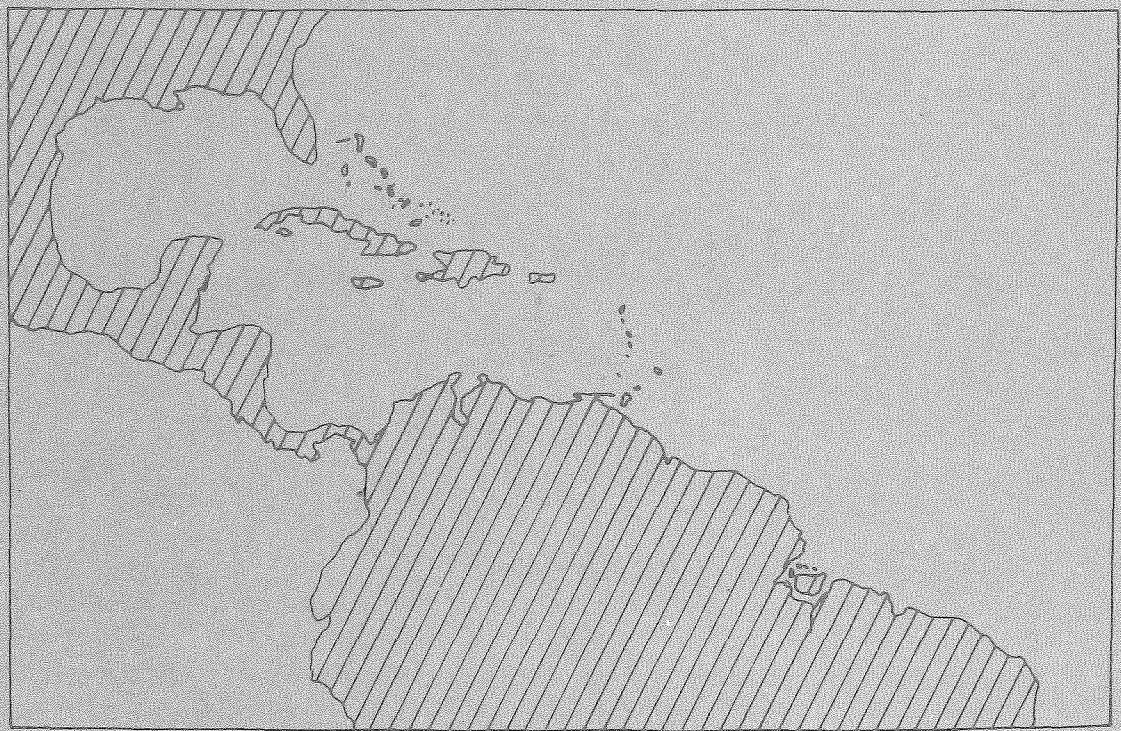


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INTERREGIONAL FISHERIES DEVELOPMENT AND MANAGEMENT PROGRAMME
(WECAF Component)

REPORT OF MISSION TO ST. LUCIA



UNITED NATIONS DEVELOPMENT PROGRAMME

FOOD AND AGRICULTURE ORGANIZATION OF
THE UNITED NATIONS

Interregional Fisheries Development and Management Programme
(WECAF Component)

Report of Mission to St. Lucia

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INTERREGIONAL FISHERIES DEVELOPMENT AND MANAGEMENT PROGRAMME

The Interregional Fisheries Development and Management Programme began its activities on 1 January 1980. It has three components (Headquarters, CEEAF and WECAF) and the WECAF component is the successor of the Interregional Project for the Development of Fisheries in the Western Central Atlantic (WECAF) which was initiated in March 1975 and terminated its second phase on 31 December 1979. Its objectives are to assist developing coastal countries in assessing development opportunities offered by their available fishery resources and to formulate appropriate actions, to promote the rational utilization of fishery resources, to promote the development of technical and economic cooperation among countries of the region and to assist in the upgrading of their human resources. Its activities are coordinated by the Western Central Atlantic Fishery Commission (WECAFC) established by FAO in 1973. The Project is supported by the United Nations Development Programme (UNDP) and the Food and Agriculture Organization of the United Nations (FAO) as the Executing Agency.

As with the previous project, two series of documents will be prepared to provide information on activities and/or studies carried out. This document is the thirty first of the series WECAF Reports. The other series of documents is entitled WECAF Studies.

D.A. Lintern
Acting Project Director

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1. Conclusions and Recommendations

(a) Conclusions

(1) Supply of Fish

The 1978 landing statistics indicate an island production of about 1 400 t of fish, largely made up of pelagic species such as dolphin fish, kingfish, tuna and flying fish, which are caught during the main fishing season from January to June. Landings during the second half of the year are only about half those made during the season and consist of demersal reef fishes, sharks and some porpoise. The statistics only cover landings on the 11 most important beaches, out of a total of 25, and are therefore underestimates of total production. During the main fishing season, owing to weather and other causes, fishing effort changes from day-to-day and landings can fluctuate significantly. Deficiencies in the marketing and distribution system mean that glut conditions alternate with fish shortages. Out of season the island is typically undersupplied with fish. In general, it is not thought that resources are, in practice, a limiting factor to increased productivity.

From an examination of the historical trade statistics and estimates of landings, it would seem that local fish production has always fallen well short of domestic demand. This shortage has traditionally been met through the importation of large quantities of salted-dried cod (salt cod) from North America and Europe. In the past, these imports were of a similar price level to locally produced fish on a protein for protein basis. However, recently, the price of imported salt cod has increased markedly compared to local fish and imports of this commodity have fallen, reducing per caput fish consumption.

It has been suggested that the fish resources off St. Lucia can be exploited at considerably higher levels than at present and that the main reason why this does not happen is the highly splintered nature of the marketing system, which prevents fishing crews from maximising their catches. However, the number of professional full-time fishermen is relatively small and for many of them fishing is only one of several occupations pursued. Leisure time also has a high priority and, in practice, fishermen may not react very positively to incentives to increase production. Whilst marketing is undoubtedly a constraint to increased productivity, it should also be recognized that a sociological problem exists as well. In the medium term, say the next five years, no drastic changes in fishing techniques, gears or vessels are to be expected.

(2) Marketing and Distribution

Fish is generally purchased from fishermen on the beaches by consumers and by a small number of traders who transport it to Castries for sale in the fish market, to cold stores or to the catering industry. Vieux Fort is the most important landing beach. If fish is surplus to local requirements and is not purchased by a trader, the individual fishermen and their families must hawk it further inland, hire transport to take it to Castries or simply throw it away. To try to avoid this situation, the fishermen tend to land their fish early in the day.

To date, little attempt has been made to hold fish from day-to-day to stabilize

supply. As a result there is considerable waste during glut conditions and large-scale price fluctuations. Because there is no alternative convenient source of supply, prospective purchases have to wait long periods - perhaps for several hours - in order to buy fish.

No attempt has been made to store fish from the main fishing season to the off season. The "slow freezing" and storage of fish is practiced almost exclusively in a segment of the market supplying the catering trade. "Slow freezing" is only suitable for short-term storage, say one or two months, and in the off season the catering industry relies to a great extent on imported frozen fish.

At the height of the fishing season about 13 vendors rent stalls in the Castries market. These vendors are paid a commission on fish sales, usually 4 percent. Fish is brought to the market by traders, fishermen and boat owners, and if a vendor finds he has too much fish he may subcontract part of it to other vendors. There are no storage facilities for fresh or frozen fish at the Castries market, though three vendors use domestic freezers. Traders use their own refrigerators or freezers, or occasionally hire space in commercial cold stores normally used for storing imported frozen goods. In general Castries, which has 40 percent of the island's population, is undersupplied with fish, as are the people residing in the interior of the island.

(3) Prices

The Government sets maximum wholesale and retail prices for fresh fish but in practice these are not being observed and the Government is presently considering the possibility of abolishing them. The prices do not apply to locally frozen fish. Fish prices paid to the fishermen are very sensitive to the quantities landed so that when fish is abundant prices fall sharply. Generally, fresh fish is still considered a reasonably priced product, though there is strong competition from the cheaper cuts of imported meat and poultry.

The CIF prices for imported fish and fish products have increased by almost 300 percent between 1970 and 1978. Canned fish, mainly sardines and herring, have not shown the same increases as salt cod, crustacea and fresh and frozen fish. Imported fish and fish products are subject to price control regulations which fix wholesale and retail gross margins.

(4) Infrastructure

Although more than adequate cold storage space exists on the island, no quick freezing facilities are available. Instead, local fish is "slow frozen". On the other hand, there is virtually no chill temperature storage and the only ice plant is the one at the Goodwill Cooperative, Vieux Fort, and that is not operating at the moment.

Although some covered markets exist in outlying areas, they are generally redundant and only the one at Castries is normally active. Conditions at this market, where approximately 20 selling areas are available, are unhygienic.

The major hotels on the island all have considerable chill and cold storage space so that they can hold at least one month's stock against possible shortages in local supply, shipping problems and labour disputes.

Insulated transport is not normally used for fish in St. Lucia, the vehicle usually employed being a small pick-up. Road conditions vary considerably.

(5) Fishermen's Cooperatives

Twelve fishermen's cooperatives have been established and a joint body made up of representatives of each of these has been set up. To encourage these organizations, the Government grants duty-free petrol and equipment concessions to members.

However, only one, the Goodwill Cooperative at Vieux Fort - which is also the oldest - has embarked on any truly cooperative venture. It has a sub-agency for a make of outboard engine and can offer wholesale and after sales service to its members and also achieve savings through economies of scale and reduced wholesale margins. In addition, during glut periods it has purchased surplus fish from its members at market prices (usually at the Government maximum price) and "slow frozen" it for sale to cold store owners. This arrangement has operated at a loss so far.

Although it is a precondition of membership, no cooperative members regularly supply their catches to the cooperatives for disposal. As yet the movement is in its earliest stages and, in practice, the cooperatives exist as a structure through which Government subsidies to the industry can be channelled. It is possible that these subsidies are not really assisting the fishermen but, rather, are helping the engine suppliers and encouraging a wasteful use of energy. Unless some truly cooperative advances result in the near future, it might be better to withdraw the subsidies.

(b) Recommendations

(1) Preservation Techniques

Taking into account the present stage of the St. Lucia fisheries, it is believed that the development process in fisheries should make use of the following preservation systems, which are more fully described in Appendices 2-5.

- (i) Day-to-day fluctuations in supply should be evened out by using iced storage for fish, a method which can preserve fish for a week or more;
- (ii) longer term and season-to-season fluctuations should be overcome primarily by low investment preservation techniques, particularly salt-drying and brining;
- (iii) slow freezing as a method of preservation is expensive, inefficient and short term. In the medium term this practice should be discouraged and replaced either by the use of ice or quick freezing;

- (iv) although a quick freezing facility will be provided as part of the project being financed by the Canadian International Development Agency (CIDA), it is recommended that initially this method of preservation be used; mainly for these products which can sustain a price increase due to freezing and frozen storage; i.e., products for which an effective demand exists;
- (v) as more ice becomes available following the completion of the Castries fish plant, the industry should be encouraged to store iced fish in chill boxes or refrigerated chill rooms (- 2° C) only, and to use refrigerated cold rooms (- 10° C to - 30° C) for the storage of already frozen goods.

(2) The Role of Fishermen's Cooperatives in Marketing

In view of the promising start already made by cooperatives, and in line with the Government's plans, the fishermen's cooperatives should be the nucleus of development in the industry, and particularly in marketing.

At present only one cooperative, the Goodwill Fishermen's Cooperative at Vieux Fort, has sufficient capital facilities to expand its marketing function significantly. This cooperative should be given every encouragement and assistance by the Fisheries Administration to achieve such advances. The small flake ice plant owned by the Goodwill Fishermen's Cooperative should be used to provide ice for the development of regular iced fish sales at the Castries fish market and limited sales from its premises at Vieux Fort.

The recommendations made here apply in particular to the Goodwill Fishermen's Cooperative, but also to the other cooperatives on the island. To ensure a supply of fish an existing rule of membership should be exercised whereby fishermen are called upon to supply fish to the cooperative and, in the first instance, members should be called upon to provide a proportion of their landings, say 25 percent, at pre-arranged prices.

The cooperative should take up the option to purchase from its members fish that is surplus to immediate market requirements at pre-arranged 'glut' prices. Such prices should be at or near the lowest price paid on the first-hand market. The fish should be iced and sold on days when landings are poor, or processed to salted-dried or brined fish.

The cooperative should seek to supply a small section of the catering industry on a regular or contract basis with fresh, iced and, in the absence of quick freezing facilities, "slow frozen" fish if required.

The pricing policy of the cooperative should be such that moneys from fresh and iced sales produce sufficient working capital to support its fish processing programme. Following the first year's out-of-season sales of processed fish, sufficient funds should be retained to support the following year's purchases.

Prior to the completion of the Castries fish plant, ice will be scarce and it will not be possible to distribute ice to the remaining 11 fishermen's cooperatives. However, rather than just continue the present marketing pattern, these cooperatives and their members should be encouraged to produce salted/dried and brined fish on their own behalf.

NAFCoop, an association of fishermen's cooperatives, is at present only a name. Funds have been requested to support this association and, if this request is successful, plans are afoot to establish NAFCoop not only as a central equipment purchasing agency for the fishing industry but also as a central fish marketing agency. In this latter respect plans are to take a lease on the Abattoir Vieux Fort (a facility with some chill and cold storage space) and later to take over the Castries fish complex. Insofar as insufficient ice is available for its operation in the iced fish field until the Castries plant becomes operational, its activities in day-to-day fish sales are limited. It could provide short-term buffer stocks of fish by "slow freezing" and storing in the cold room. However, this operation is tenuous. If NAFCoop is to use the Abattoir premises in the immediate future, it should concentrate on the purchase of surplus fish from its member cooperatives and the production of salted/dried and brined fish.

There may be a place for the Abattoir premises in an expanded market development in conjunction with the Castries fish complex but, prior to any further development, a professional survey of the site, and particularly the state and likely refurbishment requirements of the cold storage and refrigeration equipment, should be commissioned.

As many fishermen on the island do not fully understand the function and advantages of cooperatives, it is recommended that the Government strengthen its activities in promoting and popularizing the concepts and practices of cooperatives.

(3) Prices

It is recommended that the current system of Government-controlled price ceilings for fish be discontinued and that a study be made with a view to establishing a producers' price stabilization scheme.

(4) Import Substitution

Fish imports have always played a major role in the total supplies of fish to the island. Recent increases in the price of imports, particularly of salted/dried cod, have resulted in a

reduction in the quantities of product imported, yet there has been no noticeable increase in domestic production of fish to counter this fall. Fresh fish is not directly substitutable for many of the imported fish products and consumers have turned to other forms of cheap protein. However, comparable fish products could be produced from island landings, such as salted/dried and brined fish. Every effort should be made to develop this type of processing and to replace imports as far as is possible.

(5) Fisheries Administration

In the near future some changes in the fisheries administration will result as personnel return from overseas training and others leave for training. With this in mind, since site preparations are already underway for the construction of the Castries Fish Complex, one officer should be designated as the St. Lucia Project Manager for the CIDA project, as soon as possible.

A second officer should be designated as a Fish Market Development Officer. His role should be to assist the cooperatives, as necessary, to develop an iced fish marketing system and to develop fish processing and marketing.

(6) Foreign Assistance

Since CIDA has already committed itself to the establishment of a Fisheries Complex in Castries, including storage and marketing facilities, there is little room in the short term for further foreign assistance. The services of a fish processing expert are being requested by the Government from the WECAF Project to train and demonstrate to members of the fishermen's cooperatives how to brine, salt and dry fish.

Despite the fact that the Fisheries Management Unit in the Ministry of Agriculture, Lands and Fisheries is a well-trained and competent body, it is felt that in the fields of small business management and fish plant management some assistance is required. It is recommended that the Fisheries Management Unit be strengthened by an internationally recruited Fisheries Cooperative Officer for a period of one to two years. His role should be to advise fishermen's cooperatives in general management, train cooperative managers of the existing 12 cooperatives, popularize cooperatives in the fishing community, supervise fish processing and storage and participate in the market development for locally produced fish products. It is considered that the expert recruited should have a small development funds of some EC\$ 25 000^{1/} (US\$ 10 000) at his disposal to initiate small-scale processing and marketing schemes in cases where no capital is available from other sources.

^{1/} EC\$ 2.7 = US\$ 1.00

Insofar as NAFCoop is considering taking the lease of the Abattoir, Vieux Fort, and since this facility could, in the short to medium term, play a useful role in the development of fish marketing, consideration should be given to the possible financing of the refurbishment of the cold store and refrigeration equipment. Much depends on whether or not NAFCoop becomes operational and, then, if the chill and cold storage component of the site is to be used prior to the completion of the Castries complex or after. In any case, submission for financing should be accompanied by a full site survey (including a refrigeration engineer's report), and the rationale for the site's use. It is envisaged that refurbishment would cost in the order of EC\$ 40 000.

2. Introduction

During recent years, visiting WECAF Project consultants and experts to the island of St. Lucia have all commented on the constraining influence of the existing marketing and distribution system on the future development of the fishing industry. This mission was undertaken with the express purpose of analysing the current situation and making recommendations to alleviate the constraints that exist.

In 1975, at the request of the St. Lucian Government, a pre-feasibility study was undertaken by representatives of CIDA to assess the possibility of constructing a fish plant at the capital, Castries. It had been decided that this development could not be looked at in isolation and, in consequence, an assessment of total development aid requirements was made. In 1978, a Memorandum of Understanding was signed by the Governments of St. Lucia and Canada, indicating that the latter Government could provide a number of services to the industry, including the construction of a major fish plant at Castries. These provisions are summarized in Section 3.

The CIDA Project is due to begin towards the end of 1979 or early 1980, and the facilities to be provided will be operational at the earliest by the 1982 fishing season. It is with this in mind that the present terms of reference were drawn up. They are:

- " - to identify shortcomings of the existing fish marketing system with regard to marketing, infrastructure, operations and organization with due regard to the project to be implemented by CIDA;
- to propose improvements required and to suggest ways of implementing them, indicating external assistance needs, if any;
- to analyse fish consumption patterns and suggest suitable measures aiming at an expansion of the market for fishery products from national production;
- to submit a report to the Programme Leader of INT/77/016 at the end of the assignment."

The study was carried out over a one-month period during July/August 1979 by an FAO consultant in fish marketing and handling, and an Associate Expert specialized

in development planning. The terms of reference were in agreement with the wishes of the St. Lucian Government and every assistance was afforded the project team by the Fisheries Management Unit (FMU) during their stay on the island. A number of field trips were made, and interviews and discussions held with fish traders, importers, retailers, fishermen and representatives of the fishermen's cooperatives and the catering industry. The existing cold storage, processing and marketing facilities were assessed and consumer attitudes were determined by direct interview.

The team was honoured by a meeting with the Hon. Minister for Agriculture, Lands, and Fisheries, Cooperatives and Labour, with whom some aspects of St. Lucia fisheries were discussed.

Reports submitted by the WECAF staff and consultants were used as a basis for an analysis of the fish marketing situation. The main points arising from these reports can be summarized as follows:

- during the main season when fish is abundant, fishermen can experience difficulties in disposing of catches; during the off season fish is scarce, and the market undersupplied;
- the system of price control does not protect the fishermen when landings are high and prices low nor, when fishing is poor, does it prevent fishermen from selling above the official price;
- those storage facilities that exist on the island are not fully utilized, thus exacerbating day-to-day fluctuations in landings and uneven distribution of fish amongst the population.

3. Background

The country of St. Lucia is located northeast of Venezuela at 14°N. It has a surface area of 238 mi² and a 1978 population (estimated) of 117 500. The island is surrounded by a narrow shelf area (up to 180 m depth contour) including relatively shallow water "channels" connecting St. Lucia to Martinique in the north and St. Vincent in the south.

The primary fishing population is estimated to be about 2 000 of which only about 300 fish regularly. Nearly the whole fleet of 400-500 vessels consists of 5-7 m narrow, raised edge dug-out canoes, which are locally built and powered with outboard engines ranging in size from 25 to 40 hp. Besides these, a small number of whalers of about 8 m in length are still in use. Two shrimp trawlers that used to fish off the Guianas during the mid-seventies have since been converted to tourist boats operating from Castries. At present, therefore, there is no industrial fishery.

The fishery of St. Lucia is exclusively inshore in nature and is strongly oriented towards the capture of pelagic species which occur in island waters between December and July each year. Dominant species in the landings are dolphin fish, kingfish, tuna and flying fish.— These species are exploited using trolling lines and gill-nets. During the remainder of the year, landings are much reduced and reef fish, snapper and sharks predominate. Fishing gear used during the off-season include pots, hand-^{1/} lines and beach-seines. Other common fishing gear are trammelnets, castnets, balaou-

^{1/} Half beaks.

nets and harpoons^{1/}. Landings are made at about 25 beaches around the island, of which the 11 most important are monitored by the Fisheries Management Unit for statistical purposes.

The most recent fish landing statistics indicate domestic production of about 1 400 t. However, landings have not met island demand for many years, if ever, and large imports, particularly of salt cod, have been made each year. Recent imports of fish, expressed in terms of live weight equivalent, represent approximately half the fish consumed on the island. Imported salt cod represents just over a third of the total island consumption.

The biological resource of the island waters is not considered a limiting factor to development. Because of a very narrow continental shelf, the demersal fishery does not offer as much scope for expansion as the pelagic fishery, but it is thought that productivity from both fisheries could be improved by using the existing fleet with improved gear, through greater fishing effort and/or with new vessels.

At certain times during the first half of the year, fish is caught in quantities well over the island's daily demand. Under these circumstances, prices reach rock bottom and yet fish is still thrown away. At other times, weather prevents boats from putting to sea and no fish is available. Recently, the Goodwill Fishermen's Cooperative of Vieux Fort has attempted to purchase and store "glut" fish for sale when fish is scarce. This has not yet proven financially successful. No large scale processing and storage of fish has yet been attempted on the island.

The country's policy towards fisheries is mainly concerned with the increase of fish production. The intention is to become totally self-sufficient in fish in the near future. To reach this goal, the Government has made a commitment to the primary industry and for this purpose the Fisheries Management Unit was created. In addition, duty-free concessions on all items associated with fishing have been made to those fishermen belonging to cooperatives, and some encouragement to buy and operate bigger craft has also been given.

A pre-feasibility study prepared for CIDA in 1975 put forward a development strategy for the fishing industry and concluded that it should concentrate on:

- (a) improvements in fishing technology;
- (b) the provision of better infrastructure for the primary industry;
- (c) improvements in the distribution and marketing of fish at all levels;
- (d) changes in institutional patterns and provision of incentive systems to encourage greater exploitation.

In accordance with the above, CIDA has agreed to furnish the following facilities as part of its aid programme:

^{1/} These are used to capture porpoises and small pilot whales during the latter half of the year.

- (a) provide training for two plant managers (nine months in Canada);
- (b) construct a holding and processing facility at Castries to include:
 - (i) a flake ice plant with a capacity of about 5 t per day;
 - (ii) storage capacity for 15 t of flake ice;
 - (iii) a cold store (-30°C) to hold 20 t of fish with provision for future expansion;
 - (iv) a blast freezer, capacity 10 t per day;
 - (v) a pier and canoe ramp and facilities for unloading a maximum of 18 t of fish per day;
 - (vi) lockers for fishing gear, sheds for storage of engines and a maintenance area.
- (c) provide a freezing unit of 1/2 t per day at Vieux Fort.

In turn, the Government of St. Lucia has agreed to provide the following:

- (a) At Vieux Fort:
 - (i) a covered beach area for cleaning and disposal of fish;
 - (ii) a shed and racks for fishing gear and equipment.
- (b) At Soufriere:
 - (i) a covered beach area for cleaning and disposal of fish;
 - (ii) a shed and racks for fishing gear and equipment;
 - (iii) an engine and maintenance area;
 - (iv) insulated boxes for overnight holding of fish.
- (c) At Anse-la-Raye, Canaries, Choiseul, Dennery and Micoud, provide a covered beach area, storage and maintenance facilities.

It was further recommended that the F.M.U. should "... In cooperation with the St. Lucia Agriculture Marketing Board, the local cooperatives and the fishermen, assist in the establishment of an effective marketing system based on the new plant and the new capability to supply more fish".

4. Supply of Fish

(a) National Production

According to the fishery statistics for 1978 released by the Fisheries

Management Unit, the catch reached 1 391 t, comprising 34 percent dolphin, 25 percent tuna, 15 percent kingfish, 6 percent flying fish, 7 percent shark and black fish and 13 percent others, including demersal species. Further details of the composition of the landings are given in Table 2.

Compared with estimates for past years of some 2 200 t, the figure for 1978 appears rather low, particularly the landings for flying fish which in other Windward and Leeward islands make up a major part of the catch. Following talks with officers of the Fisheries Management Unit and fishermen, it can be assumed that the landings of flying fish are at least twice as high as the published statistics indicate.

Since fishing is done mainly for pelagic species, some two thirds of the total catch is landed during the pelagic fish season, January to June. The detailed analysis of the seasonality in Table 2 and Figure 1 shows that the supply of certain species fluctuates considerably through the year. Almost no dolphin fish is caught during the period September to November, while peak landings are made in March/April. Flying fish are present in the waters of St. Lucia between December and May but fishermen show reluctance to catch this species when more valuable catches can be made; it is also said to be a fishery for old men. Flying fish are only landed in larger quantities during times when species like dolphin, tuna and kingfish are scarce, i.e., shortly before the main season for these species and immediately after it finishes. Tuna is caught throughout the year but in particular between January and June. Kingfish reaches its peak season in April and June and catches are low in the second half of the year. Shark, which is available during the whole year, is only caught in quantity during the off-season, largely because of its low commercial value. Demersal species, small jacks, sprats, etc., are only fished in the off-season in the second part of the year.

The major fishing area is located to the southeast of St. Lucia, off Vieux Fort, and along the coast up to Micoud and Dennery. Some 55 percent of the total landings were landed in this area during 1978 (see Table 1).

Though little resource evaluation has been carried out in the past, it is assumed that the demersal fish resources are not extensive due to the small area of the continental shelf. However, the pelagic resources offer considerable prospects and it should be possible to exploit this resource on a larger scale, particularly if fish marketing and fishing effort can be improved.

By far, the major part of landings is consumed fresh within 24 h of being landed. Those few households that own a refrigerator store some fish in the chill or freezer compartment, but the quantities involved represent only a very small proportion of landings. Likewise, some fish is salted at times when it can be bought cheaply, though this is rare. Large fish are usually gutted and sometimes headed, but other fish are only gutted when difficulty is experienced in selling the fish. Large fish are cut into steaks for retail, and filleting, skinning or splitting are virtually unknown.

(b) Imports

The quantities and values of imports of fish and fish products are set out in

Table 3. Whilst the value of imports increased between 1970 and 1978 by 86 percent, the quantities imported have decreased by 52 percent. This disparity is caused by the enormous increase in the average prices of imports of 293 percent over this period. The composition of the fish imports has been almost constant, with a small reduction in imports of fresh, frozen and chilled fish from 11 to 5 percent, and a slight increase in imports of crustacea from less than 1 to 3 percent. The main suppliers are the United Kingdom and Canada followed by the U.S.A.

The main fish import has been dried-salted codfish accounting for a figure of around half the total quantity of fish imported. However, its quantity has reduced substantially from 3.1 kg per caput in 1970 to an estimated 1.3 kg in 1978. The reason for this decrease appears to be the sharp increase in the international price for salted codfish by nearly 300 percent between 1970-78. At the same time, imports of frozen fish have fallen from a peak of 389.2 t in 1972 to a negligible amount in 1979. Less dramatic is the fall in imports of prepared fish products of some 60 percent between 1970 and 1978.

Converting the fish imports into live weight equivalent, as shown in Figure 2, the supply of imported fish has fallen substantially in 1978 to the extent that imports are only half of those in 1970. The extent of substitution of locally caught fish against these reductions in imports cannot be gauged due to insufficient data. However, with the reduction in fish imports, a fairly large increase in imports of poultry has occurred, particularly of the cheaper varieties, as well as of beef. Further details about imports of poultry, beef and pork are given in Table 5.

Fish is imported subject to the issue of import licences which must be approved by the Fisheries Management Unit. Present policy is that during the main fishing season no imports of fresh or frozen fish are allowed which might otherwise compete with local production, and importers who buy local fresh fish during the season are more likely to obtain import licences out of season than those who do not. Imports of frozen fish are allowed in free of import duty, while other imports of fish or fish products face a tariff of 15 percent, plus a stamp duty of 5 percent. Further expenses are a handling cost of approximately 2 percent and remittance costs of 1 percent.

In view of the fact that 8.8 kg per caput of the fish supply was imported in 1978 and that import prices registered substantial increases (see Table 4), measures should be undertaken to substitute local production for fish imports. Some possibilities in this respect are discussed in detail in Appendixes 3-5.

(c) Exports

Exports of fish from St. Lucia are negligible. In the past, data indicate a maximum export value of some EC\$ 20 000 per year. Shipments have been small, usually by air, and mainly of high value shellfish.

Undoubtedly, some fish caught in St. Lucian waters by local fishermen is sold in Martinique (some 23 mi north of St. Lucia), where most species command higher prices than in St. Lucia. Such transactions are not recorded in any island statistics.

No Government policy exists for fish exports but, in the long run, a time might come when significant exports could be made. Possible export markets are located in the Caribbean area itself, with Martinique, Guadeloupe and Barbados ranking high as large importers of fresh, frozen and chilled fish. The French islands in particular import all types of fish at relatively high prices. However, poor sea communications with other nearby islands may force dependence on air transport for exports, at relatively high costs.

5. Infrastructure

(a) Landing and Mooring Facilities

One or two beaches have wooden jetties in various states of repair and a concrete ramp has been provided at Castries. In fact, in view of the traditional type of canoe used almost exclusively in the fishery, sophisticated landing and mooring facilities are hardly required. Canoes are never taken to sea outside daylight hours and are always drawn up on the beach when not in use. Only after the canoe is safely supported on its wooden rollers is the fish unloaded.

(b) Processing

Only the simplest processing is undertaken by fishermen. When fish is scarce it can be sold whole, ungutted. When larger quantities of fish are available, gutting and heading improves its saleability, whilst also effectively reducing the price per pound. Such processing is carried out at sea or on the beach. Offal is either discarded, sold or given to small-holders as pig-food. Occasionally it is used for human consumption. At some beaches, the local council has provided covered market areas with running water. Simple processing can be effected on these premises, but in practice they are rarely used.

The agreement between the Government of St. Lucia and CIDA makes provision for the construction of covered cleaning and processing areas on or near the beaches. These may result in the centralization of beach sales or, as with the existing marketing stalls, they may be largely ignored.

(c) Markets

As mentioned above, some covered markets exist in outlying areas but are generally redundant. A large retail market is located at Castries, positioned behind the fruit and vegetable market and at the side of the meat market, close to where the Castries landings are made. This building measures some 50 ft by 30 ft, is of solid construction and roofed with corrugated iron. It has four access doors and an array of concrete plinths supplied with water and drainage, from which fish is retailed. Approximately 20 selling areas are available, a rental of EC\$ 10 per month being charged for each area by the Municipal authorities. Work surfaces are covered in ceramic tiles which are now old and unhygienic. Drainage facilities appear inadequate and offal has to be removed individually by stall-holders. Each stall is rented by regular fish vendors or commission salesmen and women, their numbers at any one time depending on the general level of fish landings. Some vendors use a privately-owned domestic freezer, adjacent to the market, for short-term storage of fish.

(d) Storage

In terms of low temperature cold storage facilities, the island may have a capacity of as much as 1 000 t at temperatures of -10°C to -30°C. Very little of this comprises purpose built cold rooms but, instead, is largely made up of refrigerated containers (6-18 t) which have been purchased cheaply from the United States' mainland or container cargo companies. Most of the equipment is old, although some replacement of refrigeration equipment has been carried out.

Virtually all the storage space is privately owned and used to store imported frozen meats. Some of the space is used to "slow freeze" locally caught fish for sale to the catering industry and to supermarkets. It appears that three or four companies dominate the importation of frozen food.

Maintenance of refrigeration is competently carried out by engineers on the island, one company appearing to dominate the service market. Small inventories of general spares and gas are held on the island, and spares for the more common makes can be flown in from Miami at one or two weeks' notice. Power sources are 220 V, 60 cycle, 440 V, 60 cycle, diesel or propane. Power failures are uncommon and, in general, contingency plans exist when individual plant failure occurs. American equipment predominates. Three facilities warrant particular description:

(1) The new dock: as part of a programme of harbour and direct improvement, the construction of a large refrigerated storage facility is well advanced. The completed facility will contain:

blast freezer	approximate capacity	300 m ³	at -12°C
cool rooms	"	1 600 m ³	at +10°C
chill room	"	300 m ³	at - 2°C
cold room	"	625 m ³	at -18°C
cold room	"	300 m ³	at -23°C

(2) The Goodwill Cooperative, Vieux Fort: This cooperative was the first to be formed on the island, has the largest membership and is most active. It was given a flake ice-plant some years ago and this was shortly followed by the purchase of a small refrigerated container. A second container was purchased and conversions to rented property were made to provide working space for fish handling, processing, storage and rental. Present facilities include the following:

- 2 refrigerated containers of approximately 32 m³ each at -18°C;
- 1 flake ice-plant, 1/2 t per 24 h;
- 1 ice bin, 1/2 t storage;
- 6 concrete bins for storage of iced fish, 1 m³ each;
- 7 insulated bins for storage of iced fish, 1/2 m³ each;
- 8 plastic fish boxes, 35 l each.

(3) The Abattoir, Vieux Fort: this facility was originally constructed to supply frozen goods to the American forces at Vieux Fort. Once they withdrew from the island, the facility became Government property and was leased to private enterprise. The most recent company to hold the lease appears to have used the property for everything but storing frozen goods, is now in serious financial difficulty and has effectively ceased trading.

It is the intention of the Fisheries Department to acquire the Abattoir at a nominal rent from the Government for the practical establishment of NAFCoop. The refrigeration equipment is said to have last worked at the beginning of 1977. It is the same equipment as was first installed, manufactured by ILG of Chicago, U.S.A. It is more than likely that this equipment will need replacing, if refrigeration is required. Such replacement might cost in the order of US\$ 5 000. The insulation of the stores may well prove adequate for a few more years' service.

It was only possible to inspect the property from the outside but it appeared to possess the following:

cold room, approximately 15 t; chill room, approximately 10 t; processing area; workshop; two offices; working area; feed silos; and a loading bay.

The eight major hotels on the island have considerable chill and cold storage space; some considerably more than others. It was indicated that normally a hotel would plan to hold one month's buffer stock against the vagaries of local supply, shipping and labour disputes. However, one hotel has gone as far as to have storage for two months' stock, and this saw it through a recent dock strike.

(e) Transport

No refrigerated lorries are used on island roads, except when delivering large containers to and from cargo boats. One insulated van was seen operating in Castries.

Fish transportation on the island, whether it be fresh or frozen, usually involves the use of small pick-ups (Toyota, Datsun, etc.) which can carry between 500 lb and 2 000 lb. Vehicles are readily available for hire and the regular traders usually own their own.

The main road from Vieux Fort, through Micoud and Dennery to Castries, is the best on the island. The road Vieux Fort, Laborie, Choiseul, Soufriere, Canaries, Anse-la-Raye, Castries is very hilly and windy. Although repair of vehicles is good, and they appear to stay on the road considerably longer than might be expected for depreciation purposes, the economic life of a vehicle can be taken as five years.

6. Marketing and Distribution

As a result of interviews at all levels of the industry, it is estimated that of the 1 400 t of fish landed each year at the major beaches, 250 t are consumed by fishermen's families and friends, and about 150 t are sold to hotels and restaurants. Table 6 indicates the importance of this division of landings.

Fish supplies in the first half of the year amount to twice those in the latter half. Vagaries in weather and sea conditions, and other factors affecting fishing effort, produce regular gluts of fish during the fishing season interposed with days of poor landings. Out-of-season landings are insufficient to meet island requirements. The present marketing system does not cater for glut conditions, nor is it able to increase supplies to the consumer out-of season. An improved marketing structure should be able to cater to some extent for present glut conditions, whilst also encouraging higher productivity throughout the year.

It is estimated that significant quantities of fish by-pass the statistics collecting system, in particular flying fish and "pot" fish. Thus total island landings can be conservatively estimated at 200 or 300 t more than recorded.

All fishing boats on the island are kept on suitable beaches or concrete ramps. After a day's fishing, boats are pulled out of the water, the gear tidied and removed to an equipment store or locker. The day's catch is sold direct to the public, fishing crews retaining whatever fish they wish for their own use. A simple tray balance is used to weigh the fish, which is sold at prices which take into account the Government maximum prices (these are not adhered to but may have a restraining influence on high pricing) and the actual and expected quantities of fish to be sold on that beach or to be available in Castries, the major market. When fish is plentiful, the larger fish are cleaned and gutted; when fish is scarce and the demand is high, it is sold in whole (undressed) state, since it fetches a higher price per lb.

Roughly estimated, of a total of 1 400 t of fresh fish landed per year, 250 t are consumed by fishermen, their families and friends at prices well below the market, about 900 t are supplied fresh direct to the public and about 250 t are purchased by medium-sized traders (with an average annual turnover of say 60 t), who keep the fish overnight in cold rooms, freezers or domestic refrigerators for distribution to the public, hotels and restaurants the following day as fresh (chilled) or "frozen" fish. Part of the 900 t which is sold directly to the public is marketed away from the beach at which it is landed by fishermen themselves or by small entrepreneurs. This is particularly so when "glut" conditions exist. Once the immediate demand for fish at the beach has been met, fishermen and their families hawk the fish further afield, and in extreme conditions hire transport to take fish to Castries, selling fish in villages through which they pass and, on reaching Castries, commissioning market saleswomen to retail the remainder.

During glut conditions, particularly when fish prices have to be lowered to maximize sales (i.e., when all island markets have more than adequate quantities of fish) householders, small store keepers and cold store owners sometimes buy excess fish for long-term preservation. Slow freezing is used for much of this fish, which is eventually offered for sale to hotels, restaurants and the higher income groups. A much less common occurrence is for fish, most commonly cheap sardine and flying fish, to be heavily salted and dried, depending on the length of time it is to be stored. After storage it is consumed by the producing household or retailed.

Ice is very rarely used in fish distribution or storage. Occasionally, when

traders have purchased fish which will be stored in a domestic freezer or refrigerator, home-made ice blocks are broken up to help lower the temperature of the fish.

In general, fishermen tend to land their catches as early in the day as possible so that they can obtain the highest prices for their catches. Traders on the other hand tend to wait to buy until late in the day, when they can purchase at low prices. In this way, fishermen do not stay at sea as long as they might if a market for their fish were guaranteed. Lack of cooperation between fishermen perpetuates this situation.

Most regular traders purchase their fish from Vieux Fort and carry it to Castries. Only when supplies from Vieux Fort are poor will traders stop off at Micoud, Praslin and Dennery to make purchases. If landings on any one beach or by any one group of fishermen are very large, they might hire transport to take the fish into the country districts or to Castries.

Fish is, therefore, most regularly supplied to those populations closest to the beaches on which the fish are landed. If the surplus of fish is large, it is carried to Castries for sale (the largest potential market on the island) and, if small, carried into the country districts. Thus, if landings are extra large, fish is available everywhere. It is unlikely, because of this marketing structure, that Castries receives adequate quantities of fish for much of the year and the interior of the island is also poorly supplied.

7. Fishermen's Cooperatives

At present, structured fish marketing and distribution is largely controlled by a small number of middlemen who dictate the price paid to fishermen during the peak season but who cannot supply sufficient fish to the population during the off season. It is therefore the Government's intention that the fishermen's cooperatives take on the major responsibility for fish marketing on the island.

With Government assistance, the following fishermen's cooperatives have been founded in recent years:

<u>Society</u>	<u>Area</u>	<u>Membership</u>
Goodwill Fishermen's Cooperative, Soc. Ltd.	Vieux Fort	140
Laborie Fishermen's Cooperative, Soc. Ltd.	Laborie	60
Choiseul Fishermen's Cooperative, Soc. Ltd.	Choiseul	36
Soufriere Fishermen's Cooperative, Soc. Ltd.	Soufriere	60
Anse-la-Raye Fishermen's Cooperative, Soc. Ltd.	Anse-la-Raye	70
Rodney Bay Fishermen's Cooperative, Soc. Ltd.	Gros Islet	n.a.
Canaries Fishermen's Cooperative, Soc. Ltd.	Canaries	n.a.

<u>Society</u>	<u>Area</u>	<u>Membership</u>
Anse Chastanet Fishermen Cooperative, Soc. Ltd.	Anse Chastanet	n.a.
Dennery Fishermen's Cooperative, Soc. Ltd.	Dennery	n.a.
Port Praslin Fishermen's Cooperative, Soc. Ltd.	Praslin	n.a.
Castries Fishermen's Cooperative, Soc. Ltd.	Castries	n.a.
Micoud East Coast Fishermen's Cooperative, Soc. Ltd.	Micoud	30

An umbrella organization, eventually intended to comprise representatives from each of the fishermen's cooperatives, was established in Castries in 1978. Called the National Association of Fishermen's Cooperatives Society Ltd. (NAFCoop), this organization is currently supported by five primary fishermen's cooperatives which have deposited 25 percent of their share capital with NAFCoop. Its main functions are to promote fishermen's cooperatives, improve the supply of gear and fishing equipment to these cooperatives and, in the field of fish marketing, run the Abattoir at Vieux Fort as the basis of a marketing and distribution system.

NAFCoop has applied for a loan of EC\$ 250 000 at the Agricultural Development Bank, Castries, which will be refinanced by the Caribbean Development Bank. In addition, it has asked the Christian Action for Development in the Caribbean Ltd. (CADEC) for financial assistance in meeting the salary of a permanent manager for his first two years of office. If NAFCoop can prove its management capability, it is the intention of the Government to hand the running of the planned Fisheries Complex at Castries over to NAFCoop after a scheduled transition period.

The Government of St. Lucia gives the cooperatives a high priority in its development policy. In a move to strengthen the fishermen's cooperatives, members are eligible to receive tax rebates on the purchase of engines, fishing equipment, and fuel for fishing purposes (a rebate of EC\$ 0.57 per gallon in July 1979). As these benefits are only available to cooperative members, many fishermen have joined the cooperatives specifically to take advantage of this and not because they understand the idea behind a cooperative. Therefore, most of the cooperatives deal mainly with duty-free concessions and rebates, while fishing and marketing continues on the traditional individual basis. Payments for fish by the cooperatives at levels below those paid by traders, though such fish may be surplus even to trader's requirements, act as disincentives to join cooperative marketing schemes. Such systems as fish bonuses, patronage funds, distress funds, etc., may not be quite understood by many of the fishermen. Accordingly, it is the plan of the Fisheries Administration to coerce cooperative members to sell at least part of their catch to the cooperative (at present an unenforced rule of membership) at prices to be agreed upon. In addition, some basic education regarding the role of cooperatives will be given.

At present, only Goodwill Fishermen's Cooperative has marketed fish. This is an important advance since this cooperative is the oldest and largest on the island and fish landings at Vieux Fort amount to some 40 percent of recorded island landings. However, purchases and sales have been very low. Between January 1977

and June 1978 sales amounted to some 80 000 lb valued at EC\$ 84 072.18 i.e., some 7 percent of the recorded landings for Vieux Fort. In the period 1978-79, the cooperative bought fish valued at EC\$ 80 396.70 and sold it for EC\$ 71 634.08, incurring a trading loss of EC\$ 8 762.62. During this latter period, fish trading made up only 15 percent of the turnover of the cooperative.

The Goodwill Fishermen's Cooperative plans to strengthen its fish marketing function. It will undoubtedly meet many problems in this direction, not least of which will be obtaining fish from fishermen in competition with the six regular traders who purchase from Vieux Fort. To do this, the cooperative will inevitably need to enforce a commitment on the part of its members to supply fish. Technically and financially, the cooperative is in a position to handle fish on a considerably larger scale than at present but stronger managerial skills will have to be developed. Technical details of the cooperative's facilities are given in Section 5 (d) (2).

Should the Goodwill Fishermen's Cooperative establish a successful marketing business, it will give a boost to the industry and to the cooperative movement. By demonstrating the advantages to fishermen and consumers of having an ordered marketing system where fish can be sold at all times of the day at stabilized prices, and where fishermen are able to catch more fish without fear of uneconomic returns, it will encourage other cooperatives to work along similar lines. When NAFCoop becomes functional and the Castries fish plant eventually comes into operation, the industry will be in a far better position to strengthen such a marketing system if this preliminary work can be accomplished.

8. Prices

(a) Prices of Imported Fish and Fish Products

As shown in Table 4, the CIF prices for imported fish and fish products have shown substantial increases between 1970-78. During this period the average CIF price per kg has risen by 293 percent. The increase for "Fish otherwise prepared", which mainly consists of canned sardines and herrings, has been more modest at 184 percent. Also, below the average increase has been the product group "Fish, salted, dried or smoked".

Imported fish and fish products are subject to price control regulations, which allow a wholesale gross margin of between 7.5 percent for canned products and 20 percent for frozen fish, and a retail gross margin ranging from 10 percent for canned products to 18 percent for pickled and salted products.

(b) Prices Paid to Fishermen

Prices paid to fishermen by fish traders are flexible downwards, whilst the Government imposed price ceilings for wholesale and retail transactions limit fluctuation upwards. Understandably, traders and fishermen disagree over prices. Traders know that the price in the early afternoon is higher than late in the afternoon; they wait for these early sales to be over and then buy at a much reduced price. Fishermen, on the other hand, try to return as early as possible in the afternoon to sell their fish at a high price before the other fishermen land their catch.

Price bargaining is very sensitive to the quantities of fish landed. If fish is abundant, the price immediately decreases - the lack of chill and cold storage facilities in most places dictates that fish be sold on the same day it is landed. In the fishing season of 1979, the price for first class fish fell at the retail level to EC\$ 1.00/lb (max. EC\$ 1.75) and flying fish had to be sold at 8 to 10 pieces per EC\$ 1.00 (max. 3 pieces/EC\$ 1.00). However, when fish is in short supply, the fishermen can get prices above the price ceiling and, at times, they deliberately limit their catches in order to maintain prices.

Price fluctuations contribute to the instability and insecurity of fishermen's incomes, which have already suffered serious erosion in real money terms due to the relatively high rates of inflation for gasoline and other fishing inputs as compared with fish prices. Fishermen openly complain about irregular and unsatisfactory prices and might react favourably towards a system designed to stabilize prices.

(c) Retail Prices

Selected retail prices paid in August 1979 and maximum prices set by the price control system are shown in Table 7. Since many customers are prepared to pay prices above the official maximum when fish is scarce, and the Price Control Office is not able to ensure that the prices are not exceeded, the system of price control has lost much of its usefulness for fresh fish. Local frozen fish is not subject to price control. While first class fresh fish can still be bought during the fishing season at a reasonable price (EC\$ 1.50/lb in 1979) the price paid out of season may amount to EC\$ 2.00/lb and first class frozen fish is already being sold to hotels at EC\$ 1.60 - 1.80/lb. Because of the high prices for the very popular fish like dolphin, kingfish and tuna, cheap species like flying fish and sprats find a good market. Fresh sprats are sold at EC\$ 0.60/lb and salted sprats for EC\$ 1.00/lb.

Generally, fresh fish is still regarded as a reasonably priced product compared with the present level of minimum salary of EC\$ 9.00 a day (which will increase soon in accordance with a Government promise). However, there is strong competition from the cheaper imports of poultry and meat (chicken backs sell at EC\$ 1.20/lb).

At present the Government is considering the decontrol of fresh fish prices, combined with improved measures in fish marketing, or at least the indexing of fish price ceilings to some formula yet to be established. Such moves should help to increase the average earnings of fishermen.

9. Consumer Behaviour

(a) Households

Fish, both fresh and processed, comprises a relatively high proportion of protein consumption on the island. Fresh fish is the preferred product form although, in its absence, chilled and frozen fish are acceptable and meet little or no consumer resistance. Traders sometimes store their purchases overnight in a refrigerator or freezer but such fish can only be sold when fresh landings are low.

Salted-dried cod, imported from Canada and the United Kingdom, has become a traditional product on the island. Large quantities are imported annually but a recent escalation of prices has caused demand to fall. Salt cod is eaten on Good Friday and during Easter Week without fail. During the remainder of the year, it is eaten from time to time, say once a week to once a month, regardless of availability of other products, and more often when fresh fish is unavailable. According to interviews held with housewives, comparatively poor distribution of fresh fish to the interior of the island leads to higher consumption of salt cod in these areas, although it is considered more expensive and less desirable than fresh fish.

Mackerel and herring in brine are regularly imported to the island where they are said to find a small but regular market. Neither of these products was seen during the visit but it was apparent that the salt content of such products was important and well received.

Smoked fish products, salmon, kippers, etc., are imported by some of the hotels and restaurants but there is no obvious evidence of such products being regularly consumed by households on the island.

Tinned fish such as sardine and mackerel are consumed regularly, along with the lower value tinned meats. These products are not ready substitutes for fresh fish and meats, although consumption of tinned meats is likely to increase during periods when the fresh products are scarce or expensive.

Fresh meat is most commonly slaughtered on Friday and Saturday for consumption at Sunday dinner. Few households regularly buy meat for consumption in mid-week.

The main meal of the day is usually lunch. Breakfast often contains a meat course and the evening meal is more likely to be in the nature of a snack. The more highly seasoned dishes (pepper-pot, broth and salt fish) are consumed in the evenings.

Although bottled gas and electric cooking stoves are available, most households appear to still cook on coal-pots using charcoal or wood as the main fuels. Fish is usually boiled or made into a stew (broth). Most dishes contain curry powder and/or pepper.

Those who can purchase fresh or chilled fish every other day and consume fish between one and three times a day, except on Sunday. Households without refrigerators buy only enough fish for one or two days, or hire space in a neighbour's refrigerator. Those with freezers or refrigerators buy larger quantities of fish when the price is low and store for later consumption.

Although the grades of fish (see Table 11) represent consumer preferences, price is a limiting factor for many households and species such as flying fish find a consistently high demand because of their low price in relation to most other species. Demand for snapper, kingfish, dolphin and tuna is price elastic.

Heads, tails and visceras are used for human consumption and anything remaining is fed to domestic animals such as pigs.

From time to time, people in inland areas and smaller traders buy low priced fish for salt-drying and later resale or home consumption. Home-cured fish (sardines and flying fish) can be stored for up to six months depending on the amount of salt used and the degree of drying.

(b) Hotels, Restaurants

These outlets look for regular deliveries of fresh fish throughout the year. The species is relatively unimportant as long as bone-free flesh can be easily obtained from the fish. Red snapper is, however, in high demand as a named menu fish and for central display in buffets, etc. At present, virtually none of the tourist hotels and restaurants obtains enough fish from local sources and they are forced to import frozen fish.

Although crawfish are available locally in season, most shellfish are imported as no local substitute exists, or because available quantities are well below requirements. Other specialist products such as smoked salmon, trout, kippers, etc., do not have any obvious local equivalent. Many of the hotels and restaurants already serve salt fish, brined fish and marinated dishes from time to time and would extend these and their fresh fish menus if deliveries could be guaranteed and wider species selection were readily available. Whole fish are preferred so that fish stock, soups, broth and hors d'oeuvres can be prepared from carcasses.

A single-portion fish should find a ready market in this sector but no locally available species has been found to fit the bill. Such fish should weigh about 1 lb and fit easily onto a normal dinner plate. Possible species might be squirrel, soldier fish, bullseyes (Priacanthidae) and the smaller carangids. Bone-free fillets of similar sized fish should also be well received, e.g., flying fish fillets.

Hotel and restaurant fish supplies at present are provided through St. Lucia Cold Stores, Peter and Co., Halcyon Days, Boulaye and any traders or fishermen who happen to knock on the door with fish.

(c) Consumption and Demand Projection

If one takes into account the approximate nature of the figure for local landings of 1 391 000 kg and adds the estimated live weight equivalent of the imports of 1 031 000 kg, the total available for consumption in 1978 was 2 422 000 kg or a per caput consumption of 20.6 kg. By comparison, the figures for other Caribbean islands are: Grenada 37.6 kg, Trinidad and Tobago 16.8 kg and Barbados 27.7 kg. All the indications are that for at least half of the year fish is undersupplied. Traditional imports of salt cod have produced heavy demand for this product, but increasing prices have led to a new demand equilibrium at much reduced levels of consumption. A cheaper product would be well received. There appears to be no objection to chilled or frozen fish, although fresh fish is still preferred. During the periods when fresh supplies are low, fish is considered to be expensive, but at other times the lower qualities of fish are considered to be cheap (e.g. flying fish, "pot" fish, etc.) However, at all times fresh fish sales and imports meet heavy competition from low quality chicken.

The future demand for fish in St. Lucia will depend largely on an increased

ability to supply fish throughout the year and population growth. A negative impact on consumption could occur if prices for imported fish and fish products continue to rise. Assuming a 20 percent higher fish consumption per caput of 24.7 kg and an increase in the population of 1.6 percent per annum, the demand will reach 3 243 t in 1985.

Table 1. Summary of Fish Production by District: 1978

(all quantities in t)

Month	D I S T R I C T S										
	Castries	Anse-la-Raye	Canaries	Soufriere	Choiseul	Laborie	Vieux Fort	Micoud	Dennerly	Gros Islet	Praslin
January	29.6	6.2	4.1	1.3	12.7	8.4	68.2	8.0	18.6	9.2	3.8
February	18.8	5.0	3.7	2.1	3.0	4.3	40.2	9.3	21.4	6.6	3.5
March	42.2	5.0	3.3	2.8	13.9	6.8	58.3	11.5	12.5	9.6	5.0
April	16.1	9.1	6.8	3.7	56.2	11.5	75.5	10.0	32.8	4.7	4.3
May	32.2	9.1	6.8	2.3	16.4	7.4	75.3	9.8	37.7	6.2	6.5
June	25.4	4.3	3.2	2.1	4.5	4.3	35.9	6.7	10.5	7.2	1.3
July	24.4	3.9	2.9	0.7	2.1	3.1	32.4	3.6	11.4	5.8	1.6
August	13.0	2.2	3.0	2.9	4.0	7.2	25.0	3.1	5.2	12.1	1.9
September	6.8	7.8	2.0	1.2	4.4	3.0	31.9	4.3	7.9	4.1	3.5
October	7.6	0.6	1.5	0.9	5.0	5.6	20.5	2.8	3.0	2.7	4.2
November	7.2	3.5	3.0	0.9	4.5	5.5	28.8	2.5	2.9	1.2	2.0
December	9.8	2.6	2.4	1.8	4.8	4.3	26.8	4.1	6.5	3.4	2.9
Total	233.1	59.3	42.7	22.8	131.6	71.5	518.7	75.7	170.4	73.0	40.4
% ^{1/}	16.2	4.1	3.0	1.6	9.1	5.0	36.0	5.3	11.8	5.1	2.8

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Annual district landings expressed as percentage of total landings.

Source: Fisheries Management Unit

Table 2. Total Monthly Landing of Fish: 1978

(all quantities in t)

Month	T Y P E O F F I S H						Total	Monthly Landings as Percentage of Annual Landings
	Dolphin	Flying fish	Tuna	King fish	Sharks/Black fish ^{1/}	Others		
January	35.9	38.6	62.2	14.1	5.9	13.2	170.0	12.2
February	64.5	4.5	26.8	20.5	2.3	1.8	120.5	8.7
March	103.6	3.6	31.8	23.6	0.9	1.4	165.0	11.9
April	104.5	8.2	40.0	45.0	2.7	2.3	202.7	14.6
May	73.2	15.5	32.7	63.6	2.7	1.8	189.5	13.6
June	27.3	3.2	42.3	7.7	5.9	5.9	92.3	6.6
July	28.6	1.2	24.5	10.9	8.6	12.7	86.6	6.2
August	11.8	1.1	24.0	6.4	4.1	15.0	62.5	4.5
September	2.3	1.0	17.3	2.3	17.7	37.3	77.9	5.6
October	1.1	1.1	11.8	2.3	21.4	24.1	61.8	4.4
November	3.9	1.3	12.3	7.3	22.7	40.5	87.9	6.3
December	16.4	10.8	17.7	6.4	4.5	18.6	74.4	5.3
Total	473.2	90.1	343.6	210.0	99.5	174.5	1 391.0	
Species Landings as Percentage of Total Landings	34.0	6.5	24.7	15.1	7.2	12.5		

^{1/} Black fish are mammals; porpoise and pilot whales

Source: Fisheries Management Unit

Table 3. Imports of Fish and Fish Products
(all quantities in t)

Item	1970	1971	1972	1973	1974	1975	1976	1977	1978 ^{1/}
Fish, fresh, chilled or frozen	59.6	159.0	389.2	320.8	283.3	233.5	128.8	35.0 ^{2/}	13.5
Fish, salted, dried or smoked (excluding cod fish)	56.6	56.3	83.8	31.0	18.5	29.3	22.4	35.2	30.3
Cod fish, dried, salted	313.0	356.9	348.0	410.0	319.1	257.1	279.1	205.6	148.6
Crustacea	2.1	2.0	4.9	14.2	7.4	21.8	5.0	7.1	7.5
Fish, otherwise prepared: mostly canned	131.3	182.5	178.1	128.5	122.2	54.1	36.3	81.2	67.7
Total	562.6	756.7	1004.0	904.5	750.5	595.8	471.6	364.1	267.6

(Value in '000 EC \$ CIF)

Fish, fresh, chilled or frozen	60.7	193.2	439.4	420.9	492.0	420.3	272.7	124.1	70.0
Fish, salted, dried or smoked (excluding cod fish)	57.1	77.0	120.1	112.7	44.2	62.1	91.0	126.7	105.3
Cod fish, dried, salted	432.1	568.7	583.0	799.5	944.8	812.4	934.8	961.5	816.6
Crustacea	10.9	11.2	22.9	82.9	60.3	187.7	89.2	156.9	160.7
Fish, otherwise prepared: mostly canned	267.5	350.4	336.8	309.7	469.2	140.7	164.1	464.3	391.9
Total	828.3	1200.5	1502.2	1725.7	2010.5	1623.2	1551.8	1833.5	1544.5

Source: Government of St. Lucia; various overseas reports.

^{1/} January-September 1978

^{2/} Estimated.

Table 4. Average Import Price for Fish and Fish Products for 1970 - 1979
(CIF: EC\$ per kg)

Item	1970	1971	1972	1973	1974	1975	1976	1977	1978
Fish, fresh, chilled or frozen	1.02	1.22	1.13	1.31	1.74	1.80	2.12	3.55	5.19
Fish, salted dried or smoked (excluding codfish)	1.01	1.37	1.43	3.64	2.39	2.12	4.07	3.60	3.48
Codfish, dried, salted	1.38	1.59	1.68	1.95	2.96	3.16	3.35	4.68	5.50
Crustacea	5.19	5.59	4.67	5.84	8.15	8.61	17.84	22.10	21.43
Fish otherwise prepared: mostly canned	2.04	1.92	1.89	2.41	3.84	2.60	4.52	5.72	5.79
Total	1.47	1.59	1.49	1.91	2.68	2.72	3.29	5.03	5.77

Source: Government of St. Lucia; various overseas trade reports.

Table 5. Imports of Meats: 1970-1977
(all quantities Q in tonnes and values AV in EC\$/kg)

<u>Year</u>	<u>Poultry</u>		<u>Beef</u>		<u>Pork</u>	
	<u>Q</u>	<u>AV</u>	<u>Q</u>	<u>AV</u>	<u>Q</u>	<u>AV</u>
1970	1 059.7	0.78	484.1	0.73	298.0	1.08
1971	1 021.7	0.91	321.7	1.67	385.7	1.07
1972	816.6	1.36	351.1	2.09	371.7	1.35
1973	1 093.4	1.50	315.9	3.01	425.8	1.67
1974	897.0	1.54	310.6	3.08	160.1	2.60
1975	1 123.4	1.58	676.7	2.04	119.8	3.77
1976	1 293.5	2.09	631.0	3.24	454.2	2.72
1977	1 615.9	1.96	652.5	4.00	338.8	2.47

Source: Agricultural Statistics 1978; Ministry of Agriculture, Lands and Fisheries;
Statistics Unit, St. Lucia.

Table 6. Estimates of Division of Fish Production by Sector

<u>Sector</u>	<u>Landings</u> (t)	<u>Consuming</u> <u>Population</u>	<u>Per Caput</u> <u>Consumption</u> (kg/head)
Hotels ^{1/}	100	2 000 ^{2/}	50.00
Tourist and local restaurants	50	-	-
Fishermen, their families and friends	250 ^{3/}	22 500 ^{4/}	11.11
The remaining island population	1 000	95 000 ^{5/}	10.53

1/ The 1979 Statistical Pocket Digest, St. Lucia, Government Statistical Office indicates in 1977 that there were 13 hotels and 15 guest houses, total number of beds 2 862 and occupancy 72.4 percent for the year.

2/ Using the figures above, the tourist industry is equivalent to an additional resident population of 2 000.

3/ Two hundred and fifty t are calculated according to a fleet of 425 canoes fishing an average of 65 days a year, and on average each of the three crew members and owner retaining 5 lb of fish for distribution to family and friends.

4/ It is further assumed that on average a fisherman's household has more than one fishermen, say 1.5, who supply fish to three additional households. Fishermen's families are generally larger than the average, as are rural families. A household size of five has been used in this calculation.

5/ The mid-1978 island population was calculated as 117 500 which, after subtracting that part of the population supplied with free or nearby free fish by fishermen leaves 95 000.

Table 7. Selected Prices for Fish, Fish Products and Meat

	<u>Maximum Wholesale Prices EC\$/lb</u>	<u>Maximum Retail Prices EC\$/lb</u>	<u>Retail Price in August 1979 EC\$/lb</u>
<u>1. Fish</u>			
<u>Group 1</u>			
Dolphin, kingfish, snapper barracuda, albacore, cavalli, grouper, jacks (less than 4 pieces per lb)	1.25	1.50	1.75-2.00
<u>Group 2</u>			
Flying fish, porpoise, shark, jacks (more than 4 pieces per lb) ballahoo, etc.	0.95	1.15	1.50
<u>Group 3</u>			
Sprat, anchovy, etc.	0.55	0.65	0.60
<u>2. Meat (locally slaughtered)</u>			
Beaf, steak		2.00	
Goat		1.70	
Mutton		1.80	2.00
Pork		1.50	1.50
<u>3. Imported Fish</u>			
Salted codfish			3.75-4.50
Canned Pacific salmon (EC\$ 7.20 per 15 1/2 oz)			7.43
Canned Portugese sardines (EC\$ 0.92 per 3 1/3 oz)			4.42
<u>4. Imported Poultry</u>			
Frozen chicken backs			1.10-1.25
Frozen chicken legs			3.00

Table 8. Per Caput Supply of Fish in 1978
(in kg live weight equivalent^{1/})

	<u>Kg</u>	<u>Kg</u>
National production of fish		1 391 000
Imports ^{2/}		
Fresh, frozen or chilled fish	21 600	
Salted fish (excluding codfish)	80 800	
Salted, dried codfish	733 000	
Crustacea	15 000	
Canned products and others	<u>180 600</u>	1 031 000
Exports		<u>Nil</u>
<u>Total Supply</u>		<u>2 422 000</u>
Population (1978)		117 500
<u>Per Caput Supply</u>		20.6

1/ The following conversion factors have been used: fresh, frozen or chilled fish = x 1.2; salted fish = x 2.0; salted, dried, codfish = x 3.7; crustacea = x 1.5; canned products and others = x 2.0.

2/ Estimated by adding 33 1/3 percent of the imports of the first three quarters.

Table 9. Seasonal Per Caput Supply of Domestic Fish

<u>Month</u>	<u>Total Landings</u> (t)	<u>Per Caput Supply</u> ^{1/} (kg)	<u>Changes Relating to the Average</u> ^{2/}		<u>Estimates of Monthly Surpluses and Deficits</u>	
			<u>Per Caput Supply</u> (kg)		-	+
January	170.0	1.4	-	+		17.3
February	120.5	1.0	(0.3)		(32.3)	
March	165.0	1.4		0.1		12.3
April	202.7	1.7		0.4		50.0
May	189.5	1.6		0.3		36.8
June	92.3	0.8	(0.5)		(60.5)	
July	86.6	0.7	(0.6)		(66.2)	
August	62.5	0.5	(0.8)		(90.3)	
September	77.9	0.7	(0.6)		(74.9)	
October	61.8	0.5	(0.8)		(91.0)	
November	87.9	0.7	(0.6)		(64.9)	
December	<u>74.4</u>	0.6	(0.7)		<u>(78.4)</u>	
Total	1 391.0				(558.5)	116.4

1/ Population 1978: 117 500

2/ Average per caput supply during fishing season January-June amounts to 1.3 kg. This is used as an estimate of per caput demand.

Table 10. Population Distribution

<u>Areas</u>	<u>Population 1970</u>	<u>Percentage</u>	<u>Estimated Population 1978^{1/}</u>
Castries	40 451	40.5	47 588
Anse-la-Raye	4 769	4.8	5 640
Canaries	1 939	1.9	2 233
Soufriere	7 250	7.3	8 578
Choiseul	6 167	6.2	7 285
Laborie	6 013	6.0	7 050
Vieux Fort	8 108	8.1	9 518
Micoud	10 145	10.2	11 985
Dennery	8 851	8.7	10 222
Gros Islet	<u>6 113</u>	<u>6.3</u>	<u>7 401</u>
Total	99 806	100.0	117 500

Source: Census Research Programme, University of the West Indies, 1970
Population Census of the Commonwealth Caribbean. St. Lucia Government
Statistical Office, Statistical Pocket Digest.

^{1/} Assuming no changes in the regional composition

Table 11. Fish Grades

Group 1

Albacore	Dolphin	Salmon
Amber	Grouper	Snapper
Barracuda	Ocean gar	Butterfish
Cavalli	King fish	Whiting
Jacks (4 or less/lb)		

Group 2

Rockhind	Old wife	Doctor fish
Barber	Blackfish	Lion
Marian	Ballahoo	Porpoise
Chub	Mackerel	Shark
Round robin	Longer eel	Flying fish
Jacks (more than 4/lb)		

Group 3

Anchovy	Round Robin	
Cupboard	Shellfish (excluding lobster and shrimp)	
Sprats	Other fish	

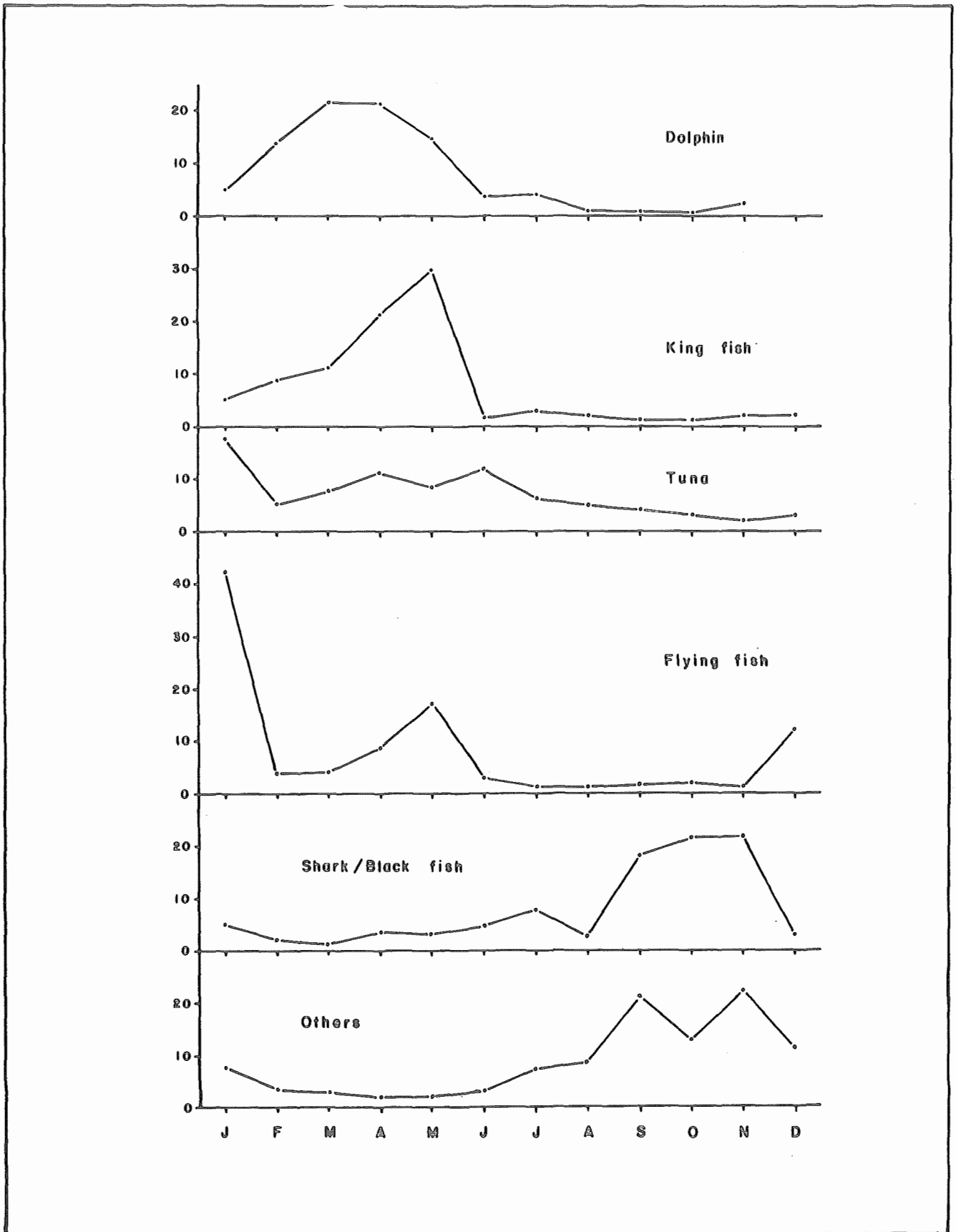


FIGURE 1.- COMPOSITION OF MONTHLY LANDINGS BY SPECIES (in percentage)

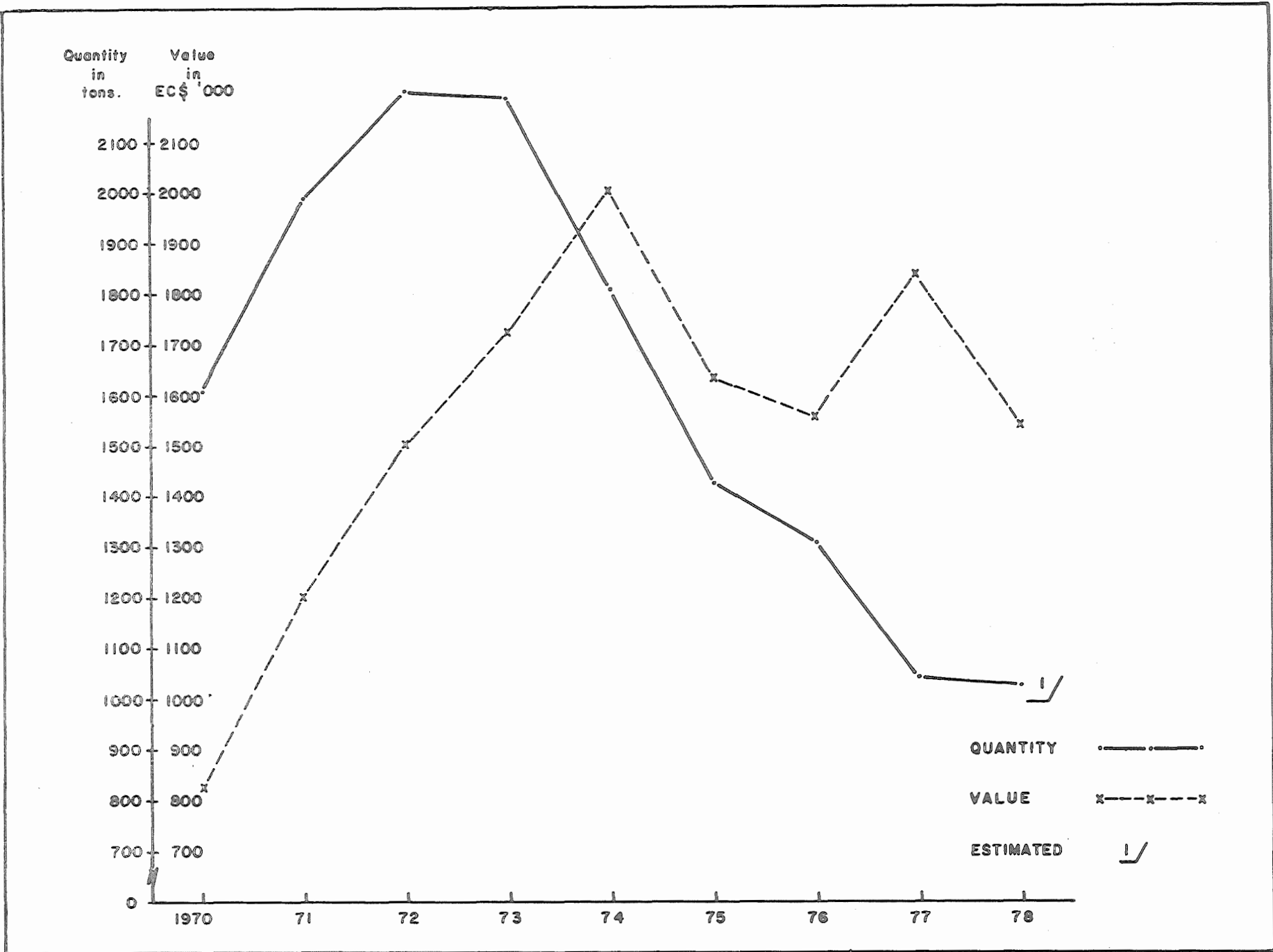


FIGURE 2.- IMPORTED FISH SUPPLY IN FIVE WEIGHT EQUIVALENT AND EXPENDITURES FOR IMPORTS

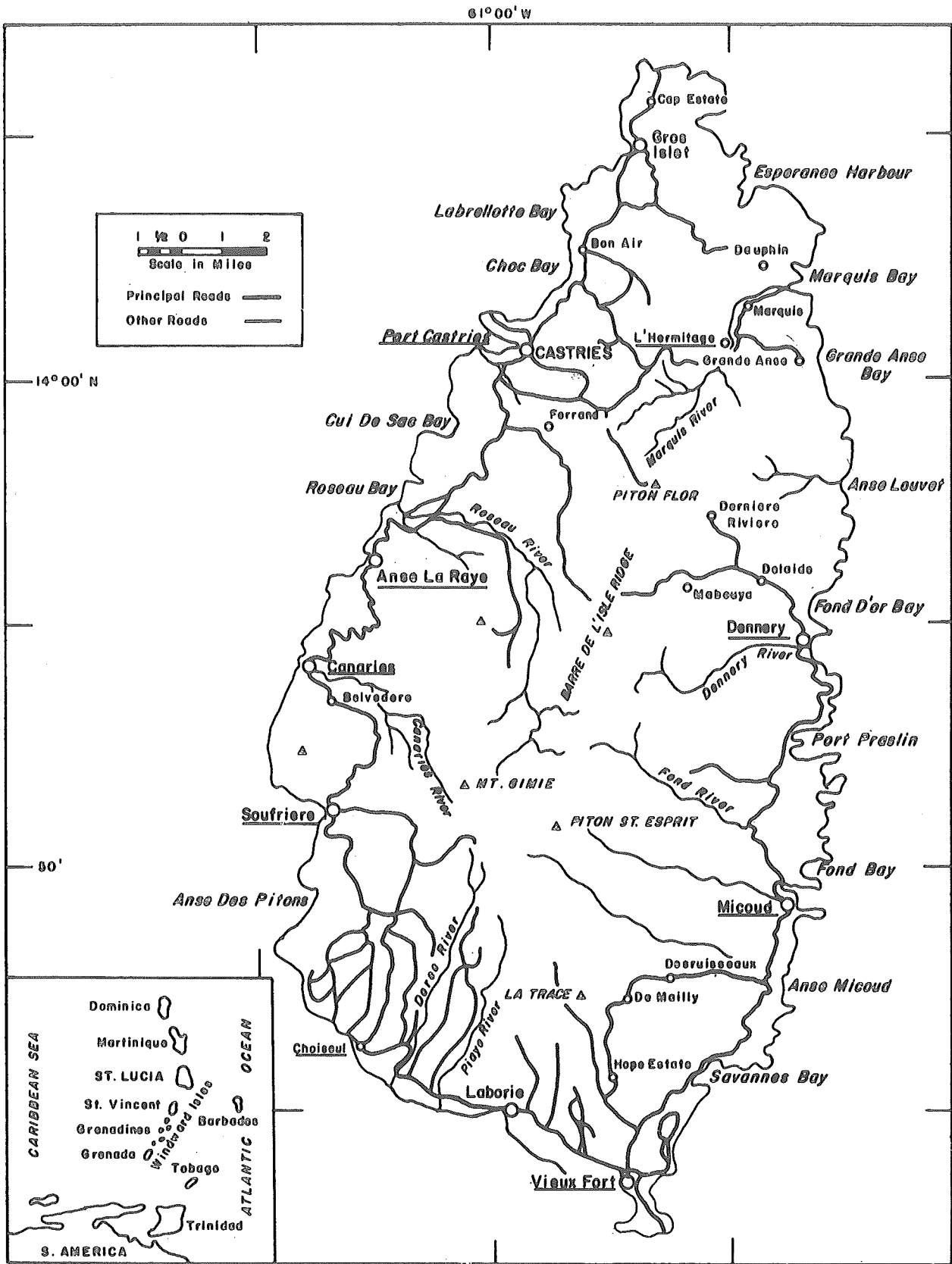


FIGURE 3.- MAP OF ST. LUCIA

Iced Fish Storage, Distribution and Marketing

To overcome daily fluctuations in fish supply, particularly in the population centre of Castries, it is recommended that the Goodwill Cooperative pioneers the large-scale use of ice for the day-to-day preservation of fresh fish. At present, fish is held overnight by traders and fishermen in cold rooms, domestic chest freezers and refrigerators. Occasionally home-made ice is used to assist the cooling process. Although a possible method of overnight storage, use of sub-zero facilities for cooling is inefficient, expensive and in addition unsuitable for longer-term storage, say three to seven days. Bearing this in mind, "slow freezing" as a technique should be phased out. Chilled fish should be placed in chill containers (insulated and refrigerated at $\pm 2^{\circ}$ C) and deep frozen fish stored in cold chambers (-10° C to -20° C). Such a policy may only become fully effective when the Castries plant has been developed.

Fish that is supplied to cooperatives by their members should be retailed fresh on the day of capture. Fish in excess of such requirements should be iced and stored for sale the following morning and for collection for sale in Castries. Ideally fish should be held in boxes (such as Allibert plastic fish boxes 35 to 70 l) with an ice to fish ratio of 1:1 or 1:2 and stored in large insulated chambers (a plywood or soft wood cube with 6-9 in polystyrene insulation and metal water proof liner).

The Goodwill Cooperative should hire a suitable van to carry an insulated container to Castries each day when fish will be sold in the market by a regular fish vendor, the van driver or an employee of the cooperative. Sufficient storage facilities at Goodwill already exist in the way of insulated and concrete bins to cater for this.

Insufficient ice production on the island precludes the expansion of this system until the ice plant in the Castries plant becomes functional. If, as is intended, NAFCoop takes over the Castries plant after a transition period, the other cooperatives could be drawn into the system, and ice wholesaled to them together with a collection system for their surplus landings. This is in line with the general operating parameter of the Castries plant described in the feasibility study. To facilitate this, daily landings, ice requirements, surpluses and deficits must be telephoned in to a central point and accurate records kept of all transactions.

Such a system will only be effective if the market can absorb all the fish entrusted to the organization (taking into consideration the outlets for processing to salt-dried, brined or frozen fish). It is suggested that the point at which this occurs is when the organization (NAFCoop) can hold at least 25 percent of the island's daily requirement during the fishing season. Stored product and an organized marketing and distribution system should ensure that the organization holds 50-75 percent of the out-of-season requirements. Fixed contracts should be sought with the catering industry.

The Preparation of High-value Frozen Fish

In the absence of fresh fish, frozen whole fish finds a ready market at prices only slightly higher than the equivalent fresh product. It is envisaged that there is not a high demand for frozen fish amongst the consumers on the island, that the demand for such fish is highly price sensitive, and that future competition from cheaper fresh, salted and brined fish products both in and out-of-season will keep sales of frozen fish to a very small percentage of the total market.

Indications from cold store managers, hotel and restaurant owners, and consumers are that "slow frozen" fish, already produced on the island, is of adequate quality. However, a batch of frozen fish was recently returned to Goodwill Cooperative by St. Lucia Cold Store - it was said to have been inedible, probably due to too long storage and variable temperatures. Fish is normally held for less than three months (four-six weeks average) so that almost no fish is stored from glut season to periods of poor landings.

In view of the absence of quick freezing facilities on the island at present, there appears little reason why this form of preservation should not continue. As long as only small quantities are "slow frozen" at a time (i.e., freezing to below 0° C takes less than 12 h and below -10° C can be achieved in 24-36 h), fish can be stored for up to three months with only slight deterioration in quality. However, longer-term storage is inadvisable.

Nevertheless, it is envisaged that current supplies of "slow frozen" fish will be replaced by regular supplies of iced fish during the main fishing season. Under these circumstances ice and insulated or refrigerated storage should replace any "slow freezing", leaving only a requirement for long-term storage of fish from in-season to out-of-season. It is most likely that, excluding frozen imports, this fish should be deep frozen fish augmented by fresh landings. A sample costing for freezing (air blast) and storing fish has been made and follows this section.

The desired product form is most likely to be whole fish (with or without guts). However, in view of the high prices presently paid by caterers for imported fish, it is probable that processed fish could be acceptable (sides, fillets, steaks, etc.). This has the advantage of providing some additional employment but primarily it reduces freezing costs and required storage space.

Current hotel requirements for this type of product are comparatively low and based on current landings, species preferences, per caput income, etc., it is unlikely that this sector of the processing industry could be developed very far. Additions to the fleet, changes in technology and more efficient marketing and distribution could change this situation. In the meantime, quick freezing requirements are small and existing cold storage space should prove more than adequate for the foreseeable future. It might, under these circumstances, be advisable to reassess the requirements of the CIDA cold store complex at Castries and to examine the benefits of air blast, vertical plate and horizontal plate freezing, or a mixture of these. Air blast freezing is most suitable for large pelagic species; vertical plate freezing for block freezing smaller whole fish and fillets and horizontal plate freezing for steaks and prepared fillets.

Estimated Costs for Freezing and Storage of Fish

	<u>EC\$</u>		
1. <u>Investment</u>			
Trailer container including cooling unit ^{1/}		12 150	
Installation costs (10% of container costs)		1 215	
Storage shelves, (wooden shelves, or frame covered with chicken wire)		<u>750</u>	
		<u><u>14 115</u></u>	
2. <u>Annual Fixed Costs</u>			
Depreciation (20% on total investment)		2 823	
Interest (8% on capital)		1 129	
Insurance (2% of investment)		282	
Rent (estimated EC\$ 20/month)		<u>240</u>	
		<u><u>4 474</u></u>	
3. <u>Operational Costs</u>			
	S T O R A G E T I M E		
	<u>One month</u>	<u>Three months</u>	<u>Six months</u>
	EC\$	EC\$	EC\$
Freezing costs (EC\$ 0.10/lb) ^{2/}	1 100	1 100	1 100
Electricity (EC\$ 1.00/h)	720	2 160	4 320
Maintenance (10% annual on trailer costs)	56	168	336
Labour for loading, unloading, supervision (EC\$ 2.50/h) ^{3/}	36	49	68
Contingencies (10% on operational costs)	<u>191</u>	<u>348</u>	<u>582</u>
	<u><u>2 103</u></u>	<u><u>3 825</u></u>	<u><u>6 406</u></u>
4. <u>Costs per Pound of Whole Fish</u> (Average Capacity Utilization of 11 000 lb)			
	S T O R A G E T I M E		
	<u>One month</u>	<u>Three months</u>	<u>Six months</u>
	EC\$	EC\$	EC\$
Operational costs	2 103	3 825	6 406
Fixed costs	<u>373</u>	<u>1 119</u>	<u>2 237</u>
Total costs	<u><u>2 476</u></u>	<u><u>4 944</u></u>	<u><u>8 643</u></u>
Cost/lb	<u><u>0.23</u></u>	<u><u>0.45</u></u>	<u><u>0.79</u></u>

- / Second hand trailer, imported from U.S.A. for US\$ 4 500, storage capacity of 8 t of fish.
 / Average capacity utilization of 11 000 lb (some 60 % of maximum capacity)
 / Based on four hours loading, eight hours unloading and five minutes daily supervision.

Establishment of a New Pricing System

As indicated in the main part of the report, the selling prices of fish and fish products, either imported or locally produced, have undergone substantial increases over the last decade. However, in general, these increases have not kept pace with the increasing costs of gasoline and fishing equipment. Fishermen, on the one hand, seek higher prices for their product while the consumer, on the other hand, finds fish becoming more and more expensive and asks for less or cheaper fish, and/or substitute meatstuffs. While during the fishing season fish is abundant and reasonably cheap, fish prices rise considerably in the off season.

To counteract this situation and minimize the conflict, the Fisheries Management Unit intends to decontrol the price for local fresh fish in order to improve the financial situation of the fishermen. Decontrolling the price under the present market conditions, however, would only partially benefit the fishermen since the fish traders are still in a strong bargaining position and would keep first-hand prices down.

Bearing in mind the desire of the fishermen to get a stable and higher income and the Government's wish to increase the local production of fish and to supply the population on a more regular basis throughout the year, it is recommended that a study be made of a producers' price stabilization scheme.

Some Preliminary Estimates of Island Fish Requirements
and the Business Objectives of a Marketing Scheme Involving
an Island Cooperative Marketing Organization

Outlined below are some ideas concerning the operation of an island cooperative marketing organization. It is envisaged that such an organization will have access to all the existing facilities of the cooperatives, the CIDA fish complex at Castries and, possibly, the Abattoir, Vieux Fort. Any numbers mentioned are only indications of quantities; in practical terms, the management of such an organization must adapt to circumstances as well as it can.

A short designation of what the Goodwill Fishermen's Cooperative might do prior to the establishment of such an organization is given. Day-to-day circumstances in the running of the cooperative will determine performance and, to a certain extent, policy.

For the following proposals a number of assumptions have been made. These are:

- a 1978 level of supply;
- a maximum beach price of EC\$ 1.75 and retail price of EC\$ 2.00 (an average say, of EC\$ 1.20 and EC\$ 1.40 respectively);
- a in-season demand of 35 t a week and an out-of-season demand of 19 t;
- in the long term an island cooperative marketing organization should be handling 25 percent of in-season sales and 50 percent of out-of-season, i.e., approximately 475 t annually;
- cooperative members will catch twice as much fish in season as out, so that in the first six months of the year 313 t must be caught and 162 t in the last six months.

In-season daily supplies might range from 5 to 15 t with a regular market for say, 5-10 t a day. The organization might attempt to market about 1 t of fish six days a week primarily through the Castries market, augmented by local sales, and hold a maximum iced buffer stock of 5 t to offset poor landings. Losses due to overestimating requirements should be kept below 5 percent (this is perhaps the most difficult aspect of such a system and requires that the manager of such an organization be sharp witted and quick to take the advantage of any market changes to the benefit of his shareholders).

Weekly supplies in season range from 15-50 t thus producing market surpluses and deficits of 15-20 t. If the surpluses could be disposed of, for instance, in the processing development of the organization, cooperative members could be expected to catch at least half of these surpluses and reduce the occurrences of deficits. In this situation supplies to the organization might vary from 5 t under weekly fresh fish requirements to 10 t and over (i.e., 10 t destined for long-term storage).

Thus the organization is looking to market each week during the season about 1 t of fish six days of the week, plus up to an additional 5 t as market conditions allow. Fish available for processing and long-term storage is likely to be of the order of 4 t per week with a maximum of about 10 t in season, a total of about 100 t processed, for sale out-of-season (about 4 t live weight equivalent per week), plus about 6 t per week fresh. Catches from the rest of the fleet out-of-season would be in the order of 11-12 t.

A market for an additional 2-3 t of fish exists each week supplying the catering industry. It is possible that the improved marketing facilities offered by the organization to its members may (this is by no means definite) result in higher landings and a significant increase in total island annual landings. Until quick freezing facilities become available, the island frozen fish cannot be kept through the second half of the year and the catering industry will still request imports to tide it over this part of the year. However, it is the organization that will eventually develop quick freezing (through the CIDA project) and the catering industry should be approached for contracts to supply fresh fish in season and perhaps some "slow frozen" and fresh fish out-of-season, to be eventually replaced by quick-frozen fish out-of-season.

The organization will need reception facilities for a maximum of just over 20 t of fish per week. About 10 t will be required for sale as fresh fish each week, requiring chill storage of 5 or 6 t. Processing of surplus fish will depend on manpower availability, work space, and optimum batch sizes. These are likely to have to cater for a maximum of 10 t a week. Surplus fish may have to be held in ice for two or three days, and thus additional storage space will be required. It is suggested that fish be stored in ice at a ratio of 1:2 in plastic stackable fish boxes that can be easily handled by two people, one if need be. It may be necessary to manufacture some longer wooden boxes to cope with the large whole kingfish, dolphin or tuna, or use considerably larger plastic boxes (70 l).

A delivery truck capable of carrying at least 1 t of iced fish will be needed by the organization (hired or owned) - an insulated box should be sufficient - plus facilities for delivering ice to outlying cooperatives. Two such trucks are due to be provided as part of the CIDA project. Storage facilities for say, 20 t (product weight) of salt-dried fish will be needed and room for 25 t of brined and barrelled fish.

However, in the first instance, in the short term, the Goodwill Fishermen's Cooperative might aim to handle and market a small proportion of the quantities described above. This takes into consideration the facts that fishermen do not at present supply their catches to the cooperative, that a fresh fish marketing system has never before been attempted by the cooperative, that the required management skills (book-keeping, decision making and negotiating with fishermen) must be developed and that the management of the cooperative will be held responsible for the profitable undertaking of the exercise. A reasonable aim might therefore be:

(a) to sell an average of 1/2 t of fish per day through the year primarily through a retail outlet in the Castries market, but also through its own retail facility at Vieux Fort;

(b) to market up to a maximum of 2 t additional fish on an opportunist basis as market conditions allow;

(c) to process a batch of 500 lb of fish to salt-dried fish twice a week during the season;

(d) to produce the equivalent of 200 lb of brined flying fish each week during the season;

(e) to test market "slow frozen" fish fillets;

(f) assuming the cooperation of member fishermen, to seek contracts to supply, on a regular basis, the requirements of at least one hotel and one restaurant with fresh, iced fish (hotels and restaurants can do their own "slow freezing" if needed).

These modest aims would require chill storage for a maximum of about 3 t of iced fish, facilities for processing and drying less than 1 t of fish a week, and storage for a maximum of 10 t (product weight) of salt-dried fish and 2 1/2 t of brined fish. If fish is iced at reception, as necessary for chill storage, and again when transported to Castries for sale, requirements might be in the order of one part ice to one part fish. Thus, there would be a daily requirement for 1/2 t of ice a day (the supposed capacity of the installed ice plant at the Goodwill Cooperative). It is possible that the operating capacity of the plant may be slightly higher, which would be all to the good, bearing in mind the objective of making opportunist sales of fish in addition to the average 1/2 t a day.

It is undesirable to use the refrigerated containers to store iced fish at sub-zero temperatures and their capacity is likely to be too large to use them as insulated containers only. It is therefore suggested that a smaller insulated container be made to store iced fish. The existing concrete bins may serve this purpose.

A part of the Castries retail fish market should be rented on an annual basis and efforts made to have the rented bays, at least, upgraded with new and brighter surfaces, new water fittings, efficient drainage and better lighting. A small insulated container will be necessary to store fish that has not been sold from one day to the next. Suitably sized wooden boxes of standard size should be made for the storing and transportation of iced fish. In due course, if at all possible, these boxes should be replaced by plastic ones.

Under present conditions, ice will be a limiting factor to the further development of fresh fish marketing. If NAFCoop takes over the Abattoir, ice will remain a limiting factor until the Castries plant is completed. In this case, the Abattoir will mainly be used for processing fish. Consideration should be given to the efficacy of providing an ice plant at the Abattoir prior to the completion of the Castries plant, or in addition to that at the Castries plant.

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