting in New Orleans, it sailed on January 26, 1948, to Pensacola, Florida, where additional fuel and provisions were taken aboard. It left Pensacola on February 1, and arrived at Laguaira on February 21, when the vessel was turned over to the Ministry of Agriculture, and a Venezuelan captain and crew placed aboard.

### SARDINE INDUSTRY

Although at least three species of small herring-like fishes occur in Venezuelan waters, only one, Clupanodon or Sardinella pseudohispanicus (locally called sardinas or arenque), is commercially important. This sardine is believed to be sufficiently different to warrant reclassification to a separate species or subspecies.



PLACING PRECOOKED SARDINES IN CANS

in processing, renders the product unsuitable for the United States trade, though the fish itself has excellent flavor and texture, with no lingering after-taste characteristic of some other species.

On reaching the cannery, the fish are cut to size, washed, precooked, packed, sealed, and processed. About half the pack is in round cans of 140-150 grams net (4.75-5.35 oz.), but the change is being made to flat cans of similar capacity as rapidly as they are available.

Some 20 different kinds of pack are turned out, of which the most common for sardines are:

Six canneries were in operation during 1948. A seventh will open early in 1949. All of these plants are small, capacities varying from 300 to about 750 cases per day. However, balancing the relatively small daily output is the long season, extending from 200 to nearly 300 working days in some years.

Machinery is generally of the most modern design from United States and European manufacturers. Some operations are still done by hand in varying degree, especially cutting off the head and tail, filling the cans, and adding oil or sauces. Unfortunately, no mechanical method of removing the scales has been found, so all Venezuelan sardines are packed with scales on. This is due to the softness of the flesh, which makes it impossible to remove the scales without tearing the meat. This, coupled with lack of uniformity

- a. Natural (in water)
- b. In oil (olive or peanut)
- c. Tomato sauce
- d. "Picante" (various combinations of vinegar, chili peppers, onion, oil)
- e. "Escabeche" (pre-roasted, various condiments)
- f. "Estofada" (literally, "stewed" with vegetables and other flavorings)

In addition to sardines, the canneries put up small quantities of bluefish (pez azul or anchoa); goatfish (salmonete); Spanish mackerel (macarel); frigate mackerel and common bonito (both called cabaña); roe of various species, especially that of crevalle (jurel) and cabaña; pearl oysters (ostras madre perlas); and a mussel-like shellfish (pepitona, *Arca occidentalis*); turtle soup (sopa de tortugas marinas), mostly from the green turtle.

In order to obtain the maximum production for human consumption, the Government has prohibited the use of any food fish in reduction plants. A small amount of fish meal is produced from cannery wastes.

Sardines are found in greatest abundance in a triangular area of which Cumana to Carupano (Estado Sucre) forms the base line, and Porlamar (Island of Margarita) the apex.



ADDING OIL TO SARDINES (FOREGROUND) AND SEALING THE CANS (BACKGROUND)

All six canneries are located along the south shore of the Gulf of Cariaco, which extends eastward from Cumana for a distance of 35.5 miles, and has a maximum width of 10 miles.

Canneries are located at Cumana (1); Caiguira, two miles east of Cumana (3); Mariguitar (1); and San Antonio (1). These are all along the south shore because of transportation requirements, but the fishing camps are along the north shore.

Only beach seines may be used. Purse seines were tried and found successful, but were prohibited by the Government in 1947 because of the large quantities of sardines wasted. It was not uncommon for the purse seines to take 25 to 75 tons of sardines in one set. Since the factory capacity does not exceed 15 tons per day, and no refrigerated storage is available, the unused balance had to be dumped. The beach seines, on the other hand, may take a similar quantity of sardines, but instead of hauling the catch ashore, the net is left in the water, where

the sardines remain alive and in good condition for as long as three weeks. The disadvantage of the seine is that at times the sardine schools either move offshore beyond their reach, or leave the Gulf entirely, causing the canneries to close.

### SARDINE INVESTIGATIONS

It was this periodic disappearance of the sardines from the Gulf of Cariaco which prompted the Government to undertake an investigation of the life history, and especially to chart the migratory movements of the sardine.

A house was rented in Caiguire to serve as a temporary laboratory and to house the collections, at present amounting to over 2,000 specimens.

The investigations are proceeding along three lines.

1. The Commercial Catch: Daily samples of sardines are obtained from the canneries in Caiguire, from which data are obtained on size, sex, sexual development, weight, age, and relative fatness. Although the work has not extended over a sufficient length of time to draw definite conclusions, an analysis of the data points to a finding that the sardine population of the Gulf of Cariaco is a migratory rather than a resident one; that there is some spawning throughout the year, and that this spawning takes place mostly outside the Gulf of Cariaco.
2. Field Surveys: Regular trips are being made aboard the Golfo de Cariaco to collect samples of sardines, not only in the Gulf, but within a radius of 50 miles. Records are taken of ocean temperature, salinity, color, transparency, relative alkalinity, and depth. In addition, bottom samples are taken.

An experiment was made in which live sardines, obtained from a commercial seine, were marked by cutting the upper lobe of the tail, and liberated at the entrance to the Gulf. A number of them appeared a week later in a seine not far from where they had been secured, a distance of approximately 20 miles from point of liberation.

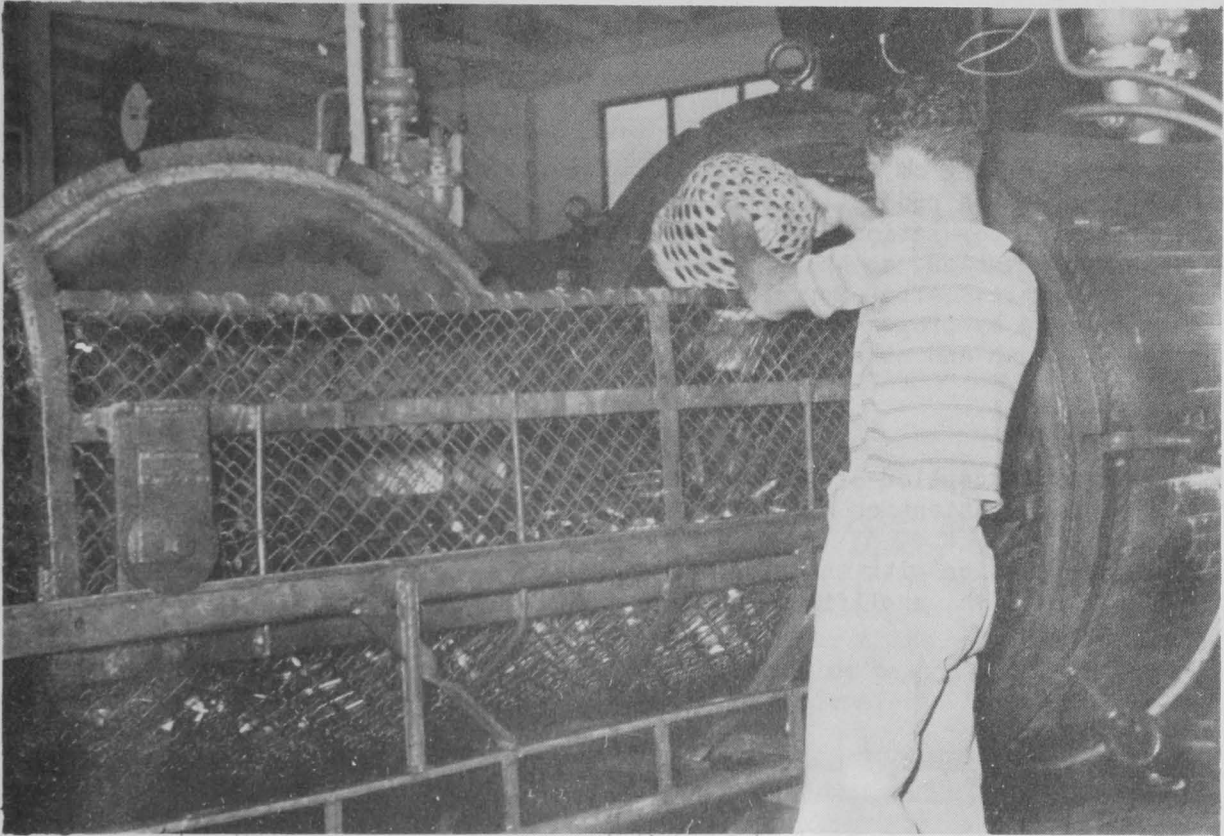
3. Relation of Sardines to Other Fishes: Sardines provide an important source of food for many predatory fish. Examinations are made of the stomach contents of various species of fish, as this provides information on sizes and distribution of sardines which would be difficult or impossible to secure otherwise.

### EFFECT OF SEISMOGRAPHIC EXPLORATION ON FISHERIES OF LAKE MARACAIBO

The Lake Maracaibo region is not only important as a center of crude oil production, but also is the second most important area for fishery production. So far, there has been comparatively little interference between the two industries, for the oil fields are located in the northeast section of the Lake, while the fisheries are, for the most part, along the western side.

Recently, evidence has accumulated of possible oil deposits beneath other parts of the Lake, and several petroleum companies have applied to the Government for permission to carry on extensive seismographic explorations. The method consists in exploding charges of dynamite, either just below the surface of the water, or in a pipe below the Lake bottom, and recording the echoes on seismographic instruments.

The fishermen of Lake Maracaibo were concerned as to the probable effect of these explosions on the fisheries, for the charges were to be exploded every quarter of a mile over most of the western and southern portion of the Lake. To protect



FINAL PROCESSING OF SARDINE CANS IN ORDER TO CLEAN THEM OF OIL

their interests, they lodged a protest with the Ministry of Agriculture. At the request of the Ministry, and with the cooperation of the petroleum companies, a series of experiments was made in the Lake to determine the effect of explosions on fish. Twenty-four experiments were made in all, 4 in March, and 20 in September-October, 1948. The tests simulated, as nearly as possible, actual working conditions during seismographic explorations, including the use of recording instruments.

It is obvious that danger to the fisheries from exploration, positive though it is, must be, in any case, of a temporary nature, whereas actual production would, at least semipermanently, end commercial fishing, not necessarily by destroying fish, but by cluttering the fishing grounds with well rigs. An interesting angle to the problem is that since the Government's share of oil production is 50 percent, it would seem to be in the position of deciding for or against itself in the matter of restriction of exploration.

#### PEPITONAS

This mollusk, *Arca occidentalis*, grows abundantly in the seaweed on sandy bottom in shallow water (1 to 2 fathoms), and supports a minor commercial fishery in the Gulf of Cariaco, where it is taken by dredges from November to May. The entire catch is canned, either natural, in oil, or with chili pepper sauce. Since

the Ministry of Agriculture was concerned with the possibility of overfishing, an investigation has been under way since May 1948, to discover the life history, and to recommend conservation measures. In particular, a program of shell planting is being undertaken because no shells have been returned to the bottoms in the past.

### OYSTERS

At one time, there were a number of natural oyster beds, and in addition, a supply from setting on mangrove roots. The quantity was not large as compared with United States production, but was sufficient to add measurably to the diet of the coastal population. During the years, the beds were stripped without regard to conservation, so that now the annual production is probably not over a thousand bushels. After a preliminary study, it is believed that the industry can be revived by proper methods of culture, and a program of planting based on the use of brush and other types of collectors will be undertaken.

### COLLECTIONS

With the exception of fresh-water fishes, the aquatic fauna of Venezuela has received little attention from ichthyologists.

In cooperation with the Director of the Caiguire Laboratory, collections are being made of fish, shellfish, and other marine organisms as rapidly as possible.



## THE CUBAN FISHING INDUSTRY

Fish, other sea food, and byproducts constitute only about one percent of the value of all imports into Cuba. The total import value rose from an average of 1.4 million dollars during prewar years to 2.5 million dollars in 1945; and the average value per pound rose from 6.2 cents to 23.7 cents. The quantity, however, dropped from an average of 22.7 million pounds in 1937-41 to only 10.6 million pounds in 1945.

Codfish, stockfish, and canned sardines comprised 85 percent (19 million pounds) of the total Cuban imports in prewar years, but only 51 percent (7.5 million pounds) in 1945. Imports of herring and canned tunny combined increased from about one million pounds before the war to 2.4 million pounds in 1945.

Substantial quantities of canned squid, oysters, shellfish, and cod liver oil were also imported. Among the fish of lesser importance in Cuba's imports are hake, salted skate, and haddock, and canned salmon and mackerel.