

Fish Marketing in El Salvador



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SUMMARY AND CONCLUSIONS

In recent years, one goal of the Fisheries Service, Government of El Salvador, has been to increase the availability of fish, an inexpensive source of high quality protein, through the promotion and extension of fishcultural practices to Salvadoran farmers. The production of pond-raised fish had been limited in part by marketing problems encountered by producers.

A study was conducted to determine factors which influence marketing of fish and implications of these factors in the development of fishculture. Emphasis was placed on marketing in rural areas, where incomes were lowest, diets inadequate, and 60 percent of the population reside.

Municipalities with public markets were partitioned into three categories on the basis of size. A stratified random sample was chosen from each category. Quantitative and qualitative information was collected through interviews with fish vendors in public markets. Locations were visited four times during the year to detect seasonal marketing patterns.

Most fish consumed in El Salvador came from marine sources, both industrial and artisanal. Freshwater artisanal fisheries also contributed substantially to the total supply. The production from fishponds was insignificant at the national level in 1973.

Most fish were marketed through established channels of distribution. Major cities served as centers of fish distribution for surrounding areas.

In large cities, substantial quantities of all types of fish were sold. Less expensive fish comprised a greater part of sales in the small cities. Limited amounts of less expensive fish were sold in rural markets. Both supply and income appeared to influence the consumption of fish.

The demand for fish in the cities absorbed a large part of supply, thus limiting amounts available for rural areas. Higher incomes allowed large city consumers to purchase relatively great quantities of all types of fish. In contrast, low incomes of rural dwellers restricted consumption to limited quantities of cheaper types of fish.

Within rural areas, both fresh and total fish consumption was greater in the central zone than in other zones. This was attributed to the proximity of towns in the central zone to major centers of fish distribution located in the large cities.

A general trend of increased prices and sales was detected during the weeks preceding Easter. Demand for fish increased greatly during this period as a result of religious customs.

An increase in fish sales in rural towns of the coastal and northern zones was not detected during the period preceding Easter, however. Increased demand for fish in cities and nearby areas absorbed more of the actual supply, thus limiting availability of fish in more distant rural towns.

Consumers paid premium prices for all freshwater species of Cichlidae: guapotes, mojarras, and tilapias. These fish generally sold higher than even the more preferred marine species. The freshwater catfishes, characins, and top-water minnows sold for prices similar to those for less preferred marine species.

Market demand for fish in urban areas was projected at 7,651 metric tons for 1985, representing additional needs for 4,118 metric tons over 1973 urban supply. Market demand in rural areas was projected at 1,956 metric tons for 1985, representing additional needs for 1,077 metric tons. In view of growing demand for fish in cities, however, supply to rural areas may decrease in coming years.

A substantial increase in demand for fish in El Salvador is projected for the near future. Domestic production has not increased significantly in recent years. Trends indicate that efforts to increase the production of fish in all sectors should be undertaken. Large quantities of inexpensive fish are needed to benefit low income consumers.

Fishculture can make an important contribution to future fish supplies in El Salvador for several reasons. Pond-raised fish are preferred over many other types. Fish can be grown near areas of consumption, thus reducing transportation costs and improving quality. Pond-raised fish can be economically produced at competitive prices.

Fishculture becomes especially important when the supply situation in rural areas is considered. Increased production of pond-raised fish would reduce dependency of rural areas on cities for fish supplies. Though problems confronting many rural inhabitants are numerous and complex, development of fishculture represents one important way in which conditions in rural areas may be improved.

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Fish Marketing in El Salvador*

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INTRODUCTION

THE WORLD FOOD SITUATION has been recognized as an immediate and complex problem. A recent food survey conducted by the United Nations found that an estimated 50 percent of the world's people suffer from hunger, malnutrition, or both (6). The majority live in third world or developing nations, regions characterized by rapid population growth and low incomes (19). Therefore, any solution to the food problem requires a multi-faceted approach.

Improvements in quality of diets in developing countries can be attained only by increases in purchasing power. People must be able to buy the additional food produced. It is particularly important that increases in income occur among the poor.

Population growth must be slowed to improve conditions for many of the world's poor. Past years' economic devel-

opment resulted in higher incomes, but this was largely offset by population increases. Food production barely grew with population, with no provision for the moderately expanded demand resulting from improvement in per capita income (19).

An increased supply of food, particularly foods of higher nutritional quality, is required to improve the quality of life for many of the world's undernourished. In densely populated developing countries, new agricultural lands are not available at a reasonable cost. Thus, increases in food production must be achieved through improvements in yields per acre (19). Streeter (16) cited examples of how the use of modern cultivation practices, utilization of improved varieties of traditional crops, and introduction of non-traditional crops increase productivity of agricultural lands in developing countries. One example was from the Republic of El Salvador, a country which has much in common with other developing regions of the world. One of the important problems facing this country is the need for increased food production.

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Basic Data About El Salvador

El Salvador is a Central American republic bordered by Guatemala to the west, Honduras to the north and east, and



FIG. 1. Map of El Salvador.

the Pacific Ocean to the south. It is the smallest country in Central America with an area of approximately 21,000 square kilometers, roughly the size of Massachusetts. The coastline has a distance of 321 kilometers (5). Greatest land distances are 256 kilometers in an east-west direction and 96 kilometers north to south, Figure 1.

Mountain ranges divide the country into three geographical regions running east to west. These are (1) a narrow coastal plain, (2) a populous central plateau where the three largest cities are located, and (3) a mountainous northern region (10).

The climate is tropical. Mean temperatures vary with altitude. There are two distinct seasons, a rainy period which lasts from May to October and a dry period the rest of the year (5).

El Salvador is the most densely populated country in Central America. Population in 1973 was estimated at 3,814,000, a density of 181 persons per square kilometer. At the current rate of increase, 3.5 percent per year, population would double in 20 to 21 years (2).

Average per capita income was \$324 in 1972 (4). However, 80 percent of the population received only 37 percent of the income (17). For this low income group, average annual per capita income was approximately \$150.

Income in rural areas was only one-third of the national average, with similar inequalities in distribution (11). Landless families and those owning farms of less than 1 hectare comprised 62 percent of the rural population and received only 27.2 percent of the income in 1970. In contrast, rural families with land holdings of 200 hectares or more made up 0.3 percent of the rural population but received 22 percent of the income.

A nutritional survey in El Salvador in 1963 revealed that 75 percent of the nation's children suffered from some form of malnutrition. This was considered to be the contributing cause in more than 50 percent of the deaths of children below the age of 5. A 1965 survey in 30 rural communities concluded that a deficiency in animal protein (only 26 percent of recommended levels)¹ was one of the more serious nutritional problems confronting rural inhabitants (11).

The traditional diet of rural Salvadorans consists of tortillas, beans, and coffee or coffee substitute, occasionally supplemented with rice or cheese. This diet, deficient by 900 calories when compared with the minimum food ration recommended by the General Direction of Public Health in El Salvador, is notably lacking in animal protein (11).

Human organisms do not distinguish between essential amino acids of plant or animal origin so long as an adequate quantity of each is present. Plant proteins lack one or more essential amino acids, while meat, milk, eggs, and fish proteins are high quality because they contain a balance of the nine amino acids essential to man (12).

Man traditionally balanced his diet with proteins of animal origin. Although animal protein per se is not required by human organisms for adequate nutrition, it is generally conceded that providing sufficient quantities of foods from animal sources is one means by which world protein nutrition can be improved.

¹ Recommended levels of protein are 70 grams per day for adult males, 58 grams per day for adult females, and higher levels for growing children.

Factors Affecting the Demand for Food

Agriculture constitutes the largest single sector in the economy of El Salvador. For many countries, largely dependent on agriculture, the relationship between population and available agricultural land has great influence on the ability of a country to feed itself. In El Salvador, a country of approximately 2 million hectares, an estimated 1.6 million hectares are in agricultural use. Virtually no additional agricultural land is available for cultivation, so increases in domestically produced food supply must come through increased productivity from existing agricultural lands.

Agricultural production must grow with population to maintain per capita consumption of food, even at substandard levels existing in El Salvador. This has not taken place. Since 1962, agricultural production in El Salvador has increased at the rate of about 1 percent per year. The actual net food deficit threatens to grow in the immediate future (11).

The concentration of population in urban areas influences the demand for food in developing countries. For most agricultural products, urbanization means that a more efficient system of distribution must be developed to move food from population areas to centers of consumption.

In El Salvador, 37.9 percent of the population was urban in 1970. This will increase to 50 percent by 1985 (13). As more people move into urban centers, demand for food will increase in these areas.

Economic growth and levels of income rank second only to population among factors influencing demand for food in developing countries. With rising incomes, people spend more money for food and particularly for food of higher quality (19).

Efforts to improve quality of diets in developing countries can be successful only if accompanied by an increase in purchasing power. People must be able to buy any additional food produced. In El Salvador, the real per capita income is increasing at the moderate rate of 1 percent per year (2). However, it is particularly important that increases occur in the lower income strata to produce a real impact on the demand for food.

Income elasticity of demand for food measures the percentage increase in food expenditure resulting from a 1 percent rise in per capita income. With increasing incomes, the income elasticity of demand for food generally declines. This tendency is because of the inelasticity of the human stomach. A hungry person may spend an initial increase in income on food, probably the least expensive available. After hunger pains have subsided, additional income may be spent for foods of higher quality in an effort to vary the previously bland or monotonous diet. Upon reaching a certain level of consumption, however, additional income is spent on other things, perhaps for improved housing or clothing, because the capacity of a person to eat continuously greater quantities of food is limited.

In low income countries, uncertainty exists regarding the rapidity of the decline in the income elasticity of demand for food. For nearly all high quality foods, such as meats, dairy products, fruits, and vegetables, the income elasticity of demand is higher in developing countries than in developed countries (19).

In El Salvador the income elasticities of demand for pork, fish, beef, and chicken were reported to be 0.5, 0.6, 0.8, and 1.0, respectively (7). These data indicate that a moderate increase in demand for these products will occur with growth

in average per capita income. The potential inclusion of the less expensive of these animal products in the diets of lower income consumers may become especially important if this group shares in the reported increase in income.

Fish Marketing

Fish has recently been recognized by the Government of El Salvador (GOES) as an inexpensive source of high quality protein to supplement the diets of lower income Salvadorans. In 1969 GOES requested that the U.S. Agency for International Development and the U.S. Peace Corps assist the Fisheries Service, General Direction of National and Renewable Resources, to increase the production of fish in inland waters, including natural lakes, rivers, and ponds of the country.

In the evaluation of fishponds in El Salvador, it was determined that the majority of fish harvested were sold. Prices obtained by pond owners depended on region of the country, size of fish, and the buyer (9). Several pond owners considered marketing as the most important problem associated with fish culture in El Salvador, and other owners were not producing fish because of low prices. The authors suggested that pond owners advise neighbors of pending harvests and sell fish at pond-side, sell in rural areas where there is less competition from other types of fish, harvest during the Christmas and Easter seasons when demand for fish is greater, and that neighboring pond owners coordinate harvests to provide a more stable supply of fish to an area.

Fish marketing was deemed of sufficient importance to warrant a specific section in a fish culture manual recently prepared by the Fisheries Service. The manual emphasized that pond owners seek sales outlets for fish prior to the actual date of harvest (14).

Tilic and McCleary (19) performed an analysis of the commercialization of fish products in El Salvador. The primary objective was to evaluate the marketing system for fish destined for domestic consumption and relate the implications to marine fisheries development. Consumption of fresh fish was estimated as being 60 percent in the three large cities, 20 percent in coastal areas, 15 percent in other cities, and 5 percent in rural areas. Most fresh fish in the cities were bought by middle class families as an inexpensive alternative to meat. Upper class consumers bought approximately 3 percent of the total domestic supply, normally in the form of fresh or frozen fish, from retail outlets other than public markets.

Consumption of fresh fish in rural areas of the country was insignificant because of lack of supply and low incomes of most rural inhabitants. Most dried fish were marketed in rural areas where fresh fish were normally not available.

Consumption of fish increased greatly during months preceding Easter in response to traditional religious customs in this predominantly Roman Catholic country. Following Easter, consumption of fish declined and remained low for the duration of the rainy season.

Deficiencies in the fish marketing system in El Salvador were characteristic of those in developing countries. Quantities were limited, handling and transportation methods were inadequate, and geographical availability was restricted. A large number of intermediaries moved small quantities of fish with elevated marketing margins. The deficiencies were expressed in modest levels of consumption, poor quality fish, and reduced demand.

Objectives of Study

In recent years one goal of the Fisheries Service, GOES, has been to increase the availability of fish through promotion and extension of fishcultural practices to Salvadoran farmers. Production of pond-raised fish had been limited in part by marketing problems encountered by producers.

Fish were recognized as a potential source of high quality protein to supplement the diets of lower income Salvadorans. Little knowledge of fish marketing was available in rural areas, where incomes were lowest, diets inadequate, and 60 percent of the population reside.

The present study attempted to contribute basic information on factors which influence the marketing of fish, especially in rural areas of the country, through the following specific objectives:

1. To determine existing fish marketing channels in El Salvador.
2. To determine the per capita consumption of fish.
3. To determine the factors which influence the demand for fish.

METHODOLOGY

Selection of Sample

Markets were divided into three major categories which correspond to the pattern of fish distribution: large cities, small cities, and rural towns.

Large cities were defined as municipalities with populations greater than 100,000. This group contained only three cities: San Salvador, Santa Ana, and San Miguel.

The second group, small cities, contained 16 cities with populations of 30,000 to 100,000 and included departmental capitals and other important cities. The lower population figure separated regional commercial centers from smaller rural towns.

Comprising the rural towns group were 233 municipalities (pueblos) with populations of less than 30,000. Most rural inhabitants live in or near pueblos and are dependent on pueblos public markets for commodities not produced at home. Data collected in rural towns represented marketing to the rural sector of the population. Because of differences in the location of towns relative to the seacoast and large cities, possible variations in fish sales within the rural towns warranted further stratification of this group. Rural towns, therefore, were divided into three zones corresponding to the three natural geographic regions of the country. After stratification, 50 pueblos were located in the coastal zone, 94 in the central zone, and 89 in the northern zone.

Public markets with fish sales in all large cities were visited during the survey. A random sample of 7 small cities, 9 rural towns from the coastal zone, 10 from the central zone, and 10 from the northern zone was selected.

Upon initiating the survey of markets in rural towns, it was discovered that seven in the coastal, six in the central, and eight in the northern zone had no public markets and no fish sales. Subsequent visits were not made to these locations. Whether any fish were sold in a particular rural town would be useful information. However, actual market data were collected from only eight rural towns, which might have been insufficient to adequately reflect marketing trends in the rural areas. Therefore, six rural towns from the coastal zone, four from the central zone, and five from the northern zone, all known to have public markets, were added to the

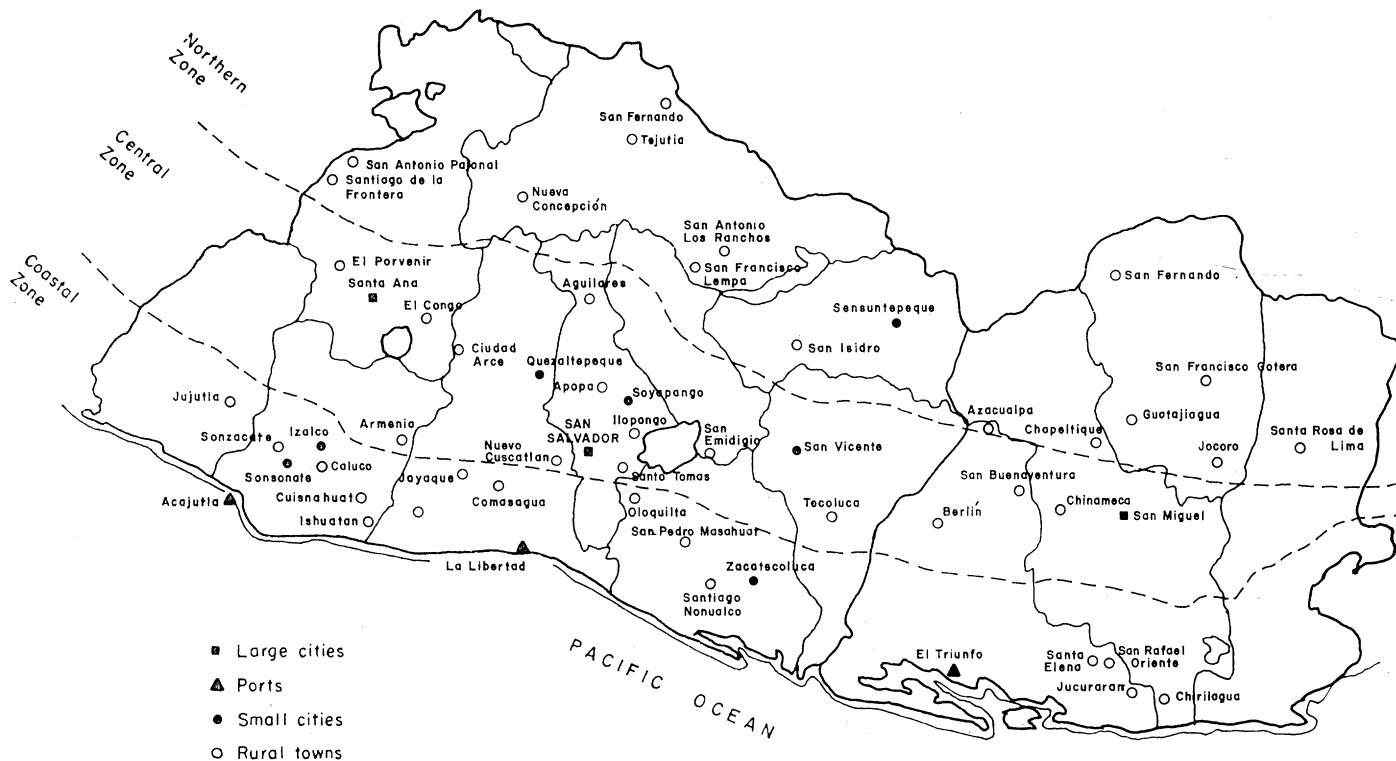


FIG. 2. Municipalities visited during the survey.

survey. Figure 2 shows the geographical distribution of all markets visited after modification of the sample group.

Market sample modification resulted in increased data for price trend analysis. Conclusions resulting from price analysis necessarily referred to that population of municipalities where market sales of fish occurred.

The scope of inference involving sales data from the modified market sample changed. Trends derived from the modified sample were biased toward greater sales than actually occurred in rural areas. Relative sales according to type of fish or season, however, were more accurately depicted.

Preliminary Visits

During the months of April and May 1973, preliminary visits were conducted to selected markets in San Salvador to familiarize surveyors with the species of fish sold and identify potential problems associated with the survey. Visits to several of the more important fishing communities were also made to learn of fish distribution, marketing procedures, and preservation practices.

Time of Visits

All markets were visited four times during the year, twice during the rainy and twice during the dry season, to detect seasonal trends. Markets were visited during the following periods:

- First visit, quarter 1, rainy season: August 1-October 31, 1973.
- Second visit, quarter 2, dry season: November 1, 1973-January 31, 1974.
- Third visit, quarter 3, dry season: February 1-April 30, 1974.

- Fourth visit, quarter 4, rainy season: May 1-July 31, 1974.

Fish were sold in the public markets during the morning hours. An effort was made, therefore, to visit markets early to interview all vendors and make accurate estimates of species sold and quantities on hand.

Information Obtained

All wholesale and retail fish vendors in markets visited were interviewed. In addition, observations were made on sanitary conditions, preservation methods, and fish quality.

Quantities and prices were recorded in kilograms and colones (ϕ)² per kilogram, respectively. When fish were sold by the unit, dozen, string, or bunch, weights were estimated in kilograms and prices converted to colones per kilogram. When dried fish were encountered, prices and quantities were converted to a live weight basis. A comparison of weight loss in two species commonly sold in the dried form was made to derive the conversion factor.³

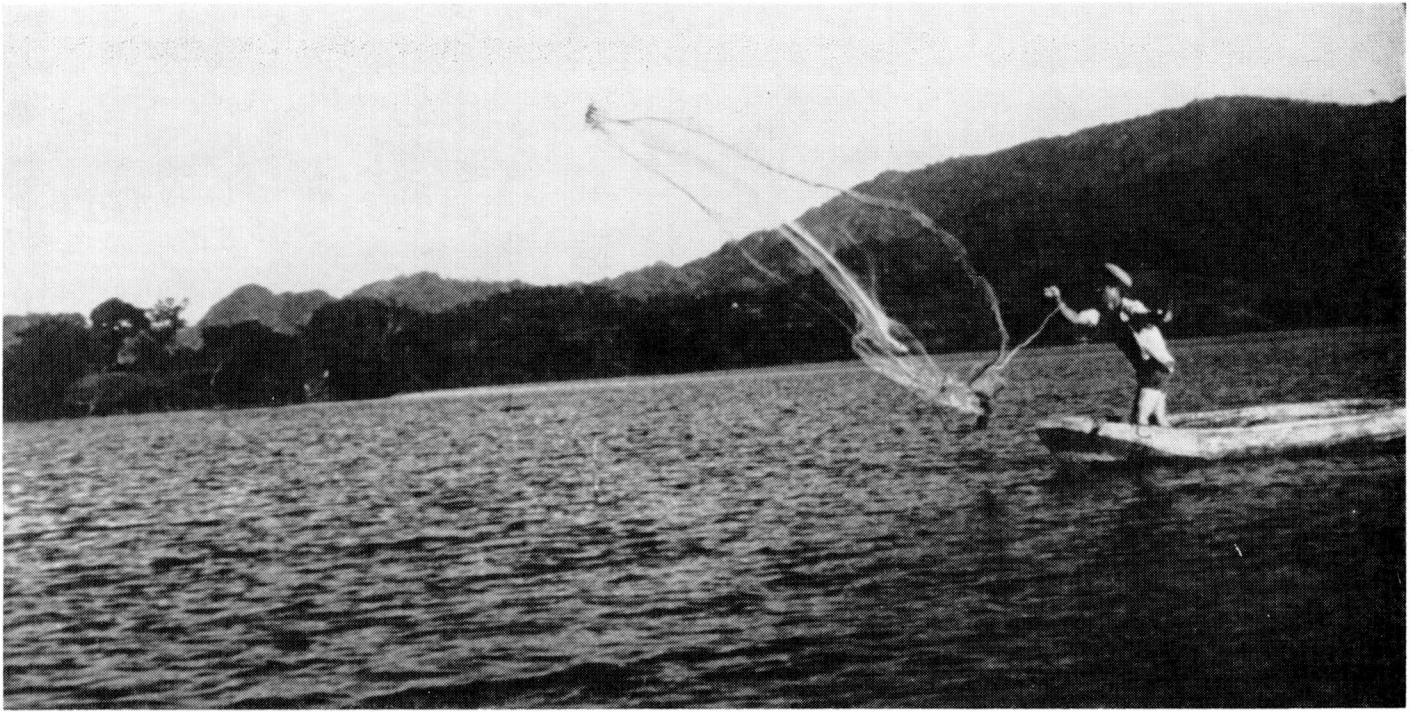
Delimitation of Fish Types

In markets of El Salvador, consumers recognized fish by species or general type. They did not buy fish per se, but rather bought catfish, snapper, shark, or mojarra. They distinguished between freshwater and marine, high and low priced, and fresh and dried fish.

Since one important aspect of the study was to learn of the marketing of fish from inland water, freshwater species were assigned to two fish types: freshwater cichlids, including pond cultured species and all close relatives, and fresh-

² 2.5 colones = \$1.00.

³ Conversion factor = 1.9.



Fisherman using cast net at 5 de Noviembre Reservoir.

water others, consisting of species not belonging to the family Cichlidae.

Marine fish were also partitioned in two groups on the basis of price to detect differences in marketing to consumers of different income strata. A reference market in San Salvador was chosen for purposes of defining the marine fish types. All marine species which sold for an average price per kilogram of ϕ 1.65 or higher in the La Compania market were defined as first class marine. First class marine species included snapper (Lutianidae), grouper (Serranidae), snook (Centropomidae), sea bass (Scianidae), and half-beak (Exocoetidae). Species selling for a lower price in the same market were defined as second class marine.

Dried fish reportedly were sold almost exclusively in rural areas. Thus, a distinction between fresh and dried fish was also desirable. All fish sold in the dried state, regardless of source, were assigned to the dried fish category.

Data Analysis

Price data collected from vendors in a particular market were combined to form an average price for each species. Average prices were combined for each market to form an average weighted price, based on the average price and proportional sales of each species comprising a particular fish type. In locations with more than one public market, price data from individual markets were combined to form one set of average weighted prices per municipality. A total of 20 values, price estimates for five types of fish in each of four visits, was derived for each municipality.

Weekly retail sales data were also collected from each fish vendor by species. All sales data were initially aggregated into fish types for each municipality by visit. A total of 20 values was derived for each municipality, comprised of weekly sales estimates for the five types of fish in each of four visits. Weekly sales values were multiplied by 13

to estimate quarterly sales. All per capita sales estimates were calculated by dividing total sales by total population for a particular category. For purposes of data analysis, however, quarterly sales estimates for each municipality were converted to a per capita basis.

The influence of several factors on prices and per capita sales was examined during data analysis. These factors were type of fish, season, city size, and zone (in rural areas).

An analysis of variance technique was used to determine if differences between factors existed. Hypotheses were tested at the 0.05 probability level. Appropriate means were separated using the New Duncan's Multiple Range Test. For separations involving unequal replications, a modification of Duncan's test as described in Steel and Torrie (17) was used. Means were declared significantly different at a 5 percent probability level.

RESULTS AND DISCUSSION

Market Channels

Source of Fish

Most fish sold through public markets in El Salvador came from industrial and artisanal marine sources. Freshwater artisanal fisheries also provided a substantial part of the total supply. Pond-raised fish and imports contributed limited quantities to supply.

Approximately 1,481 metric tons of individual marine fish destined for human consumption were landed in 1973 (3). Industrial catch from trawlers, caught as a by-product to normal shrimp fishing operations, passed through the ports of El Triunfo and La Union.

Approximately 2,450 metric tons per year were taken by marine artisanal fisherman (17). Marine artisanal catch was landed in fishing communities along the coast with most passing through several major ports. Government sponsored



Stocking communal pond at Metalio (left) and harvest of large communal pond, Agua Zarca at Metalio (right).

fishing cooperatives provided marketing services to member fishermen in four ports.

The bulk of freshwater harvest came from four major lakes and one reservoir. Annual catch from lakes and reservoirs was 1,100-1,390 metric tons (1,10). Smaller natural lagoons and rivers provided an additional 155 metric tons (10). Pond-cultured fish contributed only 6.8 metric tons to the total harvest from inland waters (9). A summary of the estimated catch from inland waters in 1973 is presented in the Appendix.

Imports also contributed to the total supply of fish for public markets. Approximately 267 metric tons, chiefly in the form of dried fish from the neighboring countries of Guatemala and Nicaragua, were imported in 1973 (4).

Channels of Supply

Great variation was found in the flow of fish from production areas to consumers, whether one species from one source or different species from different sources were considered. A brief description of marketing channels for major sources of fish is presented.

Industrial marine fish, comprised of a mixture of small-sized species, were sold to two wholesalers in El Triunfo on several days each week. Fish were transported by truck to a distribution center in San Salvador and sold in the early morning to wholesaler-retailers and retailers from markets in San Salvador and nearby municipalities. After supplying larger volume sellers, fish were sold to door-to-door vendors. If fish remained after all vendors were supplied, limited quantities were sold directly to consumers, Figure 3.

The marine artisanal catch from major ports was sold daily in the afternoon to wholesalers and retailers. Fish were transported by bus or truck to principal cities for sale the following morning. Most fish from larger ports were sold fresh.

In smaller fishing communities along the coast, where catch was limited and major markets relatively distant, fish were salted and dried. After a sufficient quantity had been collected, usually at weekly or bi-weekly intervals, it was sold to dried-fish wholesalers in the cities. A large part of the dried-fish imports was also sold to wholesalers in the cities.

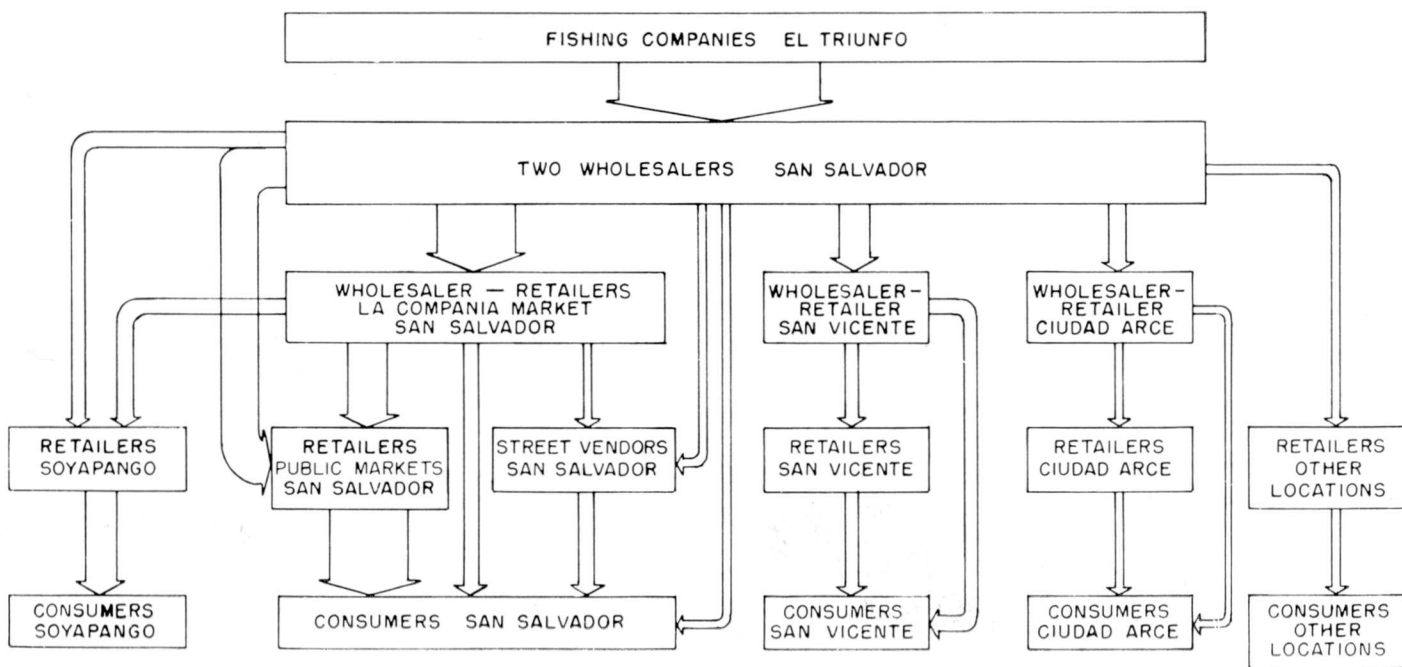


FIG. 3. Market channel example of industrial catch through one distribution center in San Salvador, March 1974.

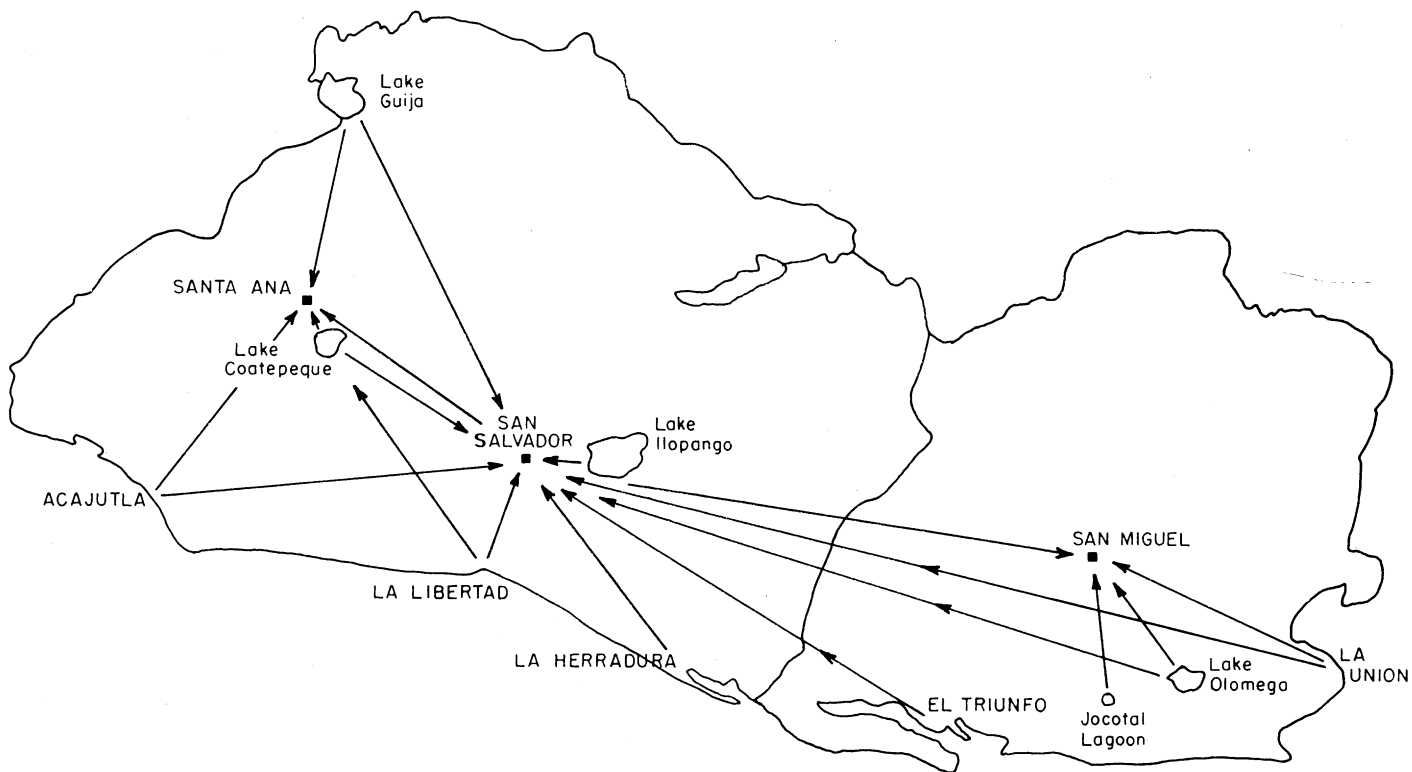


FIG. 4. Flow of fish to the large cities.

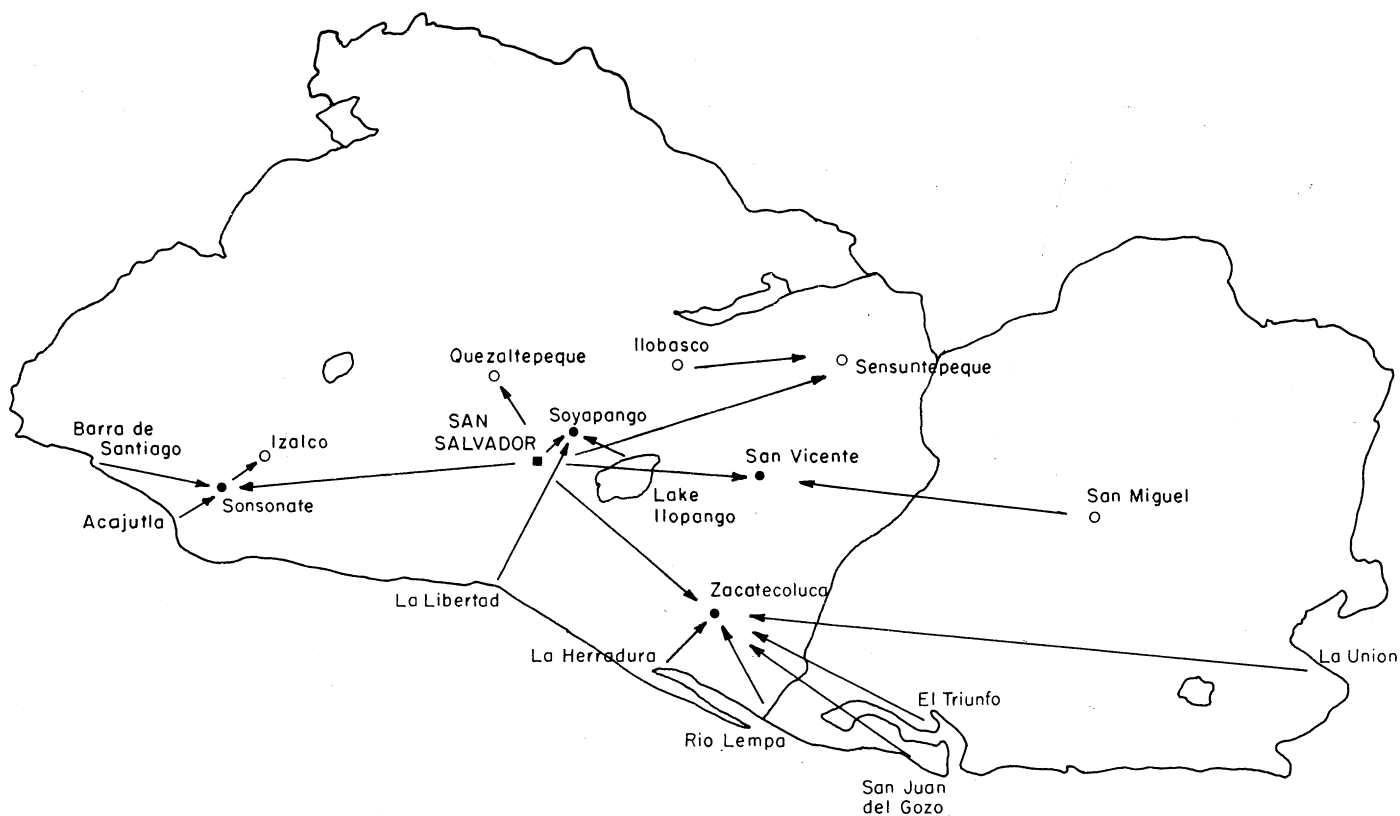


FIG. 5. Flow of fish to the small cities.

Freshwater catch was transported by bus or train to the cities and sold to wholesalers or retailers, or directly to city consumers by a family member. Depending on species of fish and source, freshwater fish were sold in the fresh state or were salted and dried.

Geographical Distribution of Supply

Most fish landed in El Salvador, with the exception of those consumed in fishing communities, were marketed through established channels of distribution. Fish were transported from areas of production to the large cities, where substantial quantities were consumed, Figure 4.

Small cities located near fishing centers also received quantities of fish directly from production areas. Only a limited number of rural towns received fish directly from landing sites. These were the small towns located along principal transportation routes connecting fishing communities with major cities or regions.

Markets in large cities served as major centers of fish distribution for surrounding small cities and rural towns. Most fish consumed in the central and northern zones of the country passed through San Salvador or San Miguel. Most fish consumed in the coastal zone were channeled through the small cities of Sonsonate, Zacatecoluca, or Uzulutan. Figures 5 and 6 illustrate the pattern of fish distribution to small cities and rural towns.

Marketing Margins

The mark-up in price was traced from producer to consumer for two species, representing both first and second class marine fish. During January 1974, a fishing cooperative from the port of La Libertad purchased sea bass from fishermen for a price of ¢1.32 per kilogram. The fish were transported to San Salvador and sold to retailers in public markets for ¢1.76 per kilogram. Consumers paid ¢2.20 per kilogram for these fish.

During the same month, industrial catch from the port of El Triunfo was sold to two wholesalers for a price of ¢0.57 per kilogram. After transportation to San Salvador, it was sold to wholesaler-retailers and retailers for approximately ¢0.88 per kilogram. In the public markets of San Salvador, consumers paid ¢1.23 to ¢1.32 per kilogram for these fish.

Expressed in terms of the original price paid to fishermen, the price for industrial marine fish had a mark-up of 123 percent and the price for sea bass had a mark-up of 67 percent. The actual mark-up, however, was similar for the two types.

Fish Compared with Other Animal Protein Sources

Fish compared favorably in price with other sources of animal protein in El Salvador. In markets of San Salvador, fish were less expensive than pork, beef, or poultry on a price per kilogram basis. Though consumers purchase food rather than protein, it is important that planners of food production programs consider the nutritional value of agricultural products per unit of consumer cost. Fish were less expensive per unit of edible protein than other meats, eggs, or milk, Table 1.



Fishing boat winched onto dock at La Libertad (top) and fisheries cooperative building, La Libertad (bottom).

- | NORTHERN ZONE | CENTRAL ZONE | COASTAL ZONE |
|-------------------------|----------------|------------------------|
| 1. Nueva Concepción | 8. El Congo | 16. Teatepeque |
| 2. Tejutla | 9. Ciudad Arce | 17. Jayaque |
| 3. San Isidro | 10. Armenia | 18. Comasagua |
| 4. Chapeltique | 11. Aguilares | 19. Olacuilta |
| 5. San Francisco Gotera | 12. Apopa | 20. San Pedro Masahuat |
| 6. Jocoro | 13. Tecoluca | 21. Santiago Nonualco |
| 7. Santa Rosa de Lima | 14. Berlin | 22. Santa Elena |
| | 15. Chinameca | 23. San Rafael Oriente |

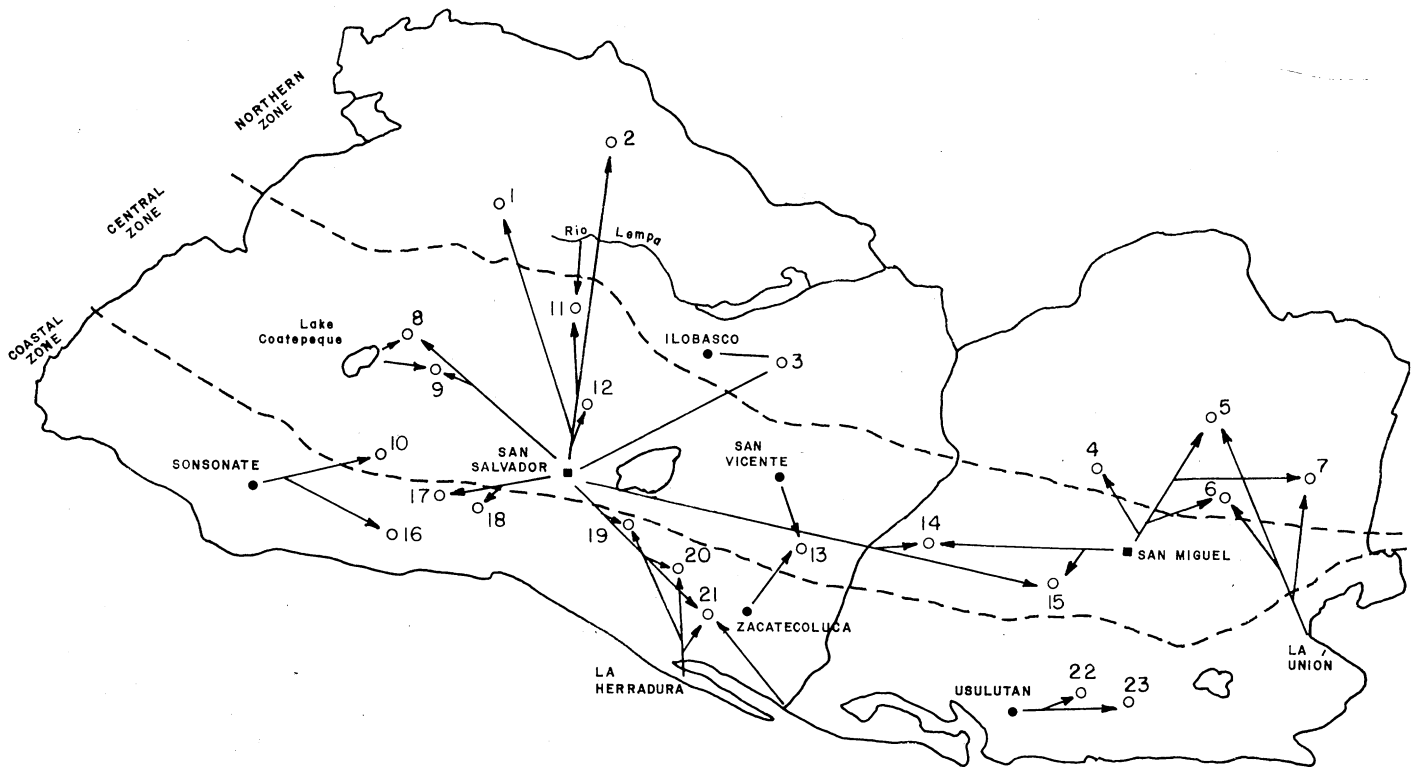


FIG. 6. Flow of fish to rural towns.

TABLE I. RETAIL PRICES OF COMMONLY SOLD SOURCES OF ANIMAL PROTEIN AND COST PER KILOGRAM OF EDIBLE PROTEIN, SAN SALVADOR, JANUARY 1974

Product	Price/unit ¹	Protein/unit ²	Cost/kg of protein
	Colones	Grams	Colones
Fish³			
First class marine.....	2.10/kg	132	16.15
Second class marine.....	1.40/kg	132	10.82
Beef⁴			
Loin.....	5.30/kg	180	29.22
Round.....	5.10/kg	180	28.01
Pork⁴			
Loin.....	3.30/kg	162	20.24
Ham.....	2.90/kg	162	17.56
Poultry³	2.90/kg	140	20.28
Eggs.....	3.10/doz.	158	19.43
Milk.....	.97/qt.	75	12.94

¹ Prices of all products except fish were reported in Dirección General de Economía y Planificación Agropecuaria, *Precios comunes de los principales productos pecuarios en la plaza de San Salvador, 15 de Enero de 1974*, San Salvador: 1974, 1 p. Fish prices were the average prices determined from second visit interviews in the La Compañía market.

² Protein content elaborated with data from United States Department of Agriculture, *Food, The Yearbook of Agriculture, 1959*, Washington, D.C.: U.S. Govt. Print. Off., 1960, pp. 244-248.

³ Fish—39 percent refuse (Spanish mackerel) and chicken—32 percent refuse, from United States Department of Agriculture, *Composition of Foods, Handbook No. 8*, Washington, D.C.: U.S. Govt. Print. Off., 1963, pp. 32, 113.

⁴ Beef and pork sold boneless.

Price and Sales Trends in Public Markets

Several factors were thought to influence fish marketing in El Salvador. Among these were city size, zone (in rural areas), and season. All sales data were reduced to a per capita basis to compare marketing trends in different locations. Price analyses were limited to markets in which actual data were reported.

According to City Size

TOTAL SALES. Total per capita sales according to city size were compared to learn of differences in the consumption of fish in the various sectors of the Salvadoran population. Greater quantities of fish were sold in large and small cities than in rural towns. Based on the original market sample, total annual per capita sales were 1.04 kilograms in the large cities, 1.45 kilograms in the small cities, and 0.41 kilogram in the rural towns.

It was assumed that all fish purchased at the retail level in public markets were consumed. Per capita sales from public market sources provided a good estimate of fish consumption in rural areas. In large and small cities, however, fish from other sources were also consumed.

Approximately 1,500 metric tons of canned fish (live weight) were imported in 1973 (5). Canned fish were consumed almost exclusively in urban areas because of high price. Fresh and frozen fish, amounting to approximately

TABLE 2. ESTIMATED ANNUAL PER CAPITA CONSUMPTION OF FISH ACCORDING TO MARKET LOCATION, 1973

City group	Per capita consumption of different type fish			
	Fresh and frozen other sources	Canned fish	All types from public markets	Total
	Kg	Kg	Kg	Kg
Large cities	0.23	1.45	1.05	2.73
Small cities	---	.73	1.14	1.87
Rural towns	---	---	.41	.47

3 percent of the total domestic supply, were sold for high prices in supermarkets and neighborhood shops, through door-to-door vendors, or directly in ports to upper income consumers from large cities (17).

Assuming canned fish were consumed in a two to one ratio in large and small cities, respectively, and 3 percent of the total domestic supply in 1973 was sold to consumers in large cities through non-public market outlets, total consumption of fish was more realistically depicted by estimates presented in Table 2.

Throughout the discussion of fish sales from public market sources, one is reminded that certain quantities of fish from other sources, similar to those estimated in Table 2, were also consumed in the cities.

PRICE BY TYPE OF FISH. In public markets, prices differed according to type of fish. Generally freshwater cichlids were more expensive than other types of fish. Next most expensive were first class marine fish. Freshwater other and second class marine occupied an intermediate price range and dried fish were least expensive of all fish types. With respect to comparisons involving city sizes within type, prices were similar with the exception of the price for freshwater cichlids, which was higher in the large and small cities than in rural towns, Table 3.

Price differentials detected among fish types indicated that consumers recognized and preferred certain species. Several vendors reported consumers preferred the flavor of freshwater fish over most marine species. Freshwater species of the family Cichlidae brought a higher price than freshwater others – the top-water minnows (Poeciliidae), freshwater characins (Characidae), and freshwater catfishes (Ariidae) – an indication that cichlid-type fish were highly acceptable to consumers.

Fish quality also appeared to influence the willingness of consumers to pay premium prices for certain species. For example, many sources of inland fish were located near major markets so freshwater species were normally sold in excellent condition. A large part of the supply of first class marine fish was marketed through fishing cooperatives located in major ports. The cooperatives required that fish be eviscerated at the time of catch and all were stored on ice immediately after landing. These methods assured high quality.

TABLE 3. AVERAGE WEIGHTED PRICES FOR FISH TYPES ACCORDING TO MARKET LOCATION

Type of fish	Price, colones per kg		
	Large cities	Small cities	Rural towns
Freshwater cichlids	2.51	2.75	2.11
Freshwater others	1.34	1.34	1.47
First class marine	1.83	2.18	1.96
Second class marine	1.36	1.41	1.36
Dried	1.01	.97	.95



Sharks on dock at Acajutla, with fins removed for shipment to China.

It was a different story for marine industrial fish, which comprised the bulk of the second class marine supply. These fish were marketed in extremely poor condition. After being kept on ice for several days before reaching markets, the unviscerated fish were soft-bodied and unappealing.

Price of freshwater cichlids was lower in rural towns than in large and small cities. Scattered throughout the countryside of El Salvador are several major lakes, smaller lagoons, and rivers, the principal sources of freshwater fish. Many of the rural towns visited during the survey were located near at least one of these sources. Even though most fish moved through established channels of distribution to the cities, limited quantities were also transported directly to nearby towns. The proximity of rural towns to the sources of freshwater fish permitted quantities to be transported to these markets at a low cost.

SALES BY TYPE OF FISH. Sales represent the quantity interface between supply and demand. With unlimited supply of product, demand establishes price. When quantities are limited, however, supply exerts a much stronger influence.

Comparisons were made of sales of the various types of fish since each represented a unique product. Per capita sales of all types sold in the fresh state were then combined so that relative sales of total fresh and dried fish could be compared.

Comparison of sales by type of fish and all subsequent comparisons in the analysis were based on sales data from the modified market sample. While sales estimates for the large and small cities remained unchanged, the modified market sample provided more sales information from the rural towns group. Even though it overestimated actual consumption of fish in rural areas (0.52 kilogram per person per year as compared to 0.41 kilogram from the original sample), data from the modified sample more accurately depicted marketing trends in rural areas.

When sales by type of fish were examined, a general pattern was detected. Sales of more expensive types of fish were greater in large cities than in small cities and rural



Frozen tilapia in supermarket at Todos, San Salvador.

towns, Table 4, an indication of greater buying power of large city consumers.

Relative sales of dried fish in large cities and rural towns emphasized actual differences in fish consumption in the two areas. Dried fish represented 70 percent of total sales in rural areas and 23 percent of total sales in large cities, yet actual consumption of dried fish in the two areas was about the same. The real difference in fish consumption between large cities and rural towns was that greater quantities of fresh fish were consumed in the large cities, along with equal amounts of dried fish. Differences in consumption between the two locations were actually greater than depicted by the market data, because of (1) consumption of fish from other sources in cities, and (2) overestimation of sales in rural areas caused by market sample bias.

In large cities, which served as centers of fish distribution for the country, all types of fish were available to the consumer. The combined sales of all fresh fish were 0.80 kilogram per person per year. In contrast, dried sales were only 0.24 kilogram even though dried fish sold for a low price. Low consumption of dried fish in large cities, low price of dried fish, and amount of dried fish passing through urban centers to rural areas indicated consumers in large cities preferred fresh over dried fish.

Fresh fish sales comprised 77 percent of total sales in large cities, 48 percent of total sales in small cities, and only 30 percent of total sales in rural towns. The bulk of fresh fish supply was distributed to large cities where most was consumed. Limited amounts of less preferred

TABLE 4. ANNUAL PER CAPITA SALES OF FISH TYPES ACCORDING TO MARKET LOCATION

Type of fish	Per capita sales			Pct. of total sales		
	Large cities	Small cities	Rural towns	Large cities	Small cities	Rural towns
	Kg	Kg	Kg	Kg	Kg	Kg
Freshwater cichlids	0.11	0.03	0.01	11	2	2
Freshwater others	.05	.01	.01	5	1	2
First class marine	.15	.04	.01	15	3	2
Second class marine	.47	.46	.12	46	41	24
Dried	.24	.54	.36	23	52	70
TOTAL	1.02	1.08	.51	100	100	100

fresh fish reached small cities, either directly from nearby landing sites or through large cities. Rural towns, being almost wholly dependent on cities as the source of supply, were only able to attract limited quantities of fresh fish out of the large and small cities.

Low consumption of fresh fish should not be explained in terms of supply alone. It is important to consider incomes of rural inhabitants and prices of various fish types. Possible preservation requirements for fish sold in rural areas may also influence consumption of fish. Examination of fish sales in rural areas should help to determine the relative importance of these factors.

In Rural Areas According to Zone

TOTAL SALES. Though sales data from the original market sample were not examined during the statistical analysis, their presentation was desirable to provide estimates of the total fish consumption in rural areas. Based on the original market sample, the average annual per capita consumption of fish was 0.18 kilogram in the coastal zone, 0.69 kilogram in the central zone, and 0.40 kilogram in the northern zone.

In the rural areas fish sales varied with zone. Per capita sales were greater in the central zone than in the coastal and northern zones. Based on the modified market sample, the annual per capita consumption was 0.29 kilogram in the coastal zone, 0.81 kilogram in the central zone, and 0.38 kilogram in the northern zone.

The pattern of fish distribution appears to explain the greater consumption in the central zone. Large cities, which serve as centers of fish distribution, are located in this zone. A principal highway connecting the large cities traverses this zone, facilitating the movement of fish.

Due to the proximity of towns in the coastal zone to marine fish sources, it was originally believed that consumption in the coastal zone was greater than that in other zones. This consumption pattern did not generally prevail outside of active fishing centers along the coast. Most fish consumed in rural towns of the coastal zone moved in established channels of distribution through the large and small cities. Two causative factors in the consumption pattern involved the transportation system.

In El Salvador, principal highways connect major cities and regions. Secondary roads connect smaller towns with principal highways. Geographical proximity of rural towns to the seacoast does not imply that actual highway distance to the nearest port is always small. Based on the modified market sample, the average distance from rural towns in the coastal zone to their nearest port was greater than the distance from rural towns in the central zone to their major source of supply.

In the coastal zone, most fish were transported to rural towns by bus. Bus routes normally run between the rural towns and nearby commercial centers (usually of a size corresponding to the small city category) or to the large cities. For this reason fish were generally transported from ports to large or small cities and from these distribution hubs to rural towns.

Rural towns in the northern zone were characterized by relative isolation from fish supply sources. It was originally thought that fish consumption was lowest in the northern zone because of this isolation. The market data, however, indicated otherwise. One rural town in the northern zone visited during the survey was Santa Rosa de Lima. This town was geographically located in the northern zone but

Dried fish vendor in small city market (top), vendor weighing fish on street in typical rural market at San Isidro (center), and rural town market scene (bottom).

was not typical of other northern towns. A paved highway connects Santa Rosa to the nearby port of La Union. The per capita consumption of fish in Santa Rosa was approximately 5 times greater than consumption in Nueva Concepcion, the only other northern town from the original market sample which had fish sales. Fish consumption for the northern zone as a whole was thought to be overestimated due to the high consumption levels found in atypical Santa Rosa.

An indication of the influence of market sales from Santa Rosa on consumption estimates for the northern zone is shown by the relative consumption levels derived from original and modified market data. Per capita consumption was estimated at 0.40 kilogram when data from the original market sample were considered. Only 2 of 10 original northern towns had fish sales. When the market sample was modified, five additional towns, all having fish sales, were added to this group. The estimated consumption, however, decreased to 0.39 kilogram. Though only two towns from the original selection had fish sales, the consumption level of Santa Rosa increased average consumption of the zone above the level of all additional towns with fish sales which were added to the sample group.

PRICES BY TYPE OF FISH. Utilizing data from rural markets alone, prices for various types of fish in all zones were similar to those described for rural areas as a whole; however, no freshwater or first class marine fish were found to be sold in the northern zone. Comparisons among zones showed that second class marine fish were more expensive in the coastal zone than in the central or northern zones, Table 5.

TABLE 5. AVERAGE WEIGHTED PRICES FOR FISH TYPES IN RURAL MARKETS BY ZONE

Type of fish	Price per kilogram, colones		
	Coastal Zone	Central Zone	Northern Zone
Freshwater cichlids.....	2.22	2.09	---
Freshwater others.....	1.63	1.45	---
First class marine.....	1.94	1.69	---
Second class marine.....	1.56	1.25	1.10
Dried.....	.90	.95	.90

SALES BY TYPE OF FISH. Sales of dried fish were significantly greater than combined sales of all fresh fish in rural areas. The central zone had greater sales of dried fish as well as greater total sales, than the other zones. Sales of fresh fish were also greater in the central zone because of larger use of second class marine, one of the lesser expensive of the fresh fish types, Table 6.

Greater consumption of fresh fish in the rural towns of the central zone is a result of proximity of these towns to the large supply of fresh fish in cities. Where available, consumers in rural areas prefer fresh over dried fish, even though they may be limited to the less expensive classes.

According to Season

Comparisons of per capita sales by seasons were made to detect seasonal trends in fish marketing. Markets were visited four times during the year, twice each during the rainy



TABLE 6. ANNUAL PER CAPITA SALES OF FISH TYPES IN RURAL MARKETS BY ZONE

Type of fish	Per capita sales			Pct. of total sales		
	Coastal Zone	Central Zone	Northern Zone	Coastal Zone	Central Zone	Northern Zone
	Kg	Kg	Kg	Kg	Kg	Kg
Freshwater cichlids.....		0.02		0	3	0
Freshwater others.....		.01		0	3	0
First class marine.....	0.01	.02		2	2	0
Second class marine.....	.08	.24	0.01	28	29	2
Dried.....	.21	.51	.37	70	63	98
TOTAL.....	.30	.80	.38	100	100	100

and dry seasons. Data from each visit were expanded to estimate sales for respective quarters.

TOTAL SALES ALL MARKETS. Based on the modified market sample, the estimated quarterly fish sales in all markets visited were 235,199 kilograms in Quarter 1 (0.15 kilogram per capita), 261,891 kilograms in Quarter 2 (0.17 kilogram per capita), 449,416 kilograms in Quarter 3 (0.30 kilogram per capita), and 381,154 kilograms in Quarter 4 (0.25 kilogram per capita). The quarterly sales data provide limited marketing information when considered individually, but by comparing sales in various quarters a seasonal trend in fish sales can readily be detected.

Per capita sales in Quarter 3 were significantly greater than sales in other quarters. This quarter corresponds to the religious season of Lent. During the weeks preceding Easter, demand for fish increased greatly in El Salvador due to traditional religious custom of eating fish among the predominantly Catholic population (19). In anticipation of the increased demand for fish, the entire system of fish marketing was geared up. Fishing activities along the coast increased, purchases at landing sites became highly competitive among fish vendors, and many retailers in urban markets began to temporarily sell fish.

The number of fish vendors encountered during the present study served to substantiate the response of the marketing system to the increased demand for fish. During Quarter 3 visits, 506 fish vendors were encountered. In contrast 290, 336, and 453 vendors were interviewed during visits in quarters 1, 2, and 4, respectively.

Following Easter season, fish sales appeared to decrease gradually to a low point at the end of the rainy season. According to Tilic and McCleary (17) the decrease in consumption was due to (1) demand for fish being satisfied during the preceding weeks, (2) poor quality of fresh fish sold due to the extremely hot weather in this period, and (3) diminished supply resulting from reduced fishing during the rainy season. Fish dried during the rainy season were generally of poor quality, another causative factor of reduced consumption.

TOTAL SALES IN CITIES. Total sales in the various city groups were compared according to season. Though a general trend of increased sales during Quarter 3 was detected, variations in seasonal sales within market locations appeared to deviate from the overall pattern. In large cities, sales increases occurring in Quarter 3 appeared to continue through Quarter 4. Though rural sales were greatest during Quarter 3, the gradual decrease to a low in Quarter 1 was not detected, Table 7.

TABLE 7. QUARTERLY FISH SALES ACCORDING TO MARKET LOCATION AND SEASON

Market location	Sales by season			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
	Kg	Kg	Kg	Kg
Large cities				
Total.....	105,625	146,085	214,589	236,937
Per capita.....	.16	.21	.32	.35
Small cities				
Total.....	59,765	71,382	135,891	85,617
Per capita.....	.20	.23	.44	.23
Rural towns				
Total.....	69,810	44,425	98,936	58,600
Per capita.....	.13	.09	.19	.11
All markets				
Total.....	235,199	261,891	449,416	381,154
Per capita.....	.16	.17	.30	.25

TOTAL SALES IN RURAL AREAS. Within the rural towns group, total sales according to season were also examined. In the central zone, total per capita sales during Quarter 3 were greater than sales in other quarters. In the coastal and northern zones, however, this response was not detected, Table 8.

Fish sales did not increase in coastal and northern zones during Quarter 3 as in cities and rural towns of the central zone. This reflected the inadequate supply of fish at a time when demand for fish increased in all locations. Even though supply was greater during Quarter 3, consumers in the cities absorbed a greater proportion of that supply, thus limiting the amount available to more distant rural towns.

TABLE 8. QUARTERLY FISH SALES IN RURAL MARKETS ACCORDING TO ZONE AND SEASON

Zone	Sales by season			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
	Kg	Kg	Kg	Kg
Coastal zone				
Total.....	17,928	12,816	12,273	12,922
Per capita.....	.10	.07	.06	.07
Central zone				
Total.....	37,859	25,835	69,390	34,373
Per capita.....	.18	.12	.34	.17
Northern zone				
Total.....	14,022	5,773	17,272	11,304
Per capita.....	.11	.05	.34	.09
All rural markets				
Total.....	69,810	44,425	98,936	58,600
Per capita.....	.13	.09	.19	.11

PRICES BY TYPE OF FISH. Data were examined on the basis of type of fish and quarter to detect seasonal price trends. A general pattern of increased prices during quarters 2 and 3 was detected, Table 9. These quarters correspond to the period preceding Easter, when demand for fish increased.

Prices for freshwater cichlids and first class marine, the two more expensive fish types, were greater in Quarter 2 than in Quarter 3. Second class marine and dried fish, two of the less expensive types, demanded a higher price during Quarter 3. Freshwater others were most expensive during Quarter 2 but least expensive during Quarter 3.



Fish drying at Acajutla.

TABLE 9. AVERAGE WEIGHTED PRICES FOR FISH TYPES ACCORDING TO SEASON

Type of fish	Price/kilogram, colones			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Freshwater cichlids.....	2.31	2.75	2.64	2.16
Freshwater others.....	1.32	1.69	1.23	1.36
First class marine.....	1.85	2.18	2.11	1.83
Second class marine.....	1.21	1.41	1.54	1.39
Dried.....	.77	.99	1.25	.88

SALES BY TYPE OF FISH. Dried fish sales were greater in Quarter 3 than in any other quarter. Differences in seasonal sales of other fish types were not detected during the analysis. Dried fish also made up a significantly greater part of total market sales during Quarter 3, Table 10.

During the months preceding Easter, large quantities of dried fish were accumulated by vendors in anticipation of increased demand for fish. Fresh fish vendors in the cities bought additional quantities when available and salted and dried any fish left unsold at the end of each day. Dried fish wholesalers in the large cities also purchased and stored large quantities of fish during this period.

Much of the increase in sales during Quarter 3 was comprised of dried fish, despite the fact that dried fish is the least preferred type. Most fish sold in public markets of El Salvador were supplied by capture fisheries. The quantity of fish landed during Quarter 3 alone was insufficient to satisfy the increased demand. Thus, an accumulation of supply was necessary. Storage facilities available to the majority of fresh fish vendors consisted of an insulated box

TABLE 10. QUARTERLY SALES OF FISH TYPES ACCORDING TO SEASON

Type of fish	Sales by season			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
	Kg	Kg	Kg	Kg
Freshwater cichlids				
Total.....	17,945	26,620	24,826	19,876
Per capita.....	.01	.02	.02	.01
Freshwater others				
Total.....	13,018	6,358	13,347	15,026
Per capita.....	.01	.01	.01	.01
First class marine				
Total.....	18,956	31,921	18,785	55,652
Per capita.....	.01	.02	.01	.04
Second class marine				
Total.....	86,662	118,929	175,282	148,099
Per capita.....	.06	.08	.11	.10
Dried				
Total.....	98,617	78,053	218,205	142,480
Per capita.....	.06	.05	.15	.10
All types				
Total.....	235,199	216,891	449,415	381,154
Per capita.....	.15	.17	.30	.25

where fish were stored with ice. This preservation method was inadequate for the accumulation of fish over an extended period. Therefore, dried fish was the only type available in sufficient quantity to meet demand.

Projected Demand for Fish

Simple projections of market demand for fish in both urban and rural areas were calculated to provide estimates of the quantities of fish which consumers will be willing and able to purchase within a relatively short period of time. Projections were based on estimated consumption of fish from all retail sources in 1973 and expected changes brought about by factors whose effects were easily quantified: population and income. It was assumed that all other factors will remain constant.

The 1973 consumption of fish from retail sources was considered to be the best available indicator of actual market demand for fish in El Salvador. For expressed demand (consumption) to be truly representative of actual quantities of fish that consumers were willing and able to purchase requires that adequate supply be available. Data from the study indicate that this did not occur in all locations. Demand projections therefore are somewhat conservative.

Demand in the Cities

An estimated 1,510,000 people lived in urban areas (large and small cities) in 1973. Based on expected growth in population and reported trends in migration from rural to urban areas, urban population will increase to approximately 2,256,000 by 1980 and 2,954,000 by 1985.

TABLE 11. PROJECTION OF THE MARKET DEMAND FOR FISH IN URBAN AREAS IN 1980 AND 1985

Year	Population	Per capita consumption, kilograms	Estimated supply, metric tons	Projected demand, metric tons	Additional need, metric tons
1973.....	1,510,000	2.34	3,533	-----	-----
1980.....	2,256,000	2.49	-----	5,617	2,084
1985.....	2,954,000	2.59	-----	7,651	4,118

TABLE 12. PROJECTION OF THE MARKET DEMAND FOR FISH IN RURAL AREAS IN 1980 AND 1985

Year	Population	Per capita consumption, kilograms	Estimated supply, metric tons	Projected demand, metric tons	Additional need, metric tons
1973	2,143,000	0.69	879	-----	-----
1980	2,550,000	.69	-----	1,759	880
1985	2,835,000	.69	-----	1,956	1,077

Income elasticity of demand for fish in El Salvador was reported to be 0.6. For each 1 percent rise in per capita income, the expenditure for fish will increase by 0.6 percent. In 1973, the average urban consumer spent about ϕ 5.85 for fish. As a result of income growth, the consumer will spend an additional ϕ 0.26 for fish in 1980 and ϕ 0.44 by 1985.

Estimated per capita consumption of fish from retail outlets in urban areas was 2.34 kilograms in 1973. Assuming that the average consumer will pay ϕ 1.75 per kilogram for additional fish purchased as a result of income growth, 1973 consumption level will increase to 2.49 kilograms by 1980 and to 2.59 kilograms by 1985. Based on these data, market demand for fish in urban areas is projected to be 5,617 metric tons in 1980 and 7,651 metric tons in 1985, Table 11.

Demand in Rural Areas

Fish consumption was greater in rural towns of the central zone than in other zones. A major factor limiting consumption in the coastal and northern zones was lack of supply. Expressed demand for fish in the central zone more adequately reflected actual market demand for fish in rural areas. A projection of market demand for fish was calculated, based on actual consumption of fish from public market sources in the central zone in 1973, expected growth in population, and reported trends in migration from rural to urban areas. Possible changes in rural income were not considered in this projection. Market demand for fish in rural areas is projected to be 1,759 metric tons in 1980 and 1,956 in 1985, Table 12.

Projected Needs

In view of the projected market demand for fish it is imperative that production increases in all contributing sectors be achieved. Actual trends in supply indicate that this is not occurring. Total domestic production of fish has remained relatively stable at approximately 5,500 metric tons (see estimates in Appendix). An additional 5,195 metric tons of fish will be required by 1985 to satisfy the increased market demand in El Salvador. It is particularly important that much of the increase in production be comprised of less expensive fish to benefit low income consumers.

Projected market demand for fish refers only to quantities which will actually be sold through the marketing system. A significant part of total domestic production in El Salvador is consumed by persons actively engaged in fishing. In 1970, approximately 20 percent of the total fresh fish supply was consumed in fishing centers along the coast (17). While not included in present demand projections, it is important to consider the significant autoconsumption levels of the fishing sector of El Salvador when determining future needs.

The present study has attempted to examine fish marketing patterns in El Salvador, with emphasis on rural areas of the country. It is important to consider certain marketing trends and their influence on the future supply of fish to rural areas.

Urbanization of the population of El Salvador has been mentioned. For most agricultural commodities, urbanization requires a more efficient system of distribution to move food from production areas to centers of consumption. For fish, urbanization has additional meaning.

In 1973, the bulk of fish supply to public markets came from marine sources. Channels of distribution have been established to move the supply from landing sites to major consumption centers. As a result of increased demand that accompanies urbanization, catch from marine sources would be absorbed to a greater degree in the cities.

Most fish reaching rural markets passed through distribution centers in cities. The supply situation for rural areas was not ideal in 1973, as indicated by data from the present study, and would not improve as a result of urbanization. Projected demand for fish in the cities will surpass 1973 domestic production by 1980. In view of this increasing demand in cities, the actual supply to rural areas will decrease in upcoming years unless greater fish production is achieved.

The situation for rural areas becomes even less favorable when income levels are considered. Prices must necessarily be greater in rural areas than those paid in the cities to attract fish out of urban centers. This would prove an additional burden to rural inhabitants, as this sector has the lowest average incomes.

Means of Increasing Supply

A substantial increase in demand for fish in El Salvador is projected for the near future. Domestic supply has not increased significantly in recent years. Therefore, meeting the growing demand indicates the need for immediate efforts to increase the production of fish in all sectors. Large quantities of inexpensive fish are needed to benefit low income consumers.

Means of increasing production of fish from marine sources have been suggested (8,17). Similar development programs may be established to increase harvest from natural inland waters. Natural fish stocks represent a finite resource, and management techniques designed to increase the productivity of these fisheries are extremely limited in scope. Without careful supervision and regulation, the danger of over-exploitation is everpresent.

Fishculture represents an additional means of increasing future fish supplies in El Salvador. Certain quantities may be produced in cages and pens located in suitable natural waters. To a large extent, however, increased production from inland waters must come through culture of fish in artificial ponds.

Fishculture in artificial ponds can make an important contribution to future fish supplies for several reasons. Pond-raised fish are preferred over many other types and can be economically produced at competitive prices. Fish can be produced near areas of consumption, thus reducing transportation costs and improving quality.

When the supply situation in rural areas is considered, fishculture becomes especially important. Production of fish in artificial ponds scattered throughout the countryside would reduce the dependency of rural areas on the cities for fish supplies. In view of the conditions under which many rural Salvadorans live, the provision of increased quantities of inexpensive fish should be considered a worthwhile achievement.

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COVER PHOTO. This dried fish vendor at Sensuntepeque is typical of rural town and small city markets.

APPENDIX

APPENDIX TABLE 1. ESTIMATED PRODUCTION FROM INLAND WATERS, 1973

Source	Production, metric tons
Lakes and reservoir¹	
Olomega.....	497.5
Guija.....	226.5
Ilopango.....	118.9
Coatepeque.....	156.7
5 de Noviembre.....	121.9
TOTAL.....	1,121.5
Rivers and lagoons²	
Lempa.....	41.2
Paz.....	28.9
Grande de San Miguel.....	21.1
Jiboa.....	5.5
Jocotal.....	57.9
TOTAL.....	154.6
Artificial ponds ³	6.8
Total production.....	1,282.9

¹ D. R. BAYNE. 1974. Progress Report on Fisheries Development in El Salvador. Research and Development Series No. 7, International Center for Aquaculture, Auburn Univ. (Ala.) Agr. Exp. Sta.

² M. R. MACHON C. Produccion pesquera de las principales especies comerciales de El Salvador en 1974. Ministerio de Agricultura y Ganaderia, San Salvador. pp. 29-43 passim. Only locations with available production data included.

³ G. JENSEN ET AL. 1973. Inventario y evaluacion de estanques piscicolas en El Salvador, 1970-1972. Ministerio de Agricultura y Ganaderia, San Salvador. p. 34.

APPENDIX TABLE 2. MONTHLY IMPORTS AND EXPORTS OF FRESH AND DRIED FISH (LIVE WEIGHTS), 1973

Month	Imports		Exports	
	Fresh	Dried ¹	Fresh	Dried ¹
	Kg	Kg	Kg	Kg
January.....		84,831		114
February.....	230	3,053		
March.....	238	21,354	1,664	
April.....		6,705	276	992
May.....		3,706		714
June.....		5,606	368	1,631
July.....		12,043		1,164
August.....		10,091		2,933
September.....		1,553	138	
October.....		7,245	4,119	21,049
November.....		7,073		10,155
December.....		103,125	7,257	5,899
TOTAL.....	468	266,384	13,822	44,651

SOURCE: Direccion General de Economia y Planificacion Agropecuaria, Informes mensuales de las importaciones y exportaciones de los productos pecuarios, Ministerio de Agricultura y Ganaderia. (San Salvador: 1973).

¹ Conversion factor = 1.9.

APPENDIX TABLE 3. CANNED FISH IMPORTS (LIVE WEIGHT), 1973

Type of fish	Quantity imported, kilograms
Sardine.....	1,203,602
Anchovy.....	4,808
Salmon.....	2,148
Cod.....	1,026
Others.....	362,282
TOTAL.....	1,573,866

SOURCE: Direccion General de Estadistica y Censos, Boletin estadistico, II epoca, octubre-diciembre, 1973, No. 100, Ministerio de Economia (San Salvador: 1974), p. 136.

Conversion factors: sardine—1.62; salmon—1.52; others—2.0. From Tilic and McCleary, Analisis de la comercializacion de pescado para consumo y requisitos para su desarrollo, El Salvador, Boletin Tecnico. Vol. IV, No. 4, CCDP-FAO-PNUD (San Salvador: 1971), p. 86.

APPENDIX TABLE 4. ESTIMATION OF THE TOTAL SUPPLY OF FISH, 1966, 1969, and 1973

Source of supply	Metric tons, by year		
	1966	1969	1973
Domestic production			
Industrial (human consumption) ¹	1,618	1,264	1,481
Marine artisanal ²	2,451	2,451	2,451
Inland waters ³	1,283	1,283	1,283
TOTAL.....	5,352	4,998	5,215
Imports⁴			
Fresh.....	3	1	1
Dried.....	776	190	266
Canned.....	1,981	1,326	1,574
TOTAL.....	2,760	1,517	1,841
Exports⁴			
Fresh.....	48	29	13
Dried.....	15	24	45
TOTAL.....	63	53	58
Total supply.....	7,349	6,462	6,998

¹ DIRECCION DE DESARROLLO Y CONTROL INDUSTRIAL. 1974. Industria camaronera de El Salvador, datos estadisticos, 1960-1973, Ministerio de Economia, San Salvador. p. 1.

² TILIC, I. AND W. MCCLEARY. 1971. Analisis de la comercializacion de pescado para consumo y requisitos para su desarrollo, El Salvador, Boletin Tecnico, Vol. IV, No. 4, CCDP-FAO-PNUD. San Salvador. p. 73.

³ See above estimate of production from inland waters.

⁴ Estimates for 1966 and 1969 from Tilic and McCleary, Analisis. p. 86. For 1973 estimates, see above.

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