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TECHNO-ECONOMIC FEASIBILITY STUDY
ON FISH PROCESSING
BARBADOS

NORGAARD
CONSULTANTS INC.

16209

TECHNO-ECONOMIC FEASIBILITY STUDY ON FISH PROCESSING BARBADOS

UNIDO PROJECT US/BAR/85/152

OCTOBER 1986

TECHNO-ECONOMIC FEASIBILITY STUDY ON FISH PROCESSING, BARBADOS
US/BAR/85/152

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1. EXECUTIVE SUMMARY

1.1 Project Background

Barbados Development Bank has assisted the fishing industry by making loans available to fishermen to improve their fishing vessels and harvesting techniques. Problems have been encountered with the increased landings, particularly during seasonal gluts of fish, with resulting depressed prices for fresh landed fish and financial losses for fishermen.

In association with UNIDO, the Barbados Development Bank has therefore commissioned a study of the Seafood Industry in Barbados, to examine whether a modern Seafood Processing Plant will benefit the fishing industry, and to determine the technical and financial parameters for such a Process Plant.

The study has confirmed that the establishment of a Seafood Processing Plant will increase demand for fish landings and slightly raise and stabilise prices paid to the fishermen and thereby make their operation financially sound again. The study has also confirmed that a process plant, primarily based on production of frozen fillets of Flying Fish for the domestic as well as selected export markets, will be economically feasible.

The **Project Promoter** will be:
Barbados Development Bank
P.O. Box 50, Bridgetown
Barbados, W.I.
Tel.: (809) 426.0511 Cables: BARDEBAN
(Att: Mr. Eric Brathwaite
Manager Research and Planning)

The project is oriented towards the supply of raw fish and the market for the frozen product will primarily be domestic and secondly export to ethnic markets (W.I. populations) in the U.S.A., Canada and the U.K.

The policy of the new Barbados Government is to develop the fishing industry according to the following manifesto:

1. Provide tax incentives and financial assistance to promote the processing, packaging and marketing of fish, and the development of fish based products.

2. Provide substantially increased assistance to fishermen, in relation to the repair and re-equipment of their boats.

3. Encourage and facilitate the development of fish farming.

4. Arrange for the insurance of the total fishing fleet, through a system whereby fishermen will be allowed to pay boat insurance on a monthly basis. A policy directive will be given to the Insurance Corporation of Barbados, in this regard.

5. Establish research programmes to provide the necessary technology for the optimal exploitation of our fishing resources, with a view to converting the fishing industry into a major foreign exchange earning industry.

6. Organise training for fishermen in the maintenance of engines and other equipment.

The Barbados Development Bank is charged with the task of assisting industry with loans for developing projects. An investment in a Seafood Processing Plant is not only economically attractive by itself, but the positive effect on the fishermen will assist greatly in protecting previous investments in this sector. The project will also create additional employment and will earn foreign exchange by direct export as well as by import substitution.

1.2 Market and Plant Capacity

The present annual seafood demand in Barbados is approximately 10,300 tons, equivalent to 40 kg/person/year. The supply is composed of approximately 6,600 tons of fish being landed domestically and imports of fish products equivalent to 3,300 tons. The cost in foreign exchange for seafood imports is around US$3,600,000.

The proposed plant will process 700 tons of Flying Fish and can in addition handle 400 tons of Other Fish per year, and will meet the demand for frozen fish, in fillets and in steaks, particularly in the off-season August - December, when fresh fish is not available in sufficient quantity. The product will replace some of the seafood products at present being imported.

The production programme will depend on actual availability of fish supply, but four alternative case scenarios were identified and analysed:

ALT A:

Receipts: 4 tons of whole Flying Fish per day (8 hrs) 6 days a week for 7 months.

Product: 224 tons frozen fillets in polybags
450 tons of fish waste to fishmeal plant.

Cycle: One shift per day, 6 days per week for 7 months.

ALT B:

As ALT A above, with the addition of

Receipts: 4 tons of Other Fish per day for 4 months.

Product: 384 tons of frozen steaks and fillets.

Cycle: Two shifts per day for 4 months
One shift per day for 3 months

ALT C:

Receipts: 2 tons of whole Flying Fish per day for 7 months.
4 tons of Other Fish per day day for 7 months.

Product: 112 tons of Flying Fish fillets per season.
672 tons of frozen fillets and steaks
225 tons of fish waste to a fishmeal plant

Cycle: One shift per day for 7 months.

ALT D:

As ALT B above, with the addition of

Receipts: 4 tons of fresh vegetables per day for four months.

Product: 400 tons of frozen vegetables per season.

Cycle: Two shifts per day for 4 months.
One shift per day for 11 months.

1.3 Materials and Input

Present landings of fish in Barbados are around 6,600 tons per year. Although there is insufficient knowledge concerning the marine resource, it is a reasonable assumption that future landings could increase to 10,000 tons per year. The proposed plant requires 700 tons per year to be economically feasible, which is equal to 10% of present landings, or 7% of future expected landings.

The plant will require supplies of polybags for packaging of fish fillets and cartons. These will be imported, whereas labels will be manufactured locally.

The infrastructure in Barbados is well developed and can support the proposed plant. The daily requirements are maximum 16 cubic meters of fresh water, and 2,440 kWh of electricity per day.

1.4 Location and Site

The factory building covers 1,024 sq m and requires a site of at least 2,000 sq m.

An ideal location for the plant is in Cheapside, adjoining the new Bridgetown Fish Port, at present under construction.

1.5 Project Engineering

The factory building (Fig. 16) is a one story industrial building 32m x 32m, built to international standards for food processing. It contains a fish reception area with an iceplant and a 24 tons capacity chill store. The filleting room contains two parallel filleting lines, leading to the freezing room where product is packed and frozen.

There are two Cold Stores of 100 tons capacity each and seperate engine room, workshop, spare store and store for packing materials.

The staff and labour facilities comprise security office, general office, change rooms and toilets.

The technology selected is comprised of best quality, least maintenance equipment with the processing technique being manual filleting, not automatic. Emphasis will be placed on achieving a quality product to export standards, but with the maximum labour opportunities commensurate with economic viability.

The equipment will consist of scales, fish elevators and conveyors, packing tables and check scales, tunnel freezer, plate freezers or automatic belt tunnel freezers. The refrigeration equipment will be ammonia with compressors housed seperately. All equipment will be specified for durability in the atmosphere of fish and water.

Civil engineering work will include site preparation and access ramp, foundations, floors and drains, columns and roof structure, walls and internal division, insulated walls for cold store and staff facilities with toilet block.

1.6 Plant Organisation and Overhead Costs

The Seafood Plant is assumed to be owned by a private investor, or a group of joint venture owners, supported by the Barbados Development Bank. The daily manager should have some previous experience from fish processing or be supported by an experienced manager for the first season.

The Seafood Company will purchase raw fish directly from the fishermen and after processing keep the product in cold store. The Company will also be responsible for sales both domestically to supermarkets and for export to 2 - 3 selected fish importers in the U.S.A., Canada and the U.K.

The Fixed Investment consists of building and equipment, to be depreciated over 20 and 10 years respectively. Capital is also required for Inventory of frozen product and for working expenses.

Apart from the financial charges, the overheads include office staff, utilities and sundry costs.

1.7 Manpower

The labour force for one shift work requires a total of 61 unskilled workers. These will be recruited locally for a period of seven months and trained on the job. Two plant supervisors and three mechanics for equipment maintenance will be hired during plant erection and they will be trained by equipment supplier.

The Manager will be carefully selected based on previous experience and will be assisted by 5 office and security staff. Total number of employees will be 72 and it is not considered difficult to find sufficient applicants in Barbados.

1.8 Impementation Schedule

The project can be operative 12 months after the decision to proceed has been taken and an investor identified.

Three months will be used for design and preparation of tender documents.

Two months have been set aside for tender procedure and contract award.

The manufacture of equipment and shipment to Barbados is estimated to require 5 months and the equipment installation 2 months. One month will be set aside for commissioning the plant.

During the first season, it is assumed that production will be 50% for the first half and 100% for the remainder of the season.

1.9 Financial and Economic Evaluation

The financial evaluation shows that Alternative Case Scenarios A, B, and D are not only feasible, but financially highly attractive. Even under the conservative financial assumptions utilised, the plant would generate sufficient revenues to meet it's financial obligations with a Rate of Return on total invested capital of 30% to 36%, depending on the alternative.

In addition to other positive impacts on the local economy, ie: creation of additional jobs, reduce import fishery expenditures and earn foreign exchange, the plant will also induce improvements in the economic situation of the ice-boat fishermen, thus better abling them to administer their outstanding loans.

1.10 Conclusions

The Seafood Processing Project in Barbados is recommended for implementation because of the following advantages:

A) The project is financially an attractive investment with an Internal Rate of Return of 35%, and a Net Present Value of BD$2,583,000, on the Base Case A.

B) The establishment of a process plant will improve the economic conditions for the fishermen and turn their operation around from present losses to a reasonable profitability, which will enable them to service their present loans to the Barbados Development Bank.

C) The project will create 72 new jobs directly in Barbados, 20 new opportunities for fishermen and 30 in support service industries, ie: a total of 122 new jobs.

D) Export opportunities for the frozen Barbados seafood product could earn up to US$1,150,000 in foreign exchange per year.

F) Ready availability, year round, of frozen quality seafood will improve the nutrition of the population of Barbados.

G) The Process Plant will absorb large supplies of fish from ice-boats and thereby remove supply/price pressure on artisanal day-boats.

The major drawbacks of the project are:

A) Lack of sufficient detailed knowledge of the extent of the marine resources.

B) The need to fish in adjacent territorial waters (ie: Trinidad & Tobago) for part of the supply of Flying Fish.

C) The resulting modest increase in cost of fish, both fresh and frozen, to the consumer.

Comments to the forementioned drawbacks are:

A) The plant is flexible. If it is not possible to obtain sufficient Flying Fish, the plant could process and freeze Other Fish not yet properly exploited.

B) Agreements will have to be entered into at national level. Flying Fish are migratory, so should be shared by adjoining nations.

C) The increase will improve the living conditions of fishermen and the additional funds will return to the Bank and the economy.

The chances of implementing the project appear very good. The initiative must be taken by the Barbados Development Bank.

In short, the project is recommended for the following reasons:

- It will improve fishermen's economic situation
- It will improve nutrition in Barbados
- It will earn foreign exchange
- It will create additional employment

2. INTRODUCTION

2.1 Project Background

2.1.1 Project History

As an island state, Barbados has always relied to a certain extent on seafood as a major resource for the national diet. Fisheries and fish distribution has been an important occupation.

The advent of larger, more powerful boats with ice keeping capabilities has extended the fisheries in recent years both in terms of quantity and quality landed, and also in the economic range of vessels, which now fish not only in Barbados waters, but as far away as Tobago.

The successful growth of the tourism industry on the island has also provided opportunities for extended domestic markets as well as raised the possibility of exporting specialised seafood products.

Barbados Development Bank has supported the expansion of the fishing industry, both in terms of financial assistance to the fishing fleet as well as to previous attempts at seafood processing. In the process, certain shortcomings of the industry have been discovered and the Bank has therefore requested UNIDO to carry out an investigation of the fishing industry and if justified make recommendations for the establishment of a modern seafood industry.

2.1.2 Project Idea

The project consists of establishing on Barbados a commercially viable seafood processing plant, which will primarily serve the local fishing industry by absorbing excess fish and stabilising prices paid to fishermen. It will produce both whole frozen fish as well as fillets, packed in vacuum bags and sold frozen particularly during the off-season.

In order to reduce the overhead costs to the fish products, the building will be designed in such a manner that it can function as a vegetable freezing plant during the off-season, when fish are not in plentiful supply.

The market for the seafood products will primarily be the domestic market in Barbados, which will help to reduce import of fish products. The plant will be designed to modern international standards for hygiene and quality, and the products can also be exported to overseas countries. The ethnic markets in Toronto, Miami and London, with large West Indian populations, have been identified as those most likely to be developed.

The study established that it is reasonable to assume that a sufficient resource base exists on Barbados, to permit total landings of 10,000 tons per year. The present landings have ranged between an estimated 6,500 and 8,500 tons per year.

The capacity of the proposed seafood processing plant will be either 4 tons of Flying Fish per 8 hour shift or a mixture of 2 tons Flying Fish and 4 tons Other Fish (Dolphinfish, Swordfish, Kingfish etc). Assuming an average of 5 tons per day for seven months, the plant will therefore require a total supply of 840 tons, equivalent to 8.4% of the anticipated catch. The establishment of the plant should therefore not upset the present supply and demand situation in a serious manner, but should assist by stabilising and slightly raising the prices

paid to the fishermen, while making fish more readily available on a year round basis to the consumers in Barbados.

The new process plant should be located in or adjacent to the new fishing port being constructed in Bridgetown. It will be an attractive design, which should improve the look of this part of the town, much visited by tourists.

Barbados suffers from a high unemployment rate and this project will provide a total of 72 direct jobs, plus an estimated 30 jobs in associated industries, distribution etc. The increased demand for fish should help to improve conditions for existing fishermen and attract an additional 20 fishermen to this profession.

It is proposed that the seafood plant be built by a private investor working with the Barbados Development Bank. The benefits of the plant are of great socio-economic importance and it is recommended that the establishment of the plant be supported financially to a certain extent because of the many socio-economic benefits, as described in this report.

2.2 Objectives

The overall objectives for the study have been to:

> **Utilise the available natural sea resources to develop the national fish processing industry in order to increase the variety of food, create a source of employment and to save on foreign exchange spent on imported seafood.**

The proposed Seafood processing project fulfills these objectives.

The special objectives for the project as defined by the Consultants in this study are to:

- Provide improved and increased opportunities for the fishing vessels of Barbados to sell fish more efficiently and at slightly increased and stabilised prices.

- To establish a commercially viable seafood industry which will make profits for the owners.

- To provide Barbados with a modern food processing plant built to international standards for hygiene and quality control.

- To increase domestic consumption of local seafood products by making frozen quality products available on a year round basis.

- To develop selected export markets for seafood products and earn foreign exchange.

- To reduce food imports and thus improve the balance of trade.

- To provide new employment opportunities in the fishing industry.

2.3 Related Investigations

2.3.1 Other Studies

The list of references in App.A contains a summary of other studies or investigations of relevance into the Barbados Seafood Industry.

Of particular relevance to this study, because of its timeliness and the quality of the work undertaken, is the report by Dr. Wayne Hunte, titled "Status of the Barbados Pelagic Fishery, 1986." His report provides useful data concerning the key pelagic species found in Barbados waters and comparisons of the operations of day and ice-boats. It concludes that there is insufficient fisheries resource data to date, to perform reliable stock assessments on the target species, that detailed biological studies should be performed, and that the present mixed fleet of day and ice-boats should be limited in growth to two per year for a five year pulse. This would allow time for the stocks to be assessed and to determine if they are coping with the additional effort.

Other studies of relevance to this report are the "Survey of Manufacturing Costs in Barbados," by the Barbados Industrial Development Corporation, the F.A.O. report of 1982 on the "Barbados Fisheries Development Project Preparation Mission," which supplied much background information of the history and status of various Barbados fishing industry sectors, and the Barbados Development Bank's "Interim Report on the Fisheries Sector," prepared by Mr. Wilbur Lavine, that provided insight into a few of the problems occurring within the local fishing industry.

The construction and improvement of fish landing sites and fish markets on Barbados has been remarkable during the past few years and is continuing, with financial support from various international aid agencies. These new and efficient facilities

have greatly improved conditions for landing of fish and for direct retail sale to consumers, but none of the projects have included consideration of the establishment of a processing industry. The nearest attempt is the proposed inclusion of a small filletting hall, to be constructed in the new Bridgetown Fishing Harbour. The intent is apparently that this facility should be operated as required by fishermen and buyers, but it will not and can not be run as a commercially viable industry. The need for a modern industry is therefore not being covered by any other agency at this point in time.

2.3.2 Feasibility Study

This feasibility study was undertaken by Norgaard Consultants of San Francisco, USA, under contract with UNIDO in Vienna, and in close cooperation with the Barbados Development Bank, the other sponsor of the project.

The consultants visited Barbados during May and June 1986 and again briefly in August 1986, with a team consisting of:

Erik Norgaard, Team Leader
Benny Jensen, Fish Processing Specialist
Kurt Jacobsen, Market and Research
Bruce Epler, Fisheries Economist

The officers representing the Barbados Development Bank were Mr Eric Braithwaite, Manager of Research and Planning, and Mr. Wilbur Lavine, Economist. Support was also provided by the Ministry of Agriculture and Natural Resources, Permanent Secretary Mr. Clifton Maynard, Mr. Samuel Headley, Permanent Secretary, Special Assignments, Mr. Hinckson of Special Affairs, and Mr. Gooding and Mr. Murrell of the Planning Unit. Mr. Ralph Jones of the Fisheries Division also provided great insight into the fisheries operations.

3. THE COUNTRY

After it's discovery by the Portuguese in 1536, Barbados remained relatively uninhabited until the British established the first settlement in 1627, in what is now Holetown in the parish of St. James.

Barbados remained a British Protectorate until it peacefully declared it's independence on November 30, 1966.

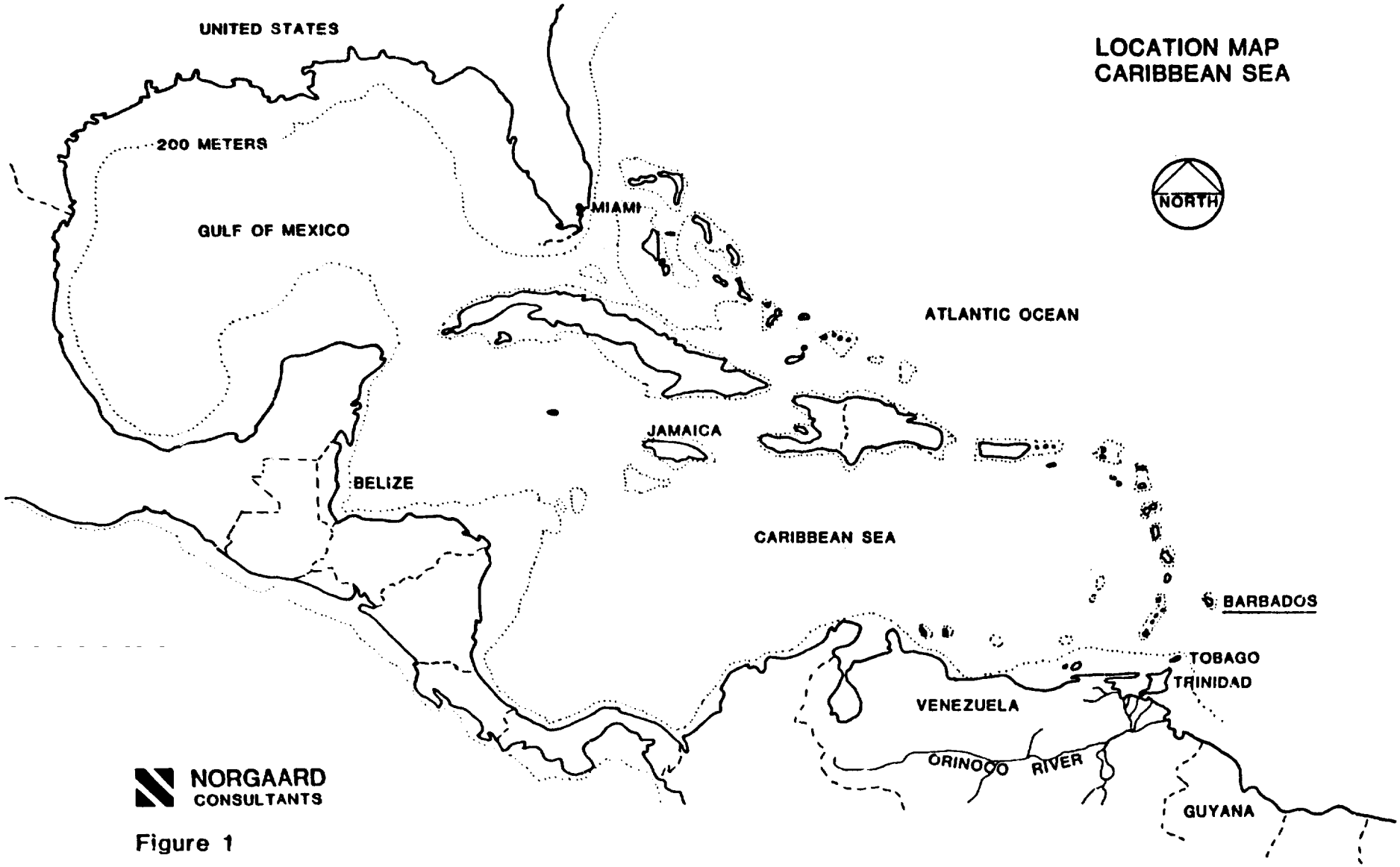
3.1 Geography

Barbados, located at 13 degrees 15 minutes North latitude and 59 degrees 30 minutes West longitude, is the most easterly island of the Windward Island Chain of the Caribbean Sea.

The island is 34 km in length and 23 km at it's widest point, occupying a total land area of 430 sq km.

The general appearance of Barbados is low and level, the interior mostly plains of sugar cane and rolling hills. The highest point on the island being Mt. Hillaby with an elevation of 337 m.

The western coastline is characterised by long sandy beaches while the eastern coast is jagged and hilly sloping to a pounding surf. The northern coast consists of cliffs of up to 18m in height. A rugged coastline with occasional sandy bays and beaches is found along the southern shore. Some of these bays are used as shelter for fishing vessels, but due to an offshore fringing coral reef they are not always accessible to enter or leave during bad weather. The total coastline of Barbados amounts to about 90 km.



LOCATION MAP
CARIBBEAN SEA

NORGAARD
CONSULTANTS

Figure 1

In political geography, Barbados claims a 12 nautical mile Territorial Sea and a 200 nautical mile Exclusive Economic Zone(EEZ). The total area enclosed by Barbados' EEZ covers an area of 166,600 sq km. Surveillance of this area of ocean is an expensive and impractical problem for a small country, where assistance is provided in security surveillance by the U.K., it is not at this stage apparent that Barbados is able to enforce it's fishing rights and there are reports of illegal fishing by foreign powers in the Barbados E.E.Z.

3.2 Climate

Barbados has a tropical climate with temperatures remaining fairly constant year round. The average low temperature being 22 degrees C and an average high temperature of 29 degrees C.

BARBADOS: AVERAGE HIGH AND LOW AIR TEMPERATURES

	MONTH											
	J	F	M	A	M	J	J	A	S	O	N	D
Avg. Low	21	20	21	22	23	23	23	23	23	23	23	22
Avg. HI	28	28	29	30	31	31	30	31	31	30	29	28

(in degrees centigrade)

The air is cooled, particularly on the eastern side of the island, by the Northeast Trade Winds which range in speed between 8 and 15 knots. The period of January and February being the windiest, and August through October the period of lightest winds.

There are basically two seasons in Barbados, wet and dry. The dry season occurs during the months of December through May, the wet season from June through November. The wet season is characterised by frequent tropical rain showers, but with about an equal percentage of sunny days.

Hurricanes

Barbados lies just within the southern border of the West Indian hurricane belt.

Hurricanes will usually approach Barbados from the east - southeast, during the wet season months of June through November with the months of August, September and October being the period of highest incidence.

The expectation of a hurricane in Barbados is 1 in 26 years. However, hurricanes are very irregular in occurence, thus there have historically been longer periods without a hurricane and there have occasionally been two hurricanes within one year.

Fishing operations are usually curtailed during the hurricane season of August through October.

3.3 Hydrography

The Caribbean Sea region is generally less productive in living marine resources than many areas of the world's oceans.

One reason that this region does not support a high fish production is that the Caribbean lacks large areas of shallow water where light can penetrate and support, to any great extent, photosynthetic production necessary for primary productivity. Approximately 50% of the Caribbean's waters exceed 2,000 m in depth, with 80% exceeding 1,000 m.

The narrow continental shelf areas surrounding the islands of the Eastern Caribbean are also a limiting factor for the regions productivity. In addition, much of these shelf areas cannot be fished by trawl nets because of the coral sea floor and coral reefs.

This region also lacks any major upwellings of a magnitude that would provide a significant nutrient input into the surface waters.

Outflows from the Amazon, Orinoco and other South American rivers do provide nutrients to the Caribbean Sea, but their effects are not detectable to any significant extent in the waters surrounding Barbados.

Barbados has a small continental shelf with an area of 320 sq km with the 180 m depth contour, on the average, just 1.8 km from the shoreline, thus limiting the availability of coastal resources.

The Guiana and the North Equatorial Currents flow past Barbados towards the west - northwest at an average rate of 1 knot (0.5 m/sec) into the Caribbean Sea. See Figure 2.

Tides in Barbados are minimal with a maximum range of about 0.5 m.

General Surface Current Circulation

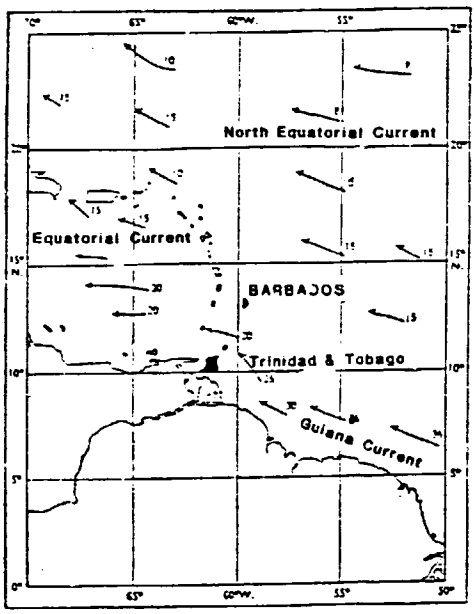


Figure 2

The ocean surface temperatures around Barbados remain relatively stable year round, fluctuating from about 26.5 degrees C in January through March, to 29 degrees C in August through September.

The salinity also remains at a fairly constant concentration of 35.5 parts per thousand, except during the period of May through August when concentrations may decrease to 34.75 parts per thousand.

Rainwater runoff and outflows from the island's streams are minimal, thus adding little in the way of land runoff nutrients to the nearshore environment, much less having any detectable effect further from shore.

Combining the effects of fairly constant water temperatures, salinity concentrations and little rain water runoff, the result is a very stable water column, with little or no mixing of the surface and bottom waters. Nutrients found in the surface waters, will tend to sink towards the bottom and will not be brought back to the surface.

3.4 Demography

Population densities of the Caribbean countries are among the highest in the world. Barbados, with a present population estimated at exceeding 254,000 and an overall population density of about 590 inhabitants per square kilometer, is placed amongst the highest. Most of the population is concentrated in the coastal areas in the west and the southwest regions of the island.

Population growth rates for Barbados have been fairly constant during the past decade ranging between 0.2% and 0.4% per annum.

The latest figures attainable from the World Bank Atlas, indicate that in 1984 Barbados enjoyed a per capita income of BDS$ 8,218 which is up 5% from 1983 and a literacy rate of 99%. The labour force totalled about 112,300 persons in 1984 with an unemployment rate of 18.3%.

MALE	61,200
FEMALE	51,100
TOTAL =	112,300

The fishing sector in 1983 employed an estimated total of 2800 people. It is believed that this number is higher today due to increases in the numbers of ice boats and fisheries infrastructure. The figures are estimates which include full and part-time workers. The secondary sector includes fish vendors, boat builders, fish processors and fisheries administration staff.

PRIMARY SECTOR	1600
SECONDARY SECTOR	1200
TOTAL =	2800

The primary sector is dominated almost completely by males, whereas females account for most of the secondary sector workforce.

The Barbados economy has been traditionally stable. Through the 1950's this was based mainly on the sugar industry, it has since diversified into other agricultural products, tourism and manufacturing.

Tourism remains one of the major industries, with a reported annual influx of 3 million tourists, mainly from the U.S.A. and Canada.

The island's infrastructure includes an adequate network of paved roads and highways, a modern international airport, a modern deepwater harbour capable of berthing large cargo and cruise ships, and reliable electric supply, telephone and telex services.

4. THE MARINE RESOURCE

For fishery statistical purposes, Barbados is included in the FAO statistical area 31, (Western-Central Atlantic) from which some 2 million metric tonnes of fish are harvested annually.

Catch from Statistical Area 31 1973-1983 '000's tonnes.

1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
1,394	1,529	1,545	1,574	1,417	1,837	1,800	1,791	1,898	2,131	2,267

Source: FAO Fisheries Statistics Yearbook Vol.56.

TABLE 4.1

The Caribbean Sea area constitutes only a small part of Area 31 and the total fishery catch for the Caribbean is also a relatively small proportion for the total for Area 31. Table 4.2 illustrates the annual combined catch for the Leeward and Windward island groups.

Total Catch Caribbean Sector of Windward and Leeward Islands. '000's tonnes.

1976	1977	1978	1979	1980	1981	1982
250,607	243,539	274,645	218,991	251,706	229,337	261,650

Source: FAO Fisneries Statistics Yearbook Vol.56.

TABLE 4.2

The Windward Island chain consists of the following island countries:

- Barbados
- Dominica
- Grenada
- Guadeloupe
- Martinique
- St. Lucia
- St. Vincent
- Trinidad & Tobago

Guadeloupe has consistently recorded the highest catch at about 9,000 mt, which represents 30% of the Chain's catch, while Martinique and Trinidad & Tobago each land of the order of 4,000 mt or 15% each of the Chain's catch. Barbados has for many years been consistent around 3,000 mt, 12% of the Chain's landings until 1983 when the landings increased to 6,500 mt or 21% of the Chain's landings. This increase appears to have been mainly due to increased landings of Flying Fish with the rapid increase in the numbers of long ranging ice-boats after two were introduced into the Barbados fishing fleet in 1980.

Fish Landings at the countries in the Windward Islands.
1977 - 1983

	1977	1978	1979	1980	1981	1982	1983
Barbados	3166	3683	4342	3735	3411	3480	6522
Dominica	1047	1070	642	1445	1514	1545	1545*
Grenada	3241	3509	4202	1753	1674	1801	1801*
Guadeloupe	9525	9000**	8500**	8000**	8300**	8800**	8653
Martinique	2167	3928	4684	4684*	4684*	4684*	4684*
St Lucia	2500	2600	2600	2400	2404	2404	2635
St Vincent	581	698	547	547*	547*	547*	647*
Trindad &Tabago	4303	4823	3840	4461	4461*	4461*	4461*
Totals	26,530	29,311	29,357	27,025	26,995	27,722	30,848

* Repeat of prvious data ** Estimate from available data

Source: FAO Fisheries Statistics Yearbook 56.

TABLE 4.3

Barbados Landings by Main Species Group 1977 to 1983 (tonnes).

	1977	1978	1979	1980	1981	1982	1983
Flying fish (Exocetidae)	1510	1756	2119	933	1968	2040	4116
Snappers (Lutjanidae)	216	252	303	348	111	111	135
Common Dolphin Fish	741	862	1040	619	543	585	1341
Seerfish	135	157	189	116	144	219	222
Billfishes	257	299	261	73	117	99	126
Carangids	-	-	-	-	15	39	114
Tunas and related sp	58	67	81	40	108	108	90
Sharks & Rays	120	140	169	22	36	48	63
Marine Fishes (other)	129	150	180	1584	369	231	315
Totals	3,166	3,683	4,342	3,735	3,411	3,480	6,522

Source: FAO Fisheries Statistical Yearbook Vol.56

TABLE 4.4

Further examination of the FAO statistics indicates that of all the Flying Fish reportedly caught in Area 31, some 65% to 80% were landed in Barbados and that of all the Dolphin Fish caught in Area 31 a consistent 30% is recorded as landed in Barbados.

Comparison of landings of principle species groups from Barbados compared to total Western Atlantic Statistical Area 31.
(a) Flying Fish (b) Dolphin Fish
Barbados landings as % of total for area in parenthesis.

	1977	1978	1979	1980	1981	1982
(a)						
Barbados	1510(72.1)	1756(73.6)	2119(66.3)	933(65.1)	1968(79.7)	2040(77.1)
Area31	2093	2384	3198	1433	2468	2645
(b)						
Barbados	741(31.8)	862(34.8)	1040(43.0)	619(32.1)	543(29.0)	585(29.5)
Area 31	2323	2476	2417	1926**	1870**	1981**

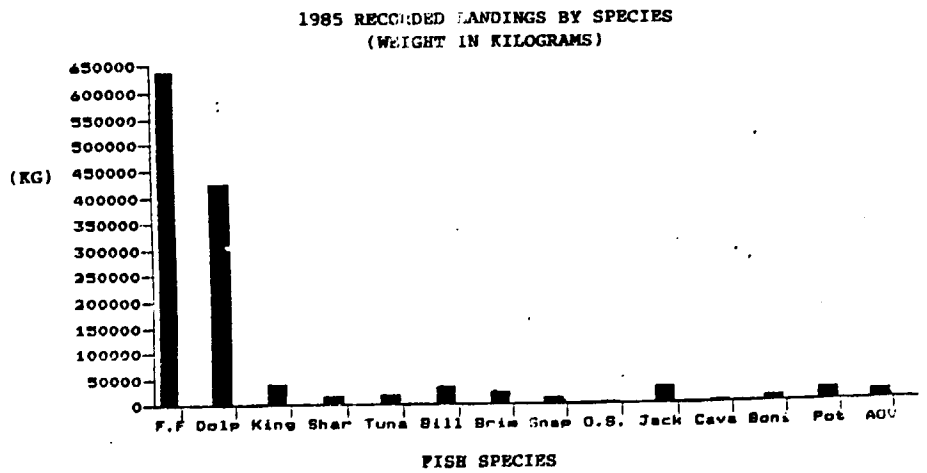
TABLE 4.5
SOURCE: FAO FISHERIES STASTICAL YEAR BOOK, Vol. 56

The absence of a significant continental shelf to provide the necessary habitat or hydrological conditions for demersal (bottom-dwelling) species means that no significant opportunities are evident for the development of this type of fishery. Presently, the demersal catch accounts for only 10% of Barbados landings. Indications from the fishermen and the biologists are that the demersal stocks around Barbados are easily over-exploited.

Pelagic (mid-water or surface-water) fisheries represent 90% of the landed catch in Barbados. The most recent information on these species is found in an account of the "Status of the Barbados Pelagic Fishery, 1986," by Hunte (1986).

The two principal species caught are the Flying Fish (Hirundichthys affinis) and the Dolphin fish (Coryphaena hippurus).

Of the total pelagic fishery, the Flying Fish constitutes 50% of Barbados landings, with the Dolphin fish accounting for 33%. The remaining 17% of the catch consists mainly of Kingfish (Wahoo), Billfish (Atlantic Sailfish or Swordfish, Blue Marlin, White Marlin), Jacks, Yellowfin Tuna and Shark (Blue shark, Oceanic Whitetip shark, Shortfin Mako shark).



SOURCE: PLANNING UNIT AND FISHERIES DIVISION
FIGURE 3

As the intent of this techno-economic feasibility study was aimed at the seafood processing sector of Barbados and not towards biological resource studies, it should be noted that the Consultants utilised existing data and information concerning the different species and landings. It is recognised that this published data is not always reliable due mainly to the fact that the data on landings is only collected at the main landing sites and landing sheds. The published data also does not include all the landings made at the numerous minor landing sites along the beaches and coastline.

These figures are also mostly day-boat catches and do not include the ice-boat landings because most of the ice-boats are selling directly to the processors. There is also quite a bit of by-passing of the markets by the fishermen to avoid paying the Government fish landing toll.

The Fisheries Division has been working with landing figures over the years and have developed an extrapolation factor of about 3.0, which they feel, when multiplied by the recorded landings, provides a more realistic indication. Thus if recorded landings are 2,000 mt, the estimated landings are of the order of 6,000 mt. FAO is reportedly receiving their figures from the Fisheries Division, based on the use of the adjustment factor of 3.0.

4.1 Flying Fish

The Flying Fish constitutes the principal fishery of Barbados. Under the family of Exocoetidae, (see Figure 4), there are four species of flying fish taken by the Barbados fishing fleet, but Hirundichthys affinis composes the highest percentage by far.

EXOC Hir 1

1977

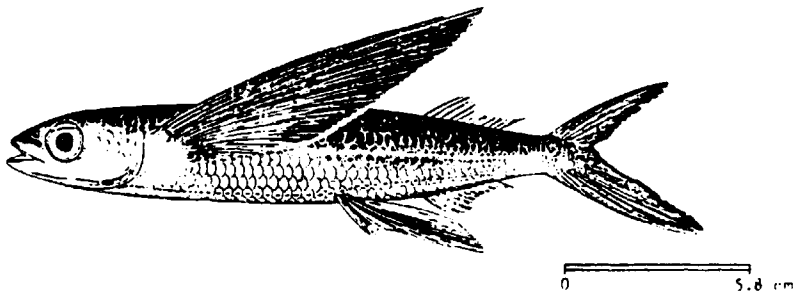
FAO SPECIES IDENTIFICATION SHEETS

FAMILY: EXOCOETIDAE

FISHING AREA 31
(W Cent. Atlantic)

Hirundichthys affinis (Günther, 1866)

OTHER SCIENTIFIC NAMES STILL IN USE: None



VERNACULAR NAMES:

FAO: En - Fourwing flyingfish
Fr - Exocet hirondelle
Sp - Volador golondrina

NATIONAL:

DISTINCTIVE CHARACTERS:

Body elongate, thick, somewhat flattened ventrally. Snout shorter than eye, blunt; *palatine teeth (on roof of mouth) usually absent.* Dorsal and anal fins set far back on body, their bases short; *dorsal fin low, rays at anterior end the longest;* anal-fin origin slightly before, or 1 or 2 rays behind dorsal-fin origin; pectoral fins strikingly long, *60 to 70 percent of standard length, only first ray unbranched;* pelvic fins abdominal, large, *reaching well beyond anal-fin origin.* More than 25 scale rows across back in front of dorsal fin (predorsal scales).

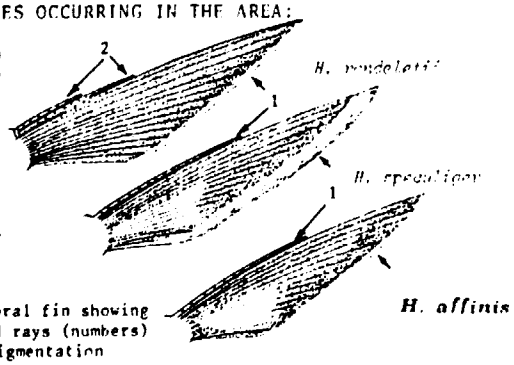
Colour: dark above, pale below, the dark colour usually iridescent blue or green in life; dorsal fin colourless or only slightly pigmented; *pectoral fins dark, with a pale basal triangle and a narrow white margin* (on trailing edge when extended).

DISTINGUISHING CHARACTERS OF SIMILAR SPECIES OCCURRING IN THE AREA:

Hirundichthys speculiger: pectoral fins also with a pale basal triangle, but with a broad white margin (narrow in *H. affinis*); palatine teeth usually present.

H. rondeletii: first two pectoral-fin rays unbranched; pectoral fins without a pale basal triangle.

Prognichthys gibbifrons: first two pectoral-fin rays unbranched; fewer than 25 predorsal scales; anal-fin origin 3 or more rays behind dorsal-fin origin.

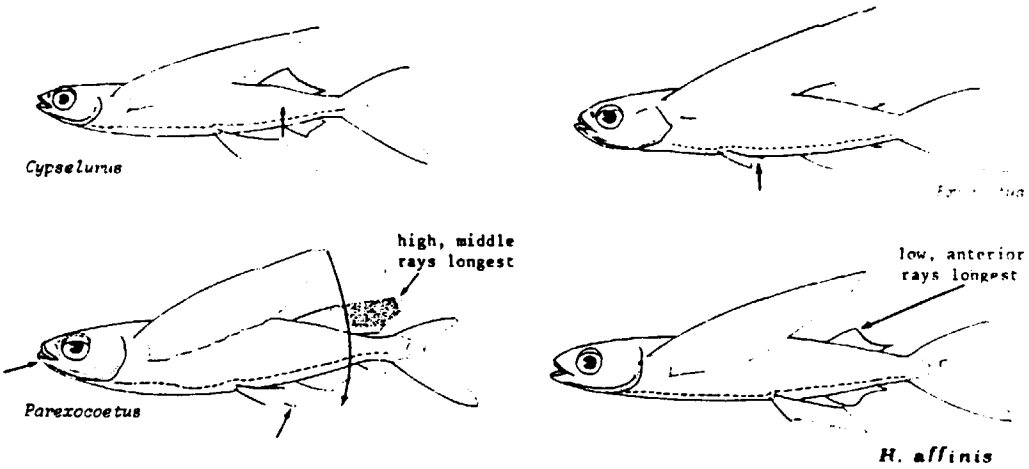


left pectoral fin showing unbranched rays (numbers) and pigmentation

FIGURE 4

Cypselurus species: dorsal fin with 2 to 5 more rays than anal fin (equal number of rays in both fins or 1 more anal - than dorsal-fin ray in *H. affinis*).

All other species of Exocoetidae: pelvic fins short, not reaching, or barely reaching *(Parexocoetus)* anal-fin origin. Furthermore, pectoral fins considerably shorter and dorsal fin high, with middle rays the longest and much black pigment in *Fodiator* and *Parexocoetus*; snout pointed, much longer than eye in *Fodiator*.



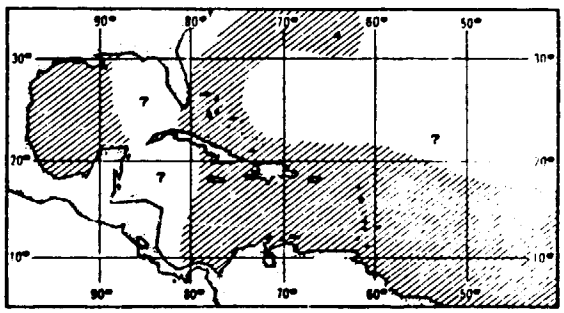
SIZE:

Maximum: about 25 cm.

GEOGRAPHICAL DISTRIBUTION AND BEHAVIOUR:

Tropical and subtropical Atlantic, including the Caribbean Sea and Gulf of Mexico.

Pelagic in nearshore surface waters; capable of leaping out of the water and gliding for long distances above the water.



PRESENT FISHING GROUNDS:

Barbados and northeastern Brazil, near land.

CATCHES, MAIN FISHING GEAR AND PRINCIPAL FORMS OF UTILIZATION:

Separate statistics are not reported for this species.

Caught by hand line or gillnets in Barbados.

Marketed mostly fresh, a good foodfish.

FIGURE 4

Little is known about the biology of this species and there is some concern about the sustainability of the stock under continued increasing fishing effort. These concerns are well founded because although a significant increase in landings could be made in the short term, the result might be a sudden and dramatic decline in the resource. Until more is known about the life history of this species, management policy should be directed towards controlling effort in the catching sector. It is therefore a recommendation of this report that further biological research and stock assessments be planned, and executed concurrent with the establishment of the processing plant.

The Consultants have prepared an outline of a proposed resource study (see App. C) which they recommend be commissioned soonest by the Government or FAO/UNDP.

Flying Fish are a migratory, gregarious (schooling) fish found mostly swimming at or near the surface, often springing out of the water and skipping or gliding through the air. The length of the "flight" rarely exceeds 30 seconds and in the majority of cases is much less, although there are reports of flights, skimming the surface, of up to half a mile in length.

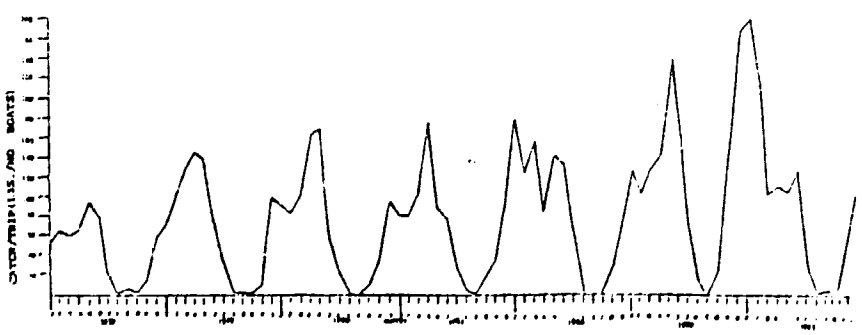
The Flying Fish feed mainly on planktonic organisms and small fish and crustaceans. They are an annual species with a life span of about 14 months, reaching a maximum length of 20 cm to 25 cm. The body is oblong shaped covered with smooth scales.

The breeding habits have not been studied and are therefore not fully understood, except it is believed that they migrate to the waters around Barbados and Trinidad & Tobago where they spawn from November to June. They seek floating patches of seaweeds or debris to which they attach their eggs. The eggs are non-bouyant and have sticky hair-like threads which serve to anchor them to one another and to the floating debris.

The fishery for Flying Fish employs a traditional system of attraction devices. The fishermen, after making a visual sighting of the Flying Fish, throw bunches of palm tree fronds or sugar cane leaves onto the water surface where they float. This attracts the Flying Fish to them to spawn and attach their eggs. The fishermen then set out their surface gillnets which are fairly standard for all vessels, of 25 m in length and 2 m deep. These nets have a cork line along the top for floatation and a lead line along the bottom to keep the net hanging vertically in the water. Occasionally the fishermen report, at times of extreme abundance, the fishermen can pull close alongside the floating debris and scoop the fish out of the water with dip nets.

The Flying Fish fishery is seasonal from November through June with the major catches occurring from February to May. This is thought to be the period of spawning during which the Flying Fish are caught with less effort since it appears that the Flying Fish are pre-occupied with finding floating debris and that this action brings them closer together in denser schools and makes them more vulnerable to being caught.

ANNUAL VARIATION IN ABUNDANCE OF FLYING FISH



YEARS

FIGURE 5

SOURCE: (HUNTE, 1986)

The latest studies (Hunte, 1986) indicate that the year-to-year variations in catch seems to be increasing, however, the average annual catch per trip by day-boats has not declined since the introduction of the ice-boats.

The annual variation in catch for Flying Fish in Barbados can be seen below in Figure 6. There are two peaks in the season, the first comes between December and February with a second peak in May - June. The catch then drops off dramatically from July until October when catches begin to increase again.

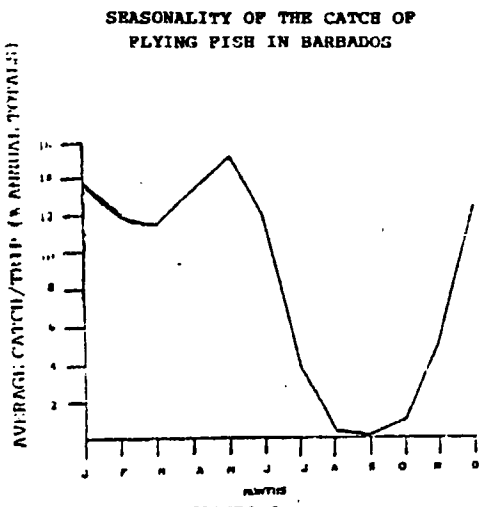


FIGURE 6
SCOURCE: STATUS OF THE BARBADOS
PELAGIC FISHERY, 1986, (HUNTE, 1986)

In addition to the seasonality of the Flying Fish fishery due to their migrations and spawning behaviors, the success of this fishery also depends upon favourable ocean currents and environmental conditions to bring them into the waters of Barbados. There have been several, but infrequent instances where it was difficult for the fishermen to locate the Flying Fish, indicating that variations in ocean conditions can exclude major concentrations from Barbadian waters.

It has been mentioned that there is interest in the viability of artificial floating devices which could be used for the Flying Fish to spawn on. These should be placed in the waters off Barbados to attract the fish and allow the eggs the chance of hatching before sinking to the sea floor.

The nature of pelagic species dictates that they are highly fecund (many eggs) and there is a very high mortality rate between the egg stage and the likelyhood of one individual growing to the point that it is recruited to the adult stock is low.

Mortality of pelagic species in the juvenile stages can be due to environmental and biotic factors. All studies to the present suggest that there is no clear link between stock and recruitment that could be influenced by allowing a (comparatively) few more eggs to hatch by placing the floating rafts in the water. All that is likely to be accomplished is to attract the natural predators on young Flying Fish and probably to improve "their" survival.

While intuitively attractive, there is little to recommend the expense of constructing a large scale Flying Fish breeding ground.

4.2 Dolphin Fish

The second principal fish species landed in Barbados is the common Dolphin Fish "Dorado," Coryphaena hippurus of the family Coryphaenidae. See Figure 7.

The Dolphin Fish is a highly migratory oceanic pelagic fish found in many areas of the world's warm oceans. They are found mostly near the surface and are characterised by an elongated, laterally compressed body, and a massive head with a blunt forehead and wide forked tail fin.

They are voracious predatory fish which relentlessly feeds upon small pelagics including the Flying Fish. The Dolphin Fish is often found following the migratory routes of these smaller pelagics.

The fishing activities carried out for Dolphin Fish are usually undertaken by trolling with baited hooks, (usually pieces of Flying Fish) while the vessel is on route to locate the Flying Fish grounds. The fishermen work these lines by hand, no rods or reels are utilised. The lines are typically 30 m in length.

Annual catch rates for the Dolphin Fish also are similar to the Flying Fish. Figure 8 illustrates a catch peak from February to April and a dramatic drop in catch from May through October. This is indicative of the Dolphin Fish following the migrations of the Flying Fish.

CORY Cory 1

19

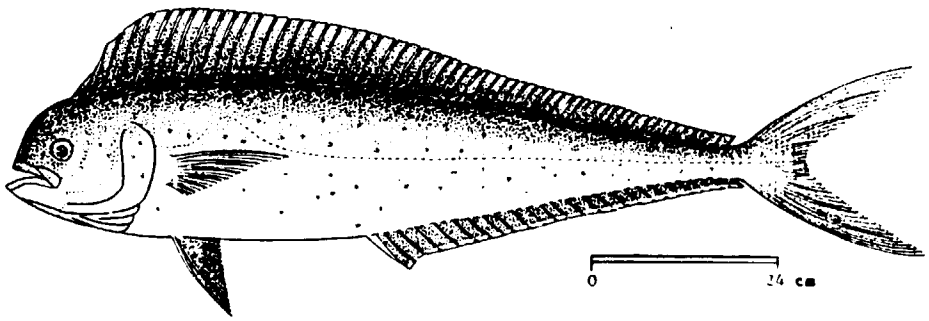
FAO SPECIES IDENTIFICATION SHEETS

FAMILY: CORYPHAENIDAE

FISHING AREA 31
(W Cent. Atlantic)

Coryphaena hippurus Linnaeus, 1758

OTHER SCIENTIFIC NAMES STILL IN USE: None



VERNACULAR NAMES:

FAO: En - Common dolphinfish (Amer.Fish.Soc.: common dolphin)
Fr - Coryphène commune
Sp - Dorado común

NATIONAL:

DISTINCTIVE CHARACTERS:

Body elongate and compressed, *greatest body depth in adults less than 25 percent of standard length;* young fish (up to 30 cm) have a slender, elongate body with head profile slightly convex; in larger males (30 to 200 cm) the head profile becomes vertical with development of a bony crest; *tooth patch on tongue small and oval;* bands of teeth on jaws, vomer and palatines (roof of mouth). *A single dorsal fin extending from above eye almost to caudal fin,* with 55 to 65 rays; *a concave anal fin* extending from anus almost to caudal fin; *pectoral fin more than half of head length;* caudal fin deeply forked; vertebrae 31.

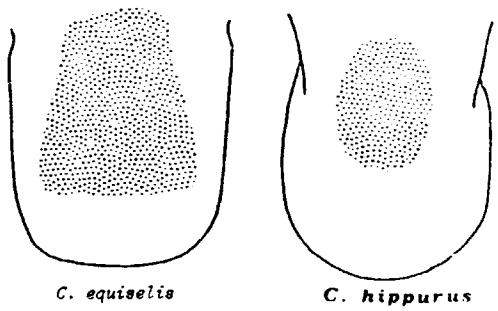
head showing increase in steepness of profile with age in male

Colour: back brilliant metallic blue/green in life, after death fading to grey with a green tinge; sides silvery with a golden sheen, and 1 row of dark spots or golden blotches running beside dorsal fin and 1, 2 or more rows on and below lateral line, some scattered irregularly; dorsal and anal fins black, the latter with a white edge; pectoral fins pale; caudal fin silvery with a golden sheen. In juveniles, only tips of caudal-fin lobes white; pelvic fins black.

FIGURE 7

DISTINGUISHING CHARACTERS OF SIMILAR SPECIES OCCURRING IN THE AREA:

Coryphaena equiselis: dorsal-fin rays 48 to 55 (55 to 65 in *C. hippurus*), a broad and square tooth patch on tongue; greatest body depth more than 25 percent of standard length; pectoral fins about half of head length; anal fin convex in outline. In juveniles, entire margin of caudal fin white, but pelvic fins not pigmented. Vertebrae 33 (31 in *C. hippurus*).



dorsal surface of tongue with tooth patches

SIZE:

Maximum: 200 cm; common to 100 cm.

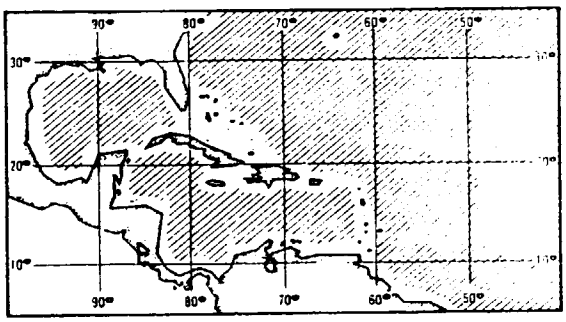
GEOGRAPHICAL DISTRIBUTION AND BEHAVIOUR:

Throughout the whole area; also, tropical and sub-tropical seas.

Pelagic, inhabiting open waters, but also approaching the coast; follows ships and forms small concentrations below floating objects.

Feeds mainly on fishes, but also on crustaceans and squids.

Breeds in the open sea, probably approaching the coast as water temperatures rise.



PRESENT FISHING GROUNDS:

Mainly oceanic waters.

CATCHES, MAIN FISHING GEAR AND PRINCIPAL FORMS OF UTILIZATION:

Separate statistics are not reported for this species.

Caught by trolling and on tuna longlines; also occasionally with purse seines.

Marketed fresh; a very highly appreciated food fish.

FIGURE 7

SEASONALITY OF THE CATCH OF DOLPHIN IN BARBADOS

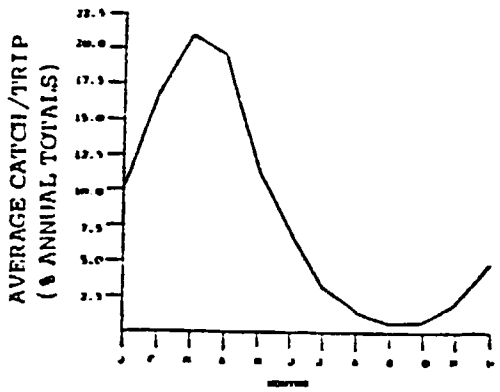


FIGURE 8
SOURCE: (HUNTE, 1986)

Current research indicates that, similar to the Flying Fish fishery, the island nations of the south-east Caribbean are fishing a single identifiable unit stock (Hunte 1986). The same concerns about the possibility of stock depletion the combined effort through the migratory route for this species must be held. Again, biological information on basic life history parameters is rudimentary and initial observations need to be treated with caution. Until further resource data is available, efforts should be made through management policy to control the increasing fishing effort on this stock.

4.3 Wahoo

Wahoo (Acanthocybium solanderi) is also commonly called Kingfish in this region of the Caribbean. Kingfish is fished throughout the year, with peak landings observed from January to July.

They are migratory and feed on small pelagic species and are therefore commonly found amongst or near to flying fish schools.

Kingfish are usually caught by trolling, while the vessel is in route towards the flying fish grounds.

SEASONALITY OF THE CATCH OF WAHOO IN BARBADOS

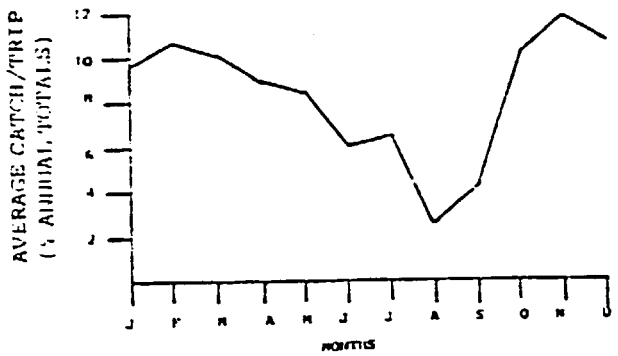


FIGURE 9
SOURCE: (HUNTE, 1986)

4.4 Billfish

This grouping called Billfish combines the Atlantic Sailfish (Istiophorus albicans) which is also commonly called the Swordfish, the Blue Marlin (Makaira nigricans) and the White Marlin (Tetrapturus albidus). These Billfish are all warm water migratory species.

The average annual catch has been rather steady with some slight fluctuations in catch until the late 1970's and early 1980's where catch per trip showed increases, but also wider annual fluctuations.

AVERAGE ANNUAL CATCH/TRIP OF BILLFISH

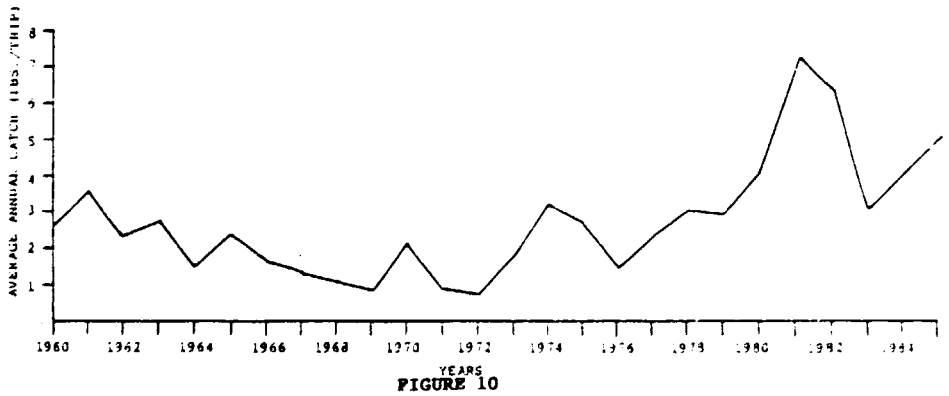


FIGURE 10
SOURCE: (HUNTE, 1986)

Although Barbadian fishermen have not yet developed major catches of Swordfish, there are consistent reports that such a commercially attractive fishery is there for development.

Experienced fishermen regularly sail down the east side of the Windward Islands and Barbados where they report exceptional catches. Sophisticated large fishing vessels, using modern longlining techniques and gear off up to 20 miles long, fish out of Miami, east of Barbados and deliver their catch to Puerto Rico, from where it is air freighted to USA markets.

Several USA fishermen who engage in this fishery, expressed keen interest in setting up a Swordfish operation out of Barbados (see App. F). Swordfish thus represents an example of potential future fisheries for Barbados.

4.5 Yellowfin Tuna and Albacore

The Yellowfin Tuna (Thunnus albacares) and the Albacore (Thunnus alalunga) are caught in small quantities by the Barbados fishermen. The catch composition is predominately the Yellowfin Tuna.

The Yellowfin season usually begins around April and May off the coast of Guyana and moves north into the Barbados region during May and June. The catch quickly drops off until about October/November through January. The resource is probably not significantly abundant, yet the sitings of Korean and Japanese longliners suggest that there is an exploitable resource.

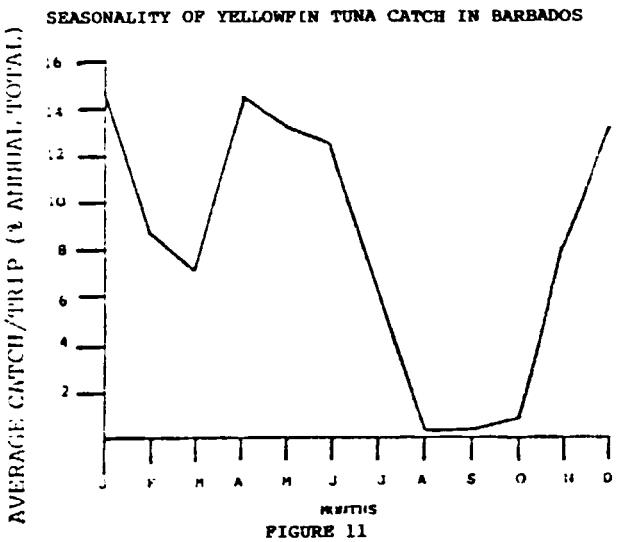


FIGURE 11
SOURCE: (HUNTE, 1986)

4.6 Shark

Although there is no real established shark fishery in Barbados, the most common species are the Oceanic Whitetip shark (Carcharinus maou), the Blue shark (Prionace glauca) and the Shortfin Mako shark (Isurus oxyrinchus). There have been no specific assessments for the potential of shark as a commercial fishery in Barbados.

Sharks have a relatively low reproductive potential, slow growth rates and could thus be overfished if increased fishing effort was allowed to develop unduly.

4.7 Landings Statstics

As the published fisheries landings and statistics for Barbados are questionable and subject to estimations, projections for future landings can vary greatly. The Consultants have therefore based their recommendations on the figure of 10,000 mt per year landings by the year 1994, provided by the client, as development parameters for the design concept of the proposed seafood plant. This figure is however considered a reasonable assumption and can be expected to represent a continued species mix of Flying Fish 50%, Dolphin Fish 33% and

other species the remaining 17%.

Future Estimated Annual Landings (mt)	
Flying Fish	5,000 mt
Dolphin Fish	3,300
Other	1,700
Total =	10,000

4.8 Proposed Resource Study

The size of a fishery resource is of critical importance when a country is looking towards plans of developing and increasing the production of it's fishery sector.

As of this date there has not been any definitive resource studies performed in the Barbados region that address specific information on the target species or potential fisheries such as stock abundance from which first order assumptions with regard to the Optimum Sustainable Yield (OSY) of the fishery resource can be made.

Questionable landing statistics and discrepancies in estimates of potential yield do not provide a secure basis for long range planning.

The Consultants therefore propose that a resouce study is necessary and they have included a detailed description and cost estimate of such a study in Appendix C.

It should be noted that the establishment of the proposed modern, efficient seafood processing plant is not dependent upon first obtaining the results of this study, but that the resource study should be commissioned and undertaken concurrently.

The future production cycle of the plant can then be guided by the results of the resource study.

5. THE FISHING FLEET

The traditional fishing vessels of Barbados were open sailboats of wood construction. These boats in later years, were replaced by small inshore dinghys which were propelled by oars or small outboard motors.

The fleet went through a second transition in the mid-1950's to motorised launches typically 7 m in length, which were engaged in day fisheries, venturing out in the mornings only so far that land could still be seen and returning to offload their catch in the late afternoon.

During the 1970's, tendencies were towards building larger **day-boats** of 10 to 12 m in length. These boats also had more powerful engines and navigation lights and compasses, extending the time-out fishing and distance from shore the fishermen would venture.

The next important development the fishing fleet experienced was in 1980 with the introduction of two long range vessels called **ice-boats** which were equipped with insulated fish holds. Up to this point in time ice had not been used , as the use of ice by the fishermen was mistakenly thought by the consumers to indicate less than fresh quality in the fish.

It is difficult to obtain reliable figures on the numbers of vessels currently active in the Barbados fishing fleet due to different sources producing conflicting data.

Although the Fishing Industry Act of 1952 requires all fishing vessels to be annually registered, there are no penalties for failure to register. This is done on a voluntary basis with vessel registration renewals infrequent.

Based on the Fisheries Division information and personal interviews and observations, estimates put the number of

day-boats at 525, and ice-boats at 50 for a total fleet of 575 vessels.

This total does not include any of the small inshore dinghys as it was not possible to differentiate between those actually engaged in commercial fishing activities from those which were used as vessel tenders, recreation or other uses.

5.1 Day-Boats

Motorised day-boats were first introduced in Barbados in the mid-1950's. These vessels were constructed of wood, about 7 m in length and powered by single inboard diesels of 10 to 22 HP.

The tendency towards larger day-boats took place during the 1970's. These vessels were also of wood construction with a length of 8 to 12 m.

CHANGES IN AVERAGE LAUNCH SIZE OF DAY-BOATS

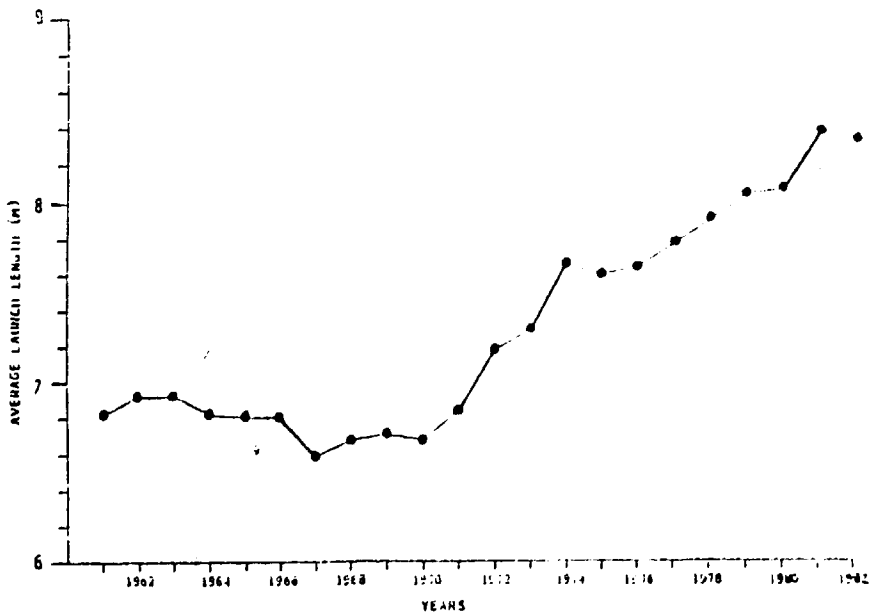


FIGURE 12
SOURCE: (HUNTE, 1986)

The engines of the larger day-boats increased in power to the 80 to 180 HP range. The reason given for using such high powered engines was that the fishermen like to return to shore quickly in order to receive the higher fish prices, but this also causes unnecessarily high fuel consumption.

Basic navigational aids such as running lights and compasses were added. VHF and CB radios were also installed by many vessel owners.

These features have extended the length of time for fishing and the distance from shore the fishermen can go.

The fishermen usually leave shore in the early morning returning about 3:00 in the afternoon, rarely venturing out any further than 30 nautical miles.

The fishermen also use the radios to talk with shoreside based counterparts who relay the latest information concerning the quantities of fish being landed that day and their selling prices.

Day-boats do not carry ice for use on the fish. The fish, after being hauled aboard by handline or picked from the gillnet, lay in the bottom of the boat until offloaded. The offloading is usually done by hand, scooping the fish into burlap or plastic sacks or buckets. A typical day-boat lands about 10 mt of fish per year.

The crew aboard a day-boat is usually one or two.

5.2 Ice-Boats

The first two ice-boats were introduced into the Barbados fishing fleet in 1980, the total of which has increased to the estimated 50 today in 1986.

These vessels range in length from 12 to 20 m, with ice hold capacities of 5 to 12 tons.

About 70% are wood construction some of which are converted day-boats, and 30% are fiberglass.

Engines are typically single inboard diesels from 80 to 225 HP.

There are usually two crewmen and a captain who may remain at sea from 3 to 14 days. The fishing grounds for the ice-boats are usually in the area between Barbados, Trinidad & Tobago and over to Grenada.

These vessels have a closed deckhouse with the steering controls and several bunks forward.

They are equipped with the standard safety equipment, a steering compass, navigation lights, VHF and SSB radios and a Radio Direction Finder.

Analysis of catch records for 10 ice-boats suggests that a typical ice-boat will land, on average, 26.2 mt per year.

Advantages of an ice-boat over a day-boat are that, it catches more fish than a day-boat, catches considerably more fish per unit of fuel consumed, reaches further fishing grounds, and it should therefore provide higher wages for the captain and crew.

A disadvantage of the ice-boat is that with the greater catching power and larger catches, they can cause market gluts which drops the price of fish, thus decreasing the profit

margins for both ice-boats and day-boats. With the reductions of fish prices and the increased volumes of fish on the market, the ice-boats will at times return to the markets with their fish holds not filled because they will have difficulties selling all their catch.

Another financial disadvantage is the tendency for the owner of the ice-boat to remain on-shore and not participate actively in the at-sea fishing operation. The financial returns from the fishing has difficulty in providing sufficient income for both crew, captain and absent owner. An economic evaluation of the fishing vessel operations and the apparent problems have been carried out by the Consultants and can be studied in Appendix B.

The fishing gear and catch methods are the same for both ice-boats and day-boats.

5.3 Landing Places and Facilities

There are approximately 25 landing sites situated around the Barbados coastline. The majority of these sites are located along the western shores of the island.

The landing sites consist of three main landing and marketing places, nine small landing sheds which are covered filleting tables for a few fishermen with potable water and lighting available, and the remaining sites consist of simple open locations along the shore where the fishermen pull ashore to sell their catch. See Figure 13.

LANDING SITES

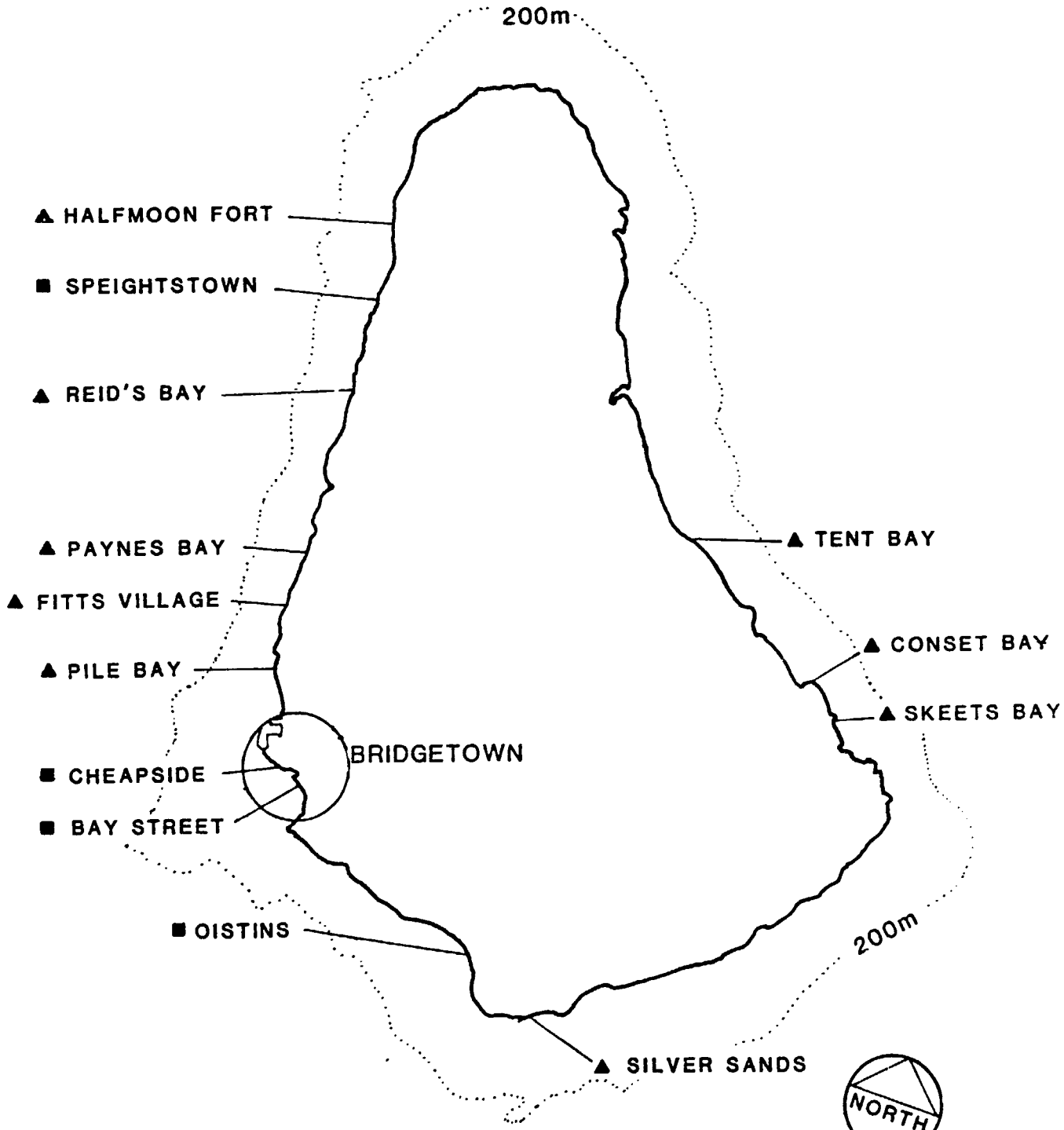


Figure 13

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The three main landing and marketing sites are Oistins, Bridgetown which is comprised of Cheapside and Bay Street, and the third is Speightstown. Figure 14 illustrates a comparison of the volumes of fish landed at the major facilities. Oistins by a large margin accounts for the most landings.

The results are skewered because the large landings of ice-boats are not included in the statistics. If the ice-boat landings were included, Bridgetown would probably be the largest in volume followed by Oistins.

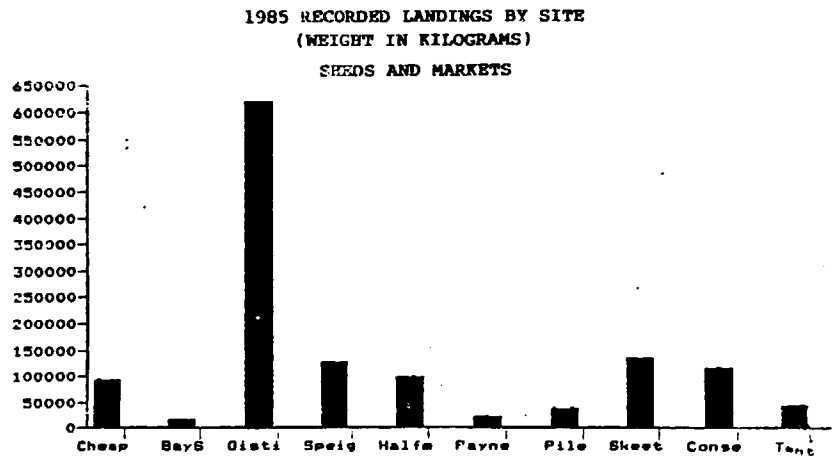


FIGURE 14
SOURCE:PLANNING UNIT AND FISHERIES DIVISION,
MINISTRY OF AGRICULTURE & NATURAL RESOURCES

Oistins

Oistins which began operations in 1983, is located approximately 10 km south of Bridgetown. The facilities are administered by the Ministry of Agriculture and Natural Resources. The staff manages the premises and oversees the toll collections.

The facilities include a 145 m jetty with a fuelling pumphouse located on the end. The fisherman typically offloads his vessel into a large plastic fish box, holding up to 800 liter capacity, which is brought onto the jetty by forklift. Once the vessel is offloaded, the forklift carries the fish box back down the jetty to the Receiving building where the fish is placed on a scale and weighed. The fisherman then pays a Fish Toll based on the species and weight of his catch.

Presently the fish tolls at Oistins (which is indicative of the tolls for the other Government controlled landing sites) is:

Flying Fish	4 cents per pound
Dolphin	10 cents per pound
Kingfish	10 cents per pound
All others	6 cents per pound

After the fish are weighed by the toll collector, the vendors then bid with the individual fishermen for a price on his catch.

The building has two ice machines with a combined capacity of 4 tons of ice per 24 hours, and an ice storage capacity of 13 tons.

There is also a third ice machine located outside the building which has a capacity of making 15 tons in 24 hours and storage of 20 tons, but frequent mechanical problems have been reported to keep it from operating properly.

The ice is being sold for 8 cents per pound for up to 1,000 pounds and 7 1/2 cents per pound for quantities over 1,000 pounds.

There are three cold storage units also located inside the building. Capacity of the units is approximately 4 tons each. Fishermen and vendors can store overnight what is not sold

during the day in the cold store for 10 cents per kg.

Located outside the receiving building are booths which are reserved for the vendors. The vendors pay a rent for using the booth of 75 cents per day, called a Vendors Ticket. There is also a booth reserved for vendors wishing to sell fresh vegetables, they pay a Gate Ticket of 50 cents per day. Should the fishermen not come to agreement with any vendor on an acceptable price for his fish he can choose to sell direct to the consumer by reserving a booth and paying the 75 cent vendor ticket.

The revenues collected by the Oistins market include the following, with fish tolls and ice sales accounting for the largest income:

- Fish landing tolls.
- Ice sales.
- Vendors tickets.
- Gate tickets.
- Fuel pumphouse space rental.
- Cold storage space rental.
- Fish box rentals.

There are also open areas on either side of the facility for the haul-out and maintenance of boats which can also be used to store boats during an emergency, or during hurricane season.

Bridgetown

As mentioned previously, the Bridgetown landing and market site consists of Cheapside and Bay Street. These sites are located in Bridgetown near the mouth of the harbour.

Most landings are at present made at the wharfside and sold on the spot curbside or hand carted around the corner to the old marketing site along the wharf which is presently inaccessible from the water due to the construction of the new fishing harbour.

Facilities here consist of a few covered filletting sheds and tables and vendors stalls, soon to be replaced by the new fish marketing facilities as shown in Figure 15.

Vessel repairs are usually handled at the Careenage which is located further into the mouth of the harbour. The boats are lifted from the water by a small crane which places the boats on barrel supports. The new fish harbour will improve both berthing and repair facilities.

Landings also take place across the harbour to the south at Barbados main fish processor, Atlantic Fishmongers. These landings are reported to be mostly ice-boats which offload directly to the processor and can take on ice.

Speightstown

Speightstown is located approximately 25 km north along the coast from Bridgetown.

At present the facilities consist of a small landing and weighing shed. Although there is quite a bit of trade passing through this facility, the Consultants observed on a number of occasions the fishermen by-passing the receiving shed and selling directly to the consumers between the buildings.

Future Landing Sites

In addition to the new Bridgetown fishing harbour, construction has started on the east coast at Tent Bay for the expansion of the landing shed into a landing market similar to Oistins, though apparently on a smaller scale.

Studies have also been undertaken in the planning for the development of the Speightstown site into a landing market facility, again modelled after Oistins.

5.4 Future Vessel Trends

As the Barbados fishing industry continues to develop and evolve, the trends will continue to move towards more ice-boats as fishermen realise the economic benefits and advantages of reaching distant fishing grounds, and having the ability to maintain fish aboard on ice for extended periods. Furthermore, greater familiarity with other fishing methods and changes in marketing demand will tend to make the fisherman more adventerous in their search for new and alternative resources, eg. Swordfish.

Improved fishing gears with increased fishing power and efficiency of the vessels, will also continue to develop. Such equipment could include longer gillnets, outriggers to accommodate more lines for trolling, electronic depth recorders or fish finders, or gear types to be used in potential new fisheries.

Overall, it is believed that the trend will be towards the larger vessels with ice carrying capabilities and of a design permitting change of gear types after the Flying Fish season and participation in another fishery in Barbados waters or distant fishing grounds.

Evidence of this trend is illustrated in the recent introduction of a British built fishing/work boat. The design of the vessel allows the captain to select various gear types to fish for traditional species such as Flying Fish, but also explore with other gear types in other fisheries. The appearance of sophisticated large longliners out of Miami, fishing for Swordfish (App. F) is another sign of the future opportunities.

6. THE SEAFOOD MARKET

6.1 Domestic Market

The domestic market for seafood in Barbados has traditionally been for fresh fish which have been distributed within hours of landing by the day-boats, which leave in the morning and return in the afternnon to offload their catch.

Until the introduction of the first ice-boats, the Barbadians had generally not been exposed to iced or frozen fish. The initial consumer reaction was negative, based on the misconception that the fish must be of poor quality if the captain is putting ice on it.

This perception still persists today, but indications show signs of increasing acceptance of iced and frozen product, although fresh is still the preference.

The Consultants discovered that consumer resistance is towards poor quality frozen fish rather than quality frozen product.

In interviews with supermarket managers, it was explained that even though chicken at present outsells fish in their markets, sales are on the increase for frozen fish products, particularly packages of frozen Flying Fish fillets.

The main consumer groups for this product appears to be the younger Barbadian families, single working people and the non-resident's who work on the island.

This trend is explained by the growing trend of the population towards convenience, and quality in their meal preparations.

According to a 1984 F.A.O. report on the role of fish consumption and nutrition in the Caribbean, seafood consumption for the lower income groups is approximately the same as that of the higher income groups. This indicates a fairly inelastic demand curve with respect to income.

Current domestic consumption estimate is 40 kg/person/year. This figure was arrived at by combining the total estimated landings of 1984, 6,600 mt with the total round weight equivalent imports of 3,700 mt and subtracting export equivalents of 18 mt. This results in a total apparent consumption of 10,282 mt. Dividing the apparent consumption by the population of 254,000 gives the per capita consumption of seafood.

Further information from the F.A.O. report reveals that in all age groups, Flying Fish was the most popular species, accounting for approximately 45% of seafood selections by the consumers. Dolphin Fish was also popular, with shark being the least popular.

The domestic market can be expressed in terms of two segments, the institutional and the retail markets. Attempts were made to seperate and proportion the institutional and retail market sectors, but it was not found to be feasible with the available data, as was also indicated in the 1984 FAO report.

The institutional market includes restaurants, hotels, hospitals and schools.

Tourism plays a major role in the economy of Barbados. Owing to the size of this sector, it represents a stable though somewhat seasonal market for fish.

Many hotels will buy fresh fish daily from the fish market sites, but have difficulties in planning menus and quantities in advance. Some hotels therefore keep certain quantities of frozen fish in their freezers to hold for those periods when supply is short. In interviews by the Consultants with hotel and restaurant food managers, keen interest was expressed in the ability to purchase Barbados fishery products on a year round basis. The hotels also represent a large portion of fish imports, particularly specialty items such as salmon, trout, shrimp and lobster for their guests.

The retail market segment comprises consumers who purchase fresh fish from the fishermen or vendors, and also other fish products from the supermarkets.

With a growing trend towards two-income families, with both husband and wife being employed with regular hours in offices or industry, it is becoming increasingly difficult for the family to find time to visit the market and buy fresh fish. The frozen product from the supermarkets therefore represent a convenient alternative, not only during off-season, but also even when fresh fish is in abundant supply.

The potential for product substitution should be considered carefully as fish in Barbados can tend to be an expensive item. For example, frozen packs of Flying Fish fillets range from BDS$ 16.13 per kg to BDS$ 18.50 per kg. By comparison, chicken sells for BDS$ 5.25 per kg (whole) to BDS$ 10.60 per kg for chicken legs. See Appendix D for representative retail prices.Products such as top sirloin are selling for less per kg than the Flying Fish fillets. Top sirloin cost BDS$ 13.27 per kg, ground beef for BDS$ 9.50 and lamb loin chops for BDS$ 9.36.

It is however a worldwide trend today, that consumers are prepared to pay more per kg for seafood than for substitutes, because it is considered a delicacy and is furthermore appreciated for its greater nutritional values.

The institutional market and the retail markets in Barbados thus both represent unsaturated domestic markets.

6.2 Seafood Imports

Seafood imports to Barbados increased significantly in 1984 over 1983 (note that these are the latest years from which detailed information was available). In 1983 imports were at 1,200 mt, increasing by 700 mt to 1,900 mt in 1984. This represents a 63% increase in import volume.

The increase was supposed to be a combination between increased consumer preference for seafood (especially tourists), higher world market prices and increased earning capacity of the population. Another explanation for the abnormal increase in 1984 could be purely business speculation in importing at a time when the dollar exchange rate was favourable, which would skew the annual results.

Cod constituted the majority of imports at 1,410 mt or 74% of the total imports and is mainly sold as frozen fillets or salted. The second largest category was "other fish frozen" which accounted for 12% of the total. Following this item was herring at 5%, and lobster and shrimp at 2% each.

The largest exporter of cod to Barbados is Canada followed by Norway, the U.K. and the USA.

The imports of "other fish frozen" originated mainly from neighbouring island countries and also the U.K.

6.3 Seafood Exports

Barbados exported a total of 18 mt of fish products in 1984. The largest category being lobster which accounted for 55% of the total export quantity. It should be noted that as lobster is not caught in Barbados waters in significant quantities, this category most likely represents partial re-exports. Next is other fish fresh or chilled at 18%, other fish frozen at 12% and fish fillets fresh or chilled, and fish fillets frozen constituting 6% each.

6.4 Distribution System

The distribution system in Barbados is not complex, but at present it is inadequate to distribute the supply.

The distribution system begins when the fish is offloaded at the wharf or brought ashore on the beach. It is the typical procedure for the vendors to bid with the fishermen to agree on a price for his fish. If the fisherman and the vendor agree on a price the transaction is made. If they cannot agree, the fisherman has the option of trying to sell his catch himself.

At sites such as the small landing sheds or beaches the fishermen will also sell to a vendor or direct to the consumer. Particularly at times of low supply when prices are up, there is incentive for the fishermen to by-pass the vendor and sell direct to the consumer. Although this practice is not supposed to take place at the main landing sites, it is a frequent occurrence at the sheds and beaches.

On the other hand, when supplies are high and prices down, the fishermen will most likely try to sell his volume as quickly as possible, and will therefore conduct sales with a vendor even though it may mean receiving a slightly lower price.

The fish vendor, who buys from the fisherman, provides a key element of market outlet and immediate cash for the fishermen. The vendor sells her (most are women) fish at retail prices to the consumer or at slightly lower than retail prices to the hotels if they are a steady customer. At the main fish markets, the vendors buy a vendors ticket and sell from a booth, whereas at the sheds or beaches, they usually find a spot along the roadside or distribute the fish to nearby hotels.

The mark-up for the vendors from wholesale paid to fishermen, to retail sales ranges from 25 to 40%, as shown in the tables for fish prices in 1985, found in Appendix D.

The present distribution system does not appear to be adequately reaching all areas of the island. Projects to be financed by the EEC aims at improving this situation by providing small vans or trucks with insulated boxes containing ice and fish for bringing the fish to the interior and other parts of the island.

6.5 Existing Seafood Processing Industry

Barbados has only one major existing seafood processing plant, Atlantic Fishmongers, which is operating in antiquated and cramped conditions across from the Careenage area in Bridgetown Harbour.

With the construction of the new Bridgetown fishing harbour, it is understood that access from the new landing site to the Atlantic Fishmongers plant will be difficult. It was the opinion of the Consultants that Atlantic Fishmonger's processing and cold storage arrangements needed major improvements and modernisation, which could not easily be implemented on the existing site.

In addition, there are at least two minor processing places on the island, none of them able to provide the quantity and quality required for an expansion and upgrading of the seafood industry.

The Consultants therefore agree with the opinion of the fishermen, that competition for supply by the establishment of a new processing plant, will be advantageous for the industry.

6.6 Future Trends in Demand

Demand for seafood is strong in Barbados as is evidenced by the high per capita seafood consumption of 40 kg in 1984, in spite of it's relative high cost in comparison to other meat products such as beef and lamb.

Although statistics are unavailable, it is believed that the consumption must be seasonal with a higher per capita consumption during fishing season. During the off-season months of July through October, the population would most likely turn towards other food products due to their greater availability.This pattern would indicate a potential demand for seafood products in the off-season, i.e. frozen seafood products.

Barbados has a relatively low population growth rate at around 0.4 % annually which would suggest that population growth is not likely to increase seafood demand.

The health conscious attitudes of people are recognising the health and nutritional benefits of fish over red meats. Continued education of the consumer as to the quality aspects of properly prepared and frozen fish will make them more inclined to buy the frozen fish product rather than switching to another protein product.

The key opportunities in future market demand thus appears to be to provide continous supply of frozen quality seafood products on a year round basis, at price levels not necessarily competitive with food substitutes, but pegged at a reasonable level as shown by present marketing experience.

7. EXPORT REQUIREMENTS

As mentioned previously in the report, the potential export markets of primary interest are the specialised West Indian ethnic markets in the U.S.A., Canada and the EEC.

7.1 U.S.A.

There are two trade development incentive programs available to Barbados which eliminate import tariffs for eligible products such as fish and fishery products. These two programs are the Generalised System of Preferences (GSP), and the Caribbean Basin Initiative (CBI).

Generalised System of Preferences

The GSP grants duty free access to U.S. markets for manufactured and semi-manufactured products from eligible countries.

Eligibility requirements for the product or country are as follows:

1) The product and country must appear on the list of eligible beneficiaries, and the country must be a member of GATT and must have a Most Favoured Nation (MFN) status.

2) The product must be exported directly into the U.S. without any intermediate processing or trading.

3) The product must have had at least 35% of it's appraised value added in the beneficiary country.

Caribbean Basin Initiative

The CBI was signed into USA law in January of 1984 and provides for a waiver of duties on certain eligible products, which includes fish and fishery products, excluding tuna, from 27 Caribbean and Central American countries until 1995.

To be eligible for duty free access to USA markets, the products must be grown, produced or manufactured in the beneficiary country. Other requirements of the CBI that would pertain to exporting fish from Barbados include the following:

1) The product must be exported directly from the beneficiary country into U.S. Customs territory.

2) The sum of the cost or value of the articles produced in the beneficiary country plus the direct costs of processing operations performed in the beneficiary country should be at least 35% of the products appraised value at the time it enters into the USA.

Health Requirements

When planning to export to the USA, the exporter must pay close attention to health and packaging standards.

These standards are contained in the Federal Food, Drug and Cosmetic Act, the intent of which is to ensure that products from abroad are free from dangerous diseases and that they conform to the same standards of sanitation and trading practices as required of products produced in the USA.

Under the Federal Food, Drug and Cosmetic Act, all fish and fishery products must also comply with product specification

requirements which are the same for domestically produced products. These standards pertain to misbranding, standards of identity, tolerances for poisonous and harmful substances, pesticides, food additives, good manufacturing practices and defect action levels.

Labelling requirements are contained in the Food and Drug Administration Regulations which includes both the Federal Food, Drug and Cosmetic Act and the Fair Packaging and Labelling Act.

In general, the labelling requirements include that the label be marked in English identifying the country of origin. All lettering in a foreign language must also be written in English. The name, address, and state of the manufacturer, packer or distributor has to appear. Using the U.S. weights system, the net amount of fish is to be listed. The common name must also be displayed. Any ingredients used in the product must be listed by common name, and so must any artificial flavouring, artificial colouring or chemical preservative imitations must be labelled as such. If the product is not manufactured by the person or company whose name appears on the label, the name must be qualified by "manufactured for," "distributed by," or a similar expression.

The net price per unit weight ($/pound) must also be stated. The effect is that Flying Fish fillets cannot be sold in the USA by numbers (Nos. to a pack as in Barbados), but must be individually weighed and the unit cost marked.

Other documentation which may be required is a "Special Customs Invoice," which must be used for shipments of over US$ 500 in value. Ordinary commercial invoices are acceptable for shipments of US$ 500 or less in value.

Also required is a "Bill of Lading," with all price quotations in US$, F.O.B. or C.I.F., U.S. ports.

7.2 CANADA

As Barbados is a member of the Commonwealth countries, import duties would not be assessed by Canada on fishery products.

Canada does impose strict health and quality regulations for imported fish and fishery products. These regulations are contained in the Marine and Freshwater Animal section of the "Canadian Food and Drug Regulations" and in the "Fish Inspection Regulations" set forth under the Fish Inspection Act. These regulations concern product specifications for safety, quality and compositional requirements.

In general, the labelling requirements are that the common name must be shown, weight must be given in Canadian as well as metric units, descriptive terms such as type of sauces, oils or special processing method must appear on the label. All ingredients must be shown, name and address of the packer or distributor must be listed along with the country of origin. All mandatory information must appear in English and in French.

It is not permissible to mark quality designation on any container, wrapper or label for fish, unless specific standards of quality have been defined by the regulation and the product complies with the prescribed standards of quality.

The Inspection branch of the Fisheries and Marine Services Division, recommends that a sample label be sent to them for approval prior to their initial use in respect to fish shipments to Canada.

Other documentation necessary are a Canadian Customs Invoice, which must be used for shipments of an F.O.B. value of C$ 200 and over. All shipments valued at C$ 10,000 or more require a Special Exporters Declaration to be attached to the customs invoice.

Also required is a Bill of Lading which quotes prices in C$ C.I.F. with the final destination shown. The British Imperial system of weights is used except that the hundredweight has been declared to be 100 pounds and the ton equals 2,000 pounds.

Canada does apply import tariffs to fishery products. As Flying Fish is not a specified listing, it would most likely fall under the category of general fish products, which would then be assessed a duty of 25%, to be waived in respect of Commonwealth countries.

7.3 E.E.C. (U.K.)

Barbados, as a participating member of the African, Caribbean and Pacific (ACP) countries in the Lome Convention, is eligible for duty free access to EEC markets. The eligibility of the product is determined on a product by product basis.

Eligibility requirements for fish and fishery products from Barbados include the following:

1) The product is transported directly to an EEC country from the beneficiary country.

2) Products must be obtained by hunting or fishing conducted within the country.

3) Products of sea-fishing and other products must be taken from the sea by their own vessels.

4) Products made aboard their own factory ships.

The value added criteria for exports to the EEC flucuates from 25% to 70% depending on the product.

Though the EEC member countries are committed to securing supplies of fish and fishery products from overseas, they regulate the import of fish through a "reference price" system which prescribes minimum import prices. This is designed to protect domestic fishermen from competition from inexpensive imports of that species. When the market price on the imported product goes below the reference price, a compensating levy that eliminates the competitive advantage of the exporter can be applied.

All exports of fish and fish products to the U.K. must comply with the National Food Laws, Public Health (imported food) Regulations of 1937, the Trade Descriptions Act of 1972 and the Labelling of Food Regulations of 1970.

These are comprehensive regulations which govern the importation and sale of foods, including their composition, permitted additives, colouring agents, preservatives, flavourings, labels and contents and size of lettering of labels, listing of ingredients and so forth.

In general, documentation should include; air waybills, bill of lading, a sanitary certificate, place of origin shown, a commercial invoice which provides a full description of the product. Prices are quoted in Pounds Sterling or US$ C.I.F. port of entry. Also required is a commercial invoice which provides a full description of the product. A shippers Export Declaration for shipments of US$ 250 or more is also required.

7.4 General Observations

The requirements for export of seafood product to the abovementioned areas, though initially complicated, are not insurmountable. Once a standard export procedure has been established, regular ovreseas shipments should not constitute major obstacles to the development of a Barbados seafood plant. The various incentives and support schemes provided to the ACP countries and Caribbean area should also assist in making such an export attractive.

8. THE SEAFOOD PROJECT

The review of the fishing industry of Barbados and studies carried out by the Consultants have convinced them that there is a market and an attractive opportunity for developing a new seafood process plant in Barbados.

The plant should be designed to the following criteria for development and design:

8.1 Design and planning criteria

a) The plant should be flexible enough to receive and process not only Flying Fish but also other fish such as Dolphinfish, Swordfish, Kingfish etc.

b) The process should include possibility to freeze whole fish, fillet and freeze fish and to make steaks out of frozen fish.

c) The capacity of the plant should be based on handling max. 4 tons of Flying Fish per 8 hour shift as well as up to 4 tons of other fish per 8 hour shift.

d) The building should be designed in such a manner that alternative production of frozen vegetables can take place in the off-season

e) The process should be based on modern, efficient methods of fish processing to conform to the international requirements for health and seafood quality

f) The plant shall be operated as a private business venture, preferably with a local investor and operator in joint venture with an overseas experienced fish company and supported by the Barbados Development Bank

8.2 General Description of Project

The process plant should be located in a convenient location preferably near the main source of supply. A location adjacent to the new Bridgetown Fishing Harbour, as shown on Fig. 15 is considered most appropriate.

The proposed factory is shown on Fig. 16 as a 32m x 32m structure but the final design could also be laid out as an elongated building, 16m x 64m.

Fish is purchased at the landing sites and transported to the plant by trucks or by handtrolleys.

The proposed process flow is shown diagrammatically on Fig. 14. The fresh fish received is divided into Flying Fish or Other Fish. The Other Fish can consist of Dolphin Fish, Swordfish, Kingfish, Shark or other species.

Fish which can not be processed immediately are re-iced and kept in the chillroom until processing can take place.

The Flying Fish is either frozen whole (with or without wings) and moved to the cold store or processed into butterfly fillets, packed in polybags, vacuum sealed, frozen and then moved to cold store.

FLOW DIAGRAM

SEAFOOD PRODUCTS - BARBADOS PLANT

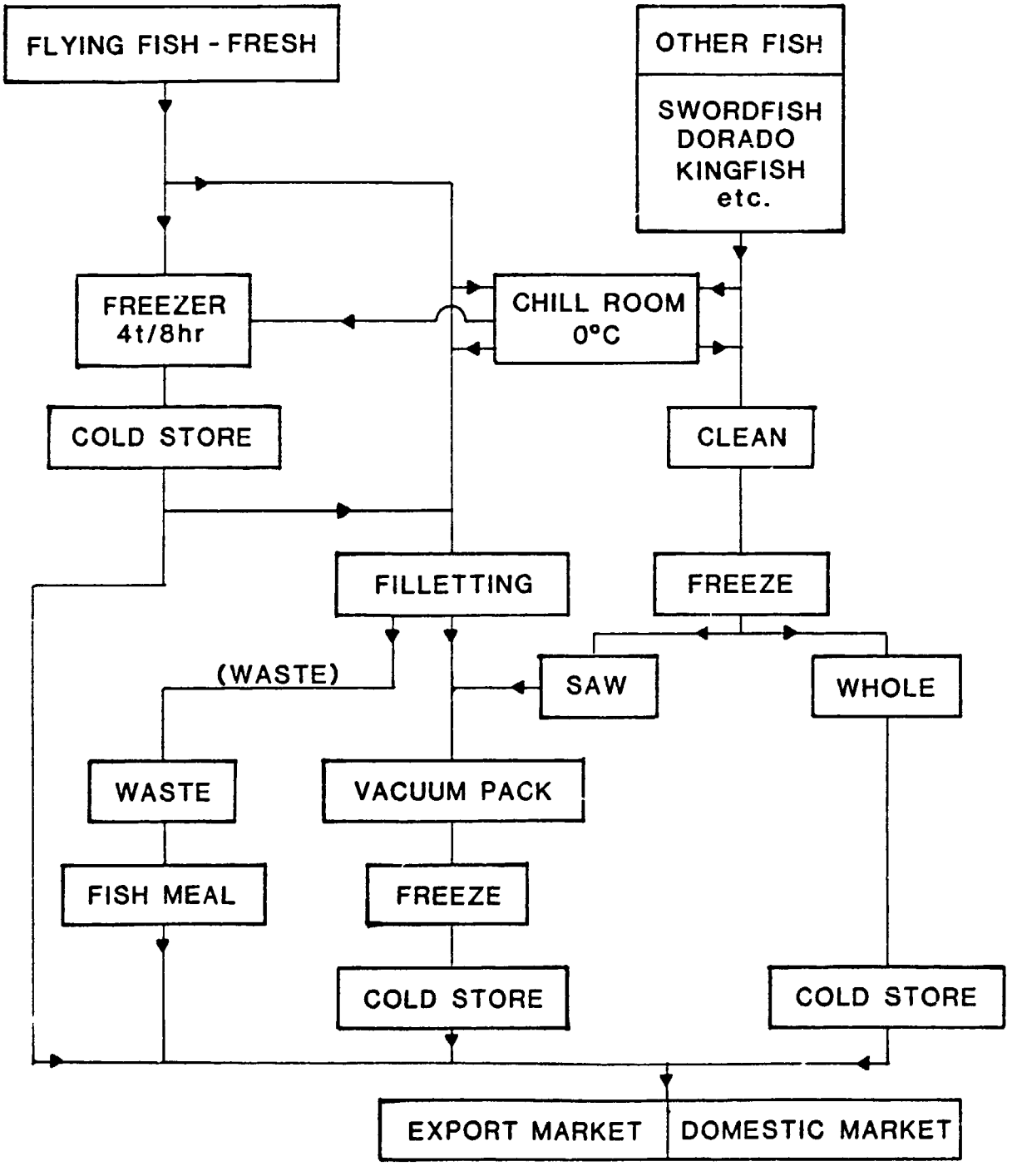


Figure 14

NORGAARD CONSULTANTS

The Other Fish are cleaned and frozen whole, whereafter they are either moved direct to coldstore or cut into steaks, packed in vacuumpacks, frozen and stored.

From the Cold Store the product is moved to the markets, whether this be domestic or export.

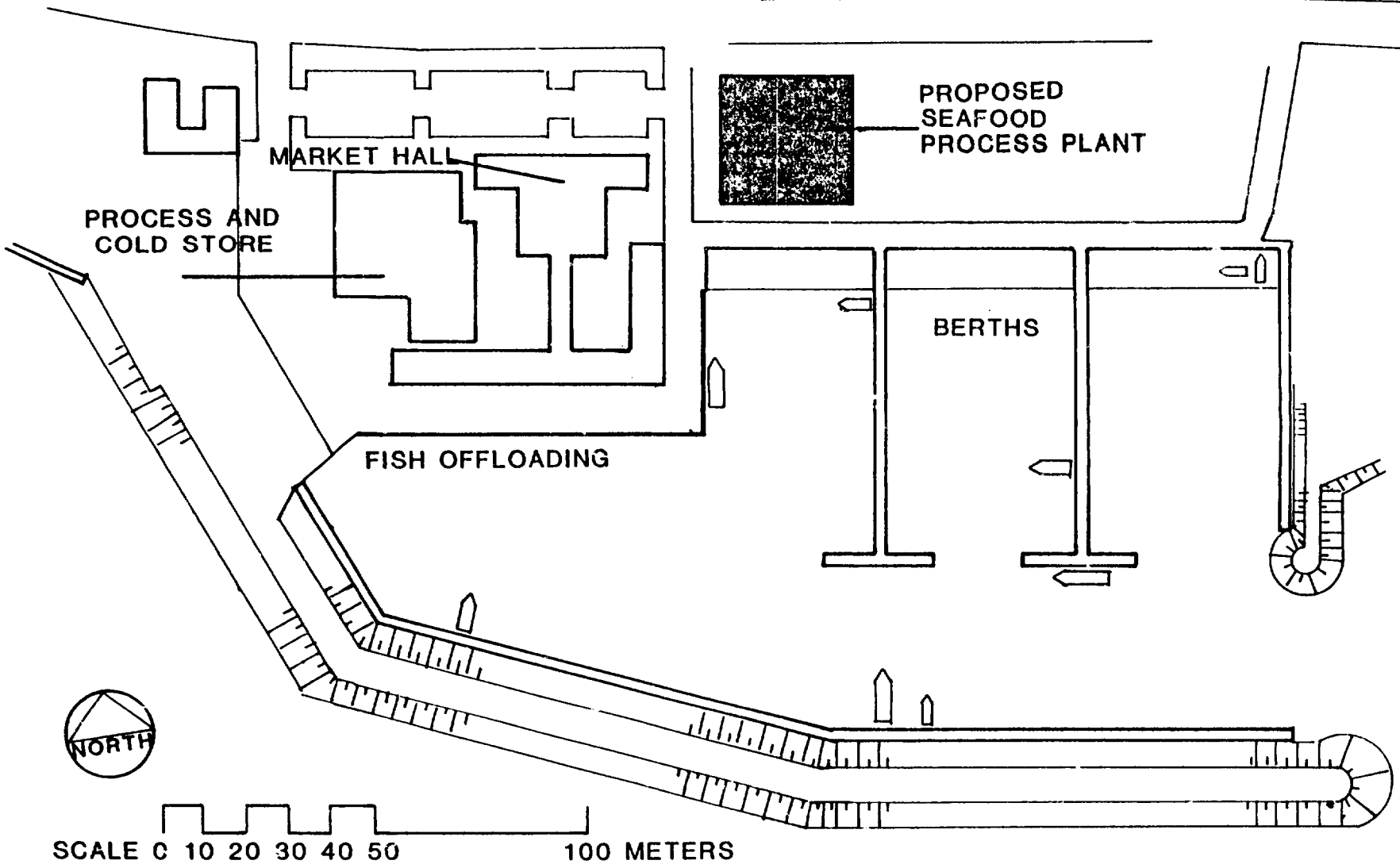
8.3 Plant Layout

Building

The proposed plant layout is shown on Fig. 16. It is housed in a building shown as 32m x 32m, constructed over a module of 4m. Half the building, 32m x 16m, contains receiving and filletting, the other half the freezing and storage areas. These two sections can be arranged adjacent as shown, end to end or at an angle depending on the layout of site selected.

The structure is envisaged as a steelframe building with an internal height of at least 4m. Double brickwall infill panels on a concrete strip foundation. Concrete floors. The filletting rooms and packing areas will have tiled walls and suspended ceiling according to specifications for foodprocessing plants.

Outside the building hardstanding areas must be constructed in concrete. It is assumed that the building is located next to the Bridgetown fishing harbour as shown on Fig. 15 and there is consequently no need for approach road.



NEW BRIDGETOWN FISHING HARBOUR

PROPOSED LOCATION OF SEAFOOD PLANT

Figure 15

Reception Area

The plant selection and layout is designed for ease of operation, cleanliness of product and minimum requirements of maintenance. The process is throughout based on manual operations in order to provide jobs and achieve maximum yield of product.

Fish is received in large plastic containers holding up to 800 liters.These are handled by electric forklift trucks in the Reception area, which is controlled from a security office with windows to the outside as well as to the reception area.

Fish received is weighed at a floor level scale (pos.15). If the fish has to be stored in chillroom it is first re-iced from the iceplant which produces 2 tons of ice per 8 hours.

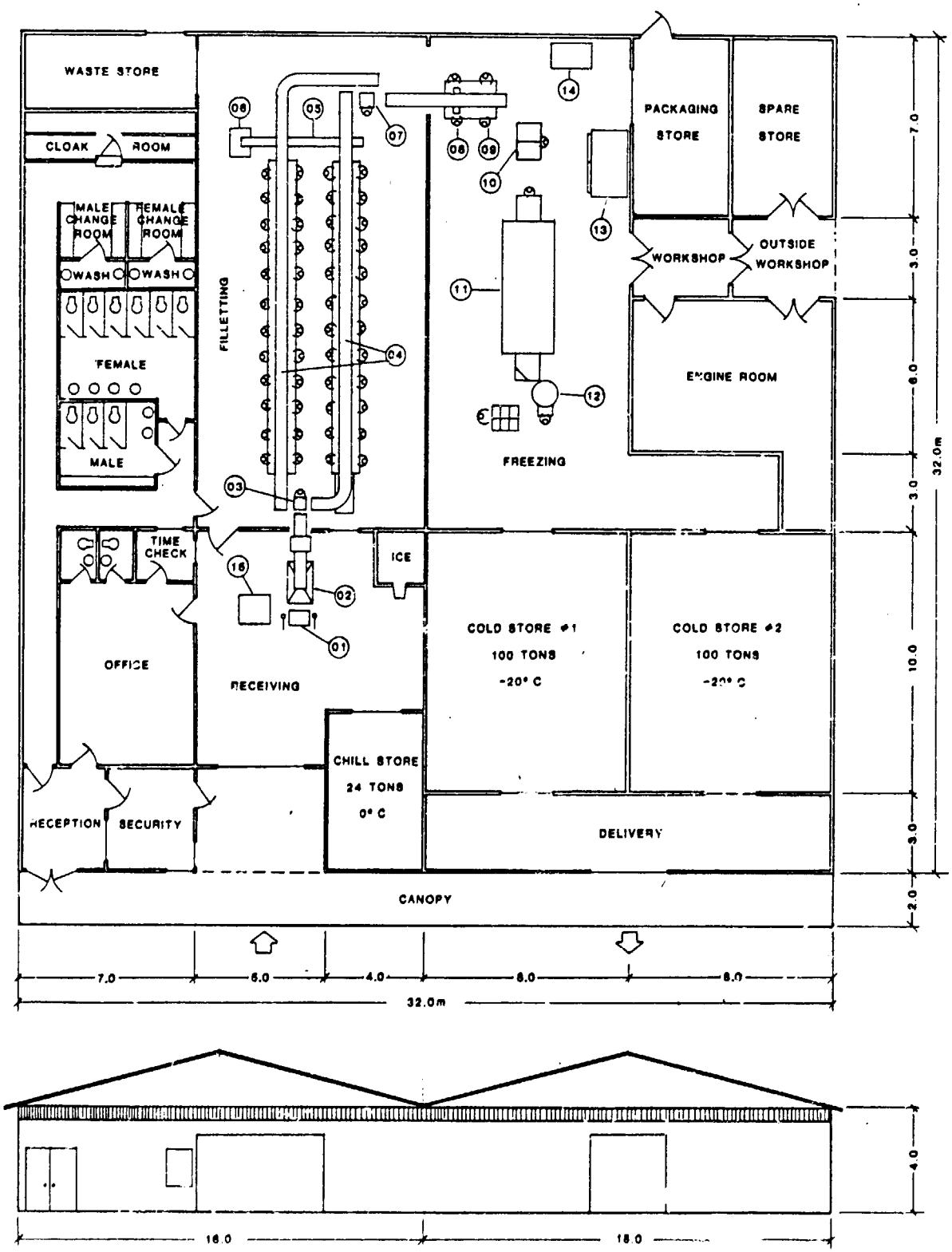
Chill Store

The Chill Store is kept at 0 degrees C and has a capacity [illegible] tons, equal to 6 days supply.

The refrigeration equipment should be designed to receive up to 8 tons of iced product per day. The cooling to be done by a ceiling suspended evaporator with a surface of approx 65 sq.m. and a finned pitch of 8.5 mm. The evaporator should be equipped with surge drum, low pressure float valve and water defrosting system.

LEGEND

01 CONTAINER TIPPER
02 BULKFEEDER W/ SPRAY SECTION
03 IN-WEIGHING OF BOXES
04 FILLETTING/CLEANING LINES (4T/8HRS)
05 SCRAPER ELEVATOR FOR OFFAL
06 OFFAL CONTAINER
07 WEIGHING STATION
08 SCALES
09 PACKING IN POLY BAGS
10 VACUUM PACK CHAMBER
11 BELT FREEZER (4T/8HRS)
12 PACKING TABLE
13 BLAST FREEZER (4T/8HRS)
14 BAND SAW
15 FLOOR SCALE



UNIDO
for BARBADOS DEVELOPMENT BANK

NORGAARD CONSULTANTS
JULY 1986

SEAFOOD PROCESSING PLANT
BARBADOS

SCALE 0 1 2 3 4 6 10 METERS

Figure 16

Filletting Room

Other Fish for cleaning and freezing is handloaded onto the second filletting or cleaning line, whereas the containers with flying fish are dumped by Container Tipper (pos.01) onto the Container Feeder (pos.02). The dumping hopper separates the ice and dirty water from the fish, which are lifted by bulkfeeder, under a spray section to the filletting lines.

The raw fish is first in weighed (pos.03) and then moved along the middle level of the conveyor fillet table to the individual stations. A total filletters, 24 at each table, have been determined based on the actual productivity of filletters.

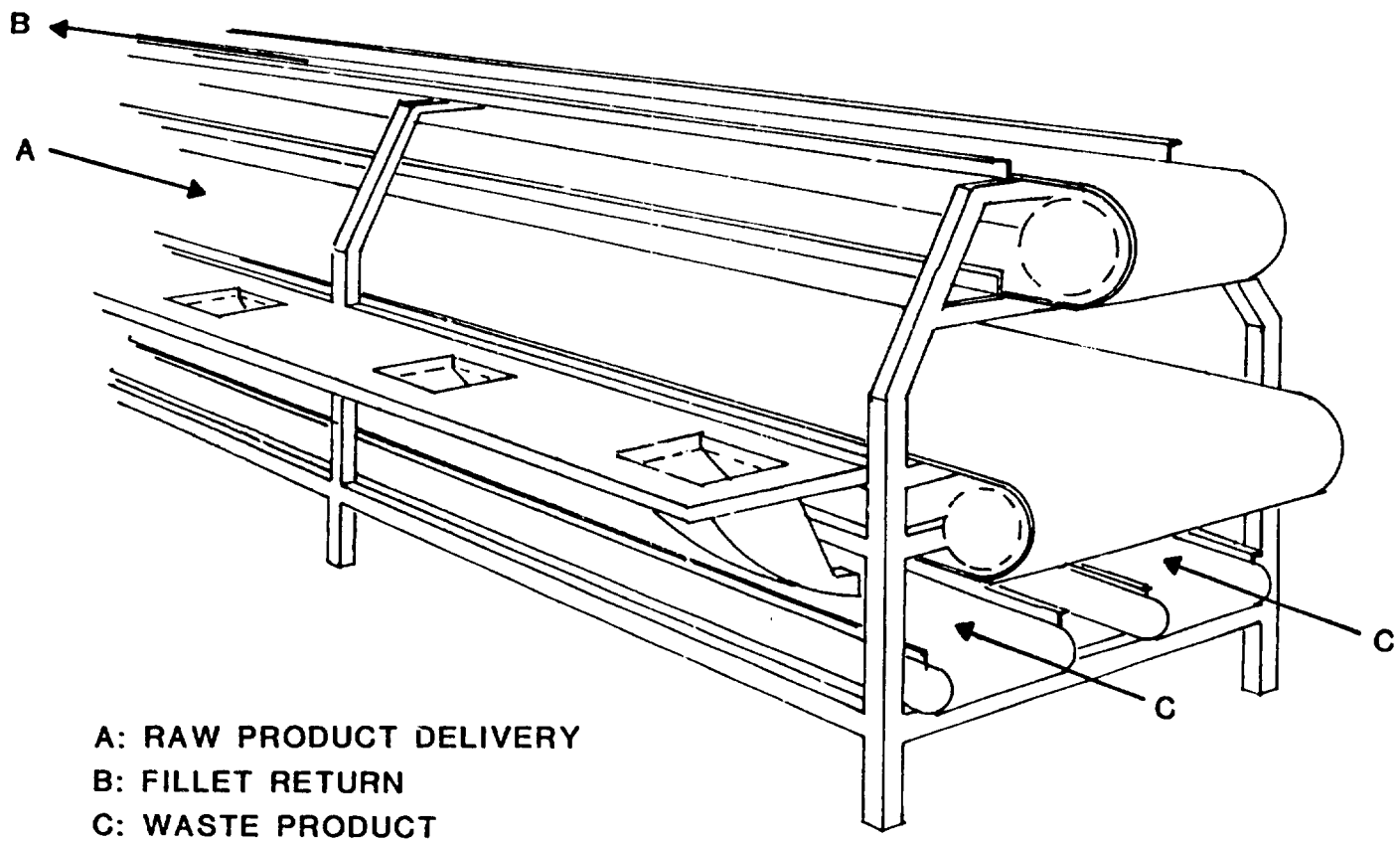
The layout of filletting lines is such that one table, with half the capacity, 2 tons per shift , can be operated independently, either when fish is in short supply or when other line is used for other fish cleaning purposes.

The filletting table is shown in perspective in Fig. 17. The filletters take the raw fish from the conveyor and clean and fillet the fish on their table, equipped with nylon cutting boards and cleaning water nozzles.

Waste is disharged on to the lower level waste conveyors which transport waste to a Scraper elevator (pos.05), disharging into an offal container at pos.06. The containers are moved to the Waste Store by forklift, for onward transport to the fish meal plant, - to be located in an adjoining separate building.

BARBADOS SEAFOOD PLANT

PROPOSED FILLET TABLE



A: RAW PRODUCT DELIVERY
B: FILLET RETURN
C: WASTE PRODUCT

Figure 17

NORGAARD CONSULTANTS

The filletters stand on small platforms and clean and fillet the fish. The fillets are placed in trays and when these are full the filletter adds her identification to the box, which moves along the upper level conveyor to the quality control station (pos.07) where the individual productions are weighed and checked for calculation of yields and bonuses. The quality and bone removal is checked at the same time.

Fish Meal Plant

The Fish Meal Plant, should be operated by the same management team as the process plant and in addition to the offal from the plant, the fishmeal plant should receive and process other fish offal from other sources as a commercial business venture. The need for such a fish meal plant has been determined during the investigations. The plant will produce about 2.8 tons of waste from the processing plant per shift, but it is proposed that the fishmeal plant be designed to handle at least 5 tons of waste per day.

The cost of a 7 tons per day fishmeal plant is about US$ 150,000. The investment has not been included in the present economic analysis as the plant is considered a seperate profit center not necessarily a part of the same project.

Packing Section

The fillets next reach the packing table for packing into polybags, where the contents are also checkweighed. Five fillets are packed into each bag at a weight of approx half a pound each for the retail markets, or a larger sized bag of 10 fillets at a weight of approximately one pound each for the institutional market. Thereafter the bags are vacuum sealed in the vacuum chamber (pos.10) and placed on the belt conveyor for the belt freezer (pos.11).

Spot checking of product quality is also carried out according to accepted standards for quality control in t' food industry. Outside laboratories in Barbados may be used for quality control, to supplement the basic laboratory equipment provided with the plant.

Freezer Room

The beltfreezer has a capacity of up to 4 tons per 8 hour, based on the need to use the plant for freezing of vegetables in the off-season. If it is decided not to provide this additional facility, the belt freezer would be replaced with a plate freezer of 2 tons per 8 hour capacity.

After freezing, the individual packages are packed in cartons (pos.12), stacked on pallets and moved to the cold store by forklift.

Fish to be frozen in the round is packed in trays and placed in the Blast Freezer with a capacity of 4 tons per 8 hour. Thereafter they are packed in crates for storage in cold store. The frozen fish for steak production are cut with the band saw (pos.14) and then moved to packing table for individual wrapping and placing in polybags for final freezing of steaks.

Cold Stores

The Cold Stores are designed as two rooms of 8m x 10m, holding 100 tons each. They will be kept below -20 degrees C. One Cold Store can hold up to 4 months production of Flying Fish fillets and the other store could then be used for frozen whole fish, all depending on circumstances. If changing to vegetable production, at least one store would be cleaned out and used exclusively for frozen vegetables. The delivery from cold stores take place through an anteroom where forklifts can operate under cover and in climate controlled environment.

The facilities for workers and support facilities are as follows:

Security

The Security office at the entrance controls all receipts and deliveries. It will also control access to plant and offices of staff and visitors.

Office

The office functions for management, accounts and sales are housed in a 10m x 5.5m unit, complete with separate toilet facilities. In one corner check on labours time and entry/exit from plant is kept.

Change Rooms

The changerooms are used for removing outer clothing and personal belongings can be left in a cloakroom with an attendant. This is preferred to having lockers which are not recommended for several reasons. Toilet blocks are located so that there is easy, but controlled access from the work area.

Engine Room

The compressors, stand-by generators and other support machinery is located in the engine room, with direct access from outside, at the back of the building. The engine rooms adjoins the cold store block so that pipelines can easily be run above the ceilings. Two workshop areas adjoin the engine room. The inside workshop services equipment in the plant and provides access to factory for mechanics. The outside workshop can service equipment such as forklifts, which also stay in this area at night for recharging of batteries. A separate spare part store is also provided.

Packaging Store and Laboratory

A store to receive and store packaging materials under approved hygienic conditions is also provided. It has direct access from the outside for receipts and opens up to the packing area. It will hold polybags, cartons, labels and wrapping materials. Adjacent to the store, space will be allocated for a quality control laboratory.

Ventilation

The offices and changerooms and security room will be airconditioned separately. The filleting room will have ceiling mounted 'sock' aircondition, where the cool air passes through socks to the floor to avoid air blasts. The temperature in this area as well as reception and freezing will be individually controlled to keep a comfortable level of about 27 degrees C, to make working conditions reasonable. The effect of melting ice will mean that the air flow can be minimal for extended periods.

8.4 Construction Costs

The land is assumed to be ready for development, i.e. with main services of water, power and sewers readily available. Access road is also assumed alongside building. An amount of US$14,346 has been allowed for site preparation.

The building comprises 1,024 sq.m. and has been calculated to cost US$ 529,010.- in terms of 1986 building costs.

Indicative prices have been obtained from various suppliers for equipment and refrigeration. The total price for the processing equipment is US$161,000 ex factory. Freight and insurance is $11,000 and erection estimated as $22,000. An additional $5,000 has been allocated to running-in expenses. It is assumed that plant will have half capacity for first half of first season and full capacity for remainder of season.

Refrigeration equipment will be US$185,000 for the min. equipment required for fish processing only. Freight and insurance is estimated at $26,100. Should it be decided to provide facilities for vegetable processing and freezing during the off-season an expensive belt freezer will be required and the total refrigeration cost increases to $425,000. Freight and insurance increases to $60,000.

A fishmeal plant is proposed to be installed as a seperate operation, but managed by the same seafood company. A small fishmeal plant with capacity of 7 tons per day will cost about US$ 150,000. This cost is not included in the investment for the present project.

8.5 Labour Requirements and Training

Based on a normal 8 hour shift, the labour and staff requirements are estimated to be as follows:

Filletters		48
Receive,load fish		2
Pack in poly bags		4
In-weighing		1
Vacuum pack and seal		1
Belt Freezer		1
Packing		2
Transport(waste, boxes)		2
Unskilled labourers		61
Supervisors, incl quality control		2
Engine Room:	Engineer	1
	Assistants	2
Office:	Manager	1
	Staff	3
	Security	1
	Records	1
TOTAL LABOURERS,STAFF		72

All labour and staff can be recruited locally, and it is envisaged that the Manager be one of the local investors, to encourage productivity and cost control. Depending on the experience of the investor, it must be decided whether an expatriate manager should be recruited for a period of the first season.

All training will therefore take place on the job, which is preferable, with the possible exception of the manager, who may spend up to two months at an overseas plant, if his experience is not sufficient.

The Consultants have observed that the skills of filletting and general handling of fish are readily available in Barbados and the only training necessary will therefore be to develop familiarity with the new equipment and the proposed packing and freezing methods. This should be provided by the suppliers of the equipment under the supply contract.

For the purpose of the financial analysis, it has been assumed that the plant will operate at half capacity during the first half of the season and at full capacity during the second half season.

Additional jobs will be created indirectly in support services. It is estimated that the increased demand and improved economics of the fishing industry will provide the basis for an additional 20 fishermen. In addition, support industries such as repair, maintenance, distribution and shipping services, will add about 30 extra jobs. The total number of new jobs created in Barbados by the establishment of the seafood processing plant could therefore be about 122 jobs.

8.6 Marketing Strategy

It is assumed that the Seafood Processing Co. will sell its product to prime wholesalers, i.e. Supermarkets and chains in Barbados and importers overseas.

8.6.1 DOMESTIC MARKET

Provision of fresh fish to the domestic market is not a problem which concerns the plant. Several excellent markets have been constructed and steps are being taken to improve distribution of fresh fish to remote areas.

The problem and the opportunity in seafood marketing in Barbados lies in absorbing the seasonal supply and glut of Flying Fish and other fish, to process and freeze and supply for domestic consumption at a later stage as well as for export.

It has been stated that the local population is not favourably disposed towards eating frozen fish. All enquiries and research by the Consultants showed that there is only aversion towards buying badly frozen fish, but not towards good quality frozen fish. One gains the impression that freezing of fish locally has been a last resort, when the supply of fish exceeded the ability of the market to absorb fresh fish at reasonable prices and that the raw material selected for freezing was not of the best quality.

The new plant, built to modern design standards, will remove this obstacle to marketing and will make quality fish products more readily available, year round at consistent prices.

As described in the section on the Seafood Market in Section 6, the total domestic market is estimated to be 10,282 tons per year. Imported fish products account for 1,900 tons per year.

The proposed production of 224 tons of frozen fillets, thus represent only 2.2% of the consumption. Stated in a different manner, if all the new production was added to present supply, it would represent an increase in per capita consumption of 1 kg per year per capita. It is not considered difficult to develop the market for this quantity, taking into account the increased quality of product.

The Seafood Plant will have its own delivery vehicle for delivery to the Supermarkets or to other cold stores during the year. Sales will be based on payment within 30 days. For further assumptions concerning the sales economics, see Section 9.

8.6.2 EXPORT MARKETS

The Consultants have inves ed export markets for the seafood products, both in the USA and in Europe. The investigations have been h pered by the relative novelty of the product. Physical samples of the frozen Flying Fish fillets have been delivered to importers on the US East Coast as well as California and trial meals prepared for tastings.

Certain interest was shown by seafood importers in the Miami area but the concern was the high cost of developing a market image, based on a relatively small volume of supply. Similar concerns were voiced by distributors in California, who however confirmed that fresh Flying Fish were now being marketed, chilled on ice, from New Zealand and meeting with some success.

Export markets for Flying Fish are supposed to have been successfully pursued in Toronto, Canada. The London, UK, markets report interest but limited to the resident W.I.

population.

Based on these surveys the recommendations for exports are to market selectively towards the ethnic markets of West Indian residents in the US East Coast, Toronto, Canada and London, UK. The plant should initially deliver large samples to selected importers in these areas and aim for long term, selective contracts with reliable importers, one in each of the three regions.

A suitable attractive package for export should be developed, prominently displaying the Barbados image, and the constant number of tourists on the island should be utilised to spread the message of the possibility of 'eating the island delicacy' when they return to their homes.

A provision for advertising has been made in the various cases, in Section 9 items II 8. Most sales would however be direct to supermarkets in Barbados, and for overseas exports it is envisioned to select 2 to 3 major importers. The supermarkets and importers would each be responsible for their own advertising.

It is impossible to forecast exactly the future division between domestic and export sales, as only the development of the sales divison and price fluctuation will determine this ratio. For the sake of an appreciation of the possibility, it is however considered reasonable to develop an export market for up to 100 tons Flying Fish fillets per year and 100 tons Frozen steaks or fillets of other fish. The corresponding value, to be earned in foreign exchange, could therefore reach US$ 700,000 for the Flying Fish and US$ 450,000 for the other fish, ie: a total of US$ 1,150,000 in foreign exchange per year.

The concept of marketing will be as follows:

The bulk of the market will be domestic and the plant management will contact and sell direct to each of the few supermarkets and hotels on the Barbados.

For overseas exports, it is proposed to negotiate with and select 2 to 3 main importers.

8.7 Implementation Schedule

The first step in implementing the project is to identify the investment partners and to set up the legal and financial framework for the realisation of the project.

Interest has already been expressed locally to participate in this project and it is therefore assumed that the Barbados Development Bank, after receipt of this report, will enter into negotiations with selected local and possibly also offshore partners.

Once the Seafood Processing Co. has been incorporated and capitalised, the following steps need to be taken:

STEP NO. 1: Review of Project - (duration 1 month)

The partners will review the project and in consultation with the Consultants determine the final extent of the project. Decisions to be made at this point concern items such as the desire also to plan for processing of vegetables in off-season, size of cold storage, location of plant etc.

The basic principles for the capitalisation, such as amount of equity and subsidized financing from various

agencies will be determined and the financial analysis revised accordingly.

STEP NO. 2: Design Phase - (duration 3 months)

The factory building will then be designed in greater detail and specifications for the supply of equipment will be prepared.

Detailed finance plans will also be prepared at this time and steps taken to initiate purchase contracts from fishermen.

The site will be selected and ownership or lease agreement drawn up. Site preparation will commence with applications for services of power, water and sewers.

STEP NO.3: Tender Procedures - (duration 2 months)

It is proposed that the Seafood Plant be tendered in two stages.

First tenders should be called for the supply and erection of the equipment, with the supplier responsible for details and working drawings. The basis will be the layout as prepared by the Consultants.

After receipt and selection of the chosen supplier, amendments or changes to the building layout may be required, in order to accommodate the most suitable and attractive plants. Revisions to the building plans will therefore be prepared, before finally going to tender on the building design.

The tenders for the building work can be handled while the equipment supplier commences fabrication.

STEP NO 4 a: Equipment Manufacture and Supply - (4 months)
STEP NO 4 b: Building Construction (concurrent)

The time required for manufacture of all the fish processing equipment, the refrigeration equipment and other supplies is estimated to be 4 months with one month allowed for shipping to Barbados.

During this period the building work will commence and be ready for commencement of installations within 5 months.

STEP NO 5: Equipment Installations - (duration 2 months)

It is anticipated that erection will require about 6 weeks with an additional 2 weeks for completion of connections and building items.

STEP NO 6: Commissioning - (duration 1 month)

One month has been set aside for commissioning plant and initial training of staff and labourers.

The plant should therefore be fully operational within 12 months from the date the decision is taken to proceed with the project and the scope of the project agreed upon.

These timelimits are dependant on the seasons, and it would be advisable to aim for a completion date right at the beginning of the fishing season, i.e. November 1.

8.8 Justification for Project

The establishment of modern seafcod processing plant in Barbados is justified socially and economically for the following reasons:

A) Although there is insufficient knowledge concerning the marine resource, it is considered a reasonable assumption that the landings, particularly of Flying Fish can increase to meet the additional demand

B) The plant will improve conditions for the fishermen, who at present suffer from depressed prices, lack of competition and lack of markets to absorb gluts of fish

C) The plant will provide opportunities for expanding and opening up new fisheries, not yet fully developed

D) The capacity of the plant and the cold storage capacity will ensure constant supply of fish products to domestic market at stable prices, during the off-season for fisheries

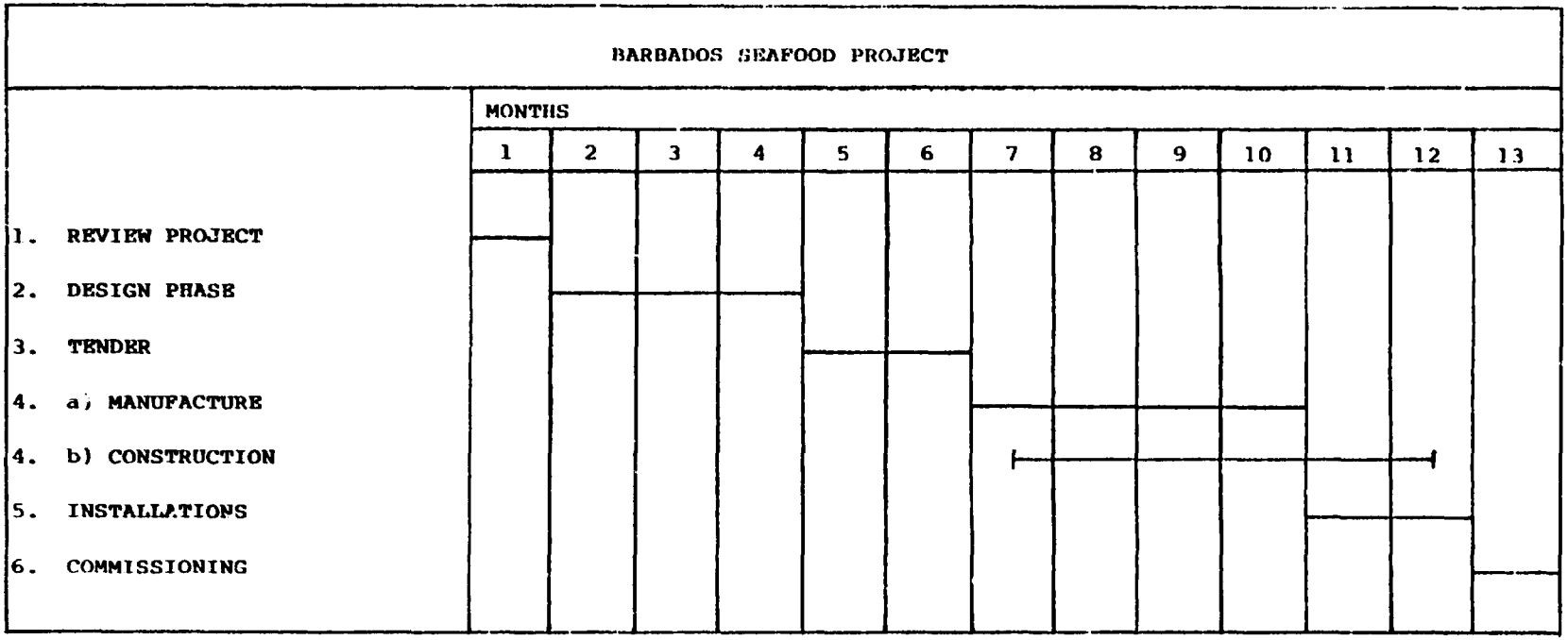


Figure 18 IMPLEMENTATION SCHEDULE

E) The high quality of seafood product will remove consumer resistance towards frozen fish products and reduce the need for imports.

F) The availability of constant fish product will improve the nutritional diet in Barbados

G) The increased earning capacity of the fishing vessels will enable the owners to meet loan demands from the Development Bank

H) 72 new jobs will be created in the plant, an additional 20 jobs as fishermen and about 30 in supporting service industries such as distribution, repairs etc.

I) The plant as conceived will also be a commercially viable plant, which will generate taxable profits for Barbados

In short, the plant will

- Improve fishermens economic situation
- Improve nutrition in Barbados
- Earn foreign exchange
- Provide additional employment

9. FINANCIAL EVALUATION

9.1 Vessel Economics

The supply side is dominated by the supply of fresh fish, especially from the Ice Boats.

Because the supply of fish is of paramount importance to the proposed Seafood Processing Plant and also because the Barbados Development Bank is experiencing problems with loans to Ice Boats, allegedly due to lack of profitability at present levels of catch and prices, -an in depth study of the fishing vessels economics has been performed and is included in Appendix B.

According to the 1984-85 Annual Report, the Bank has a total loan portfolio of $2,789,507 to the fishing industry, mainly represented by Ice Boats. In the last year a total of 53 loans were approved, totalling $ 972,100.

The conclusions of the Vessel Economics analysis confirm that the Ice Boats are experiencing problems and are unprofitable at the present production levels.

The answer to the problem lies in a combination of two events which should result from the introduction of the new process plant.

By increasing the average number of annual boat trips from the present level of 14 - 15 to a total of 19, with same catch per trip, and with a modest price increase of 5% on the price of landed fish, the Ice Boats will be able to generate sufficient revenue to service their loans and produce an acceptable income for the fishermen and owners.

The proposed Seafood Processing Plant will provide such an opportunity to increase the number of trips as the demand will

increase and the time required in port to sell and to offload will decrease. The economics of the new plant and the competition for supply will also permit an increase of 5% of the purchase price of fish.

Put in perspective, the additional 4 trips per boat per year by the 50 Ice Boats will produce an additional 360 tons of fish per season. The requirements for the new plant of 840 tons of fish per year, can be covered by this increase by the same fleet plus an additional 410 tons. The 410 tons can either be provided by increased catches from existing boats, or provide the opportunity for up to ten new boats.

All of the above considerations are based on the availability of the additional resource, up to an annual maximum of 10,000 tons as described in the Terms of Reference. Whilst there are indications that the catch can be increased as assumed, a word of caution should however be made at this point.

There is simply at this stage not sufficient information to prove the extent of the resource and the situation must therefore be carefully watched. The safety factor is the annual reproduction capability of the Flying Fish, and if this should show drastic reductions, the Barbados fisheries will have to develop alternative resources, such as eg: off-shore swordfish. The plant will be designed in a flexible manner to permit changes to other fish species but may not be as profitable for other developments.

9.2 Processing Plant Economics

This section is concerned with the pre-feasibility analysis of the seafood processing plant.

Few seafood plants can base their production pattern on a constant, year round supply of the same species and quantities.

To be successful, seafood processing, particular in a small closed environment such as Barbados, therefore has to be flexible and has to be designed to cope with a range of options of supply.

Four base scenarios based on different scales of utilisation of the various species are consequently examined. Also, the response of their economic performance to changes in the rate of interest, the prices of raw materials and wholesale prices are assessed. The species contemplated as raw material is the Flying Fish and Other Species landed, especially Dolphin Fish, as these two species comprise 75% of the total Barbados annual catch.

Some methodological aspects of the study are described in section 9.2.1. Definitions of the measures of investment worth are given in section 9.2.2, the capital requirements are examined in section 9.2.3, and earnings and costs are described in section 9.2.4.

The sensitivity analysis is presented in section 9.2.5, a COMFAR evaluation in Section 9.2.6, and conclusions in Section 9.2.7.

9.2.1 Methodology and Assumptions

The Data

Most of the data utilised in this study were collected (and reported in) Barbados dollars (BD$). Where conversions are necessary, an exchange rate of U.S.$ 1 for BD$ 2 is used.

The primary economic and financial data were obtained through personal contacts and literature searches conducted in Barbados during June 1986.

Assumptions Underlying the Feasibility Analysis

This analysis is based on a seafood processing plant to be installed in Barbados with the capacity to process 96 mt per month of Flying Fish, into 32 mt per month of fillets, operating 8 hours per day for 24 days per month. The technology is labour intensive, and filleting, the main processing operation, is done manually. The labour requirements for each base scenario are displayed in Tables: D - Labour Requirements. Due to the seasonal characteristics of the Flying Fish, Dolphins and other migratory pelagics, the target species for the project, the plant cannot operate receiving raw fish for more than 7 months a year. Therefore, it's yearly nominal capacity as in most of the scenarios hypothesized in this report, is made possible by assuming operation in two shifts.

Four base scenarios, based on different rates of utilisation of the target species are considered. They are based on information obtained from interviewing fishery experts, businessmen and government officers in Barbados.

Scenario A

This scenario is based on the likely development of the plant receiving and processing Flying Fish only, for the season of seven months. The receipt of fish will be 4 tons per 8 hour shift, 24 days per month. The processing yield is estimated to be 33% and the 7 months operation will thus produce 224 tons of fillets.

Scenario B

This is a scenario with extended use of the facilities. It involves an 8 hour shift of receiving 4 tons of Flying Fish per day for filleting and in addition, an extra shift of 8 hours for up to 4 months, receiving and freezing Other Fish. (This could include receiving and freezing additional Flying Fish

during a glut for future processing when the supply is low, or it could be Dolphin Fish for freezing and cutting into steaks). Total annual production is assumed to be 672 mt of Flying Fish and 384 mt of Other Fish.

Scenario C

This is a mixed scenario, where one filleting line operates with Flying Fish at 2 tons per shift, whereas the other line receives and handles 4 tons of Other Fish per day for cleaning and freezing. Only one shift is envisaged for a period of seven months. Annual production is envisioned as 376 mt of Flying Fish and 672 mt of Other Fish.

Scenario D

This scenario is equal to Scenario B with full production of Flying Fish at 4 tons per shift for 8 hours and an additional shift for 4 months of Other Fish. In addition, the plant will now be leased to process, package and freeze fresh vegetables during the off-season, a period of 4 months. In this manner, the overheads of the plant should be reduced by the dual, year round use of the facilities.

In all four scenarios, a "worst case" scenario is assumed, that is, that all money was borrowed to finance the project. This will present payments at their highest, should there be any equity capital invested, this would decrease the amount of the payments.

Also for all case scenarios, all inventory is assumed to be sold by the end of the seventh month.

The following cash flow assumptions hold constant in all four cases:

1) The ex-factory price of Flying Fish fillets is BD$ 14.50 per kg.

2) The ex-factory price of "Other Fish" has been weighted to reflect the importance of the various species, the seasonal fluctuations of catch and prices for the various product forms (ie: fillets, steaks or slabs). Based on this information an average sales price of BD$ 9.00 per kg was calculated.

3) Ice is projected to sell at 14 cents per kg (6.4 cents per pound) which amounts to BD$ 140 per mt.

The base assumption is that the machine selected produces 6 mt per 24 hours. This is a sufficient quantity to supply the plant's ice requirements with enough remaining to sell to the fishermen. The quantity of ice available for sales varies in relation to the fish processing production quantities.

4) The amount of fish waste is equal to 67% of the total weight of Flying Fish purchased and 0% on the Other Fish. The Other Fish are bought from the fishermen already headed and eviscerated, therefore processing wastes are minimal. Utilising world market charts, the value of the waste is assumed to be BD$ 50.00 per mt.

Maunfacturing Costs

1) The purchase price of fish is based on ex-vessel prices, Flying Fish at 21 cents per fish or BD$ 1400 per mt. The price for "Other Fish" is an estimate weighted to reflect the seasonal and species fluctuations, and also taking into account that in Hunte's 1986 report on the Status of the Barbados Pelagic Fishery, a price of BD$ 6.60 per kg is indicated, and

the Consultants data collection summarised to BD$ 7.15 per kg. Therefore, the average BD$ 6.90 per kg is used.

2) Labour requirements for each scenario as previously mentioned, are presented in Table: D - Labour Requirements. The costs of filleting is based on the assumptions that A) one worker can fillet 450 Flying Fish per 8 hour shift and B) one worker cutting Other Fish can produce 1,200 kg of steaks and fillets per shift (150 kg per hour). The Flying Fish are very uniform and 6 Flying Fish constitute one kg, thus filleters handle 75 kg per 8 hour shift, or about 10 kg per hour.

3) Package cost of 10 cents per package was collected from the processors currently packaging fillets. The number of packages is based on the assumption that 50% of the processed fish will be sold in a larger 1 pound bag (10 fillets), and the other 50% sold in the 1/2 pound bags, (5 fillets).

4) Spoilage costs were calculated as 3% of the purchase cost of Flying Fish, and 6% for the Other Fish.

5) Maintenance and repair costs were based on the following:

Building	2% of the purchase price per year
Equipment	4% of the purchase price per year
Vehicle	8% of the purchase price per year

6) Utilities costs were estimated as follows:

Electical costs are based on BD$ .206 per KWH, this figure was collected from the Barbados Power Company. Electrical usages for each piece of machinery are listed in Tables: E- Electrical Usage and Annual Cost.

Water costs are calculated from the cost of BD$ 1.91 per cubic meter which is the cost paid by current processors. Water usage was assumed to be 4,000 gallons per metric ton of processed fish, and 1.3 mt of water per 1 mt of ice.

Fuel for the delivery van is assumed to be 13,000 liters per annum (250 liters per week for 52 weeks) at a cost of BD$ .65 per liter.

Overhead Costs

1) Indirect labour is restricted to full-time salaried personnel.

2) Personnel taxes is 7.75% of the salaries. This figure was obtained through interviews with Barbados processors.

3) Phone, telex etc. are based on estimates by fishing companies interviewed.

4) Entertainment is based on estimates by fishing companies interviewed.

5) Office supplies are based on estimates by fishing companies interviewed.

6) Legal fees are based on estimates by fishing companies interviewed.

7) insurance cost for the building and equipment was quoted by local insurance companies to be 4%.

8) Miscellaneous costs including advertisements were calculated as 5% of expenses excluding fixed costs.

Total operating cost is the sum of factory and overhead costs.

Financial costs

1) The costs of the buildings and equipment is based on repaying a 13% loan for their full value over 20 years.

9.2.2 Measures of Investment Worth

In this report, the feasibility analysis of the seafood processing plant is based on the Net Present Value and the Internal Rate of Return, frequently recommended as appropriate measures of investment worth. As complimentary indicators, the payback period, the simple rate of return and the break-even point will also be calculated. Since these are all well known indicators, only a brief conceptual definition will be given here.

Net Present Value

The concept underlying Net Present Value (NPV) is based on the recognition that there is a time preference assigned to money.

It is usually assumed that there is a preference for the present with respect to money, which implies that a dollar received today is worth more than a dollar received sometime in the future. Therefore, in order to assess the worth of expenditures foregone today in favour of future expenditures, a discount should be applied to future returns. If the discounted future returns are greater than the amount now foregone, it pays to forego spending the money today in favour of future spending. Otherwise, it pays to spend it today or else look for some other alternative for generating future returns, satisfying the previous criterion. This is exactly what the NPV indicates. It gives the value today of a stream of future returns for an amount invested in a project, discounted by the rate return of the "best" alternative application. In this report, an interest rate of 13% prevailing on money market operations in Barbados is used as the discount rate.

Internal Rate of Return

The Internal Rate of Return (IRR) is the rate of discount that would make the NPV equal to zero. Therefore, the IRR can be defined as the rate of discount that would make a person indifferent between spending a certain amount today or foregoing today's spending in favour of future expenditures. From the private point of view, it represents the maximum interest rate a person could pay on money borrowed for investment purposes without incurring losses over the time horizon of the investment. From a mathematical point of view, the IRR is the real solution of a polynomial of degree equal to the number of periods considered as the life span of the project. As such, it will be unique only when this polynomial has only one root. A sufficient condition for this to happen is having the cash flow stream changing signs only once over the time horizon of the project. From the practical point of view, this is a very restrictive condition, not satisfied by many projects. As a consequence, the NPV criterion is preferred by

many project analysts.

Payback Period

The Payback Period is defined as the number of periods it takes to recover the amount invested in a project. It is commonly used by investors as an indicator of the risks associated with a given investment. A major drawback of this method is that it does not take into consideration the profitability aspect of the investment.

The Simple Rate of Return

The Simple Rate of Return is given by the ratio of the net profits generated by the project in a typical period and the amount invested in the project. The figures used for both quantities in the ratio should be defined according to the point of view the evaluation is being made from. They are defined differently depending on whether the evaluation is made for the project as a whole or just for the capital obtained from a given source.

Break-Even Point

The Break-Even Point (BEP) is the level of production that makes total costs and total revenues equal. It therefore indicates the minimum capacity the project could operate at without incurring losses.

9.2.3 Capital Requirements

1. Fixed Investment

The estimated fixed investment required to implement the project is presented in Table 1, in both US$ and BD$.

In estimating the fixed capital requirements, land was not included as it is to be provided by the Barbados Government as part of the incentive for the project's installation.

For Cases A, B and C the total investment amounts to US$ 1.3 million, with the major items being "Building and Civil Works" and "Refrigeration Equipment," with participants of 41% and 14% respectively.

For Case D, in order to provide the freezing facilities for vegetables an additional investment of US$ 340,000 is necessary, representing an increase of 26% over the investment required for Cases A, B and C. The main items of fixed investment are "Building and Civil Works" and "Refrigeration Equipment," with contributions of 32% and 26% respectively.

"Processing Equipment" is the third major investment item. However, it represents only 12% of total investment in Cases A, B and C, and 10% in Case D, reflecting thr choice of labour intensive technology.

2. Working Capital

Table 2 on the next page, shows the figures for the estimated workirg capital required by the project. Due to the seasonal character of the fishery, landings are concentrated in a relatively short season. In order to extend the operation over a longer time period it is necessary to store the raw material. It is therefore assumed that raw material sufficient to cover three months of production will be stored during the season. The capital necessary to build up the inventories would be obtained through a 6 month period loan at an interest rate of 13%. The remaining capital necessary to meet other short term requirements will be obtained in the first year of operation of the project through a 10 year loan at 13% per year.

Depreciation of value was simplified by basing it on a straight line decrease in value over time to zero. Thus, the building is depreciated by 5% per year over 20 years, the equipment at 10% per year over 10 years, and the vehicle at 20% per year over 5 years.

Total Production Cost is self explanatory, as is Net Profit.

Table 1

Initial Fixed Investments

Items	Cases A,B,C		Case D	
	BDS$1000	US$1000	BDS$1000	US$1000
I - Pre-construction				
1. Land				
2. Site preparation & devlpt.	$29	$14	$29	$14
3. Technology and project	$234	$117	$296	$148
II - Structure and civil works				
1. Buildings & civil works	$1,058	$529	$1,058	$529
2. Auxiliary & serv. faclties.	$30	$15	$30	$15
III - Machinery and Equipment				
1. Processing eqpt. (ex-factory)	$322	$161	$322	$161
Freight/insurance	$22	$11	$22	$11
Electrician	$44	$22	$44	$22
Attendant	$10	$5	$10	$5
2. Refrigeration eqpt.	$370	$185	$850	$425
Freight/Insurance	$52	$26	$120	$60
Installation	$54	$27	$126	$63
3. Ice maker	$96	$48	$96	$48
Installation	$13	$7	$13	$7
4. Auxiliary Services				
Water, power, sewerage	$30	$15	$30	$15
IV - Other				
1. Office furnitures	$10	$5	$10	$5
2. Changeroom furnishings	$4	$2	$4	$2
3. Workshop tools	$12	$6	$12	$6
4. Spare parts	$20	$10	$20	$10
5. Forklifts (two)	$20	$10	$20	$10
6. Backup generator	$100	$50	$100	$50
V - Fishmeal plant				
VI - Delivery van	$48	$24	$48	$24
Total Fixed Investment	$2,578	$1,289	$3,360	$1,630

9.2.4 Earnings and Costs

Earnings and Costs for the plant under the various scenarios considered in this report were calculated for the year of construction and for a typical year at full scale operation.

The total period of construction is estimated at 12 months. After the first 6 months the plant is assumed to start production at 50% of it's capacity. This level of production is to be maintained for the next three months. In the last 3 months of the construction period the plant is to operate at full capacity.

In Table 3 a summary of revenues and costs as well as investments for each of the scenarios are presented. The average yearly net profits for Cases A, B and D are respectively BD$ 591,000, BD$ 597,000 and BD$ 187,000. The detailed average yearly account of earnings and costs are presented in Tables A.1 to A.4.

From these tables, figures for earnings and costs over a 20 year period, considered to be the time horizon of the project, were derived. They are shown in Tables A.5 to A.12.

From these tables the indicators of investment attractiveness of the project were calculated. They are summarised in Table 4. The result of this analysis show that alternatives A and B display very similar behaviour when judged by these indicators, except for the BEP. According to this criterion the best performance is obtained with alternative D.

Table 2

Working Capital Requirements (BDS$1000)

Item	A	B	C	D
Inventories	$470	$1,795	$2,554	$1,795
Cash and Banks	$546	$1,349	$1,752	$1,362
Total	$1,017	$3,144	$4,305	$3,157
Financing costs (BDS$/yr.)				
inventories	$18	$69	$98	$69
cash and banks	$98	$242	$314	$244

Note: Inventories are totally financed for a period of 6 month, and Cash and Banks are totally financed for a period of 5 both at an intereest rate of 13%.

Based on these results Case B can be considered the most attractive scenario, followed closely by scenario A. Case C is obviously infeasible.

9.2.5 Sensitivity Analysis

In order to allow for the uncertain nature of an "ex-ante" feasibility assessment, tne scenarios under consideration were analised with respect to their sensitivity to changes in the interest rate and the price of the main raw material.

The corresponding NPV and IRR obtained by hypothesising those changes are summarised in Tables 5 and 6. More detailed data related to the sensitivity analysis are shown in Tables B.1 to B.8, for Case A; in Tables B.9 to B.14 for Case B; in Tables B.15 to B.16 for Case C; and in Tables B.17 to B.22 for Case D. For Case C, the sensitivity analysis sought to find the price of the fish species other than Flying Fish that would make it's NPV equal to zero at the prevailing interest rate of 13%. The price was found to be BD$ 6,417 per mt, which is 7% less than the current market price.

According to the results shown in Tables 5 and 6, the alternative A is the most stable with respect to changes in the rate of interest, whereas alternative D is the most sensitive. Case A is also relatively stable with respect to changes in Flying Fish prices. Both B and D show relatively high sensitivity to changes in the price of Other Fish. Both alternatives, however, present positive NPV and IRR, well above the prevailing interest rate.

Table 3 - Summary of investments, earnings and costs.

	A	B	C	D
		(mt/yr)		
Fillet Production				
Flying fish (BDS$14.50/kg)	224	224	112	224
Other species (BDS$9.00/kg)	0	384	672	384
Raw Material				
Flying fish (BDS$1.40/kg)	672	672	336	672
Other species(BDS$6.90/kg)	0	384	672	384
		(BDS$1000)		
Total Investments	$3,595	$3,927	$4,330	$4,622
Fixed investments	$2,578	$2,578	$2,578	$3,260
Working capital	$1,017	$1,349	$1,752	$1,362
		(BDS$1000)		
Revenues	$3,388	$6,800	$7,727	$7,073
Total Production Costs	$2,797	$6,203	$7,914	$6,406
Operating Costs	$2,185	$5,396	$7,007	$5,448
Financial costs	$612	$807	$907	$958
Net Profits	$591	$597	($187)	$666

Table 4 - Feasibility indicators for the base scenarios

	A	B	C	D
Net Present Value (BDS$1000)	$2,583	$2,623	($2,512)	$2,507
Internal Rate of Return (%)	35%	36%	(0%	30%
Pay Back Period (years)	3	3	-	4
Simple Rate of Return (%)	16%	15%	(0%	14%
Break-even Point (%)	64%	71%	-	64%

Note: The Break-even point is expressed as % of total capacity, calculated as the simple sum of the amount of each product.

Table 5 - Sensitivity analysis: change in the interest rate

		A	B	D
Base scenario	NPV	$2,583	$2,623	$2,507
r=13%	IRR	35%	36%	30%
Increase in r	NPV	$1,802	$1,724	$1,505
r=15%	IRR	33%	32%	26%
Decrease in r	NPV	$4,151	$4,428	$4,525
r=10%	IRR	39%	41%	34%

Note: Price of flying fish fixed at BDS$1,400/mt, and of the other species at BDS$6,900/mt.

Table 6 - Sensitivity analysis: change in fish prices

		A	B	D
Base scenario	NPV	$2,583	$2,623	$2,507
	IRR	35%	36%	30%
Price increase by 5%	NPV	$2,229	$1,598	$1,483
	IRR	32%	27%	23%
Price decrease by 5%	NPV	$2,937	$3,648	$3,533
	IRR	38%	45%	37%

Notes: 1) Rate of interest fixed at 13% p.year.
2) Case A - Price of flying fish altered from BDS$1,400/mt to BDS$1,470/mt and to BDS$1,330/mt, respectively.
3) Cases B,D - Price of other species altered from BDS$6900/mt to BDS$7,245/mt and to BDS$6,555/mt, respectively.

TABLES: A - EARNINGS AND COSTS FOR BASE SCENARIOS

Table A.1

Case A - Estimated Costs and Earnings (BDS$)

	0	1
Gross Sales		
I- Fish Sales		
Flying fish	$1,218,000	$3,248,000
Other species (not used)		
II- Sale of ice	$44,100	$117,600
III- Sale of fish offal	$8,438	$22,500
Total Gross Revenues (I+II+III)	$1,270,538	$3,388,100
Manufacturing Costs		
I- Factory Costs		
1. Purchase of fish		
Flying fish	$352,800	$940,800
Other species		
2. Direct Labor		
Unskilled Labor	$161,280	$430,080
Supervisor	$5,250	$14,000
Engineer, Maintenance	$7,403	$19,740
3. Packing material	$27,750	$74,000
4. Spoilage/losses		
Flying Fish	$10,584	$28,224
Other species		
5. Maintenance and repairs		
Buildings	$8,160	$21,760
Equipments	$17,688	$47,168
Delivery van	$720	$1,920
6. Utilities		
Electricity	$23,638	$63,035
Water	$3,303	$8,807
Fuel deliv. van	$3,169	$8,450
II- Overhead Costs		
1. Indirect Labor		
Management	$79,320	$211,520
Office, Security	$10,605	$28,280
2. Personnel taxes	$20,449	$54,531
3. Phone, telex, etc..	$4,125	$11,000
4. Entertainment	$0	$6,000
5. Office Supplies	$3,750	$10,000
6. Legal fees	$3,750	$10,000
7. Insurance	$34,368	$91,649
8. Miscellaneous	$38,906	$104,048
III- Total Operating Costs (I+II)	$817,017	$2,185,012

Case A - Estimated Costs and Earnings (BDS$) (cont.)

IV- Financial Costs		
1. Loan repayment		
Buildings	$0	$152,964
Equipment	$0	$165,783
2. Working capital		
Inventories	$6,749	$17,996
Cash and Banks	$36,597	$97,874
V- Depreciation		
1. Buildings	$0	$54,401
2. Equipment	$0	$117,920
3. Delivery van	$0	$4,800
VI- Total Production Cost (III+IV+V)	$860,362	$2,796,749
VII- Net Profit	$410,175	$591,351

Note: Year 0 corresponds to the year of construction and it is assumed that the plant will operate 3 month at 50% of its full capacity and another 3 month at full capacity.

Table A.2

Case B - Estimated Costs and Earnings (BDS$)

Processing 672 mt/yr of flying fish and 384 mt/yr of other species

	0	1
Gross Sales		
I- Fish Sales		
Flying fish	$1,218,000	$3,248,000
Other species	$1,296,000	$3,456,000
II- Sale of ice	$27,563	$73,500
III- Sale of fish offal	$8,438	$22,500
Total Gross Revenues (I+II+III)	$2,550,000	$6,800,000
Manufacturing Costs		
I- Factory Costs		
1. Purchase of fish		
Flying fish	$352,800	$940,800
Other species	$993,600	$2,649,600
2. Direct Labor		
Unskilled Labor	$185,430	$494,480
Supervisor	$7,875	$21,000
Engineer, Maintenance	$9,083	$24,220
3. Packing material	$70,950	$189,200
4. Spoilage/losses		
Flying Fish	$10,584	$28,224
Other species	$59,616	$158,976
5. Maintenance and repairs		
Buildings	$8,160	$21,760
Equipments	$17,688	$47,168
Delivery van	$720	$1,920
6. Utilities		
Electricity	$31,439	$83,838
Water	$7,339	$19,570
Fuel deliv. van	$6,338	$16,900
II- Overhead Costs		
1. Indirect Labor		
Management	$79,320	$211,520
Office, Security	$10,605	$28,280
2. Personnel taxes	$22,654	$60,411
3. Phone,telex,etc..	$4,125	$11,000
4. Entertainment	$0	$9,000
5. Office Supplies	$3,750	$10,000
6. Legal fees	$7,500	$20,000
7. Insurance	$34,368	$91,649
8. Miscellaneous	$96,197	$256,976
III- Total Operating Costs (I+II)	$2,020,141	$5,396,493

Case B - Estimated Costs and Earnings (BDS$) (cont.)

IV- Financial Costs		
1. Loan repayment		
Buildings	$0	$152,964
Equipment	$0	$165,783
2. Working capital		
Inventories	$25,755	$68,679
Cash and Banks	$90,489	$241,726
V- Depreciation		
1. Buildings	$0	$54,401
2. Equipment	$0	$117,920
3. Delivery van	$0	$4,800
VI- Total Production Cost (III+IV+V)	$2,136,384	$6,202,765
VII- Net Profit	$413,616	$597,235

Note: Year 0 corresponds to the year of construction and it is assumed that the plant will operate 3 month at 50% of its full capacity and another 3 month at full capacity.

Table A.3

Case C - Estimated Costs and Earnings (BDS$)

Processing 336 mt/yr of flying fish and 672 mt/yr of other species

	0	1
Gross Sales		
I- Fish Sales		
Flying fish	$609,000	$1,624,000
Other species	$2,268,000	$6,048,000
II- Sale of ice	$16,538	$44,100
III- Sale of fish offal	$4,219	$11,250
Total Gross Revenues (I+II+III)	$2,897,756	$7,727,350
Manufacturing Costs		
I- Factory Costs		
1. Purchase of fish		
Flying fish	$176,400	$470,400
Other species	$1,738,800	$4,636,800
2. Direct Labor		
Unskilled Labor	$137,130	$365,680
Supervisor	$7,875	$21,000
Engineer, Maintenance	$9,083	$24,220
3. Packing material	$86,250	$230,000
4. Spoilage/losses		
Flying Fish	$5,292	$14,112
Other species	$104,328	$278,208
5. Maintenance and repairs		
Buildings	$8,160	$21,760
Equipments	$17,688	$47,168
Delivery van	$720	$1,920
6. Utilities		
Electricity	$33,321	$88,856
Water	$9,128	$24,341
Fuel deliv. van	$6,338	$16,900
II- Overhead Costs		
1. Indirect Labor		
Management	$79,320	$211,520
Office, Security	$10,605	$28,280
2. Personnel taxes	$18,911	$50,429
3. Phone,telex.etc..	$4,125	$11,000
4. Entertainment	$0	$9,000
5. Office Supplies	$3,750	$10,000
6. Legal fees	$7,500	$20,000
7. Insurance	$34,368	$91,649
8. Miscellaneous	$124,955	$333,662
III- Total Operating Costs (I+II)	$2,624,046	$7,006,906

Case C - Estimated Costs and Earnings (BDS$) (cont.)

IV- Financial Costs		
1. Loan repayment		
Buildings	$0	$158,964
Equipment	$0	$165,783
2. Working capital		
Inventories	$36,635	$97,693
Cash and Banks	$117,539	$313,862
V- Depreciation		
1. Buildings	$0	$54,401
2. Equipment	$0	$117,920
3. Delivery van	$0	$4,800
VI- Total Production Cost (III+IV+V)	$2,778,221	$7,914,389
VII- Net Profit	$119,536	($186,979)

Note: Year 0 corresponds to the year of construction and it is assumed that the plant will operate 3 month at 50% of its full capacity and another 3 month at full capacity.

Table A.4

Case D - Estimated Costs and Earnings (BDS$)

Processing 672 mt/yr of flying fish and 384 mt/yr of other species and leasing off-season for vegetable processing.

	0	1
Gross Sales		
I- Fish Sales		
Flying fish	$1,218,000	$3,248,000
Other species	$1,296,000	$3,456,000
II- Sale of ice	$27,563	$73,500
III- Sale of fish offal	$8,438	$22,500
IV- Plant Rental	$0	$272,000
Total Gross Revenues (I+II+III)	$2,550,000	$7,072,000
Manufacturing Costs		
I- Factory Costs		
1. Purchase of fish		
Flying fish	$352,800	$940,800
Other species	$993,600	$2,649,600
2. Direct Labor		
Unskilled Labor	$185,430	$494,480
Supervisor	$7,875	$21,000
Engineer, Maintenance	$9,083	$24,220
3. Packing material	$70,950	$189,200
4. Spoilage/losses		
Flying Fish	$10,584	$28,224
Other species	$59,616	$158,976
5. Maintenance and repairs		
Buildings	$8,160	$21,760
Equipments	$26,985	$71,960
Delivery van	$720	$1,920
6. Utilities		
Electricity	$31,439	$83,838
Water	$7,339	$19,570
Fuel deliv. van	$6,338	$16,900
II- Overhead Costs		
1. Indirect Labor		
Management	$79,320	$211,520
Office, Security	$10,605	$28,280
2. Personnel taxes	$22,654	$60,411
3. Phone,telex,etc..	$4,125	$11,000
4. Entertainment	$0	$3,000
5. Office Supplies	$3,750	$10,000
6. Legal fees	$3,750	$20,000
7. Insurance	$43,665	$116,441
8. Miscellaneous	$96,939	$259,455
III- Total Operating Costs (I+II)	$2,035,737	$5,448,556

Case D - Estimated Costs and Earnings (BDS$) (cont.)

IV- Financial Costs		
1. Loan repayment		
Buildings	$0	$152,964
Equipment	$0	$252,920
2. Working capital		
Inventories	$25,755	$68,679
Cash and Banks	$91,187	$244,058
V- Depreciation		
1. Buildings	$0	$54,401
2. Equipment	$0	$173,900
3. Delivery van	$0	$4,800
VI- Total Production Cost (III+IV+V)	$2,152,669	$6,406,278
VII- Net Profit	$397,331	$665,722

Note: Year 0 corresponds to the year of construction and it is assumed that the plant will operate 3 month at 50% of its full capacity and another 3 month at full capacity.

Table A.5

Case A - Operational earnings and expenditures (BDS$1000)

	Revenues			Costs				
yr.	Flyg.fsh	Oth.fsh	O.rev	Raw mat.	D.labor	Othr.	Ovhd.	Net res.
0	$1,218		$53	$353	$174	$95	$195	$454
1	$3,248		$140	$941	$464	$253	$527	$1,203
2	$3,248		$140	$941	$464	$253	$527	$1,203
3	$3,248		$140	$941	$464	$253	$527	$1,203
4	$3,248		$140	$941	$464	$253	$527	$1,203
5	$3,248		$140	$941	$464	$253	$527	$1,203
6	$3,248		$140	$941	$464	$253	$527	$1,203
7	$3,248		$140	$941	$464	$253	$527	$1,203
8	$3,248		$140	$941	$464	$253	$527	$1,203
9	$3,248		$140	$941	$464	$253	$527	$1,203
10	$3,248		$140	$941	$464	$253	$527	$1,203
11	$3,248		$140	$941	$464	$253	$527	$1,203
12	$3,248		$140	$941	$464	$253	$527	$1,203
13	$3,248		$140	$941	$464	$253	$527	$1,203
14	$3,248		$140	$941	$464	$253	$527	$1,203
15	$3,248		$140	$941	$464	$253	$527	$1,203
16	$3,248		$140	$941	$464	$253	$527	$1,203
17	$3,248		$140	$941	$464	$253	$527	$1,203
18	$3,248		$140	$941	$464	$253	$527	$1,203
19	$3,248		$140	$941	$464	$253	$527	$1,203
20	$3,248		$140	$941	$464	$253	$527	$1,203

Note: Base scenario for Case A

Table A.6

Case A - Net operational results and program of investments (BDS$1000)

yr.	Net Optl. Results	Fixed Investment			Working Capital	Loans Repaymt.	Cash Flow
		Bldgs.	Eqpts.	Other			
0	$454	($1,088)	($1,179)	($251)	($43)	$0	($2,108)
1	$1,203				($116)	($319)	$768
2	$1,203				($116)	($319)	$768
3	$1,203				($116)	($319)	$768
4	$1,203				($116)	($319)	$768
5	$1,203			($24)	($116)	($319)	$744
6	$1,203				($116)	($319)	$768
7	$1,203				($116)	($319)	$768
8	$1,203				($116)	($319)	$768
9	$1,203				($116)	($319)	$768
10	$1,203		($1,179)	($24)	($116)	($319)	($435)
11	$1,203				($116)	($319)	$768
12	$1,203				($116)	($319)	$768
13	$1,203				($116)	($319)	$768
14	$1,203				($116)	($319)	$768
15	$1,203			($24)	($116)	($319)	$744
16	$1,203				($116)	($319)	$768
17	$1,203				($116)	($319)	$768
18	$1,203				($116)	($319)	$768
19	$1,203				($116)	($319)	$768
20	$1,203	$0	$0	$0	($116)	($319)	$768

Net Present Value for interest @ 13% p. year = $2,583

Internal Rate of return for this alternative = 35%

Note: Base scenario for case A

Table A.7

Case B - Operational earnings and expenditures (BDS$1000)

	Revenues			Costs				
yr.	Flyg.fsh	Oth.fsh	O.rev	Raw mat.	D.labor	Othr.	Ovhd.	Net res.
0	$1,218	$1,296	$36	$1,346	$202	$213	$259	$530
1	$3,248	$3,456	$96	$3,590	$540	$568	$699	$1,404
2	$3,248	$3,456	$96	$3,590	$540	$568	$699	$1,404
3	$3,248	$3,456	$96	$3,590	$540	$568	$699	$1,404
4	$3,248	$3,456	$96	$3,590	$540	$568	$699	$1,404
5	$3,248	$3,456	$96	$3,590	$540	$568	$699	$1,404
6	$3,248	$3,456	$96	$3,590	$540	$568	$699	$1,404
7	$3,248	$3,456	$96	$3,590	$540	$568	$699	$1,404
8	$3,248	$3,456	$96	$3,590	$540	$568	$699	$1,404
9	$3,248	$3,456	$96	$3,590	$540	$568	$699	$1,404
10	$3,248	$3,456	$96	$3,590	$540	$568	$699	$1,404
11	$3,248	$3,456	$96	$3,590	$540	$568	$699	$1,404
12	$3,248	$3,456	$96	$3,590	$540	$568	$699	$1,404
13	$3,248	$3,456	$96	$3,590	$540	$568	$699	$1,404
14	$3,248	$3,456	$96	$3,590	$540	$568	$699	$1,404
15	$3,248	$3,456	$96	$3,590	$540	$568	$699	$1,404
16	$3,248	$3,456	$96	$3,590	$540	$568	$699	$1,404
17	$3,248	$3,456	$96	$3,590	$540	$568	$699	$1,404
18	$3,248	$3,456	$96	$3,590	$540	$568	$699	$1,404
19	$3,248	$3,456	$96	$3,590	$540	$568	$699	$1,404
20	$3,248	$3,456	$96	$3,590	$540	$568	$699	$1,404

Note: Base scenario for Case B.

Table A.8

Case B - Net operational results and program of investments (BDS$1000)

yr.	Net Optl. Results	Fixed Investment			Working Capital	Loans Repaymt.	Cash Flow
		Bldgs.	Eqpts.	Other			
0	$530	($1,088)	($1,179)	($251)	($116)	$0	($2,104)
1	$1,404				($310)	($319)	$774
2	$1,404				($310)	($319)	$774
3	$1,404				($310)	($319)	$774
4	$1,404				($310)	($319)	$774
5	$1,404			($24)	($310)	($319)	$750
6	$1,404				($310)	($319)	$774
7	$1,404				($310)	($319)	$774
8	$1,404				($310)	($319)	$774
9	$1,404				($310)	($319)	$774
10	$1,404		($1,179)	($24)	($310)	($319)	($429)
11	$1,404				($310)	($319)	$774
12	$1,404				($310)	($319)	$774
13	$1,404				($310)	($319)	$774
14	$1,404				($310)	($319)	$774
15	$1,404			($24)	($310)	($319)	$750
16	$1,404				($310)	($319)	$774
17	$1,404				($310)	($319)	$774
18	$1,404				($310)	($319)	$774
19	$1,404				($310)	($319)	$774
20	$1,404	$0	$0	$0	($310)	($319)	$774

Net Present Value for interest 13% p. year = $2,623

Internal Rate of return for this alternative = 36%

Note: Base scenario for Case B.

Table A.9

Case C - Operational earnings and expenditures (BDS$1000)

	Revenues			Costs				
yr.	Flyg.fsh	Oth.fsh	O.rev	Raw mat.	D.labor	Othr.	Ovhd.	Net res.
0	$609	$2,268	$21	$1,915	$154	$271	$284	$274
1	$1,624	$6,048	$55	$5,107	$411	$723	$766	$720
2	$1,624	$6,048	$55	$5,107	$411	$723	$766	$720
3	$1,624	$6,048	$55	$5,107	$411	$723	$766	$720
4	$1,624	$6,048	$55	$5,107	$411	$723	$766	$720
5	$1,624	$6,048	$55	$5,107	$411	$723	$766	$720
6	$1,624	$6,048	$55	$5,107	$411	$723	$766	$720
7	$1,624	$6,048	$55	$5,107	$411	$723	$766	$720
8	$1,624	$6,048	$55	$5,107	$411	$723	$766	$720
9	$1,624	$6,048	$55	$5,107	$411	$723	$766	$720
10	$1,624	$6,048	$55	$5,107	$411	$723	$766	$720
11	$1,624	$6,048	$55	$5,107	$411	$723	$766	$720
12	$1,624	$6,048	$55	$5,107	$411	$723	$766	$720
13	$1,624	$6,048	$55	$5,107	$411	$723	$766	$720
14	$1,624	$6,048	$55	$5,107	$411	$723	$766	$720
15	$1,624	$6,048	$55	$5,107	$411	$723	$766	$720
16	$1,624	$6,048	$55	$5,107	$411	$723	$766	$720
17	$1,624	$6,048	$55	$5,107	$411	$723	$766	$720
18	$1,624	$6,048	$55	$5,107	$411	$723	$766	$720
19	$1,624	$6,048	$55	$5,107	$411	$723	$766	$720
20	$1,624	$6,048	$55	$5,107	$411	$723	$766	$720

NoteNote: Base scenario for Case C.

Table A.10

Case C - Net operational results and program of investments (BDS$1000)

yr.	Net Optl. Results	Fixed Investment			Working Capital	Loans Repaymt.	Cash Flow
		Bldgs.	Eqpts.	Other			
0	$274	($1,088)	($1,179)	($251)	($154)	$0	($2,398)
1	$720				($412)	($319)	($10)
2	$720				($412)	($319)	($10)
3	$720				($412)	($319)	($10)
4	$720				($412)	($319)	($10)
5	$720			($24)	($412)	($319)	($34)
6	$720				($412)	($319)	($10)
7	$720				($412)	($319)	($10)
8	$720				($412)	($319)	($10)
9	$720				($412)	($319)	($10)
10	$720		($1,179)	($24)	($412)	($319)	($1,213)
11	$720				($412)	($319)	($10)
12	$720				($412)	($319)	($10)
13	$720				($412)	($319)	($10)
14	$720				($412)	($319)	($10)
15	$720			($24)	($412)	($319)	($34)
16	$720				($412)	($319)	($10)
17	$720				($412)	($319)	($10)
18	$720				($412)	($319)	($10)
19	$720				($412)	($319)	($10)
20	$720	$0	$0	$0	($412)	($319)	($10)

Net Present Value for interest @ 13% p. year = ($2,512)

Internal Rate of return for this alternative = (not applicable).

Note: Base scenario for Case C.

Table A.11

Case D - Operational earnings and expenditures (BDS$1000)

	Revenues			Costs				
yr.	Flyg.fsh	Oth.fsh	O.rev	Raw mat.	D.labor	Othr.	Ovhd.	Net res.
0	$1,218	$1,296	$28	$1,346	$202	$222	$265	$506
1	$3,248	$3,456	$346	$3,590	$540	$592	$726	$1,601
2	$3,248	$3,456	$346	$3,590	$540	$592	$726	$1,601
3	$3,248	$3,456	$346	$3,590	$540	$592	$726	$1,601
4	$3,248	$3,456	$346	$3,590	$540	$592	$726	$1,601
5	$3,248	$3,456	$346	$3,590	$540	$592	$726	$1,601
6	$3,248	$3,456	$346	$3,590	$540	$592	$726	$1,601
7	$3,248	$3,456	$346	$3,590	$540	$592	$726	$1,601
8	$3,248	$3,456	$346	$3,590	$540	$592	$726	$1,601
9	$3,248	$3,456	$346	$3,590	$540	$592	$726	$1,601
10	$3,248	$3,456	$346	$3,590	$540	$592	$726	$1,601
11	$3,248	$3,456	$346	$3,590	$540	$592	$726	$1,601
12	$3,248	$3,456	$346	$3,590	$540	$592	$726	$1,601
13	$3,248	$3,456	$346	$3,590	$540	$592	$726	$1,601
14	$3,248	$3,456	$346	$3,590	$540	$592	$726	$1,601
15	$3,248	$3,456	$346	$3,590	$540	$592	$726	$1,601
16	$3,248	$3,456	$346	$3,590	$540	$592	$726	$1,601
17	$3,248	$3,456	$346	$3,590	$540	$592	$726	$1,601
18	$3,248	$3,456	$346	$3,590	$540	$592	$726	$1,601
19	$3,248	$3,456	$346	$3,590	$540	$592	$726	$1,601
20	$3,248	$3,456	$346	$3,590	$540	$592	$726	$1,601

Note: Base scenario for Case D.

Table A.12

Case D - Net operational results and program of investments (BDS$1000)

yr.	Net Optl. Results	Fixed Investment			Working Capital	Loans Repaymt.	Cash Flow
		Bldgs.	Eqpts.	Other			
0	$506	($1,088)	($1,799)	($313)	($117)	$0	($2,811)
1	$1,601				($313)	($406)	$882
2	$1,601				($313)	($406)	$882
3	$1,601				($313)	($406)	$882
4	$1,601				($313)	($406)	$882
5	$1,601			($24)	($313)	($406)	$858
6	$1,601				($313)	($406)	$882
7	$1,601				($313)	($406)	$882
8	$1,601				($313)	($406)	$882
9	$1,601				($313)	($406)	$882
10	$1,601		($1,799)	($24)	($313)	($406)	($941)
11	$1,601				($313)	($406)	$882
12	$1,601				($313)	($406)	$882
13	$1,601				($313)	($406)	$882
14	$1,601				($313)	($406)	$882
15	$1,601			($24)	($313)	($406)	$858
16	$1,601				($313)	($406)	$882
17	$1,601				($313)	($406)	$882
18	$1,601				($313)	($406)	$882
19	$1,601				($313)	($406)	$882
20	$1,601	$0	$0	$0	($313)	($406)	$882

Net Present Value for interest @ 13% p. year = $2,507

Internal Rate of return for this alternative = 30%

Note: Base scenario for Case D.

TABLES: B - SENSITIVITY ANALYSIS

Table B.1

Case A - Net operational results and program of investments (BDS$1000)

yr.	Net Optl. Results	Fixed Investment			Working Capital	Loans Repaymt.	Cash Flow
		Bldgs.	Eqpts.	Other			
0	$454	($1,088)	($1,179)	($251)	($47)	$0	($2,112)
1	$1,203				($127)	($358)	$718
2	$1,203				($127)	($358)	$718
3	$1,203				($127)	($358)	$718
4	$1,203				($127)	($358)	$718
5	$1,203			($24)	($127)	($358)	$694
6	$1,203				($127)	($358)	$718
7	$1,203				($127)	($358)	$718
8	$1,203				($127)	($358)	$718
9	$1,203				($127)	($358)	$718
10	$1,203		($1,179)	($24)	($127)	($358)	($485)
11	$1,203				($127)	($358)	$718
12	$1,203				($127)	($358)	$718
13	$1,203				($127)	($358)	$718
14	$1,203				($127)	($358)	$718
15	$1,203			($24)	($127)	($358)	$694
16	$1,203				($127)	($358)	$718
17	$1,203				($127)	($358)	$718
18	$1,203				($127)	($358)	$718
19	$1,203				($127)	($358)	$718
20	$1,203	$0	$0	$0	($127)	($358)	$718

Net Present Value for interest @ 15% p. year = $1,802

Internal Rate of return for this alternative = 33%

Note: Assuming the rate of interest has increased to 15% p. year.

Table B.2

Case A - Net operational results and program of investments (BDS$1000)

yr.	Net Optl. Results	Fixed Investment			Working Capital	Loans Repaymt.	Cash Flow
		Bldgs.	Eqpts.	Other			
0	$454	($1,088)	($1,179)	($251)	($38)	$0	($2,102)
1	$1,203				($100)	($263)	$840
2	$1,203				($100)	($263)	$840
3	$1,203				($100)	($263)	$840
4	$1,203				($100)	($263)	$840
5	$1,203			($24)	($100)	($263)	$816
6	$1,203				($100)	($263)	$840
7	$1,203				($100)	($263)	$840
8	$1,203				($100)	($263)	$840
9	$1,203				($100)	($263)	$840
10	$1,203		($1,179)	($24)	($100)	($263)	($363)
11	$1,203				($100)	($263)	$840
12	$1,203				($100)	($263)	$840
13	$1,203				($100)	($263)	$840
14	$1,203				($100)	($263)	$840
15	$1,203			($24)	($100)	($263)	$816
16	$1,203				($100)	($263)	$840
17	$1,203				($100)	($263)	$840
18	$1,203				($100)	($263)	$840
19	$1,203				($100)	($263)	$840
20	$1,203	$0	$0	$0	($100)	($263)	$840

Net Present Value for interest @ 10% p. year = $4,151

Internal Rate of return for this alternative = 39%

Note: Assuming the rate of interest has decreased to 10% p. year.

Table B.3

Case A - Operational earnings and expenditures (BDS$1000)

	Revenues			Costs				
yr.	Flyg.fsh	Oth.fsh	O.rev	Raw mat.	D.labor	Othr.	Ovhd.	Net res.
0	$1,218		$53	$370	$174	$96	$196	$434
1	$3,248		$140	$988	$464	$255	$529	$1,152
2	$3,248		$140	$988	$464	$255	$529	$1,152
3	$3,248		$140	$988	$464	$255	$529	$1,152
4	$3,248		$140	$988	$464	$255	$529	$1,152
5	$3,248		$140	$988	$464	$255	$529	$1,152
6	$3,248		$140	$988	$464	$255	$529	$1,152
7	$3,248		$140	$988	$464	$255	$529	$1,152
8	$3,248		$140	$988	$464	$255	$529	$1,152
9	$3,248		$140	$988	$464	$255	$529	$1,152
10	$3,248		$140	$988	$464	$255	$529	$1,152
11	$3,248		$140	$988	$464	$255	$529	$1,152
12	$3,248		$140	$988	$464	$255	$529	$1,152
13	$3,248		$140	$988	$464	$255	$529	$1,152
14	$3,248		$140	$988	$464	$255	$529	$1,152
15	$3,248		$140	$988	$464	$255	$529	$1,152
16	$3,248		$140	$988	$464	$255	$529	$1,152
17	$3,248		$140	$988	$464	$255	$529	$1,152
18	$3,248		$140	$988	$464	$255	$529	$1,152
19	$3,248		$140	$988	$464	$255	$529	$1,152
20	$3,248		$140	$988	$464	$255	$529	$1,152

Note: Assuming the price of flying fish has increased by 5%.

Table B.4

Case A - Net operational results and program of investments (BDS$1000)

yr.	Net Optl. Results	Fixed Investment			Working Capital	Loans Repaymt.	Cash Flow
		Bldgs.	Eqpts.	Other			
0	$434	($1,088)	($1,179)	($251)	($45)	$0	($2,128)
1	$1,152				($119)	($319)	$714
2	$1,152				($119)	($319)	$714
3	$1,152				($119)	($319)	$714
4	$1,152				($119)	($319)	$714
5	$1,152			($24)	($119)	($319)	$690
6	$1,152				($119)	($319)	$714
7	$1,152				($119)	($319)	$714
8	$1,152				($119)	($319)	$714
9	$1,152				($119)	($319)	$714
10	$1,152		($1,179)	($24)	($119)	($319)	($489)
11	$1,152				($119)	($319)	$714
12	$1,152				($119)	($319)	$714
13	$1,152				($119)	($319)	$714
14	$1,152				($119)	($319)	$714
15	$1,152			($24)	($119)	($319)	$690
16	$1,152				($119)	($319)	$714
17	$1,152				($119)	($319)	$714
18	$1,152				($119)	($319)	$714
19	$1,152				($119)	($319)	$714
20	$1,152	$0	$0	$0	($119)	($319)	$714

Net Present Value for interest @ 13% p. year = $2,229

Internal Rate of return for this alternative = 32%

Note: Assuming the price of flying fish has increased by 5%.

Table B.5

Case A - Operational earnings and expenditures (BDS$1000)

	Revenues			Costs				
yr.	Flyg.fsh	Oth.fsh	O.rev	Raw mat.	D.labor	Othr.	Ovhd.	Net res.
0	$1,218		$53	$388	$174	$96	$197	$415
1	$3,248		$140	$1,035	$464	$256	$532	$1,101
2	$3,248		$140	$1,035	$464	$256	$532	$1,101
3	$3,248		$140	$1,035	$464	$256	$532	$1,101
4	$3,248		$140	$1,035	$464	$256	$532	$1,101
5	$3,248		$140	$1,035	$464	$256	$532	$1,101
6	$3,248		$140	$1,035	$464	$256	$532	$1,101
7	$3,248		$140	$1,035	$464	$256	$532	$1,101
8	$3,248		$140	$1,035	$464	$256	$532	$1,101
9	$3,248		$140	$1,035	$464	$256	$532	$1,101
10	$3,248		$140	$1,035	$464	$256	$532	$1,101
11	$3,248		$140	$1,035	$464	$256	$532	$1,101
12	$3,248		$140	$1,035	$464	$256	$532	$1,101
13	$3,248		$140	$1,035	$464	$256	$532	$1,101
14	$3,248		$140	$1,035	$464	$256	$532	$1,101
15	$3,248		$140	$1,035	$464	$256	$532	$1,101
16	$3,248		$140	$1,035	$464	$256	$532	$1,101
17	$3,248		$140	$1,035	$464	$256	$532	$1,101
18	$3,248		$140	$1,035	$464	$256	$532	$1,101
19	$3,248		$140	$1,035	$464	$256	$532	$1,101
20	$3,248		$140	$1,035	$464	$256	$532	$1,101

Note: Assuming the price of flying fish increased by 10%.

Table B.6

Case A - Net operational results and program of investments (BDS$1000)

yr.	Net Optl. Results	Fixed Investment			Working Capital	Loans Repaymt.	Cash Flow
		Bldgs.	Eqpts.	Other			
0	$415	($1,088)	($1,179)	($251)	($46)	$0	($2,148)
1	$1,101				($122)	($319)	$660
2	$1,101				($122)	($319)	$660
3	$1,101				($122)	($319)	$660
4	$1,101				($122)	($319)	$660
5	$1,101			($24)	($122)	($319)	$636
6	$1,101				($122)	($319)	$660
7	$1,101				($122)	($319)	$660
8	$1,101				($122)	($319)	$660
9	$1,101				($122)	($319)	$660
10	$1,101		($1,179)	($24)	($122)	($319)	($543)
11	$1,101				($122)	($319)	$660
12	$1,101				($122)	($319)	$660
13	$1,101				($122)	($319)	$660
14	$1,101				($122)	($319)	$660
15	$1,101			($24)	($122)	($319)	$636
16	$1,101				($122)	($319)	$660
17	$1,101				($122)	($319)	$660
18	$1,101				($122)	($319)	$660
19	$1,101				($122)	($319)	$660
20	$1,101	$0	$0	$0	($122)	($319)	$660

Net Present Value for interest @ 13% p. year = $1,875

Internal Rate of return for this alternative = 29%

Note: Assuming the price of flying fish increased by 10%.

Table B.7

Case A - Operational earnings and expenditures (BDS$1000)

	Revenues			Costs				
yr.	Flyg.fsh	Oth.fsh	O.rev	Raw mat.	D.labor	Othr.	Ovhd.	Net res.
0	$1,218		$53	$335	$174	$94	$194	$473
1	$3,248		$140	$894	$464	$252	$525	$1,254
2	$3,248		$140	$894	$464	$252	$525	$1,254
3	$3,248		$140	$894	$464	$252	$525	$1,254
4	$3,248		$140	$894	$464	$252	$525	$1,254
5	$3,248		$140	$894	$464	$252	$525	$1,254
6	$3,248		$140	$894	$464	$252	$525	$1,254
7	$3,248		$140	$894	$464	$252	$525	$1,254
8	$3,248		$140	$894	$464	$252	$525	$1,254
9	$3,248		$140	$894	$464	$252	$525	$1,254
10	$3,248		$140	$894	$464	$252	$525	$1,254
11	$3,248		$140	$894	$464	$252	$525	$1,254
12	$3,248		$140	$894	$464	$252	$525	$1,254
13	$3,248		$140	$894	$464	$252	$525	$1,254
14	$3,248		$140	$894	$464	$252	$525	$1,254
15	$3,248		$140	$894	$464	$252	$525	$1,254
16	$3,248		$140	$894	$464	$252	$525	$1,254
17	$3,248		$140	$894	$464	$252	$525	$1,254
18	$3,248		$140	$894	$464	$252	$525	$1,254
19	$3,248		$140	$894	$464	$252	$525	$1,254
20	$3,248		$140	$894	$464	$252	$525	$1,254

Note: Assuming the price of flying fish has decreased by 5%.

Table B.8

Case A - Net operational results and program of investments (BDS$1000)

yr.	Net Optl. Results	Fixed Investment			Working Capital	Loans Repaymt.	Cash Flow
		Bldgs.	Eqpts.	Other			
0	$473	($1,088)	($1,179)	($251)	($42)	$0	($2,087)
1	$1,254				($113)	($319)	$823
2	$1,254				($113)	($319)	$823
3	$1,254				($113)	($319)	$823
4	$1,254				($113)	($319)	$823
5	$1,254			($24)	($113)	($319)	$799
6	$1,254				($113)	($319)	$823
7	$1,254				($113)	($319)	$823
8	$1,254				($113)	($319)	$823
9	$1,254				($113)	($319)	$823
10	$1,254		($1,179)	($24)	($113)	($319)	($381)
11	$1,254				($113)	($319)	$823
12	$1,254				($113)	($319)	$823
13	$1,254				($113)	($319)	$823
14	$1,254				($113)	($319)	$823
15	$1,254			($24)	($113)	($319)	$799
16	$1,254				($113)	($319)	$823
17	$1,254				($113)	($319)	$823
18	$1,254				($113)	($319)	$823
19	$1,254				($113)	($319)	$823
20	$1,254	$0	$0	$0	($113)	($319)	$823

Net Present Value for interest @ 13% p. year = $2,937

Internal Rate of return for this alternative = 38%

Note: Assuming the price of flying fish has decreased by 5%.

Table B.9

Case B - Net operational results and program of investments (BDS$1000)

yr.	Net Optl. Results	Fixed Investment Bldgs.	Eqpts.	Other	Working Capital	Loans Repaymt.	Cash Flow
0	$530	($1,088)	($1,179)	($251)	($128)	$0	($2,116)
1	$1,404				($341)	($358)	$705
2	$1,404				($341)	($358)	$705
3	$1,404				($341)	($358)	$705
4	$1,404				($341)	($358)	$705
5	$1,404			($24)	($341)	($358)	$681
6	$1,404				($341)	($358)	$705
7	$1,404				($341)	($358)	$705
8	$1,404				($341)	($358)	$705
9	$1,404				($341)	($358)	$705
10	$1,404		($1,179)	($24)	($341)	($358)	($498)
11	$1,404				($341)	($358)	$705
12	$1,404				($341)	($358)	$705
13	$1,404				($341)	($358)	$705
14	$1,404				($341)	($358)	$705
15	$1,404			($24)	($341)	($358)	$681
16	$1,404				($341)	($358)	$705
17	$1,404				($341)	($358)	$705
18	$1,404				($341)	($358)	$705
19	$1,404				($341)	($358)	$705
20	$1,404	$0	$0	$0	($341)	($358)	$705

Net Present Value for interest 15% p. year = $1,724

Internal Rate of return for this alternative = 32%

Note: Assuming the rate of interes has increased to 15%.

Table B.10

Case B - Net operational results and program of investments (BDS$1000)

yr.	Net Optl. Results	Fixed Investment			Working Capital	Loans Repaymt.	Cash Flow
		Bldgs.	Eqpts.	Other			
0	$530	($1,088)	($1,179)	($251)	($100)	$0	($2,088)
1	$1,404				($267)	($263)	$874
2	$1,404				($267)	($263)	$874
3	$1,404				($267)	($263)	$874
4	$1,404				($267)	($263)	$874
5	$1,404			($24)	($267)	($263)	$850
6	$1,404				($267)	($263)	$874
7	$1,404				($267)	($263)	$874
8	$1,404				($267)	($263)	$874
9	$1,404				($267)	($263)	$874
10	$1,404		($1,179)	($24)	($267)	($263)	($329)
11	$1,404				($267)	($263)	$874
12	$1,404				($267)	($263)	$874
13	$1,404				($267)	($263)	$874
14	$1,404				($267)	($263)	$874
15	$1,404			($24)	($267)	($263)	$850
16	$1,404				($267)	($263)	$874
17	$1,404				($267)	($263)	$874
18	$1,404				($267)	($263)	$874
19	$1,404				($267)	($263)	$874
20	$1,404	$0	$0	$0	($267)	($263)	$874

Net Present Value for interest 10% p. year = $4,428

Internal Rate of return for this alternative = 41%

Note: Assumin the rate of interes has decreased to 10%.

Table B.11

Case B - Operational earnings and expenditures (BDS$1000)

	Revenues			Costs				
yr.	Flyg.fsh	Oth.fsh	O.rev	Raw mat.	D.labor	Othr.	Ovhd.	Net res.
0	$1,218	$1,296	$36	$1,396	$202	$216	$261	$475
1	$3,248	$3,456	$96	$3,723	$540	$576	$706	$1,256
2	$3,248	$3,456	$96	$3,723	$540	$576	$706	$1,256
3	$3,248	$3,456	$96	$3,723	$540	$576	$706	$1,256
4	$3,248	$3,456	$96	$3,723	$540	$576	$706	$1,256
5	$3,248	$3,456	$96	$3,723	$540	$576	$706	$1,256
6	$3,248	$3,456	$96	$3,723	$540	$576	$706	$1,256
7	$3,248	$3,456	$96	$3,723	$540	$576	$706	$1,256
8	$3,248	$3,456	$96	$3,723	$540	$576	$706	$1,256
9	$3,248	$3,456	$96	$3,723	$540	$576	$706	$1,256
10	$3,248	$3,456	$96	$3,723	$540	$576	$706	$1,256
11	$3,248	$3,456	$96	$3,723	$540	$576	$706	$1,256
12	$3,248	$3,456	$96	$3,723	$540	$576	$706	$1,256
13	$3,248	$3,456	$96	$3,723	$540	$576	$706	$1,256
14	$3,248	$3,456	$96	$3,723	$540	$576	$706	$1,256
15	$3,248	$3,456	$96	$3,723	$540	$576	$706	$1,256
16	$3,248	$3,456	$96	$3,723	$540	$576	$706	$1,256
17	$3,248	$3,456	$96	$3,723	$540	$576	$706	$1,256
18	$3,248	$3,456	$96	$3,723	$540	$576	$706	$1,256
19	$3,248	$3,456	$96	$3,723	$540	$576	$706	$1,256
20	$3,248	$3,456	$96	$3,723	$540	$576	$706	$1,256

Note: Assuming the price of the other species has increased by 5%.

Table B.12

Case B - Net operational results and program of investments (BDS$1000)

yr.	Net Optl. Results	Fixed Investment			Working Capital	Loans Repaymt.	Cash Flow
		Bldgs.	Eqpts.	Other			
0	$475	($1,088)	($1,179)	($251)	($120)	$0	($2,163)
1	$1,256				($320)	($319)	$618
2	$1,256				($320)	($319)	$618
3	$1,256				($320)	($319)	$618
4	$1,256				($320)	($319)	$618
5	$1,256			($24)	($320)	($319)	$594
6	$1,256				($320)	($319)	$618
7	$1,256				($320)	($319)	$618
8	$1,256				($320)	($319)	$618
9	$1,256				($320)	($319)	$618
10	$1,256		($1,179)	($24)	($320)	($319)	($595)
11	$1,256				($320)	($319)	$618
12	$1,256				($320)	($319)	$618
13	$1,256				($320)	($319)	$618
14	$1,256				($320)	($319)	$618
15	$1,256			($24)	($320)	($319)	$594
16	$1,256				($320)	($319)	$618
17	$1,256				($320)	($319)	$618
18	$1,256				($320)	($319)	$618
19	$1,256				($320)	($319)	$618
20	$1,256	$0	$0	$0	($320)	($319)	$618

Net Present Value for interest @ 13% p. year = $1,598

Internal Rate of return for this alternative = 27%

Note: Assuming the price of the other species has increased by 5%.

Table B.13

Case B - Operational earnings and expenditures (BDS$1000)

	Revenues			Costs				
yr.	Flyg.fsh	Oth.fsh	O.rev	Raw mat.	D.labor	Othr.	Ovhd.	Net res.
0	$1,218	$1,296	$36	$1,297	$202	$210	$256	$585
1	$3,248	$3,456	$96	$3,458	$540	$560	$692	$1,551
2	$3,248	$3,456	$96	$3,458	$540	$560	$692	$1,551
3	$3,248	$3,456	$96	$3,458	$540	$560	$692	$1,551
4	$3,248	$3,456	$96	$3,458	$540	$560	$692	$1,551
5	$3,248	$3,456	$96	$3,458	$540	$560	$692	$1,551
6	$3,248	$3,456	$96	$3,458	$540	$560	$692	$1,551
7	$3,248	$3,456	$96	$3,458	$540	$560	$692	$1,551
8	$3,248	$3,456	$96	$3,458	$540	$560	$692	$1,551
9	$3,248	$3,456	$96	$3,458	$540	$560	$692	$1,551
10	$3,248	$3,456	$96	$3,458	$540	$560	$692	$1,551
11	$3,248	$3,456	$96	$3,458	$540	$560	$692	$1,551
12	$3,248	$3,456	$96	$3,458	$540	$560	$692	$1,551
13	$3,248	$3,456	$96	$3,458	$540	$560	$692	$1,551
14	$3,248	$3,456	$96	$3,458	$540	$560	$692	$1,551
15	$3,248	$3,456	$96	$3,458	$540	$560	$692	$1,551
16	$3,248	$3,456	$96	$3,458	$540	$560	$692	$1,551
17	$3,248	$3,456	$96	$3,458	$540	$560	$692	$1,551
18	$3,248	$3,456	$96	$3,458	$540	$560	$692	$1,551
19	$3,248	$3,456	$96	$3,458	$540	$560	$692	$1,551
20	$3,248	$3,456	$96	$3,458	$540	$560	$692	$1,551

Note: Assuming the price of the other species has decreased by 5%.

Table B.14

Case B - Net operational results and program of investments (BDS$1000)

yr.	Net Optl. Results	Fixed Investment			Working Capital	Loans Repaymt.	Cash Flow
		Bldgs.	Eqpts.	Other			
0	$585	($1,088)	($1,179)	($251)	($113)	$0	($2,046)
1	$1,551				($301)	($319)	$931
2	$1,551				($301)	($319)	$931
3	$1,551				($301)	($319)	$931
4	$1,551				($301)	($319)	$931
5	$1,551			($24)	($301)	($319)	$907
6	$1,551				($301)	($319)	$931
7	$1,551				($301)	($319)	$931
8	$1,551				($301)	($319)	$931
9	$1,551				($301)	($319)	$931
10	$1,551		($1,179)	($24)	($301)	($319)	($272)
11	$1,551				($301)	($319)	$931
12	$1,551				($301)	($319)	$931
13	$1,551				($301)	($319)	$931
14	$1,551				($301)	($319)	$931
15	$1,551			($24)	($301)	($319)	$907
16	$1,551				($301)	($319)	$931
17	$1,551				($301)	($319)	$931
18	$1,551				($301)	($319)	$931
19	$1,551				($301)	($319)	$931
20	$1,551	$0	$0	$0	($301)	($319)	$931

Net Present Value for interest @ 13% p. year = $3,648

Internal Rate of return for this alternative = 45%

Note: Assuming the price of the other species has decreased by 5%.

Table B.15

Case C - Operational earnings and expenditures (BDS$1000)

	Revenues			Costs				
yr.	Flyg.fsh	Oth.fsh	O.rev	Raw mat.	D.labor	Othr.	Ovhd.	Net res.
0	$609	$2,268	$21	$1,793	$154	$264	$277	$409
1	$1,624	$6,048	$55	$4,783	$411	$704	$748	$1,082
2	$1,624	$6,048	$55	$4,783	$411	$704	$748	$1,082
3	$1,624	$6,048	$55	$4,783	$411	$704	$748	$1,082
4	$1,624	$6,048	$55	$4,783	$411	$704	$748	$1,082
5	$1,624	$6,048	$55	$4,783	$411	$704	$748	$1,082
6	$1,624	$6,048	$55	$4,783	$411	$704	$748	$1,082
7	$1,624	$6,048	$55	$4,783	$411	$704	$748	$1,082
8	$1,624	$6,048	$55	$4,783	$411	$704	$748	$1,082
9	$1,624	$6,048	$55	$4,783	$411	$704	$748	$1,082
10	$1,624	$6,048	$55	$4,783	$411	$704	$748	$1,082
11	$1,624	$6,048	$55	$4,783	$411	$704	$748	$1,082
12	$1,624	$6,048	$55	$4,783	$411	$704	$748	$1,082
13	$1,624	$6,048	$55	$4,783	$411	$704	$748	$1,082
14	$1,624	$6,048	$55	$4,783	$411	$704	$748	$1,082
15	$1,624	$6,048	$55	$4,783	$411	$704	$748	$1,082
16	$1,624	$6,048	$55	$4,783	$411	$704	$748	$1,082
17	$1,624	$6,048	$55	$4,783	$411	$704	$748	$1,082
18	$1,624	$6,048	$55	$4,783	$411	$704	$748	$1,082
19	$1,624	$6,048	$55	$4,783	$411	$704	$748	$1,082
20	$1,624	$6,048	$55	$4,783	$411	$704	$748	$1,082

Note: This table is calculated with the price of the other species set to BDS$6417/mt, which is the price necessary to drive the NPV of this alternative to zero.

Table B.16

Case C - Net operational results and program of investments (BDS$1000)

yr.	Net Optl. Results	Fixed Investment: Bldgs.	Fixed Investment: Eqpts.	Fixed Investment: Other	Working Capital	Loans Repaymt.	Cash Flow
0	$409	($1,088)	($1,179)	($251)	($146)	$0	($2,255)
1	$1,082				($389)	($319)	$374
2	$1,082				($389)	($319)	$374
3	$1,082				($389)	($319)	$374
4	$1,082				($389)	($319)	$374
5	$1,082			($24)	($389)	($319)	$350
6	$1,082				($389)	($319)	$374
7	$1,082				($389)	($319)	$374
8	$1,082				($389)	($319)	$374
9	$1,082				($389)	($319)	$374
10	$1,082		($1,179)	($24)	($389)	($319)	($829)
11	$1,082				($389)	($319)	$374
12	$1,082				($389)	($319)	$374
13	$1,082				($389)	($319)	$374
14	$1,082				($389)	($319)	$374
15	$1,082			($24)	($389)	($319)	$350
16	$1,082				($389)	($319)	$374
17	$1,082				($389)	($319)	$374
18	$1,082				($389)	($319)	$374
19	$1,082				($389)	($319)	$374
20	$1,082	$0	$0	$0	($389)	($319)	$374

Net Present Value for interest @ 13% p. year = ($0)

Internal Rate of return for this alternative = 13%

Note: This table is calculated with the price of the other species set to BDS$6417/mt, which is the price necessary to drive the NPV of this alternative to zero.

Table B.17

Case D - Net operational results and program of investments (BDS$1000)

yr.	Net Optl. Results	Fixed Investment Bldgs.	Eqpts.	Other	Working Capital	Loans Repaymt.	Cash Flow
0	$506	($1,088)	($1,799)	($313)	($128)	$0	($2,822)
1	$1,601				($343)	($456)	$802
2	$1,601				($343)	($456)	$802
3	$1,601				($343)	($456)	$802
4	$1,601				($343)	($456)	$802
5	$1,601			($24)	($343)	($456)	$778
6	$1,601				($343)	($456)	$802
7	$1,601				($343)	($456)	$802
8	$1,601				($343)	($456)	$802
9	$1,601				($343)	($456)	$802
10	$1,601		($1,799)	($24)	($343)	($456)	($1,021)
11	$1,601				($343)	($456)	$802
12	$1,601				($343)	($456)	$802
13	$1,601				($343)	($456)	$802
14	$1,601				($343)	($456)	$802
15	$1,601			($24)	($343)	($456)	$778
16	$1,601				($343)	($456)	$802
17	$1,601				($343)	($456)	$802
18	$1,601				($343)	($456)	$802
19	$1,601				($343)	($456)	$802
20	$1,601	$0	$0	$0	($343)	($456)	$802

Net Present Value for interest @ 15% p. year = $1,505

Internal Rate of return for this alternative = 26%

Note: Assuming the rate of interest has increased to 15%.

Table B.18

Case D - Net operational results and program of investments (BDS$1000)

yr.	Net Optl. Results	Fixed Investment Bldgs.	Eqpts.	Other	Working Capital	Loans Repaymt.	Cash Flow
0	$506	($1,088)	($1,799)	($313)	($100)	$0	($2,794)
1	$1,601				($269)	($334)	$998
2	$1,601				($269)	($334)	$998
3	$1,601				($269)	($334)	$998
4	$1,601				($269)	($334)	$998
5	$1,601			($24)	($269)	($334)	$974
6	$1,601				($269)	($334)	$998
7	$1,601				($269)	($334)	$998
8	$1,601				($269)	($334)	$998
9	$1,601				($269)	($334)	$998
10	$1,601		($1,799)	($24)	($269)	($334)	($825)
11	$1,601				($269)	($334)	$998
12	$1,601				($269)	($334)	$998
13	$1,601				($269)	($334)	$998
14	$1,601				($269)	($334)	$998
15	$1,601			($24)	($269)	($334)	$974
16	$1,601				($269)	($334)	$998
17	$1,601				($269)	($334)	$998
18	$1,601				($269)	($334)	$998
19	$1,601				($269)	($334)	$998
20	$1,601	$0	$0	$0	($269)	($334)	$998

Net Present Value for interest @ 10% p. year = $4,525

Internal Rate of return for this alternative = 34%

Note: Assuming the rate of interest has decreased to 10%

Table B.19

Case D - Operational earnings and expenditures (BDS$1000)

	Revenues			Costs				
yr.	Flyg.fsh	Oth.fsh	O.rev	Raw mat.	D.labor	Othr.	Ovhd.	Net res.
0	$1,218	$1,296	$28	$1,396	$202	$225	$267	$451
1	$3,248	$3,456	$346	$3,723	$540	$600	$733	$1,453
2	$3,248	$3,456	$346	$3,723	$540	$600	$733	$1,453
3	$3,248	$3,456	$346	$3,723	$540	$600	$733	$1,453
4	$3,248	$3,456	$346	$3,723	$540	$600	$733	$1,453
5	$3,248	$3,456	$346	$3,723	$540	$600	$733	$1,453
6	$3,248	$3,456	$346	$3,723	$540	$600	$733	$1,453
7	$3,248	$3,456	$346	$3,723	$540	$600	$733	$1,453
8	$3,248	$3,456	$346	$3,723	$540	$600	$733	$1,453
9	$3,248	$3,456	$346	$3,723	$540	$600	$733	$1,453
10	$3,248	$3,456	$346	$3,723	$540	$600	$733	$1,453
11	$3,248	$3,456	$346	$3,723	$540	$600	$733	$1,453
12	$3,248	$3,456	$346	$3,723	$540	$600	$733	$1,453
13	$3,248	$3,456	$346	$3,723	$540	$600	$733	$1,453
14	$3,248	$3,456	$346	$3,723	$540	$600	$733	$1,453
15	$3,248	$3,456	$346	$3,723	$540	$600	$733	$1,453
16	$3,248	$3,456	$346	$3,723	$540	$600	$733	$1,453
17	$3,248	$3,456	$346	$3,723	$540	$600	$733	$1,453
18	$3,248	$3,456	$346	$3,723	$540	$600	$733	$1,453
19	$3,248	$3,456	$346	$3,723	$540	$600	$733	$1,453
20	$3,248	$3,456	$346	$3,723	$540	$600	$733	$1,453

Note: Assuming the price of other fish has increased by 5%.

Table B.20

Case D - Net operational results and program of investments (BDS$1000)

yr.	Net Optl. Results	Fixed Investment			Working Capital	Loans Repaymt.	Cash Flow
		Bldgs.	Eqpts.	Other			
0	$451	($1,088)	($1,799)	($313)	($120)	$0	($2,870)
1	$1,453				($322)	($406)	$726
2	$1,453				($322)	($406)	$726
3	$1,453				($322)	($406)	$726
4	$1,453				($322)	($406)	$726
5	$1,453			($24)	($322)	($406)	$726
6	$1,453				($322)	($406)	$726
7	$1,453				($322)	($406)	$726
8	$1,453				($322)	($406)	$726
9	$1,453				($322)	($406)	$726
10	$1,453		($1,799)	($24)	($322)	($406)	($1,097)
11	$1,453				($322)	($406)	$726
12	$1,453				($322)	($406)	$726
13	$1,453				($322)	($406)	$726
14	$1,453				($322)	($406)	$726
15	$1,453			($24)	($322)	($406)	$726
16	$1,453				($322)	($406)	$726
17	$1,453				($322)	($406)	$726
18	$1,453				($322)	($406)	$726
19	$1,453				($322)	($406)	$726
20	$1,453	$0	$0	$0	($322)	($406)	$726

Net Present Value for interest @ 13% p. year = $1,482

Internal Rate of return for this alternative = 23%

Note: Assuming the price of other fish has increased by 5%.

Table B.21

Case D - Operational earnings and expenditures (BDS$1000)

	Revenues			Costs				
yr.	Flyg.fsh	Oth.fsh	O.rev	Raw mat.	D.labor	Othr.	Ovhd.	Net res.
0	$1,218	$1,296	$28	$1,297	$202	$219	$262	$561
1	$3,248	$3,456	$346	$3,458	$540	$584	$719	$1,748
2	$3,248	$3,456	$346	$3,458	$540	$584	$719	$1,748
3	$3,248	$3,456	$346	$3,458	$540	$584	$719	$1,748
4	$3,248	$3,456	$346	$3,458	$540	$584	$719	$1,748
5	$3,248	$3,456	$346	$3,458	$540	$584	$719	$1,748
6	$3,248	$3,456	$346	$3,458	$540	$584	$719	$1,748
7	$3,248	$3,456	$346	$3,458	$540	$584	$719	$1,748
8	$3,248	$3,456	$346	$3,458	$540	$584	$719	$1,748
9	$3,248	$3,456	$346	$3,458	$540	$584	$719	$1,748
10	$3,248	$3,456	$346	$3,458	$540	$584	$719	$1,748
11	$3,248	$3,456	$346	$3,458	$540	$584	$719	$1,748
12	$3,248	$3,456	$346	$3,458	$540	$584	$719	$1,748
13	$3,248	$3,456	$346	$3,458	$540	$584	$719	$1,748
14	$3,248	$3,456	$346	$3,458	$540	$584	$719	$1,748
15	$3,248	$3,456	$346	$3,458	$540	$584	$719	$1,748
16	$3,248	$3,456	$346	$3,458	$540	$584	$719	$1,748
17	$3,248	$3,456	$346	$3,458	$540	$584	$719	$1,748
18	$3,248	$3,456	$346	$3,458	$540	$584	$719	$1,748
19	$3,248	$3,456	$346	$3,458	$540	$584	$719	$1,748
20	$3,248	$3,456	$346	$3,458	$540	$584	$719	$1,748

Note: Assuming the price of other fish has decreased by 5%.

Table B.22

Case D - Net operational results and program of investments (BDS$1000)

yr.	Net Optl. Results	Fixed Investment			Working Capital	Loans Repaymt.	Cash Flow
		Bldgs.	Eqpts.	Other			
0	$561	($1,088)	($1,799)	($313)	($114)	$0	($2,752)
1	$1,748				($304)	($406)	$1,039
2	$1,748				($304)	($406)	$1,039
3	$1,748				($304)	($406)	$1,039
4	$1,748				($304)	($406)	$1,039
5	$1,748			($24)	($304)	($406)	$1,015
6	$1,748				($304)	($406)	$1,039
7	$1,748				($304)	($406)	$1,039
8	$1,748				($304)	($406)	$1,039
9	$1,748				($304)	($406)	$1,039
10	$1,748		($1,799)	($24)	($304)	($406)	($784)
11	$1,748				($304)	($406)	$1,039
12	$1,748				($304)	($406)	$1,039
13	$1,748				($304)	($406)	$1,039
14	$1,748				($304)	($406)	$1,039
15	$1,748			($24)	($304)	($406)	$1,015
16	$1,748				($304)	($406)	$1,039
17	$1,748				($304)	($406)	$1,039
18	$1,748				($304)	($406)	$1,039
19	$1,748				($304)	($406)	$1,039
20	$1,748	$0	$0	$0	($304)	($406)	$1,039

Net Present Value for interest @ 13% p. year = $3,533

Internal Rate of return for this alternative = 37%

Note: Assuming the price of other fish has decreased by 5%.

TABLE: C - BASIC TECHNICAL COEFFICIENTS AND PRICES

C - Basic technical coefficients and prices

	price BDS$	A	B	C	D
Final products					
flying fish fillet	$14.50/kg	224 mt	224 mt	112 mt	224 mt
Other fish fillet	$9.00/kg	-	384 mt	672 mt	384 mt
Secondary products					
ice	$140/kg	840 mt	525 mt	315 mt	525 mt
fish offal	$50/mt	450 mt	450 mt	225 mt	450 mt
plant rental	$68,000/mo	-	-	-	4 mo
Raw material					
flying fish	$1.40/kg	672 mt	672 mt	336 mt	672 mt
other fish	$6.90/kg	-	384 mt	672 mt	384 mt
packing material	$0.10/un	740,000	1,892,000	2,300,000	1,892,000
Water					
fish processing	$2.64/m3	2,550m3/mt	6,922m3/mt	8,926m3/mt	6,922m3/mt
ice production	$1.90/m3	1,092m3/mt	683m3/mt	410m3/mt	683m3/mt
Electricity	$.206/kwh	305,993kwh	406,980kwh	431,340kwh	406,980kwh
Fuel	$0.65/l	250 l/wk.	500 l/wk.	500 l/wk.	500 l/wk
Spoilage losses					
flying fish	-	3%	3%	3%	3%
other species	-	6%	6%	6%	6%

TABLE: D - LABOUR REQUIREMENTS

D - Labor requirements

	average weekly wage ($BDS)	A	B	C	D
			(# of workers)		
Direct Labor					
filleting line	$270	50	50	30	50
receiving and loading	$160	3	3	4	3
packing fish in bags	$160	6	6	7	6
in-weighting	$160	2	2	2	2
Vacuum packing	$160	2	2	3	2
belt freezer operator	$160	2	2	2	2
packers	$160	4	4	5	4
carriers(waste/boxes)	$160	3	3	3	3
casual labor	$160	4	4	5	4
plant supervisors	$250	3	3	3	3
engineer	$385	1	1	1	1
assistants	$160	3	3	3	3
Indirect Labor					
manager	$4,000	1	1	1	1
salesmen	$160	2	2	2	2
bookkeeper	$300	1	1	1	1
delivery	$220	1	1	1	1
security guard	$170	1	1	1	1
clerical	$180	3	3	3	3

Source: Barbados Industrial Development Corp., 1985, Survey of Manufacturing Costs in Barbados.

TABLES: E - ELECTRICAL USAGE AND ANNUAL COST

Case A Electrical Usage and Annual Cost

Equipment	# of kwh/day	# of kwh/season	cost/kwh	cost/ season
Processing equipment	150	25133	0.206	5177
Belt freezer	360	60480	0.206	12459
Chill room	120	20160	0.206	4153
Cold stores				
#1 (7 months)	360	60480	0.206	12459
#2 (3 months)	360	25920	0.206	5340
Ice Maker	510	107100	0.206	22063
Miscellaneous	40	6720	0.206	1384
Totals	1900	305993	1.442	63035

Case B Electrical Usage and Annual Cost

Equipment	# of kwh/day	# of kwh/season	cost/kwh	cost/ season
Processing equipment	225	37800	0.206	7787
Belt freezer	540	90720	0.206	18688
Chill room	240	40320	0.206	8306
Cold stores				
#1 (7 months)	360	60480	0.206	12459
#2 (7 months)	360	60480	0.206	12459
Ice maker	510	107100	0.206	22063
Miscellaneous	60	10080	0.206	2076
Totals	2295	406980		83838

Case C Electrical Usage and Annual Cost

Equipment	# of kwh/day	# of kwh/season	cost/kwh	cost/ season
Processing equipment	300	50400	0.206	10382
Belt freezer	600	100800	0.206	20765
Chill room	240	40320	0.206	8306
Cold stores				
#1 (7 months)	360	60480	0.206	12459
#2 (7 months)	360	60480	0.206	12459
Ice Maker	510	107100	0.206	22063
Miscellaneous	70	11760	0.206	2434
Totals	2440	431340		88868

Case D Electrical Usage and Annual Cost

Equipment	# of kwh/day	# of kwh/season	cost/kwh	cost/ season
Processing equipment	225	37800	0.206	7787
Belt freezer	540	90720	0.206	18688
Chill room	240	40320	0.206	8306
Cold stores				
#1 (7 months)	360	60480	0.206	12459
#2 (7 months)	360	60480	0.206	12459
Ice maker	510	107100	0.206	22063
Miscellaneous	60	10080	0.206	2076
Totals	2295	406980		83838

9.2.6 COMFAR Evaluation

The UNIDO Computer Model for feasibility analysis, COMFAR, has also been applied to appraise the financial and economic viability of the proposed plant.

The proposed seafood plant aims at processing at least 672 mt per year of fresh fish into frozen fillets and steaks, primarily for the domestic market. The products are planned to be sold mainly during the fishing off-season, when fresh fish is not available in sufficient quantities.

The plant is designed in a flexible way, allowing a one or two shift operation. Flying Fish is the target species, but also Other Fish, ie: Dolphin and Swordfish may be processed.

Due to seasonal characteristics, the plant may operate for seven months per year only. Production at full capacity could be achieved one year after commencement of the construction works.

Depending on the availability of fresh fish supply, three basic scenarios are considered in this COMFAR analysis:

Scenario A: One shift operation. 672 mt per year of Flying Fish are processed into 224 tons of frozen fillets.

Scenario B: In addition to Scenario A, 384 mt per year of Other Fish are processed in a second shift.

Scenario C: 336 mt per year of Flying Fish and 672 mt per year of Other Fish are processed in two shifts.

This financial appraisal is based on COMFAR computations. The Cash Flow tables and the Net Income Statement of the COMFAR models are given in Annex 1 and 2 for Scenario A, in Annex 3 and 4 for Scenario B, and in Annex 5 and 6 for Scenario C.

Basic Data

The initial investment requirements are BD$2,578,000 mainly for processing equipment and construction works.

Infrastructure and land is provided by the Government.

Requirements for working capital depend on the type of processed species and are estimated to be 50% of the annual quantities. The total requirements, including cash, is in ,000 BD$:

Scenario A: 1,017
Scenario B: 3,144
Scenario C: 4,305

Material costs are $1.40 for Flying Fish and $6.90 for Other Fish, with sales prices of $14.50 per kg and $9.50.

The total investment is loan financed. The interest rate is 13%.

Financial Assumptions

The conservative assumptions of loan financing with comparative high interest rates promise a high degree of validity of the interpretations.

As shown in Annex 1 and Annex 3 the Scenarios A and B have cash surpluses, sufficient to meet annual interest payments and the repayment of the principal. The cash surpluses are considered, representing a high degree of liquid security.

Scenario C (Annex 5) has cash deficits in each year. The Net Cash Flow is too small to cover financial obligations.

Investment Profitability

The return on the total investment (IRR) and net present value (NPV) at 13% discounting rate are:

	IRR	NPV
Scenario A:	29.6	3474
Scenario B:	22.9	2970
Scenario C:	8.1	-1750

The IRR and the NPV of Scenario A and B indicate a high profitability on the invested capital. These findings are in line with high annual net profits, as shown in Annex 2 and 4.

The IRR of Scenario C is with 8.1% lower than the assumed opportunity costs of capital (13%), thus, causing a negative NPV and losses during the first 10 years of production (see Annex 6). Therefore, Scenario C is under the given assumptions financially not feasible.

RISK ANALYSIS

Break-Even Analysis

In Annex 7 and 8 break even charts are shown for scenario A with and without costs of finance. The corresponding charts for Scenario B are given in Annex 9 and 10.

The break even points are without costs of finance below 55%, which represents a high degree of security. If costs of finance are included, then sales equal total costs at 80% and 85% capacity utilisation. These figures may be interpreted as acceptable, considering the conservative financing assumptions.

Sensitivity Analysis

The results of the sensitivity analysis are shown in Annex 11 or Scenario A and in Annex 12 for Scenario B.

The charts show clearly that the variations of major parameters, ie. sales prices and operational costs, do not have any major influence on the financial profitability.

Simulation of the Product Mix

Flying Fish has a considerably higher margin of selling price over materials costs, than Other Fish have. (in BD$,000).

SPECIES	MATERIAL COSTS per mt/product	SALES PRICES per mt	MATERIAL COSTS as % of sales
FLYING F.:	4.2	14.5|4.5	29
OTHER F.:	6.9	99.0	77

Above figures explain why Scenario C is not attractive, as it assumes the processing of 672 mt per year of Other Fish and only 336 mt of Flying Fish. In this connection two interesting questions arise:

First, at which minimum level of processed Flying Fish in a one shift operation does the plant become financially unattractive, and Secondly, what quantities of which species determine the break even level in a two shift operation.

Simulations with COMFAR show that in a one shift operation the minimum quantity of processed Flying Fish may be as low as 200 mt per year. Below this quantity the IRR would drop below 13%.

With respect to a two shift operation the minimum quantity of processed Flying Fish per year is about 600 tons, if 672 mt of Other Fish are processed.

Enterpreneur's Profitability

The basic Scenarios assume that the total investment is financed by loans. If an investor would finance parts of the investment with equity, then the return on the paid equity would be extremely high.

If, for example, an investor provides BD$1.1 mil, which is about 40% of the initial investment, then the return on the BD$1.1 mil would be 45% for Scenario A and 43% for Scenario B.

The return on equity would accordingly be higher with a decreasing proportion of equity financed investment and lower with an increasing proportion of equity financed investment.

Leasing the Plant for Vegetable Processing

During the off-season the plant could be leased for four months for vegetable processing and freezing, thus possibly increasing the overall profitability of the plant (Scenario D).

As the fish processing does neither technically nor financially depend on the potential vegetable leasing, this aspect could be evaluated seperately by an investor. There is no need to integrate the leasing component into one of the basic scenarios. This would only complicate the present evaluation.

A total additional investment of BD$682,000 would be required, with additional annual expenses of approximately BD$52.00. For the evaluation, loan financing with 13% interest charges is assumed.

Calculations show, that annual leasing incomes of BD$272,000, 200,000 and 180,000 correspond with returns on the additional investment of 30%, 16% and 12%.

These results may be interpreted as follows: If the vegetable processing is regarded as attractive, comparing with 13% opportunity costs of capital, if annual leasing incmes would exceed BD$180,000. If however, the vegetable processing would have to increase the overall profitability of the plant, then the annual leasing incomes would have to exceed BD$272,000 for Scenario A and BD$240,000 for Scenario B.

ECONOMIC ASPECTS

Impacts on the Supply

The demand for fresh fish is according to this study, fairly inelastic. The proposed plant would require a minimum of 672 mt per year of fresh fish. Although it appears likely that day-boats could increase their fishing capacity, the additional demand would cause a small increase of fresh fish prices.

The price increase would, at least in the short term, lead to an increased utilisation of fishing capacities. The major beneficiaries would be the ice-boat fishing sector, which has idle capacities.

Impacts on the Foreign Exchange Balance

No attempts have been made to quantify the impact of the proposed plant on the foreign exchange balance.

It is however likely, that the plant would be a net producer rather than a net consumer of foreign exchange. This depends on the choice of future activities in the marketing of products.

COMFAR Summary

The proposed seafood processing plant is financially highly attractive for the processing of Flying Fish or the processing of Flying Fish and Other Fish in a two shift operation. Even under conservative financial assumptions the plant would generate sufficient surplus to meet it's obligations with a return on the total invested capital of around 30%. In addition, the plant would be rather insensitive towards increased investment costs, higher material costs or lower revenues.

Due to differenecs with respect to material costs and sales prices the processing of Flying Fish is more profitable than the processing of Other Fish. If only Flying Fish is processed, then as little as 200 tons per year of processed Flying Fish would lead to acceptable results. In a two shift operation at least 600 mt per year of Flying Fish would have to be processed to make the plant financially feasible.

The plant is an attractive investment opportunity. The rate of return on the paid in equity would exceed 40%, if BD$1.1 mil of equity are provided.

Besides other positive impacts on the economy, ie: job creation and an increase of the income level, the plant is likely to induce a substantial improvement of the economic situation of the ice-boat fishing sector.

The proposed plant has a potential of approximately BD$4.6 mil per year in foreign exchange earnings and savings. Whether this potential would be realised would first of all depend on future marketing activities.

Considering the financial and economic findings, two crucial conditions are likely to determine the proposed plant's future feasibility:

1) A sufficient marine resource of Flying Fish

2) A successful marketing of the new products

No reliable data is available to assess the first condition. However, the relatively low break even quantity of 200 tons of Flying Fish per year indicates a small risk. In addition, a marine resource study, as suggested could be essential for the future economic utilisation.

Concerning the marketing of the products, it is recommended that a seperate marketing study be undertaken, both domestically and for export markets, as soon as the basic decision to proceed has been reached. Such a study should include a strategy on how to overcome consumer resistance towards frozen products and development strategies of export markets.

All suggested activities could be initiated simultaneously with the plants construction.

---------- COMFAR 2.0 - UNIDO IO/FEAS, Vienna -----

Tables, production in 000 BDS

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	1970.54	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1970.54	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10
	1957.00	3132.29	2822.64	2822.64	2870.64	2822.64	2822.64	2822.64	2822.64	3954.64	2822.64	2185.00	2185.00	2185.00	2185.00
Total assets	676.12	309.65	0.00	0.00	48.00	0.00	0.00	0.00	0.00	1132.00	0.00	0.00	0.00	0.00	0.00
Operating costs	876.66	2185.00	2185.00	2185.00	2185.00	2185.00	2185.00	2185.00	2185.00	2185.00	2185.00	2185.00	2185.00	2185.00	2185.00
Cost of finance	404.30	449.80	425.38	393.79	366.61	331.37	291.54	244.54	195.72	138.27	73.36	0.00	0.00	0.00	0.00
Repayment	0.00	187.84	212.26	239.86	271.04	306.27	346.09	391.08	441.92	499.37	564.79	0.00	0.00	0.00	0.00
Corporate tax	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dividends paid	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Surplus (deficit)	13.46	255.81	565.46	565.46	517.46	565.46	565.46	565.46	565.46	-566.54	565.46	1203.10	1203.10	1203.10	1203.10
Cumulated cash balance	16.06	271.87	837.33	1402.79	1920.25	2485.71	3051.16	3616.62	4182.08	3615.54	4181.00	5384.10	6587.20	7790.30	8993.40
	1970.54	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10
	1552.78	2494.65	2185.00	2185.00	2185.00	2185.00	2185.00	2185.00	2185.00	2135	2185.00	2185.00	2185.00	2185.00	2185.00
	261.24	893.45	1203.10	1203.10	1203.10	1203.10	1203.10	1203.10	1203.10	1203	703.10	1203.10	1203.10	1203.10	1203.10
	316.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0..	0.00	0.00	0.00	0.00	0.00
	404.30	637.64	637.64	637.64	685.64	637.64	637.64	637.64	637.64	1769.64	637.64	0.00	0.00	0.00	0.00
	295.70	-637.64	-637.64	-637.64	-685.64	-637.64	-637.64	-637.64	-637.64	-1769.64	-637.64	0.00	0.00	0.00	0.00
	-282.24	893.45	1203.10	1203.10	1155.10	1203.10	1203.10	1203.10	1203.10	73.10	1203.10	1203.10	1203.10	1203.10	1203.10
Cumulated net cashflow	-2869.24	-1966.79	-763.69	439.41	1594.51	2797.61	4000.71	5203.81	6406.92	6478.02	7681.12	8884.21	10087.31	11290.41	12493.51

FISH PROCESSING BARBADOS - CENARIO A --- 22 SEPTEMBER 1986

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Cashflow Discounting:

a) Equity paid versus Net income flow:
Net present value ..... 3890.66 at 13.00 %
Internal Rate of Return (IRR(1)) .. not found

b) Net Worth versus Net cash return:
Net present value ..... 3257.17 at 13.00 %
Internal Rate of Return (IRR(2)) .. not found

c) Internal Rate of Return on total investment:
Net present value ..... 3474.63 at 13.00 %
Internal Rate of Return (IRR) .. 24.57 %
Net Worth = Equity paid plus reserves

COMFAR 2.0 UNIDO

---------- COMFAR 2.0 - UNIDO ID/FEAS, Vienna ----

Net Income Statement in 000 BDS$

Year	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Total sales, incl. sales tax	1270.54	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10	3388.10
Less: variable costs, incl. sales tax	785.01	2093.35	2093.35	2093.35	2093.35	2093.35	2093.35	2093.35	2093.35	2093.35	2093.35	2093.35	2093.35	2093.35	2093.35
Variable margin	485.53	1294.75	1294.75	1294.75	1294.75	1294.75	1294.75	1294.75	1294.75	1294.75	1294.75	1294.75	1294.75	1294.75	1294.75
As % of total sales	38.21	38.21	38.21	38.21	38.21	38.21	38.21	38.21	38.21	38.21	38.21	38.21	38.21	38.21	38.21
Non variable costs, incl. depreciation	280.35	280.35	280.35	280.35	280.35	280.35	280.35	280.35	280.35	280.35	280.35	280.35	280.35	280.35	280.35
Operational margin	205.18	1014.40	1014.40	1014.40	1014.40	1014.40	1014.40	1014.40	1014.40	1014.40	1014.40	1014.40	1014.40	1014.40	1014.40
As % of total sales	16.15	29.94	29.94	29.94	29.94	29.94	29.94	29.94	29.94	29.94	29.94	29.94	29.94	29.94	29.94
Cost of finance	404.30	449.80	425.38	397.79	366.61	331.37	291.56	246.56	195.72	138.27	73.36	0.00	0.00	0.00	0.00
Gross profit	-199.12	564.60	589.02	616.61	647.79	683.03	722.84	767.84	818.68	876.13	941.04	1014.40	1014.40	1014.40	1014.40
Allowances	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taxable profit	-199.12	564.60	589.02	616.61	647.79	683.03	722.84	767.84	818.68	876.13	941.04	1014.40	1014.40	1014.40	1014.40
Tax	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net profit	-199.12	564.60	589.02	616.61	647.79	683.03	722.84	767.84	818.68	876.13	941.04	1014.40	1014.40	1014.40	1014.40
Dividends paid	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Undistributed profit	-199.12	564.60	589.02	616.61	647.79	683.03	722.84	767.84	818.68	876.13	941.04	1014.40	1014.40	1014.40	1014.40
Accumulated undistributed profit	-199.12	365.48	954.50	1571.12	2218.91	2901.94	3624.79	4392.62	5211.30	6087.42	7028.47	8042.87	9057.27	10071.67	11086.07
Gross profit, % of total sales	-15.67	16.66	17.38	18.20	19.12	20.16	21.33	22.66	24.16	25.86	27.77	29.94	29.94	29.94	29.94
Net profit, % of total sales	-15.67	16.66	17.38	18.20	19.12	20.16	21.33	22.66	24.16	25.86	27.77	29.94	29.94	29.94	29.94
Ave. Net profit, % of equity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ave. Net profit+interest, % of invest.	6.31	28.46	28.46	28.46	28.09	28.09	28.09	28.09	28.09	21.38	21.38	21.38	21.38	21.38	21.38

FISH PROCESSING BARBADOS - CENARIO A --- 22 SEPTEMBER 1986

COMFAR

COMFAR 2.0 - UNIDO ID/FEAS, Vienna

... tables, production in 000 BDS$

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00
... expenses	1450.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
... tax, net of tax	2550.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00
Total cash outflow	4942.24	6844.09	6356.65	6356.65	6404.65	6356.65	6356.65	6356.65	6356.65	6356.65	7488.65	6942.65	6356.65	5396.50	5396.50	5396.50
... assets	2392.22	770.29	0.00	0.00	48.00	0.00	0.00	0.00	0.00	0.00	1132.00	586.00	0.00	0.00	0.00	0.00
... costs	2550.02	5396.50	5396.50	5396.50	5396.50	5396.50	5396.50	5396.50	5396.50	5396.50	5396.50	5396.50	5396.50	5396.50	5396.50	5396.50
... ance	518.05	677.30	677.30	640.53	598.98	552.03	498.97	439.02	371.27	294.72	208.21	110.46	0.00	0.00	0.00	0.00
...	0.00	0.00	282.85	319.62	361.17	408.12	461.18	521.13	588.88	665.43	751.94	849.69	0.00	0.00	0.00	0.00
... tax	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
...	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	57.78	-44.09	443.35	443.35	395.35	443.35	443.35	443.35	443.35	443.35	-688.65	-142.65	443.35	1403.50	1403.50	1403.50
	57.78	16.27	459.62	902.97	1298.32	1741.68	2185.02	2628.38	3071.73	3515.08	2826.43	2683.79	3127.14	4530.64	5934.14	7337.64
	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00
	5396.50	5396.50	5396.50	5396.50	5396.50	5396.50	5396.50	5396.50	5396.50	5396.50	5396.50	5396.50	5396.50	5396.50	5396.50	5396.50
	1403.50	1403.50	1403.50	1403.50	1403.50	1403.50	1403.50	1403.50	1403.50	1403.50	1403.50	1403.50	1403.50	1403.50	1403.50	1403.50
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	518.05	677.30	960.15	960.15	1008.15	960.15	960.15	960.15	960.15	960.15	2092.15	1546.15	960.15	0.00	0.00	0.00
	1971.95	-677.30	-960.15	-960.15	-1008.15	-960.15	-960.15	-960.15	-960.15	-960.15	-2092.15	-1546.15	-960.15	0.00	0.00	0.00
Net cashflow	-1874.19	633.21	1403.50	1403.50	1355.50	1403.50	1403.50	1403.50	1403.50	1403.50	271.50	817.50	1403.50	1403.50	1403.50	1403.50
Cumulated net cashflow	-4452.19	-3818.98	-2415.48	-1011.98	343.52	1747.02	3150.52	4554.02	5957.52	7361.02	7632.52	8450.02	9853.52	11257.02	12660.52	14064.02

FISH PROCESSING BARBADOS - CENAPIC B --- 22 SEPTEMBER 1986

COMFAR 2.0 - UNIDO ID/FEAS, Vienna

Cashflow Discounting:

a) Equity paid versus Net income flow
Net present value ..... 3869.30 at 12.00 %
Internal Rate of Return (IRR%) .. not found

b) Net Worth versus Net cash returns:
Net present value ..... 2647.96 at 13.00 %
Internal Rate of Return (IRR%) .. not found

c) Internal Rate of Return on total investment:
Net present value ..... 2776.84 at 13.00 %
Internal Rate of Return (IRR) .. 22.92 %
Net Worth + Equity paid plus reserves

FISH PROCESSING BARBADOS - CENAPIC B --- 22 SEPTEMBER 1986

COMFAR

COMFAR 2.0 - UNIDO IO/PEAS, Vienna

Profit Income Statement in 000 BDS$

Year	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Total sales, incl. sales tax	2350.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00	6800.00
Less: variable costs, incl. sales tax	1989.32	5304.85	5304.85	5304.85	5304.85	5304.85	5304.85	5304.85	5304.85	5304.85	5304.85	5304.85	5304.85	5304.85	5304.85
Variable margin	360.68	1495.15	1495.15	1495.15	1495.15	1495.15	1495.15	1495.15	1495.15	1495.15	1495.15	1495.15	1495.15	1495.15	1495.15
As % of total sales	21.99	21.99	21.99	21.99	21.99	21.99	21.99	21.99	21.99	21.99	21.99	21.99	21.99	21.99	21.99
Non-variable costs, incl. depreciation	280.35	280.35	280.35	280.35	280.35	280.35	280.35	280.35	280.35	280.35	280.35	338.95	338.95	338.95	338.95
Operational margin	280.33	1214.80	1214.80	1214.80	1214.80	1214.80	1214.80	1214.80	1214.80	1214.80	1214.80	1156.20	1156.20	1156.20	1156.20
As % of total sales	10.99	17.86	17.86	17.86	17.86	17.86	17.86	17.86	17.86	17.86	17.86	17.00	17.00	17.00	17.00
Cost of finance	518.05	677.30	677.30	640.93	598.98	552.03	498.97	439.02	371.27	294.72	208.21	110.46	0.00	0.00	0.00
Gross profit	-237.72	537.50	537.50	574.27	615.82	662.77	715.83	775.78	843.53	920.08	1006.59	1045.74	1156.20	1156.20	1156.20
Allowances	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taxable profit	-237.72	537.50	537.50	574.27	615.82	662.77	715.83	775.78	843.53	920.08	1006.59	1045.74	1156.20	1156.20	1156.20
Tax	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net profit	-237.72	537.50	537.50	574.27	615.82	662.77	715.83	775.78	843.53	920.08	1006.59	1045.74	1156.20	1156.20	1156.20
Dividends paid	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Undistributed profit	-237.72	537.50	537.50	574.27	615.82	662.77	715.83	775.78	843.53	920.08	1006.59	1045.74	1156.20	1156.20	1156.20
Accumulated undistributed profit	-237.72	299.78	837.28	1411.55	2027.37	2690.14	3405.97	4181.75	5025.28	5945.36	6951.95	7997.69	9153.89	10310.09	11466.29
Gross profit, % of total sales	-9.32	7.90	7.90	8.45	9.06	9.75	10.53	11.41	12.40	13.53	14.80	15.38	17.00	17.00	17.00
Net profit, % of total sales	-9.32	7.90	7.90	8.45	9.06	9.75	10.53	11.41	12.40	13.53	14.80	15.38	17.00	17.00	17.00
ROE, Net profit, % of equity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ROI, Net profit+interest, % of invest.	5.70	21.34	21.34	21.34	21.17	21.17	21.17	21.17	21.17	21.17	21.17	17.68	16.29	15.50	15.50

Cashflow tables, production in 000 BDS$

Year	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Total cash inflow	6497.76	9627.53	8027.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53
Financial resources	3595.00	1100.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sales, net of tax	2897.76	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53
Total cash outflow	6532.00	8918.61	7993.64	8433.34	8481.34	8433.34	8433.34	8433.34	8433.34	9565.34	8433.34	8433.34	8433.34	7006.94	7006.94
Total assets	3257.27	1015.97	0.00	0.00	48.00	0.00	0.00	0.00	0.00	1132.00	0.00	0.00	0.00	0.00	0.00
Operating costs	2684.88	7006.94	7006.94	7006.94	7006.94	7006.94	7006.94	7006.94	7006.94	7006.94	7006.94	7006.94	7006.94	7006.94	7006.94
Cost of finance	590.85	895.70	986.70	1066.20	951.57	889.85	820.09	741.27	652.21	551.56	437.83	309.32	164.10	0.00	0.00
Repayment	0.00	0.00	0.00	420.20	474.83	536.55	606.31	685.13	774.19	874.84	988.57	1117.08	1262.30	0.00	0.00
Corporate tax	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dividends paid	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
[illegible]	45.24	-91.00	32.89	-705.81	-753.81	-705.81	-705.81	-705.81	-705.81	-1837.81	-705.81	-705.81	-705.81	720.59	720.59
[illegible]	51.99	-143.07	-109.18	-814.99	-1568.80	-2274.61	-2980.42	-3686.24	-4392.05	-6229.86	-6935.67	-7641.48	-8347.29	-7626.70	-6906.11
[illegible]	7727.76	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53
[illegible]	7780.75	8 727.91	7006.94	7006.94	7006.94	7006.94	7006.94	7006.94	7006.94	7006.94	7006.94	7006.94	7006.94	7006.94	7006.94
[illegible]	44.76	-295.38	720.59	720.59	720.59	720.59	720.59	720.59	720.59	720.59	720.59	720.59	720.59	720.59	720.59
[illegible]	750.00	1100.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Surplus, foreign	590.85	895.70	986.70	1426.40	1474.40	1426.40	1426.40	1426.40	1426.40	2558.40	1426.40	1426.40	1426.40	0.00	0.00
Surplus / deficit	2999.15	204.30	-686.70	-1426.40	-1474.40	-1426.40	-1426.40	-1426.40	-1426.40	-2558.40	-1426.40	-1426.40	-1426.40	0.00	0.00
Net cashflow	-3044.39	-295.38	720.59	720.59	672.59	720.59	720.59	720.59	720.59	-411.41	720.59	720.59	720.59	720.59	720.59
Cumulated net cashflow	3622.39	-5917.77	-5197.18	-4476.59	-3804.00	-3083.41	-2362.82	-1642.23	-921.64	-1333.05	-612.46	108.13	828.72	1549.31	2269.90

Cashflow Discounting:

a) Equity paid versus Net income flow:
Net present value ..... -1721.12 at 13.00 %
Internal Rate of Return (IRR%) .. not found

b) Net Worth versus Net cash return:
Net present value ..... -2198.18 at 13.00 %
Internal Rate of Return (IRR%) .. not found

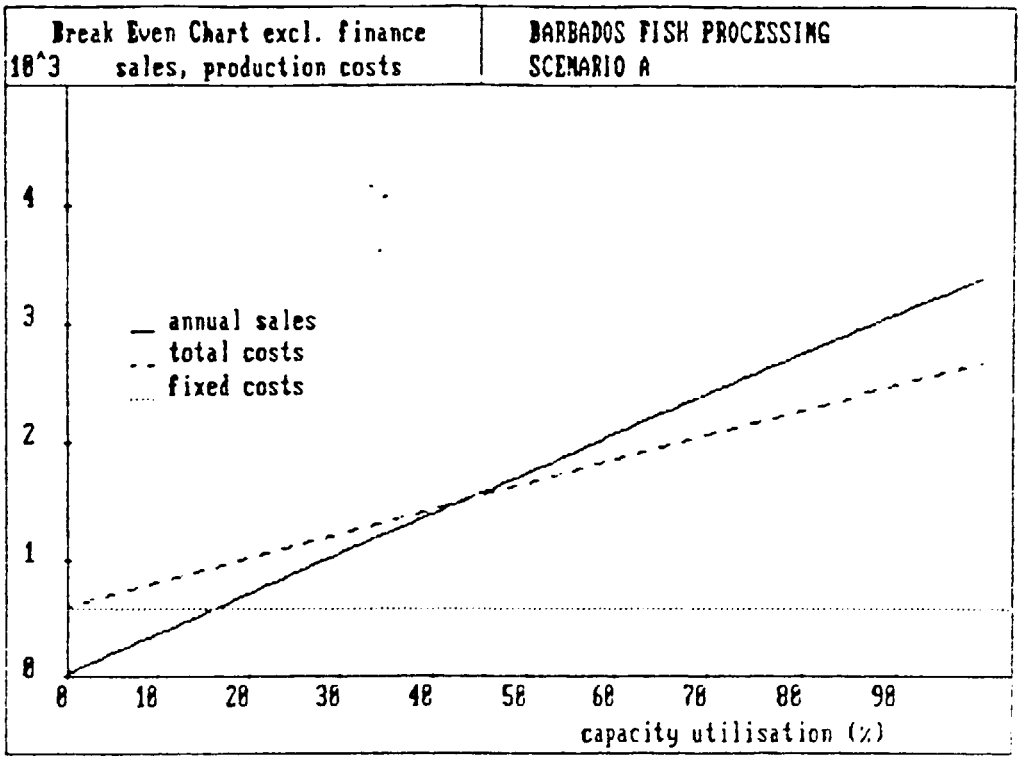
c) Internal Rate of Return on total investment:
Net present value ..... -1750.16 at 13.00 %
Internal Rate of Return (IRR) .. 8.07 %
Net Worth = Equity paid plus reserves

COMFAR

COMFAR 2.0 - UNIDO ID/FEAS, Vienna

Income Statement in 000 BDS

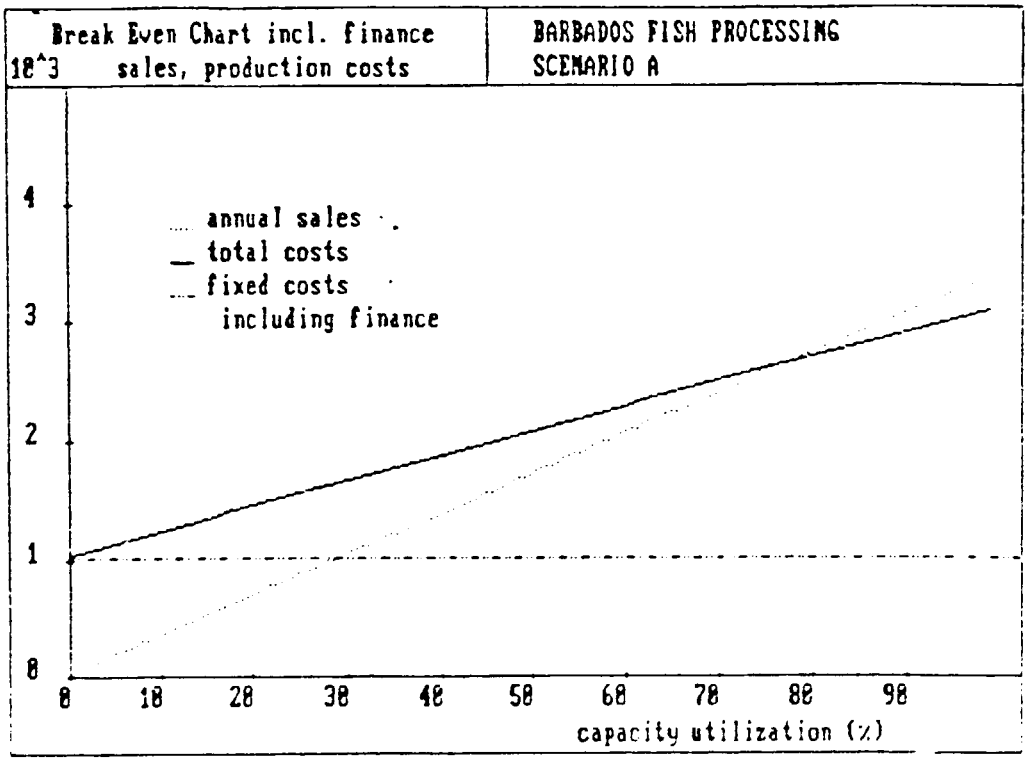
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Total sales, incl. sales tax	2897.76	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53	7727.53
less: variable costs, incl. sales tax	2592.23	6915.29	6915.29	6915.29	6915.29	6915.29	6915.29	6915.29	6915.29	6915.29	6915.29	6915.29	6915.29	6915.29	6915.29
Variable margin	304.53	812.24	812.24	812.24	812.24	812.24	812.24	812.24	812.24	812.24	812.24	812.24	812.24	812.24	812.24
As % of total sales	10.51	10.51	10.51	10.51	10.51	10.51	10.51	10.51	10.51	10.51	10.51	10.51	10.51	10.51	10.51
less: fixed costs, incl. depreciation	281.85	281.85	281.85	281.85	281.85	320.25	272.25	272.25	272.25	272.25	317.25	269.25	269.25	269.25	269.25
[illegible]	22.68	530.39	530.39	530.39	530.39	491.99	539.99	539.99	539.99	539.99	494.99	542.99	542.99	542.99	542.99
[illegible]	0.78	6.86	6.86	6.86	6.86	6.37	6.99	6.99	6.99	6.99	6.41	7.03	7.03	7.03	7.03
[illegible]	590.85	895.70	986.70	1006.20	951.57	889.85	820.09	741.27	652.21	551.56	437.83	309.37	164.10	0.00	0.00
[illegible]	-568.17	-365.31	-456.31	-475.81	-421.18	-397.86	-280.10	-201.28	-112.22	-11.57	57.16	233.67	378.89	542.99	542.99
[illegible]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
[illegible]	-568.17	-365.31	-456.31	-475.81	-421.18	-397.86	-280.10	-201.28	-112.22	-11.57	57.16	233.67	378.89	542.99	542.99
[illegible]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net profit	-568.17	-365.31	-456.31	-475.81	-421.18	-397.86	-280.10	-201.28	-112.22	-11.57	57.16	233.67	378.89	542.99	542.99
Dividends paid	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Undistributed profit	-568.17	-365.31	-456.31	-475.81	-421.18	-397.86	-280.10	-201.28	-112.22	-11.57	57.16	233.67	378.89	542.99	542.99
Accumulated undistributed profit	-568.17	-933.48	-1389.79	-1865.60	-2286.79	-2684.64	-2964.75	-3166.03	-3278.25	-3289.82	-3232.66	-2998.99	-2620.10	-2077.11	-1534.12
Gross profit, % of total sales	-19.61	-4.72	-5.90	-6.16	-5.45	-5.15	-3.62	-2.60	-1.45	-0.15	0.74	3.02	4.90	7.03	7.03
Net profit, % of total sales	-19.61	-4.72	-5.90	-6.16	-5.45	-5.15	-3.62	-2.60	-1.45	-0.15	0.74	3.02	4.90	7.03	7.03
Net profit, % of equity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net profit+interest, % of invest	6.39	7.74	7.74	7.74	7.69	7.13	7.83	7.83	7.83	6.72	6.16	6.76	6.76	6.76	6.76



Financial costs, payment of interest and the repayment of the principal, are not included.

Fixed costs are covered by sales at a capacity utilization of less than 20%.

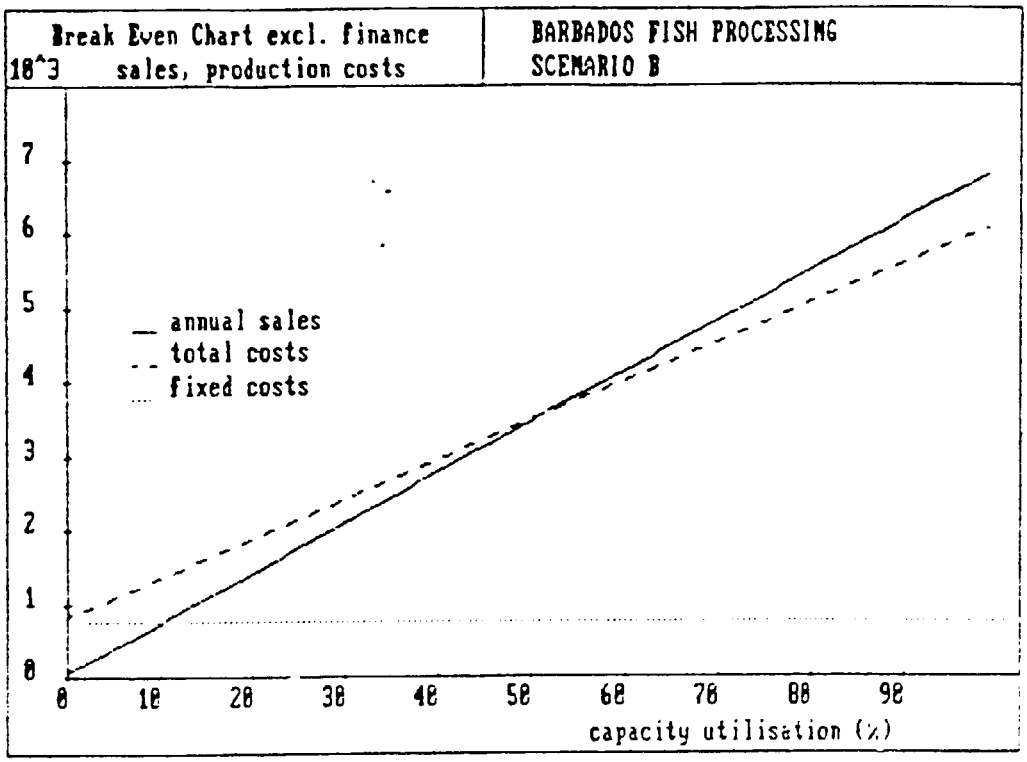
Sales equal total costs at approximately 48% capacity utilization.



The above chart includes financial costs, which are based on the assumption that the total investment is loan financed. The interest rate is 13% and the loan is amortized within 10 years.

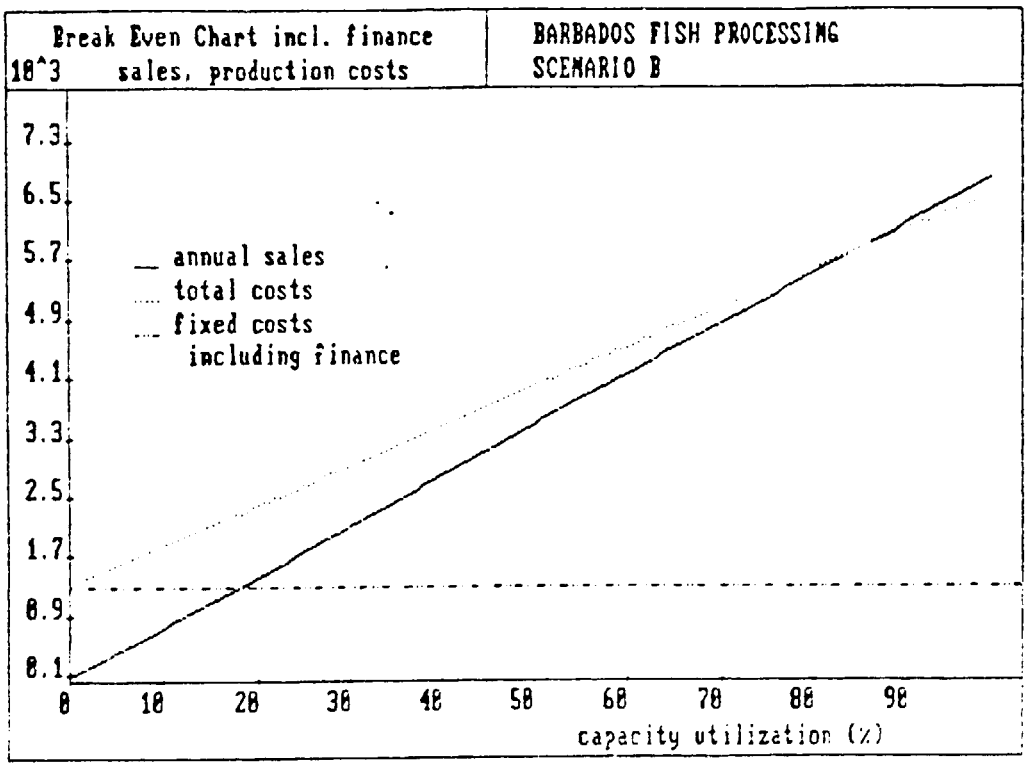
Fixed costs are covered by sales at less than 30% capacity utilization.

Total costs equal sales at 78% capacity utilization.



Financial costs are not included.

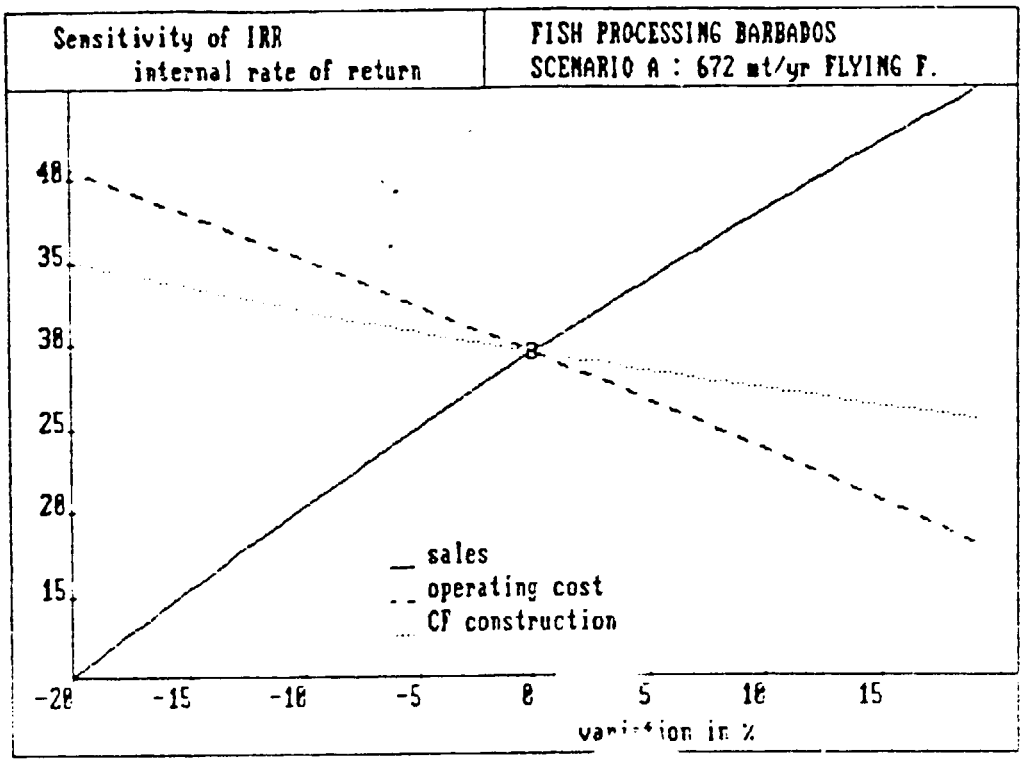
The break even points for fixed and total production costs are at 10% and 50% capacity utilization.



Financial costs, according to Scenario A, are considered.

Fixed costs are covered by sales at a capacity utilization of less than 20%.

Sales equal the total production costs at about 85% capacity utilization.

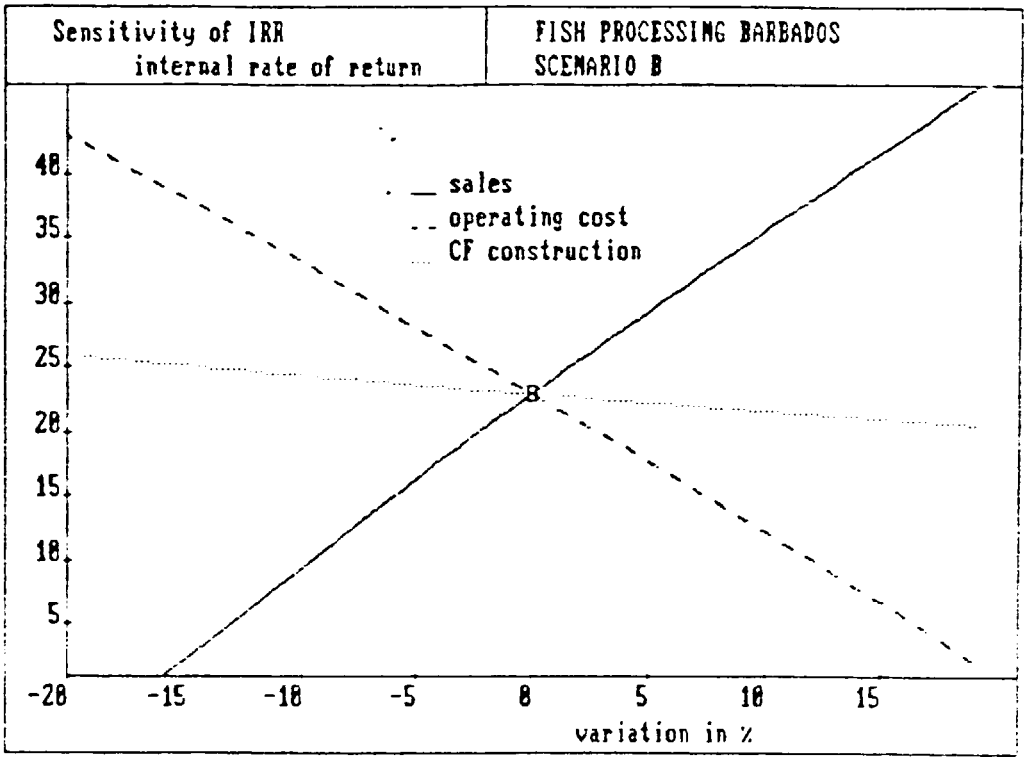


The internal rate of return (IRR) at the given assumptions of Scenario A is about 30%.

The IRR is relatively sensitive towards changes of sales prices. However, due to the high initial level, a decline of sales prices of up to 15% would still lead to an acceptable IRR of over 15%

The IRR is less sensitive towards variations of the operating costs. A 20% increase of operating costs corresponds with an IRR of over 25%.

Due to the low initial investment costs - in comparison to the annual net cash flows - changes of the investment costs have a neglectable impact on the profitability.



The internal rate of return of Scenario B is about 23%.

Like in Scenario A, the IRR is sensitive towards sales prices. The comparatively higher sensitivity towards operating costs is a result of higher material costs.

A 10% reduction of sales prices or an increase of operating costs by 13% correspond with an IRR of 10%.

Hence, the margin of security is lower than in Scenario A , however, under the given conservative assumptions, it may still be regarded as acceptable.

9.2.7 Observations and Conclusions

Presently there exists only one firm in Barbados processing on a commercial scale the species of fish considered in this report. This situation leaves the local fishermen without market alternatives for their catch. It may be possible that the implementation of this project will create a more competitive market condition to the benefit of local fishermen.

The feasibility analysis shows that Cases A, B and D are feasible, although a more careful market study for the final products would be advisable.

Overall, the plant can be expected to benefit both fishermen and consumers. It's capacity is sufficient to increase the demand for fish, particularly those landed by ice-boats. The resulting increase in ex-vessel price combined with the ability to quickly unload and return to sea will strengthen the economic viability of the harvesting sector.

Consumers will also benefit as fish will become available year round at a more stable price. In addition, the plant is small enough that there is room for others to enter the seafood processing industry. Increased competition within the industry will ensure economic efficiency which is to the advantage to the overall public.

10. CONCLUSIONS

The Seafood Processing Project in Barbados is recommended for implementation because of the following advantages:

A) The project is financially an attractive investment with an Internal Rate of Return of 35%, and a Net Present Value of BD$ 2,583,000, on the base Case A.

B) The establishment of a process plant will improve the economic conditions for the fishermen and turn their operation around from present losses to a reasonable profitability, which will enable them to service their present loans to Barbados Development Bank.

C) The project will create 72 new jobs directly in Barbados, 20 new opportunities for fishermen and 30 in support service industries, ie: a total of 122 new jobs.

D) The seafood product will replace present imports in the domestic market by import substitution at a value of about US$ 800,000.

E) Export opportunities for the frozen Barbados seafood product could earn up to US$ 1,150,000 in foreign exchange per year.

F) Ready availability, year round, of frozen quality seafood will improve the nutrition of the population of Barbados.

G) The Process Plant will absorb large supplies of fish from ice-boats and thereby remove supply/price pressure on artisanal day-boats.

The major drawbacks of the project are:

A) Lack of sufficient detailed knowledge of the extent of the marine resources.

B) The need to fish in adjacent territorial waters (ie: Trinidad & Tobago) for part of the supply of Flying Fish.

C) The resulting modest increase in cost of fish, both fresh and frozen, to the consumer.

Comments to the abovementioned drawbacks are:

A) The plant is flexible. If it is not possible to obtain sufficient Flying Fish, the plant could process and freeze Other Fish not yet properly exploited.

B) Agreements will have to be entered into at national level. Flying Fish are migratory, so should be shared by adjoining nations.

C) The increase will improve the living conditions of fishermen and the additional funds will return to the Bank and the economy.

The chances of implementing the project appear very good. The initiative must be taken by the Barbados Development Bank.

In short, the project is recommended for the following Reasons:

- It will improve fishermen's economic situation
- It will improve nutrition in Barbados
- It will earn foreign exchange
- It will create additional employment

APPENDIX A

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REFERENCES

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APPENDIX B

VESSEL ECONOMICS ANALYSIS

APPENDIX B

VESSEL ECONOMICS

INTRODUCTION

Th is section is intended to provide insights into the parameters that influence the supply side of the project, namely the economic viability of ice boats operating out of Barbados.

It is divided into three parts. The first presents a description of the method for distributing revenues. The cash flows, based on data obtained from Hunte (1986), scenario I and collected by the consultants, scenario II, during their May-June visit, are presented and compared below.

The next task invloves examining the profitability of a vessel by identifying the expenses that are currently incurred in owning a vessel.

The third part consists of a sensitivity analysis which changes key variables in order to determine how an efficient and competitive marketing and processing sector would influence vessel profitibility. In order to avoid confusion, it is helpful to elaborate on the share system, the procedure employed in allocating costs and earnings between a vessel owner and his crew.

I THE SHARE SYSTEM

The system functions as follows; First, the catch is unloaded and sold for the "best" price. Estimates of the quantity and composition of average catch along with corresponding price data are presented in table I. Supporting landings data used in preparing scenario B were taken from the Barbados Development Bank files and summarized in Attachment 1. The total value of the catch is referred to as the "gross" (table II) Next, trip expenses which include the costs of fuel, ice, supplies and market tolls, when the fish is sold at a government installation, are deducted (table III). In essence, the captain and crew pay 50% as does the vessel owner. The remainder or "net" is then distributed with 50% going to the vessel owner, 20% to the captain and the remaining 30% is divided among two crew members. Examples of the shares currently earned are presented in table IV. To put earnings by the captain and crew into perspective, table V lists salaries commonly received for various categories of jobs.

LANDINGS ASSUMPTIONS		
	SCENARIO I	SCENARIO II
ITEM		
Average number of trips/year	14.5	15.25
Total catch/trip (mt)	1.8	1.77
Total catch/year (mt)	26.2	27.10
Landings by species/yr		
Flying Fish (mt)	17.0 (65%)	17.6 (65%)
Big Fish (mt)	9.2 (35%)	9.5 (35%)

TABLE I

When contemplating whether the crew and captain's shares are reasonable, one should remember that this amount is earned over a six to seven month period, that the fishermwn are away from home for long periods of time and that their work day far exceeds the number of hours per day one would spend in a "nor.nal" job. All that can be said is that their earnings appear to be commensurative with positions which demand similar skills.

GROSS (REVENUES)		
	SCENARIO I	SCENARIO II
ITEM		
Average price/kg/yr		
Flying Fish	1.76	2.20
Big Fish	6.60	7.15
Average yearly gross	90,640.00	106,645.00
Average gross/trip	6,251.00	6,993.00

TABLE II

TRIP EXPENSES		
	SCENARIO I	SCENARIO II
ITEM		
Fuel/trip	500.00	700.00
Ice/trip	500.00	550.00
Food & supplies/trip	250.00	350.00
Market tolls/trip	110.00	108.00
TOTAL TRIP EXPENSES	1,360.00	1,708.00
YEARLY TRIP EXPENSES	19,720.00	26,047.00

TABLE III

SHARES		
	SCENARIO I	SCENARIO II
ITEM		
Net revenue /trip	4,891.00	5,285.00
Vessel owner share (50%)	2,445.50	2,642.50
Captain share (20%)	978.20	1,057.00
Share/crew (2 crew)	733.65	792.75
Annual net revenue	70,920.00	80,596.00
Vessel owner	35,460.00	40,298.00
Captain	14,184.00	16,119.20
Per crew member	10,638.00	12,089.40

TABLE IV

COMPARATIVE SALARIES IN BARBADOS	
Production Supervisor	$ 18,700/yr
Labourer	7,500
Plumber, Carpenter or Printer	14,560
Foreman	10,440
Professional	33,000

TABLE V

II VESSEL COSTS AND EARNINGS

While the shares going to the crew and captain may be considered as their before-tax wage, the situation is much different for the owner as he is liable for the fixed costs that accrue from owning the vessel. A description of the costs and the assumptions utilized in preparing his cash flow are presented below.

The reader should be aware that the motivating factor prompting the purchase of a vessel by an "absentee" owner may not always be the expectation that the investment will generate a positive cash flow. For example, the owner's financial status may be such that investing in an unprofitable venture provides tax write-offs that more than offset any losses. There may also be instances where the cash flow is negative but profits are generated when the vessel is sold. These possibilities are not addressed as they would require extensive knowlegde of each owner's financial status, tax laws in Barbados and the Caribbean market for used fishing vessels.

Before addressing the topic of vessel profitability it ios helpful to review the methodology used in calculating the cash flow as it differs slightly from traditional procedures. **First,** the shares going to the crew and captain are considered to be exogenous as they are deducted before the owner receives any money and consequently do not enter directly into his cash flow. **Second,** it is assumed that the incentive for purchasing a vessel is based on the expectation of generating a return to investment, the amount tof money he put down to purchase the vessel. Fishing cannot be considered as secure an investment as putting one's money into a bank so the investor would expect a higher rate of return to compensate for the additional risk. A rate of 13% has, therefore, been chosen. In the examples below, the owner's investment has been amortized at 13% per year with the interest and principal being repaid in equal installments over 20 years. This return is, in essence, the profit the owner makes. It is included as a cost because without it there is no incentive to invest. Depreciation is omitted as it is considered simply as a subtraction from overstated asset figures and, thus does not invlove an actual cash outlay. Including depreciation would also cause the initial capital stock, the purchase price of the vessel and gear, to be counted as it is already included in the loan repayment and reture to investment. Before proceeding, it should be mentioned that if the owner works assisting the crew or captain, his time should be assigned a value which would increase the costs. Costs associated with the initial purchase of the vessel are presented in table VI. Annual fixed costs borne by the owner are summarized in table VII.

Indications are that the ice boat owners are currently experiencing significant losses. The owner depicted in scenario A is not capable of meeting his annual bank payments even if he were to completely forego any return on his investment. One would not anticipate that such an action would be consistently repeated as it would eventually cause a "rational" investor to cut his losses by selling the vessel and putting his money in a bank or fund where it is secure and still generates a positive return two to three times that indicated in either scenario.

In the cases above, fixed cost is currently about 50% of annual gross. Loan repayment alone amounts to 25% of annual gross and a bit over 50% of annual fixed cost. Figures I and II depict the owner's costs and revenues associated with varying numbers of trips and breakeven points. The points where the owner starts to receive income on his investment are indicated by an **X**. The point where he is able to pay all costs and recoupe a "normal" return on his investment is considered the breakeven point and is indicated by the letter **Y**. The range between **X** and **Y** is considered the breakeven range as it identifies the point where the owner begins receiving a return and the point where that return becomes "excessive". Economists use this term to signify that the returns surpass the opportunity costs of capital. A 13% return on investment has been calculated into the cost so profits over and beyond the breakeven level are said to be excessive. Changes in the owner's average annual total cost per kilogram of fish produced are presented in figure 3.

VESSEL COSTS		
	SCENARIO I	SCENARIO II
ITEM		
Vessel purchase cost	200,000.00	180,000.00
Loan amount (70% of cost)	140,000.00	126,000.00
Repayment period	10 yrs	10 yrs
Interest rate	13%	13%
Return on owner's investment	13% (20yrs)	13% (20yrs)

TABLE VI

ANNUAL VESSEL COSTS & EARNINGS		
	SCENARIO I	SCENARIO II
ITEM		
Owners share	35,460.00	40,298.00
Owners costs		
Loan Repayment	24,000.00	22,576.00
Insurance	7,500.00	7,000.00
Return to investment	8,435.00	7,592.00
Maintenance & Repairs	6,500.00	9,000.00
Total Vessel Cost/year	46,435.00	46,168.00
Net profit (loss)	(10,975.00)	(5,870.00)

TABLE VII

BREAKEVEN ANALYSIS : SCENARIO A

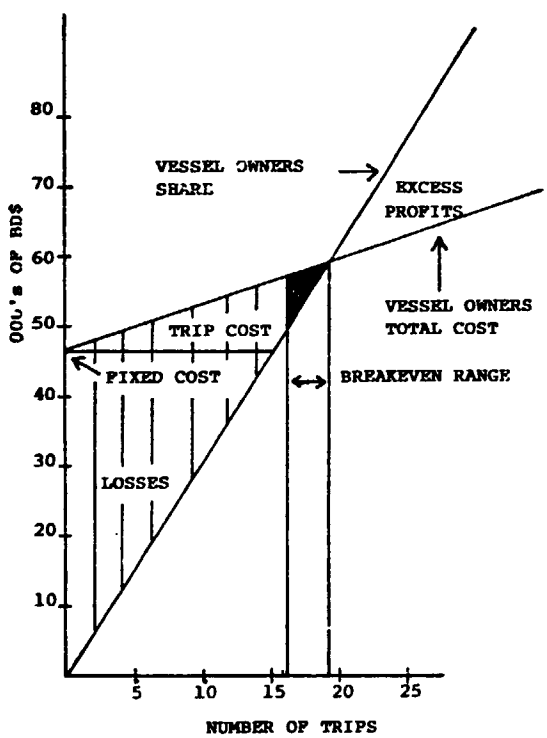


FIGURE 1

BREAKEVEN ANALYSIS : SCENARIO B

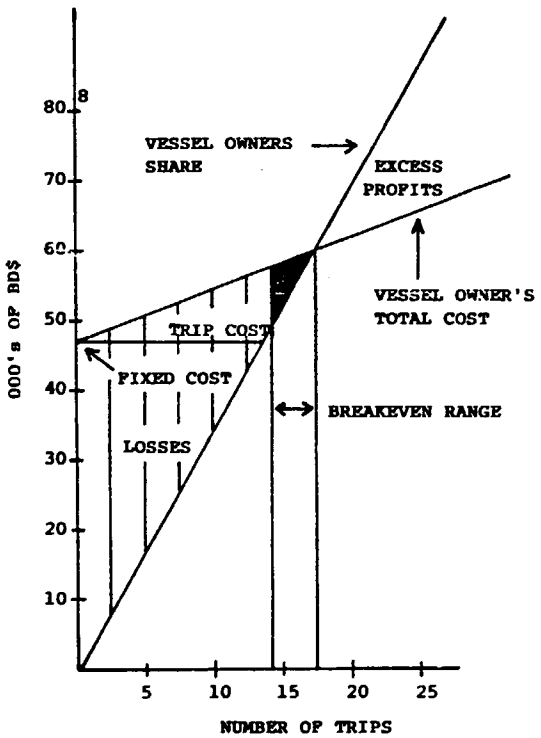


FIGURE 2

III SENSITIVITY ANALYSES

In order to conduct sensitivity analyses which demonstate how vessel profits respond to changes in the market structure, it is necessary to gain insights into the types of changes that are most likely to occur. This is accomplished by reviewing the existing market alternatives and identify those variables which would be influenced by the introduction of a modern processing facility.

Market Alternatives.

Several marketing alternatives and issues identified by Barbadian fishermen, vessel owners and industry authorities which have direct bearings on vessel earnings are examined in this section. Specifically mentioned were A) low and unstable prices, B) The inability to quickly sell the catch for an "acceptable" price and return to sea and C) alligations that the established buyers cannot dispose of larger than "normal" catches which forces fishermen to "restrict our catch when fishing is very good." In essence, issues B and C are directly related to A, low and unstable prices, but it is worthwile examining each individually. This is not to say that fishermen have no market alternatives. Some of the more common ones are discussed below but, as we shall see, there are hitches and trade offs associated with each.

A) Price Levels and Stability

Prices in a competitive industry, such as the one confronted by Barbadian fishermen, are determined by the interaction between supply and demand. The combined actions of all fishermen, excluding pressures from imports, determine supply. This does not imply that fishermen are total victims of a market in which they have no say. For example, they may decide that prices are too low to justify making a trip and will instead elect to sit at the dock until prices rise. Others may bypass lower priced species in search of more expensive ones. This is apparantly common in Barbados as more than one fisherman reported switching to dolphin and billfish when the price of flying fish was "too" low. The point is that no single individual can set the prices he receives for his fish.

Historical data indicate that ex-vessel prices in Barbados have fallen, at least over the last few years. This decline can obviously be attributed to the introduction of ice boats in the early 1980s. Hunte (1986) estimates that an average ice boat lands 162% more fish than a day boat. Restated, one ice boat produces a catch equivalent to 2.6 day boats. If one speculates that the number of active boats has remained constant since the early 1980s, the entry of ice boats has caused domestic landings to increase by approximately 30%.

AVERAGE VESSEL COST PER KILOGRAM OF FISH

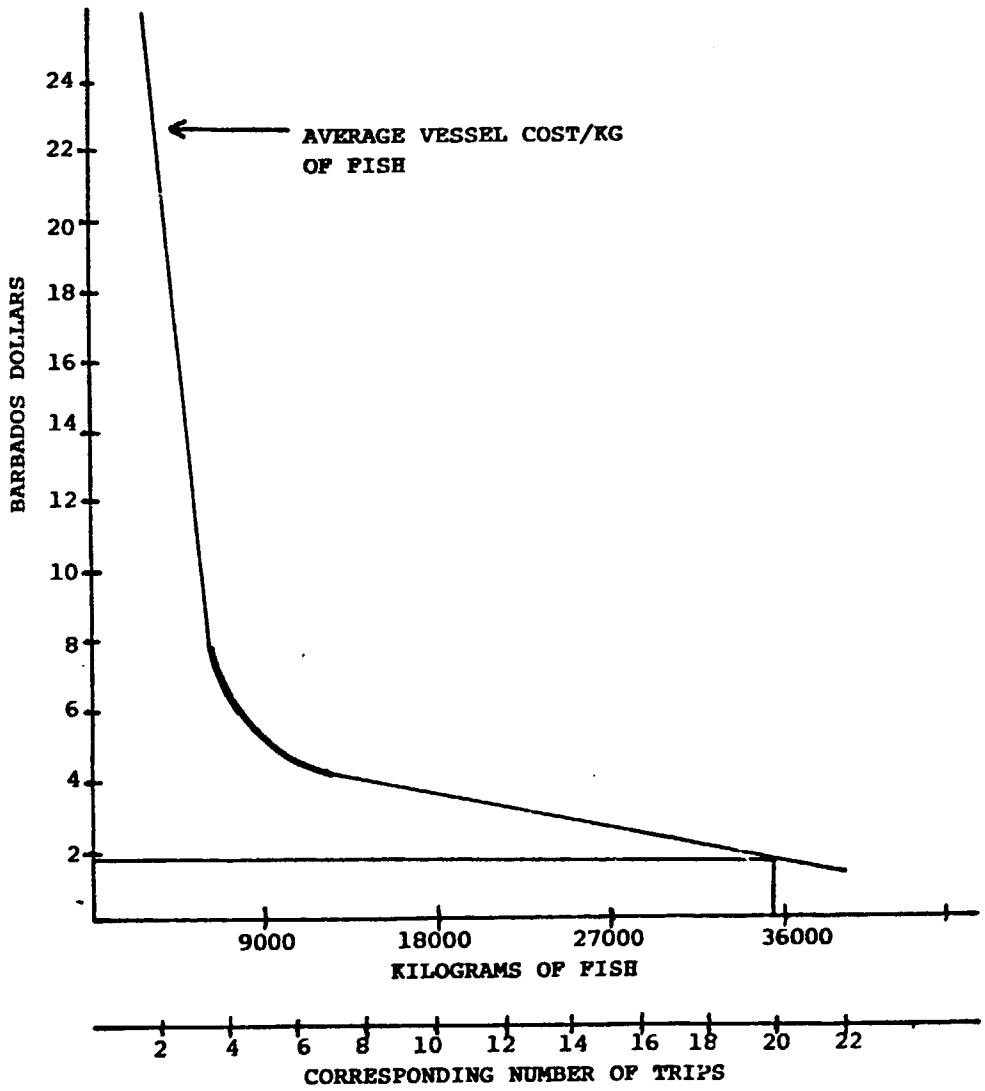


FIGURE 3

SOURCE: BASED ON DATA FROM HUNTE (1986)PRESENTED IN SCENARIO A

On the other side of the coin, demand has remained fairly stable. The annual rate of population growth is less than 0.4% which indicates that, other things remaining equal, over the four years demand has only increased by 1.2%. During the same period, there have been no significate changes in the structure, performance or capacity of the marketing and processing sectors which would enhance their ability to handle increasing supplies. The sectors remain stagnant and overtaxed which lends credence to allegations by fishermen that the market is constantly glutted. Mr Jones, Director of the Barbados Fisheries Department, claims that "before the introduction of ice boats, prices were more erratic, sometimes dropping to $12.00/100 flying fish. Prices are now more stable but drop as low as $7.00/100". He attributes part of the decline to the fact that fish landed by ice boats are generally perceived to be inferior in quality to fish landed by day boats. While this is a contributing factor, the fact still remains that supply has clearly accellerated at a faster pace than demand and prices have consequently fallen. The facts that 85.5% of the 1985 landings came in during a six month period (December - May) and that fish is perishable and must be disposed of quickly, further aggravates the problem. All these facts point clearly to the need for additional market outlets such as a new seafood processing plant.

Marketing and Trips/season.

Fishermen have four choices when marketing their catch. The first is to offload with one of the few processors which entails moving a large volume at a low price. This alternative is exasperated by the fact that Barbados, for all practical purposes, has one processor who dominates the sector and consequently has a degree of monopolistic power which provides him with a good degree of leeway when it comes to setting prices. The benefit to the fishermen is a quick turn around and the ability to spend more time at sea. The second alternative is to enter into an agreement with specific hawkers who are responsible for marketing from that boat and the third is to sell or process the fish themselves. The latter generates higher prices but takes time so the vessel must lie idle until the fish is sold. The final scenario invloves a combination of the alternatives above but diminishes the captain's bargaining power with the hawkers. In each instance, the trade off is between price, volume and consequently the number of trips per season. The economic implementations associated with the various trade-offs are closely scrutinized toward the end of this section. Fishermen may also take into account social and cultural considerations as one fisjerman reported having family members as hawkers.

Market Constraints on Quantity landed/trip

Several fishermen complained that when catches are larger than normal, hawkers have difficulty in disposing of it which causes them to argue with the captain and drop prices. The drop in price could reflect the fact that the hawkers have a fixed territory or clientel that can accept only a given range of supply. A sudden increase in supply forces hawkers to lower prices and intrude on anothers territory. Another constraint could be that hawkers need more time to sell larger quantities which causes quality and consequently price to drop. Fishermen, when restricting their catch, may be responding to inelastic demand which means that the increase in catch results in price decreases by a greater percentage. There are also complex inter dependencies between the vessel and hawkers. In either case, larger catches could yield smaller grosses. Fishermen have apparently decided that bringing in large volumes is simply not worth it.

It is reasonable to assume that this is not a common phenomena. If it were, the number of hawkers obligated to sell the catch would increase, so the potential for increasing catch per trip is most likely minimal.

It is not argued that the traditional marketing system is outdated or inapporpriate. The system has evolved in an efficient manner, is obviously well suited for Barbados and provides a variety of social and economic benefits. Attempts to undermine the system would meet with strong resistance. Hawkers do not, however, have access to the capital, technology or managerial capabilities required to cope with the sudden strain caused by recent changes in the supply side. It is also evident that the system does provide fishermen with a variety of marketing alternatives.

Sensitivity Analyses.

An efficient and competitive marketing and processing sector will have positive influence on remedying the problems identified. While it is difficult, if not impossible, to put exact dollar figures on the improvements that will occur, it is rather easy to speculate on the types and directions of change. The basic assumptions are that a new plant will increase demand at the ex-vessel level by providing fishermen with an additional market. Implicit in this argument is that fishermen will be able to maintain current alternatives. The assumption that demand will increase is easy to validate. Any new major player entering the market will have to at least match existing prices and services if he is to attract sellers and remain in business. The more efficient his operation, the greater his ability to compete.

Increased competition and efficiency translate into higher prices at each level of production. There have been cases where fishermen have fallen prey to increases in their production but such cases are rare and the presence of a marketing sector which can respond to price incentives by cost effectively transferring a product through time and space nearly eliminates the possibility of such an occurrence. This is particularly true for Barbados as the quantities landed are too small to effect the world market.

The sensitivity analyses projects how vessel profits will be influenced by increases in ex-vessel prices, average landings per trip and the number of trips made each season, given existing input costs. The analyses are based on data presented by Hunte as it is the "worst case scenario". Changes projected are minimal as the object is to gain insights into the magnitude of change in vessel profits without creating too much expectation. Remember that the owner's return, his profits, have been included as a vessel cost, so anything beyond this amount is considered as excess profit. It is worth mentioning that as such profits are often attributed to management but it has been previously assumed that the owner does not participate in day to day decision making. Also, the vessel costs listed in table VII are assumed to remain constant. The breakeven range is marked in each of the figures. Profits which exceed normal returns are again considered as excessive.

Figure 4 presents a visual portrayal of how vessel profits (losses) correspond with various numbers of trips/season. At the existing level of effort, an owner is loosing $10,975.00 annually. Each additional trip increases his share by $2,445.00.

The breakeven range is between 15.7 and 19.1 trips/season. If, for the sake of simplicity, we assume that all fixed costs have been paid at the breakeven point, 19 trips, then each additional trip increases "excess" vessel profits of $2,445.00.

Figure 5 is based on the assumption that ex-vessel prices increase by 5%. In this instance, annual vessel losses at the current level of effort are reduced by $1,900.00 and breakeven range occurs at 18 trips/season. After breakeven, profits increase by $2,578.00/trip.

Figure 6 portrays changes in profits given a 10% increase in gross. The change could result from a 10% increase in price, landings per trip going up by 10% or some simultaneous increase in both (i.e. a 5% rise in price combined with a 5% increase in landings/trip). In this instance, losses at the current level of effort would be reduced by 4,300.00 to $6,670.00. The breakeven range occurs between 14.7 and 17 trips/season after which vessel profits increase by $3,035.00/trip.

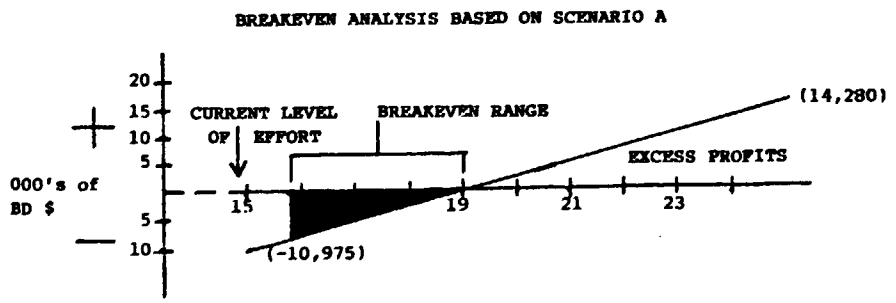


FIGURE 4

BREAKEVEN ANALYSIS BASED ON SCENARIO A WITH A 5% INCREASE

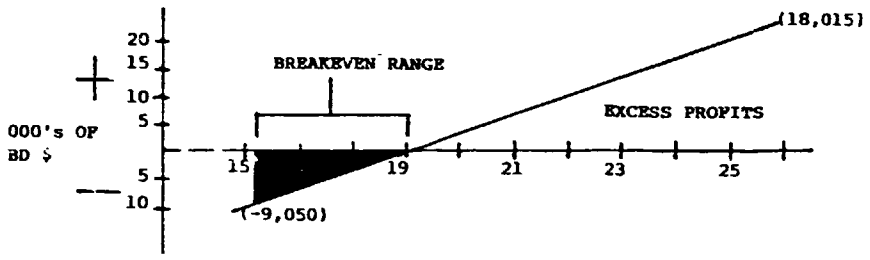


FIGURE 5

BREAKEVEN ANALYSIS BASED ON A 10% INCREASE IN GROSS/TRIP

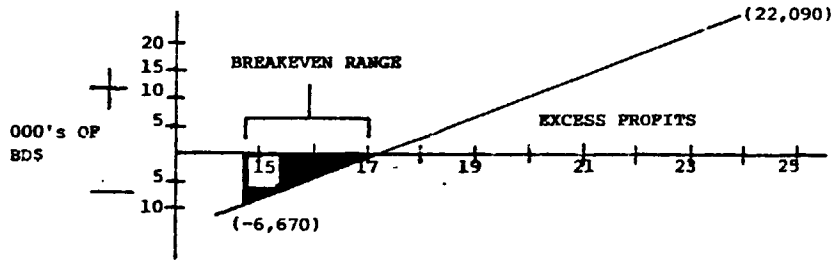


FIGURE 6

CONCLUSIONS

The primary conclusion to be drawn from the analyses above is that the number of trips per season is the most significant variable influencing vessel profits.

These results are based on the least favourable scenario and relatively conservative assumptions concerning changes that would be induced through the creation of a competitive and efficient processing sector.

The point is, that although vessels are currently experiencing large losses, a modest increase of 5% in prices and the ability to make 18 trips per year would enable vessel owners to cover all costs. Making 19 or more trips per year generates "excess" profits which would motivate others to enter the industry.

If stocks are not sufficiently healthy to support the added effort, the catch per unit of fishing effort will decrease for all vessels and the industry will start to suffer losses again. Another possible result is for the stock to collapse. Development efforts should therefore be coordinated with data collection, scientific research and stock management.

ATTACHMENT 1

Barbados Fish Processors: Vessel Landings (1983)

Vessel	Months reported	#trips	Total catch (kg)	Ave. catch /trip
Full Time Vessels				
Supertest	6	14	62798	4486
Cygnus Star	6	16	70695	5050
Wecom	6	16	50751	3172
Tiburon	6	15	54319	3621
Ave. (full time)	6	15.25	238563	3910
Part Time Vessels				
Kevannal	5	15	22228	1852
Pioneer	5	14	69785	4985
Brenda Ann	5	9	12878	1431
We Three	4	6	16727	2788
Ctgnus II	4	8	45339	5667
El Retes	2	5	15456	3091
Ave. Part Time	4.2	9.5	182413	3302

Source: Barbados Fish Processors, Landing Slips

APPENDIX C

PROPOSED RESOURCE STUDY

APPENDIX C

Proposed Resource Study

As an example, the objectives of such a study would be to define the distribution of Flying Fish, to determine the resource availability and also determine the life history including reproductive characteristics.

Short Title: Barbados Flying Fish Resource Study

Title: A Study to Determine the Annual Resource Availability of the Flying Fish, Hirundichthys affinis, in Coastal and Adjacent Waters to Barbados.

Objectives: The First objective is to define the spatial and temporal distribution of abundance of the Flying Fish in the waters surrounding Barbados on an annual basis.

The Second objective is to determine resource availability and stock size available to the Barbados fishery.

The Third objective is determining the principal life history parameters of the Flying Fish, including biological, ecological and migratory habits.

Strategy:

The study will make use of vessels in the commercial fleet, chartering boats capable of carrying out elements of the study, ie: day-boats for local coastal work and ice-boats for distant water sampling. In this way a cross section of the industry can be induced to cooperate in the study from different sectors, and communities involved in the fishery.

Where possible a simple logbook either maintained onboard or compiled by interrogation from a sample of reliable members of the fishing fleet should be compiled and maintained on a trip by trip basis to supply basic fishery operational information.

The fishing fleet is a "biased" sampler and on a planned regime vessels will have to be placed on charter and withdrawn from the preferred fishing area to maintain proper coverage of all waters through-out the year.

A random (or pseudo) stratified sample program will be defined by the biologist in charge after logistical and practical operational consideration have been taken into account at the start of the study. However sampling through-out the entire coastal zone without preference to the natural occuring density of commercial concentration of fish will be strictly adhered to on a regular pre-determined basis.

Standard biological and environmental data will be gathered by on vessel sampling and the fish landed at landing sites.

Methods

Area of survey - to be determined by biologist in charge at the outset of the survey to cover fished and non-fished zones.

A sample program to be established for a full twelve month period to cover fished and non-fished zones. The precise sample regime to be agreed after consideration of logistic, operational and statistical factors.

Engage the assistance of landing market managers and key fishermen to establish a data base on vessel performance and fish sampling.

Field trips will be made on a regular basis by the biologist in charge and technical staff to evaluate the efficiency of data being collected by remote means and personally assess species composition of catches.

Staffing:

1 Graduate Biologist

2 Technicians (local) for sea duties

Equipment

With arrangement with the local institutes, access to the following facilities for biological, environmental and data base reporting functions will be desirable:

Biological:

Microscope

Biochemical

Computing (population dynamics)

Environmental:

Salinity (seawater)

Temperature (seawater)

Secchi disk (turbidity)

Costs: (BD$)

Boat Charters:	
Day-boats for say 150 days	10,000
Ice-boats for say 240 days	40,000
Fuel	20,000
Equipment	10,000
(may require revision depending on final operational plan)	
1 Biologist	50,000
1 Technician - I	30,000
1 Technician - II	20,000
(for say a 1 year contract)	
Consumables	20,000
Estimate Cost =	BD$ 200,000

APPENDIX D

MARKET PRICE DATA

FISH PRICES (Whole sale)

Location: Oistins Kg. Month : Jan - Dec 1985

Month	F.F.	Dol.	K.F.	Sk.	Tuna	B.F.	Br.	Snap	O.S	Jk.	Cv.	Bn.	P.F.	ADV
Jan	1.265	6.608	6.608	3.921	4.891	4.711	6.492	6.508	#DIV/0	#DIV/0	#DIV/0	4.405	#DIV/0	5.422
Feb	1.857	5.959	5.925	4.231	4.405	4.846	6.608	6.608	#DIV/0	#DIV/0	#DIV/0	4.956	#DIV/0	5.507
Mar	2.091	4.206	4.225	3.214	3.775	3.511	6.608	6.608	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/
Apr	2.042	4.037	4.013	3.420	3.536	3.610	6.608	6.608	#DIV/0	4.405	#DIV/0	3.304	0.000	3.304
May	1.840	4.114	4.174	3.219	3.860	3.838	6.608	6.608	#DIV/0	#DIV/0	#DIV/0	4.405	#DIV/0	4.038
Jun	1.489	5.121	5.220	3.750	4.897	4.463	5.718	5.727	#DIV/0	#DIV/0	#DIV/0	4.005	#DIV/0	#DIV/
Jul	3.117	6.993	7.159	4.956	6.057	6.388	6.608	6.608	#DIV/0	4.293	#DIV/0	5.374	#DIV/0	5.507
Aug	#DIV/0!	7.709	7.709	5.507	#DIV/0	6.608	7.087	6.997	#DIV/0	4.405	#DIV/0	5.782	#DIV/0	5.549
Sep	#DIV/0!	7.709	7.709	5.507	5.507	5.507	7.709	7.709	#DIV/0	4.130	6.608	5.507	#DIV/0	5.459
Oct	#DIV/0!	7.709	7.709	5.507	#DIV/0	5.767	#DIV/0	7.709	#DIV/0	5.176	6.608	5.507	#DIV/0	5.337
Nov	4.561	7.709	7.709	6.608	#DIV/0	7.526	#DIV/0	7.709	#DIV/0	6.608	#DIV/0	6.608	6.608	6.608
Dec	2.092	7.711	7.709	5.507	6.608	6.608	7.709	7.709	#DIV/0	#DIV/0	6.608	5.507	#DIV/0	5.960

FISH PRICES (Retail)

Location: Oistins Kg. Month : Jan - Dec 1985

Month	F.F.	Dol.	K.F.	Sk.	Tuna	B.F.	Br.	Snap	O.S	Jk.	Cv.	Bn.	P.F.	ADV
Jan	1.622	7.709	7.709	5.552	7.159	6.84	7.709	7.709	#DIV/0	#DIV/0	#DIV/0	5.707	6.608	6.608
Feb	2.205	7.316	7.225	5.854	6.828	7.159	7.709	7.709	7.709	#DIV/0	#DIV/0	6.057	6.608	6.608
Mar	2.635	5.507	5.607	4.535	5.396	5.002	7.709	7.709	7.709	#DIV/0	#DIV/0	6.608	6.608	#DIV/0
Apr	2.873	5.81	5.746	4.753	5.636	5.657	7.709	7.709	#DIV/0	5.507	#DIV/0	4.405	6.608	5.507
May	2.304	5.542	5.507	4.49	5.565	5.551	7.709	#DIV/0	#DIV/0	#DIV/0	#DIV/0	5.507	6.608	5.14
Jun	1.879	6.204	6.3	5.192	6.438	5.97	7.179	7.304	#DIV/0	#DIV/0	#DIV/0	5.206	6.608	#DIV/0
Jul	3.75	8.15	8.26	6.608	8.26	8.37	7.709	7.709	#DIV/0	5.507	#DIV/0	6.608	6.677	6.608
Aug	#DIV/0	8.811	8.811	7.159	#DIV/0	8.811	8.667	8.681	#DIV/0	5.507	#DIV/0	6.865	6.608	6.65
Sep	#DIV/0	8.811	8.811	6.608	7.709	7.342	8.811	8.811	#DIV/0	5.231	7.709	6.608	6.608	6.56
Oct	#DIV/0	8.811	8.811	6.608	#DIV/0	7.825	#DIV/0	#DIV/0	8.811	6.388	7.342	6.608	6.608	6.396
Nov	5.23	8.645	8.659	6.608	7.709	7.709	8.496	8.48	#DIV/0	6.608	7.709	6.408	6.608	5.828
Dec	2.54	8.811	8.811	6.608	8.422	8.405	8.811	8.811	#DIV/0	#DIV/0	8.26	6.608	6.608	7.061

F I S H P R I C E S (Whole sale)

Location: Cheapside Kg. Month : Jan - Dec 1985

Month	F.F.	Dol.	K.F.	Sk.	Tuna	B.F.	Br.	Snap	O.S	Jk.	Cv.	Bn.	P.F.	AOV
Jan	1.054	6.799	6.608	4.405	4.954	4.956	#DIV/0	6.057	5.231	#DIV/0	#DIV/0	6.057	#DIV/0	2.753
Feb	1.600	6.358	6.608	4.405	5.507	5.507	#DIV/0	#DIV/0	4.405	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0
Mar	1.525	4.597	4.787	4.109	5.507	4.956	6.057	#DIV/0	2.203	#DIV/0	#DIV/0	4.956	#DIV/0	#DIV/0
Apr	2.306	3.855	3.855	3.304	3.561	3.571	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0
May	#DIV/0!	3.855	3.855	3.304	3.855	3.524	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0
Jun	1.977	6.608	6.608	5.837	6.608	6.608	7.159	#DIV/0	#DIV/0	#DIV/0	#DIV/0	6.608	#DIV/0	#DIV/0
Jul	2.965	6.608	6.608	4.405	6.608	6.608	7.709	7.709	5.507	4.405	#DIV/0	6.608	#DIV/0	5.507
Aug	#DIV/0!	6.608	6.608	6.057	#DIV/0	5.176	7.709	7.709	6.608	4.405	6.608	6.608	#DIV/0	6.608
Sep	#DIV/0!	7.159	7.159	#DIV/0	#DIV/0	5.117	#DIV/0	7.709	6.608	4.405	#DIV/0	#DIV/0	#DIV/0	#DIV/0
Oct	#DIV/0!	#DIV/0	6.608	6.057	#DIV/0	5.176	#DIV/0	6.608	6.608	4.405	6.608	#DIV/0	6.057	6.608
Nov	#DIV/0!	7.709	7.709	5.507	#DIV/0	5.176	#DIV/0	6.608	#DIV/0	3.855	#DIV/0	7.709	6.608	6.608
Dec	1.186	7.709	7.709	#DIV/0	5.066	5.066	7.709	#DIV/0	4.405	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0

F I S H P R I C E S (Retail)

Location: Cheapside Kg. Month : Jan - Dec 1985

Month	F.F.	Dol.	K.F.	Sk.	Tuna	B.F.	Br.	Snap	O.S	Jk.	Cv.	Bn.	P.F.	AOV
Jan	1.318	7.659	7.709	6.486	7.709	7.593	7.709	#DIV/0	7.709	#DIV/0	#DIV/0	7.709	#DIV/0	5.140
Feb	1.873	7.470	7.709	6.608	6.608	6.608	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0
Mar	1.835	6.007	5.979	6.015	6.606	6.608	7.159	#DIV/0	4.405	#DIV/0	#DIV/0	6.057	#DIV/0	#DIV/0
Apr	2.635	5.690	6.057	4.405	5.507	5.821	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0
May	#DIV/0!	6.608	6.608	5.507	6.608	6.264	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0
Jun	2.175	7.709	7.709	6.498	7.709	7.709	8.811	#DIV/0	#DIV/0	#DIV/0	#DIV/0	7.709	#DIV/0	#DIV/0
Jul	3.294	7.709	7.709	6.608	7.709	7.709	8.811	8.811	6.608	6.608	#DIV/0	7.709	#DIV/0	6.608
Aug	#DIV/0!	8.811	8.811	7.709	#DIV/0	7.709	8.811	8.811	7.709	6.608	7.709	7.709	#DIV/0	7.709
Sep	#DIV/0!	8.811	8.811	#DIV/0	#DIV/0	7.709	#DIV/0	8.811	8.811	6.608	#DIV/0	#DIV/0	#DIV/0	#DIV/0
Oct	#DIV/0!	#DIV/0	8.811	6.608	#DIV/0	7.709	#DIV/0	#DIV/0	8.811	6.608	8.811	#DIV/0	7.709	8.811
Nov	#DIV/0!	8.811	8.811	6.608	#DIV/0	7.709	#DIV/0	7.709	#DIV/0	4.956	#DIV/0	8.811	7.709	7.709
Dec	1.647	8.811	8.811	6.608	7.709	7.709	8.811	#DIV/0	6.608	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0

FISH PRICES (Whole sale)

Location: Speightstown Kg. Month : Jan - Dec 1985

Month	F.F.	Dol.	K.F.	Sk.	Tuna	B.F.	Br.	Snap	O.S	Jk.	Cv.	Bn.	P.F.	AOV
Jan	1.318	6.673	6.608	4.515	5.066	4.834	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0
Feb	1.753	6.222	6.057	3.304	5.507	4.681	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0
Mar	1.745	4.589	4.543	3.671	4.405	3.671	#DIV/0	#DIV/0	#DIV/0	6.608	#DIV/0	#DIV/0	#DIV/0	3.304
Apr	1.574	4.084	4.005	3.304	4.405	2.937	#DIV/0	#DIV/0	#DIV/0	#DIV/0	5.507	#DIV/0	4.405	#DIV/0
May	1.629	4.318	4.222	2.203	3.304	2.863	#DIV/0	#DIV/0	#DIV/0	3.442	#DIV/0	#DIV/0	#DIV/0	3.304
Jun	1.444	4.563	4.543	4.405	4.405	4.405	5.231	#DIV/0	#DIV/0	4.405	#DIV/0	#DIV/0	#DIV/0	4.405
Jul	2.514	6.167	4.956	4.405	#DIV/0	4.405	6.416	6.608	4.405	3.933	6.608	#DIV/0	4.405	4.405
Aug	#DIV/0!	6.975	7.159	5.507	6.608	#DIV/0	6.677	6.660	5.507	3.855	6.608	6.608	5.106	4.772
Sep	#DIV/0!	6.608	6.608	5.507	#DIV/0	5.507	7.465	6.746	#DIV/0	4.405	5.507	6.608	5.231	5.507
Oct	4.283	#DIV/0	6.608	5.507	#DIV/0	6.608	7.709	6.608	#DIV/0	4.405	#DIV/0	6.608	5.507	6.293
Nov	4.105	6.608	6.608	4.772	#DIV/0	6.424	#DIV/0	6.608	#DIV/0	5.507	#DIV/0	5.507	5.507	5.507
Dec	1.885	6.608	6.608	4.956	#DIV/0	5.803	#DIV/0	#DIV/0	#DIV/0	5.507	6.608	#DIV/0	5.507	5.727

FISH PRICES (Retail)

Location: Speightstown Kg. Month : Jan - Dec 1985

Month	F.F.	Dol.	K.F.	Sk.	Tuna	B.F.	Br.	Snap	O.S	Jk.	Cv.	Bn.	P.F.	AOV
Jan	1.619	7.778	7.778	6.222	7.333	6.667	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0
Feb	2.051	7.722	7.778	5.556	6.667	6.667	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0	#DIV/0
Mar	2.071	6.402	6.389	4.815	6.667	5.556	#DIV/0	#DIV/0	#DIV/0	#DIV/0	7.778	#DIV/0	#DIV/0	#DIV/0
Apr	1.977	5.833	5.657	4.444	6.667	4.444	5.000	#DIV/0	#DIV/0	#DIV/0	6.667	#DIV/0	#DIV/0	6.667
May	2.021	6.374	5.926	4.444	5.556	4.667	#DIV/0	#DIV/0	#DIV/0	#DIV/0	4.583	#DIV/0	#DIV/0	#DIV/0
Jun	1.758	6.667	6.667	6.667	6.667	6.667	6.667	#DIV/0	#DIV/0	#DIV/0	6.667	#DIV/0	#DIV/0	#DIV/0
Jul	3.071	7.667	7.222	5.556	#DIV/0	6.667	7.731	7.778	5.556	5.635	7.778	#DIV/0	5.556	5.556
Aug	#DIV/0!	8.148	8.333	6.667	#DIV/0	#DIV/0	7.847	7.828	6.667	5.417	7.778	7.778	6.263	5.926
Sep	#DIV/0!	7.778	7.778	6.667	#DIV/0	6.667	8.642	7.917	#DIV/0	5.873	6.667	7.778	6.389	6.667
Oct	4.612	#DIV/0	7.778	6.667	#DIV/0	7.778	8.889	7.778	#DIV/0	5.556	#DIV/0	7.778	6.667	6.508
Nov	4.561	7.778	7.778	6.667	#DIV/0	7.593	#DIV/0	7.778	#DIV/0	6.667	#DIV/0	6.667	6.667	6.667
Dec	2.338	7.778	7.778	6.667	#DIV/0	7.436	#DIV/0	#DIV/0	#DIV/0	6.667	7.778	#DIV/0	6.667	6.889

J & B Master Mart Food Prices/kg: 1986

Food Items	Price
Meats	
Ground beef	9.500
Strip loin Steak (New Zealand)	15.070
Fresh chicken legs	10.600
Frozen fish	
Flying fish fillets (Hanschell Innis)	18.500
Flying fish fillets (Seagull)	18.000
Dolphin steaks	11.950
Dolphin sections	11.950
Frozen/prepared fish	
Crisp cod portions in batter (U.K.)	9.520
Breaded cod fingers (U.K.)	15.280
Cod in parsley sauce (U.K.)	21.420
Cod in butter sauce (U.K.)	21.420
Plain plaice fillets (U.K.)	18.820
Cod fillets (U.K.)	17.210
Breaded cod fillets (U.K.)	15.700
Canned fish	
Light tuna in oil: 13 oz. (Japan)	5.050
Solid white tuna in water: 6.5 oz (U.S.	4.330
Kipper snacks: 4 oz (U.S.)	2.350
Mackerel in oil: 7 oz (Japan)	1.150
Mackerel in tomato sauce: 7.5 oz (Japan)	1.220

Goddard`s Food Fare Prices/kg: 1986

Food items	Price
Meats/kg	
Top sirloin	13.270
Local beef	9.920
New Zealand boneless lamb shoulder	11.390
Pork flank	7.340
Lamb loin chops	9.360
Whole chicken	5.250
Chichen halves	9.560
Frozen fish	
Flying fish fillets (5/pck, 8 oz.)	17.600
Flying fish melts (8 oz @ 2.33)	10.250
Flying fish fillets (Belcar, 10 @ 7.33)	16.130
Flying fish fillets (Belcar, 5 @ 4.25)	20.900
Dolphin (Atlantic Fish Mongers)	8.800
Lobster tails	79.290
Shrimp tails (shell on)	39.120
Cod fillets (U.K.)	27.530
Haddoch fillets (U.K.)	18.760
King fish steaks	12.900
Dolphin steaks	9.270
Dolphin slab	8.800
Semi boneless salted pollack (Canada)	11.000
Salted boneless cod (Canada)	13.090

APPENDIX E

EXPORT REGULATIONS

UNITED STATES OF AMERICA

TARIFF

CODE		CATEGORIES	DUTY MFN (ad val.)	DUTY LDDC (ad val.)	DUTY GT (ad val.)
110.10		Fish - fresh, chilled or frozen, whether or not whole, but not otherwise prepared or preserved:			
		Sea herring, smelts and tuna	Free		Free
		Smelts:			
	07	Fresh or chilled			
	09	Frozen			
		Tuna:			
	12	Albacore			
		Yellowfin:			
	20	Whole			
		Eviscerated:			
	25	Heads-on			
	30	Heads-off			
	37	Other			
	45	Skipjack			
	50	Other			
		Sea herring:			
	60	Fresh or chilled			
	70	Frozen			
110.15		Other - whole, or processed by removal of heads, fins, viscera, or any combination thereof, but not otherwise processed:			
		Cod, cusk, eels, haddock, hake, pollock, shad, sturgeon and freshwater fish	Free		Free
		Freshwater fish:			
		Whitefish:			
	05	Fresh or chilled			
	15	Frozen			
		Pike, pickerel and pike perch (including yellow pike):			
	37	Fresh or chilled			
	39	Frozen			
	40	Lake trout			
	50	Other trout			
	75	Other			
		Cod:			
	85	Fresh or chilled			
	89	Frozen			
		Cusk, haddock, hake and pollock:			
	93	Fresh or chilled			
	97	Frozen			
	99	Eels, shad and sturgeon			

Valid from Dec. 1984

CODE		CATEGORIES	DUTY MFN (ad val.)	DUTY LDDC (ad val.)	DUTY GT (ad val.)
110.20		Halibut and salmon	Free		2¢/lb
		Halibut:			
	25	Fresh or chilled			
	30	Frozen			
		Salmon:			
	45	Fresh or chilled			
	50	Frozen			
		Mackerel:			
110.25		Fresh or chilled	Free		2¢/lb
110.28*		Frozen	0.13¢/lb	Free	2¢/lb
		Swordfish:			
110.30		Fresh or chilled	Free		2¢/lb
110.33		Frozen	Free		3¢/lb
110.35*		Other:			
	52	Atlantic Ocean perch	0.5¢/lb		1¢/lb
		Flounders and other flatfish except halibut:			
	60	Fresh or chilled			
	65	Frozen			
		Other:			
	70	Fresh or chilled			
	75	Frozen			
110.36		If products of Cuba (except Atlantic Ocean perch - rosefish and Totoaba or white sea bass)	0.4¢/lb (S)		
		Scaled (whether or not heads, viscera, fins or any combination thereof have been removed), but not otherwise processed:			
110.40		In bulk or in immediate containers weighing with their contents over 15 lb each	Free		1.25¢/lb
110.45*		Other	6%		25%
110.47		Skinned and boned, whether or not divided into pieces and frozen into blocks, each weighing over 10 lb imported to be minced, ground or cut into pieces of uniform weights and dimensions:	Free		1.25¢/lb
	10	Cod			
		Flatfish:			
	24	Turbot			
	26	Other			
	30	Haddock			
	40	Pollock			
	55	Whiting			
	60	Atlantic Ocean perch (rosefish)			
	65	Other			
		Otherwise processed (whether or not heads, viscera, fins, scales or any combination thereof have been removed):			
		Cod, cusk, haddock, hake, pollock and Atlantic Ocean perch (rosefish)			

Valid from Dec. 1984

CODE		CATEGORIES	DUTY MFN (ad val.)	DUTY LDDC (ad val.)	DUTY GT (ad val.)
110.50		For an aggregated quantity entered in any calendar year of 15,000,000 lbs, or not more than a quantity equal to 15% of the average aggregated apparent annual consumption of such fish during the 3 calendar years immediately preceding the year in which the imported fish are entered, whichever quantity is greater, of which total quantity not over ⅓ shall be entered during the first 3 months, not covering ⅓ during the first 6 months, and not over ⅔ during the first 9 months of the year	1.875¢/lb		2.5¢/lb
110.55		Other:			
.	20	Atlantic Ocean perch (rosefish)	2.11¢/lb	1.875¢/lb	2.5¢/lb
		Cod:			
	45	Fresh or chilled			
	50	Frozen			
		Cusk, haddock, hake and pollock:			
	65	Fresh or chilled			
	70	Frozen			
110.57		Wolf fish (see catfish)	Free		2.5¢/lb
	10	Fresh or chilled			
	20	Frozen			
110.65		Yellow perch	0.2%	Free	1%
	10	Fresh			
	20	Frozen			
110.70		Other:	Free		2.5¢/lb
		Freshwater fish:			
		Pike, pickerel and pike perch (incl. yellow pike):			
	05	Fresh or chilled			
	15	Frozen			
	24	Catfish			
	28	Other			
		Flatfish, except halibut:			
	33	Fresh or chilled			
		Frozen:			
	38	Turbot			
	39	Other			
	40	Halibut			
	70	Salmon			
	80	Other			
		SUB-PART B: Fish - dried, salted, pickled, smoked or kippered			
		Sub-Part B Headnote: In this sub-part, the term "dried" means dried (but not salted, pickled, smoked or kippered); the term "salted or pickled" means salted or pickled (whether or not dried, but not smoked or kippered); and the term "smoked or kippered" means smoked or kippered (whether or not dried, salted or pickled)			

CODE	CATEGORIES	DUTY MFN (ad val.)	DUTY LDDC (ad val.)	DUTY GT (ad val.)
	Fish - dried, whether or not whole, but not otherwise prepared or preserved, and not in airtight containers:			
111.10*	Cod, cusk, haddock, hake and pollock	0.1¢/lb		2.5¢/lb
111.15*	Shark fins	0.2¢/lb		1.25¢/lb
111.18*	Other	0.1¢/lb		1.25¢/lb
	Fish - salted or pickled, whether or not whole but not otherwise prepared or preserved, and not in airtight containers:			
	Cod, cusk, haddock, hake and pollock:			
111.22	Whole or processed by removal of heads, fins, viscera scales, vertebral columns or any combination thereof but not otherwise processed	Free		1.25¢/lb
111.28	Otherwise processed (whether or not heads, fins, viscera, scales, vertebral columns or any combination thereof have been removed)	Free		2¢/lb
	Herring:			
111.32	In bulk or in immediate containers weighing with their contents over 15 lb each	Free		1¢/lb
111.37	Other	4.8%	4%	25%
	Mackerel:			
111.40	In bulk or in immediate containers weighing with their contents over 15 lb each	Free		1¢/lb
111.44	Other	5%		25%
111.48	Salmon	3.4%	3%	25%
	Other:			
	In bulk or in immediate containers weighing with their contents over 15 lb each:			
111.52	Alewives	0.9%		1%
111.56*	Other	0.5%		1%
111.60*	In immediate containers weighing with their contents not over 15 lb each	10.9%	10%	25%
	Fish - smoked or kippered, whether or not whole, but not otherwise prepared or preserved, and not in airtight containers:			
111.64	Cod, cusk, haddock, hake and pollock: Whole, or processed by removal of heads, viscera, vertebral columns, or any combination thereof, but not otherwise processed	Free		
111.68	Otherwise processed (whether or not heads, viscera, vertebral columns, or any combination thereof have been removed	Free		
	Herring:			
	Whole or beheaded but not otherwise processed:			
111.72	Hard smoked	Free		
111.76	Other	0.1¢/lb		
111.80	Otherwise processed (whether or not beheaded)	Free		

Valid from Dec. 1984

CODE		CATEGORIES	DUTY MFN (ad val.)	DUTY LDDC (ad val.)	DUTY GT (ad val.)
111.84		Mackerel	2.7%	2.5%	25%
111.88		Salmon	5%		25%
111.92		Other	Free		25%
		SUB-PART C :			
		Fish, in airtight containers			
		Fish, prepared or preserved in any manner, not in oil, in airtight containers:			
		Anchovies:			
112.01		In containers weighing with their contents not over 15 lb each	5%		25%
112.03*		Other	0.8%	Free	2.5%
112.05		Bonito and yellowtail	6%		25%
		Herring:			
		In containers, weighing with their contents not over 15 lb each:			
112.08		In tomato sauce, smoked or kippered, and in immediate containers weighing with their contents over 1 lb each	4%		25%
112.10		Other	Free		25%
112.12		Other	0.3%	Free	2%
112.14		Pollock	6%		25%
112.18		Salmon	4.7%	3%	25%
		Sardines:			
		In containers weighing with their contents not over 15 lb each:			
112.20		In immediate containers weighing with their contents under 8 oz each	3.4%	2.5%	25%
112.21*		In tomato sauce	6.25%		25%
112.23		Other	6.25%		25%
112.24		Other	1.7%		4%
		Tuna:			
112.30		In containers weighing with their contents not over 15 lb each and not the product of any insular possession of the United States, for an aggregate quantity entered in any calendar year not to exceed 20% of the United States pack of tuna during the immediately preceding calendar year, as reported by the National Marine Fisheries Service:	6%		25%
	20	Albacore			
	40	Other			
112.34		Other	12.5%		25%
112.36*		Others:	6%		25%
	20	Mackerel			
	40	Other			

Valid from Dec. 1984

CODE	CATEGORIES	DUTY MFN (ad val.)	DUTY LDDC (ad val.)	DUTY GT (ad val.)
	Fish, prepared or preserved in any manner, in oil, in airtight containers:			
112.40*	Anchovies	6%		30%
112.42	Bonito and yellowtail	5.9%	4.9%	30%
112.46	Herring	9.7%	8%	30%
	Pollock:			
112.48	Smoked	7.5%		30%
112.50	Not smoked	12.5%		30%
112.52	Salmon	12.5%		30%
112.54	Sardines:			
	Valued not over 18¢/lb (including weight of immediate container)	18.8%	12%	30%
	Valued over 18¢/lb but not over 23¢/lb (including weight of immediate container):			
	Neither skinned nor boned:			
112.58	Smoked	11.5%		30%
112.62	Not smoked	20%		30%
112.66	Skinned or boned	20%		30%
	Valued over 23¢/lb but not over 30¢/lb (including weight of immediate container):			
	Neither skinned nor boned:			
112.71	Smoked	11.5%		30%
112.73	Not smoked	15%		30%
112.74	Skinned or boned	30%		30%
	Valued over 30¢/lb (including weight of immediate container):			
	Neither skinned nor boned:			
	Smoked:			
112.79	Valued at 45¢/lb or more per lb in tin-plate containers or 50¢/lb or more in other containers	4.8%	4%	30%
112.80	Other	11.5%		30%
112.82	Not smoked	15%		30%
112.86	Skinned or boned	21.5%	20%	30%
112.90	Tuna	35%		45%
112.94*	Other	8.8%	6.5%	30%
	SUB-PART D: Other fish products			
	Fish balls, cakes, puddings, pastes and sauces (including any such articles in airtight containers):			
113.01*	Pastes and sauces	1.5%	Free	30%
113.05	Balls, cakes and puddings:			
	In oil	8.8%	6.6%	30%
	Not in oil:			
	In immediate containers weighing with their contents not over 15 lb each:			
113.08	In airtight containers	Free		25%
113.11	Other	6%		25%
113.15	Other	0.8%		2%

Valid from Dec. 1984

CODE		CATEGORIES	DUTY MFN (ad val.)	DUTY LDDC (ad val.)	DUTY GT (ad val.)
		Fish sticks and similar products of any size or shape, fillets, or other portions of fish, if breaded, coated with batter, or similarly prepared; whether or not described or provided for elsewhere in this part:			
113.20		Neither cooked nor in oil	10%		20%
113.25		Other	15%		30%
		Fish roe - fresh, chilled, frozen or preserved:			
113.30*		Sturgeon roe	15%		30%
		Other fish roe:			
113.35		Boiled and in airtight containers	2.5%		30%
113.40*		Other	0.7¢/lb	Free	20¢/lb
		Fish, prepared or preserved, not specially provided for:			
113.50*		In oil	7.8%	5%	30%
		Not in oil:			
		In bulk or in immediate containers weighing with their contents over 15 lb each:			
113.56		Tuna:			
	20	Albacore	0.5¢/lb		1.25¢/lb
	65	Other	Free		1.25¢/lb
113.58		Other:			
	20	Minced			
	40	Other			
113.60*		Other:	6%		25%
	20	Minced			
	40	Other			
		SUB-PART E - Shellfish			
		Shellfish - fresh, chilled, frozen, prepared or preserved (including pastes and sauces):			
		Clams:			
		In airtight containers:			
114.01		Razor clams (Siliqua patula)	3.5%		23%
114.04*		Others: boiled clams, whether whole, minced or chopped, and whether or not salted but not otherwise prepared or preserved in immediate containers, the contents of which do not exceed 24 ounces gross weight	17.1%	14%	110%
114.06*		Others	9.6%	7%	35%
114.10		Others	Free		Free
		Crabs:			
		Crabmeat:			
114.15		Fresh, chilled or frozen	7.5%		15%
		Prepared or preserved (including pastes and sauces):			
114.20		In airtight containers:	11%		22.5%
	20	Snow crab (Chionoecetes bairdi, C. opilio, C. tanneri and C. angulatus)			
	40	Other			
114.25*		Other	5.9%	5%	15%
114.30		Other	Free		Free

Valid from Dec. 1984

CODE		CATEGORIES	DUTY MFN (ad val.)	DUTY LDDC (ad val.)	DUTY GT (ad val.)
		Oysters:			
		In airtight containers:			
114.34		Smoked	0.8%	Free	7.5%
114.36		Other	4.7%		12.5%
114.40		Other	Free		Free
	20	Seed oysters			
	40	Other			
114.45		Other shellfish:	Free		Free
	10	Abalone			
		Lobsters:			
	15	In airtight containers			
		Other:			
	20	Live lobsters			
	25	Rock lobster tails			
	30	Other			
	37	Scallops			
		Shrimp:			
	45	Shell-on			
	50	Peeled:			
		In airtight containers			
		Other:			
		Not breaded:			
	57	Raw			
	62	Other			
	72	Breaded			
	90	Other			
		Shellfish juices, in airtight containers:			
114.50		Clam juice	8.5%		35%
114.55*		Oyster juice	1.7%	Free	13%
		PART 15: Other animal and vegetable products			
		SUB-PART A: Products of American fisheries			
		Sub-Part A Headnotes:			
		1. An American fishery, for the purposes of this sub-part, is a fishing enterprise conducted under the American flag by vessels of the United States on the high seas or in foreign waters in which such vessels have the right, by treaty or otherwise, to take fish or other marine products and may include a shore station operated in conjunction with such vessels by the owner or master thereof.			
		2. None of the items in this sub-part shall apply to fish - fresh, chilled or frozen, in the form of fillets, steaks or slices substantially free of bone (including any of the foregoing divided into sections), if produced in a foreign country, or its territorial waters, in whole or in part, with the use of the labour of persons who are not residents of the United States.			

Valid from Dec. 1984

CODE		CATEGORIES	DUTY MFN (ad val.)	DUTY LDDC (ad val.)	DUTY GT (ad val.)
180.00		Products of American Fisheries (including fish, shellfish and other marine animals, spermaceti and marine animal oils), which may not have been landed in a foreign country or which, if so landed, have been solely for transhipment without change in condition.	Free	Free	Free
180.10		Fish (except cod, cusk, haddock, hake, mackerel, pollock and swordfish), the product of American fisheries, landed in a foreign country and there processed by removal of heads, viscera or fins, or by chilling or freezing, or by any combination of these processes, but not otherwise processed.	Free	Free	Free
180.20		Products of American Fisheries, prepared or preserved by an American fishery on the treaty coasts of Labrador, Magdalen Islands and Newfoundland, as such coasts are defined in the convention of 1818 between the United States and Great Britain.			
184.54		Cod liver, solubles	5%		20%
184.55		Meal and fish scrap	Free		Free

Note :

MFN - refers to countries which receive most favoured nation treatment.

LDDC - refers to special treatment for less-developed countries.

GT - refers to all other countries.

* - The product is duty-free for designated beneficiary developing countries under the Generalized System of Preferences (G.S.P.).

(S) - Suspended.

IMPORT QUOTAS

Seasonal : None

Global : None

Bilateral : None

Tariff Quota : Canned tuna under tariff code 112.30 is subject to tariff quota. For 1984 the quota was 89,699,000 lbs (40,044 MT); within this quota the tariff was 6%. Imports above the quota are subject to 12.5% duty. The import quota for 1985 is expected to be less, since domestic production was down in 1984, and the aggregated quantity which can enter the United States in a calendar year cannot exceed 20% of the pack of canned tuna during the immediately preceding calendar year.

ADMINISTRATIVE REGULATIONS

Licensing

Not required; exceptions - licences are required for imports from Cambodia, Cuba, North Korea and Vietnam.

To import tuna, which falls under the endangered Species Act, a tuna certificate has to be obtained from the National Marine Fisheries Service prior to import.

Foreign fishing vessels operating off the coast of the United States cannot land fish directly, but must transfer the product through a third country before the product will be admitted.

Foreign Exchange

Freely obtainable.

Prior Deposit

None.

Customs Evaluation

Duties may be ad valorem, on a specific basis, i.e. as an amount per unit or a combination of both; where ad valorem rates apply, the value for duty is usually the approximate F.O.B.

Import Surcharge

Sales tax is levied by State and municipal bodies and ranges up to 12%.

TECHNICAL REGULATIONS

Health Standards

The United States impose strict standards upon the import of fish and fishery products. These standards are contained in the Federal Food, Drug and Cosmetic Act as amended. The intent of this Act is to ensure that products from abroad are free from dangerous diseases and pests, and that they conform to the same standards of wholesomeness and sanitations as are required of domestic products. These standards are often revised to ensure maximum protection to the ultimate consumer.

Product Specification Standards

Within the Federal Food, Drug and Cosmetic Act, all fish and fishery products have to comply with product specification requirements in the same manner as are the domestic produced fish and fishery products. These standards pertain to a variety of subject-matter topics, such as: adulteration, misbranding, definitions and standards of identity, tolerances for poisonous and deleterious substances, pesticides, food additives, good manufacturing practices, and defect action levels.

Valid from Dec. 1984

Labelling and Marking Standards

Details concerning type, size, location, etc. for required label information are contained in the Food and Drug Administration Regulations, which cover the requirements of both the Federal Food, Drug and Cosmetic Act and the Fair Packaging and Labelling Act. Food-labelling requirements of the regulations are as follows: The label has to be marked in English identifying the country of origin. All representations in the foreign language also have to be in English. The name, address, city, state of manufacturer, packer or distributor have to appear. The net amount of the fish has to be listed. The common name must be displayed. Ingredients used in the product must be listed by common name, and so must any artificial flavouring, artificial colouring or chemical preservative imitations must be labelled as such. If the product is not manufactured by the person or company whose name appears on the label, the name must be qualified by "Manufacture for", "Distributed by", or similar expression.

Packaging Standards

The Fair Packaging and Labelling Act set forth the rules governing packaging requirements, including size and weight of accepted packages, presentations and preservation of the product within the package, and accepted packaging materials.

The Food and Drug Administration oversees and regulates these standards while upon entry to the U.S.A. Customs will inspect all imported products to ensure that appropriate packaging requirements are met.

OTHER REGULATIONS AFFECTING IMPORT

Discriminatory Licensing of Traders

None.

State Trading

None.

IMPORT REQUIREMENTS

Documentation

(a) PRO-FORMA INVOICE :
Not mandatory but importer may request quotation by Pro-Forma invoice.

(b) SPECIAL CUSTOMS INVOICE :
"Special Customs Invoice" No. 5515 must be used for shipments over U.S.$500 in value. Original only required by Customs. Importer will specify number of additional copies. Not more than one shipment from one consignee by one vessel may be included on the same form. Ordinary commercial invoices are acceptable for shipments of U.S.$500 or less in value.

(c) BILL OF LADING :
No special requirements. Minimum of two copies required by consignee. "To Order" bills acceptable.

(d) PACKAGING LIST :
Not compulsory, but facilitates clearance.

Weight and Measures

U.S. weight and measure systems, but in the process of changing to metric. The short ton of 2,000 lb is usually used (1 cwt = 100 lb). If used in documents, etc., the term "ton" should be defined.

Insurance

Normal commercial practice.

Methods of Quoting and Payments

Quotations should be in U.S.$, F.O.B. and C.I.F., U.S. ports. Quotations by Pro-Forma invoice may be requested. Payment is usually by Letter of Credit, but under appropriate circumstances imports may be financed on the basis of dollar drafts, open account or consignment.

Trade Samples

All goods imported into the U.S.A. are subject to duty unless specially exempted. Samples, solely for use in taking orders (a) if valued under U.S.$250 may enter informally without bond, and (b) if valued over U.S.$250 require a formal entry and a temporary import bond equivalent to 110% of the value.

IMPORT POLICY

Present

The U.S.A. offers a wide open market for fish and fishery products, except for products such as canned tuna where the U.S.A. is a significant producer. However, when exporting to the U.S.A., the exporter must pay close attention to standards which are strictly enforced.

Future

No change foreseen. Due to high demand for fish and fishery products, the U.S.A. offers an exceptionally good future market.

GOVERNMENT AGENCIES INVOLVED

Certificate for Tuna Import

Office of Protected Species and Habitat Conservation, National Marine Fisheries Service, 3300 Whitehaven Street, Washington, D.C. 20235. Telephone: (202) 634-7461

Health, Product Specifications, Marking, Labelling and Packaging

Office of Utilization Research, F/S3, National Marine Fisheries Service, 3300 Whitehaven Street, N.W., Washington, D.C. 20235. Telephone: (202) 634-7458.

Customs Clearance and Duty

Commissioner of Customs, 1301 Constitution Avenue, N.W. Washington, D.C. 20229. Telephone: (202) 566-8195.

GENERAL TRADE INFORMATION

Government Trade Agency

Office of Industry Services, Development Division, National Marine Fisheries Division, 3300 Whitehaven Street, N.W., Washington, D.C. 20235. Telephone: (202) 634-7451.

Private Trade Agency

U.S. Council of International Chamber of Commerce, 1212 Avenue of the Americas, New York, N.Y. 10036. Telephone: (212) 354-4480. Telex: 14361.

Credit Reference

Dun & Bradstreet, Inc., 99 Church Street, New York, N.Y. 10007. Telephone: (212) 962-6300. Telex: RCA 232582.

Valid from Dec. 1984

UNITED KINGDOM

TARIFF

CODE	CATEGORIES	DUTY		
		Autonomous (%) or Levy (L)	Conventional (%)	G.S.P. (%)
03.01	Fish - fresh (live or dead) chilled or frozen:			
	A. Freshwater fish:			
	1) Trout and other Salmonidae:			
	a) Trout	16	12	
	b) Salmon	16	2.8	
	c) Lake white fish	Free	8	
	d) Other	Free	10	Free
	2) Eels (Anguilla spp.)	10	3.8	
	3) Carp	10	8	
	4) Other	Free		Free
	B. Saltwater fish:			
	1) Whole, headless or in pieces:			
	a) Herring:			
	i) From 15 February to 15 June:			
	Fresh or chilled	Free	Free	
	Frozen	Free	Free	
	ii) From 16 June to 14 February:			
	Fresh or chilled	20 a	15 a,b	
	Frozen	20 a	15 a,b	
	b) Sprats:			
	i) From 15 February to 15 June	Free	Free	
	ii) From 16 June to 14 February	20	13	
	c) Tuna (Thunnus spp. and Euthynnus spp.):			
	i) For the industrial manufacture of products falling within Code 16.04 (a):			
	Whole :			
	Yellowfin tuna (Thunnus albacares):			
	Weighing not more than 10 kg each	25 c,a	22 a,d	
	Other	25 c,a	22 a,d	
	Albacore (Thunnus alalunga)	25 c,a	22 a,d	
	Other	25 c,a	22 a,d	
	Gilled and gutted :			
	Yellowfin tuna (Thunnus albacares):			
	Weighing not more than 10 kg each	25 c,a	22 a,d	
	Other	25 c,a	22 a,d	
	Albacore (Thunnus alalunga)	25 c,a	22 a,d	
	Other	25 c,a	22 a,d	
	Other (e.g., "heads off") :			
	Yellowfin tuna (Thunnus albacares):			
	Weighing not more than 10 kg each	25 c,a	22 a,d	
	Other	25 c,a	22 a,d	
	Albacore (Thunnus alalunga)	25 c,a	22 a,d	
	Other	25 c,a	22 a,d	
	ii) Other	25 a	22 a,d	

Valid from Jan. 1984

CODE	CATEGORIES	DUTY		
		Autonomous (%) or Levy (L)	Conventional (%)	G.S.P. (%)
	d) Sardines (Sardina pilchardus):			
	i) Fresh or chilled	25	23	
	ii) Frozen	25	23	
	e) Sharks:			
	i) Dogfish (Squalus acanthias, Scyliorhinus spp.):			
	Fresh or chilled	15	8 e	
	Frozen	15	8 e	
	ii) Other	15	8	
	f) Redfish (Sebastes spp.):			
	i) Fresh or chilled	15	8	
	ii) Frozen	15	8	4
	g) Atlantic halibut and lesser or Greenland halibut:			
	i) Atlantic halibut (Hippoglossus hippoglossus):			
	Fresh or chilled	15	6	4
	Frozen	15	8	4
	h) Cod (Gadus morhua, Boreogadus saida, Gadus ogac):			
	i) Fresh or chilled	15	13	
	ii) Frozen	15	13	
	i,j) Saithe (Pollachius virens):			
	i) Fresh or chilled	15	15	
	ii) Frozen	15	15	
	k) Haddock (Melanogrammus aeglefinus):			
	i) Fresh or chilled	15	15	
	ii) Frozen	15	15	
	l) Whiting (Merlangus merlangus):			
	i) Fresh or chilled	15	15	
	ii) Frozen	15	15	
	m) Ling (Molva spp.):			
	i) Fresh or chilled	15	15	
	ii) Frozen	15	15	
	n) Alaska pollack (Theragra chalcogramma) and pollack (Pollachius pollachius):			
	i) Fresh or frozen	15	15	
	ii) Frozen	15	15	
	o) Mackerel (Scomber scombrus, Scomber japonicus, and Orcynopsis unicolor):			
	i) From 15 February to 15 June:			
	Fresh or chilled	Free	Free	
	Frozen	Free	Free	
	ii) From 16 June to 14 February:			
	Fresh or chilled	20	20	
	Frozen	20	20	
	p) Anchovies (Engraulis spp.):			
	i) Fresh or chilled	15	15	
	ii) Frozen	15	15	
	q) Plaice (Pleuronectes platessa):			
	i) Fresh or chilled	15	15	
	ii) Frozen	15	15	

Valid from Jan. 1984

CODE	CATEGORIES	DUTY		
		Autonomous (%) or Levy (L)	Conventional (%)	G.S.P. (%)
	r) Flounder (Pleichthys flesus):			
	i) Fresh or chilled	15	15	
	ii) Frozen	15	15	
	s) Sea-bream of the species Centex dentex and Pagellus:			
	i) Fresh or chilled	15	15	
	ii) Frozen	15	15	
	t) Hake (Merluccius sop.):			
	i) Fresh or chilled	15	15 f	
	ii) Frozen	15	15 f	
	u) Blue whiting (Micromesistius poutassou or Gadus poutassou)	15	15	
	v) Other	15	15	
	2) Fillets:			
	a) Fresh or chilled	18	18	
	b) Frozen:			
	i) Of cod (Gadus morhua, G. ogac, Boreogadus saida)	18	15 g	
	ii) Of saithe (Pollachius virens)	18	15	
	iii) Of haddock (Melanogrammus aeglefinus)	18	15	
	iv) Of redfish (Sebastes spp.)	18	13	
	v) Of whiting (Merlangius merlangus)	18	15	
	vi) Of ling (Molva spp.)	18	15	
	vii) Of tuna (Thunnus spp. and Euthynnus spp.)	18	18	
	viii) Of mackerel (Scomber scombrus, S. japonicus, and Orcynopsis unicolor)	18	15	
	ix) Of hake (Merluccius spp.)	18	15	
	x) Of shark (Squalus spp.)	18	15	
	xi) Of plaice (Pleuronectes platessa)	18	15	
	xii) Of flounder	18	15	
	xiii) Of herring	18	15	
	xiv) Other	18	15	
	C. Livers and roes	14	10	
03.02	Fish - dried, salted or in brine; smoked fish, whether or not cooked before or during the smoking process:			
	A. Dried, salted or in brine:			
	1) Whole, headless or in pieces:			
	a) Herring	12	12	
	b) Cod (Gadus morhua, G. ogac, Boreogadus saida)	13 c	13 h	
	c) Anchovies (Engraulis spp.)	15	10	
	d) Atlantic halibut (Hippoglossus hippoglossus)	15	-	10
	e) Salmon - salted or in brine	15	11	2
	f) Other	15	12	8
	2) Fillets:			
	a) Of cod (Gadus morhua, G. ogac, Boreogadus saida)	20 c	20	
	b) Of salmon - salted or in brine	18	15	
	c) Of lesser or Greenland halibut (Reinhardtius hippoglossoides) - salted or in brine	18	15	
	d) Other	18	16	10

Valid from Jan. 1984

CODE	CATEGORIES	DUTY		
		Autonomous (%) or Levy (L)	Conventional (%)	G.S.P. (%)
	B. Smoked, whether or not cooked before or during the smoking process:			
	1) Herring	16	10	
	2) Salmon	16	13	
	3) Lesser or Greenland halibut (Reinhardtius hippoglossoides)	16	15	
	4) Atlantic halibut (Hippoglossus hippoglossus)	16	16	
	5) Mackerel (Scomber scombrus, Scomber japonicus, and Orcynopsis unicolor)	16	14	
	6) Trout	16	14	
	7) Eels (Anguilla spp.)	16	14	
	5) Other	16	14	
	C. Livers and roes	15	11	
	D. Fish meal	15	13	
03.03	Crustaceans and molluscs, whether in shell or not - fresh (live or dead), chilled, frozen, salted, in brine or dried; crustaceans, in shell, simply boiled in water:			
	A. Crustaceans:			
	1) Crawfish	25	h	
	2. Lobsters (Homarus spp.):			
	a) Live	25	8.8	
	b) Other: Whole	25	9.9	
	Other: Frozen	25	17.5	7
	Other	25	20	7
	3) Crabs and freshwater crayfish:			
	a) Crabs of the species Paralithodes camchaticus, Chionoecetes spp. and Callinectes sapidus	18	10.6	7
	b) Other	18	15	7
	4) Shrimps and prawns:			
	a) Prawns and shrimps of the Pandalidae family	18	12	6
	b) Shrimps of the genus Crangon:			
	Fresh, chilled or simply boiled in water	18	18	6
	Other	18	18	6
	c) Other	18	18	
	5) Other:			
	a) Norway lobsters (Nephrops norvegicus):			
	Frozen	14	12	7
	Other	14	12	7
	b) Other	14	12	7

Valid from Jan. 1984

CODE	CATEGORIES	DUTY		
		Autonomous (%) or Levy (L)	Conventional (%)	G.S.P. (%)
	B. Molluscs:			
	1) Oysters:			
	a) European flat oysters weighing not more than 40 g each	Free	Free	
	b) Other	18	18	
	2) Mussels	10	10	7
	3) Snails, other than sea snails	6	Free	
	4) Other:			
	a) Frozen:			
	i) Squid:			
	Loligo spp.	8	6	4
	Todarodes sagittatus	8	6	
	Illex spp.	8	8	
	Other	8	8	
	ii) Cuttlefish of the species Sepia officinalis, Rossia macrosoma and Sepiola rondeleti	8	8	6
	iii) Octopus	8	8	4
	iv) Coquilles St. Jacques (Pecten maximus)	8	8	
	v) Striped venus and other species of the family Veneridae	8	8	
	vi) Other	8	8	
	b) Other:			
	i) Squid:			
	Loligo spp.	8	6	
	Todarodes sagittatus	8	6	
	Illex spp.	8	8	
	Other	8	8	
	ii) Other	8	8	
16.04	Prepared or preserved fish, including caviar and caviar substitutes:			
	A. Caviar and caviar substitutes:			
	1) Caviar (sturgeon roe)	30	30	
	2) Other	30	30	
	B. Salmonidae:			
	1) Salmon	20	6.1	
	2) Other	20	7	
	C. Herring:			
	1) Fillets - raw, coated with batter or breadcrumbs, deep frozen	18	15	
	2) Other	23	20	
	D. Sardines	25	25	
	E. Tunny	25	24	
	F. Bonito (Sarda spp.), mackerel and anchovies	25	25	
	G. Other:			
	1) Fillets - raw, coated with batter or breadcrumbs, deep frozen	18	15	10
	2) Other	25	20	10

Valid from Jan. 1984

CODE	CATEGORIES	DUTY		
		Autonomous (%) or Levy (L)	Conventional (%)	G.S.P. (%)
16.05	Crustaceans and molluscs, prepared or preserved:			
	A. Crabs	20	16	6.5
	B. Other	20	20	6
15.04	Fats and oils, of fish and marine mammals, whether or not refined:			
	A. Fish liver oil:			
	1) Of a vitamin A content, not exceeding 2,500 international units per gram	6 i	6	Free
	2) Other	Free i		
	B. Whale oil and oils of other cetaceans	Free i	Free	
	C. Other	Free i	Free	
23.01	Flour and meal of meat, offals, fish, crustaceans or molluscs, unfit for human consumption; greaves:			
	A. Flour and meal of meat and offals; greaves	4	Free	Free
	B. Flour and meal of fish, crustaceans or molluscs	5	2	

Notes :

Autonomous rates apply to countries which have not concluded any special agreement with EEC. Tariff quotas in the form of temporary suspensions of the autonomous rates, which are also applicable to the GATT signatories when the tariff advantages exceed those bound in GATT, are instituted to cope with under-supply on the domestic market. These tariff suspensions are published in the Official Journal of the EEC.

Conventional rates or most favoured nation rates apply to contracting parties of GATT or countries to which EEC has granted a favourable rate.

Generalized System of Preferences applies to ACP, CP, LDDC and MED countries - see G.S.P. for further details.

Letter Codes in Tariff Columns :

a. Subject to compliance with the reference price; a countervailing tax is provided for in the case of non-compliance with the reference price.

b. Duty exemption within the limits of an annual tariff quota of 34,000 tons to be granted by the competent authorities and subject to compliance with the reference price.

c. Total suspension for an indefinite period.

d. Duty exemption in respect of tuna intended for the canning industry within the limits of an annual tariff quota of 30,000 tons to be granted by the competent authorities and subject to compliance with the reference price. Qualification for this quota is governed by conditions to be determined by the competent authorities.

e. Duty rate reduced to 6% in respect of piked dogfish (Squalus acanthias) within the limits of an annual tariff quota of 5,000 tons to be granted by the competent authorities.

f. Duty rate reduced to 8% for silver hake (Merluccius bilinearis) within the limits of an annual tariff quota of 2,000 tons to be granted by the competent authorities.

g. Duty rate reduced to 8% for cod of the species Gadus morhua, within the limits of an annual tariff quota of 10,500 tons, to be granted by the competent authorities.

h. Duty exemption within the limits of an annual tariff quota of 25,000 tons to be granted by the competent authorities.

i. Under certain conditions, the collection of compensatory amount is provided for in addition to the customs duty.

Valid from Jan. 1984

CANADA

TARIFF

CODE	CATEGORIES	DUTY				
		BPT	MFNT	GT	GPT	UK IRL
11500.1	Mackerel, herring, salmon and all other fish, n.o.p. - fresh, salted, pickled, smoked, dired or boneless	Free	Free	1¢	-	Free
11500.2	Tuna - frozen, to be processed in Canadian canneries	Free	Free		-	Free
11500.3	Herring - salted or pickled	Free	Free		-	Free
11505.1	Herring - fresh	Free	Free	Free	-	Free
11510.1	Smelt - fresh, for processing in Canadian plants (per pound)	Free	Free	1¢	-	Free
11600.1	Halibut - fresh, pickled or salted (per pound)	Free	Free	2¢	-	Free
11700.1	Fish livers - fresh, salted or in preservative medium	Free	Free	Free	-	Free
	Sardines, sprats or pilchards, packed in oil or otherwise, in sealed tin containers; the weight of the tin container to be included in the weight for duty:					
11901.1	When weighing over 20 oz and not over 36 oz each (per box)	$1.56	$1.50	6¢	-	$1.50
11902.1	When weighing over 12 oz and not over 20 oz each (per box)	$1.31	$1.25	$4.05	-	$1.25
11903.1	When weighing over 8 oz and not over 12 oz each (per box)	88¢	84¢	$3.05	-	84¢
11904.1	When weighing 8 oz each or less (per box)	66¢	63¢	$2.05	-	63¢
	Anchovies, packed in oil or otherwise, in sealed tin containers; the weight of the tin container to be included in the weight for duty:					
12001.1	When weighing over 20 oz and not over 36 oz each (per box)	$1.31	1.25	6¢	-	1.25
12002.1	When weighing over 12 oz and not over 20 oz each (per box)	$1.06		$4.05	Free	1¢
12003.1	When weighing over 8 oz and not over 12 oz each (per box)	66¢	63¢	$3.05	Free	63¢
12004.1	When weighing 8 oz each or less	41¢	38¢	$2.05	Free	38¢

Valid from Jan. 1984

CODE	CATEGORIES	DUTY				
		BPT	MFNT	GT	GPT	UK IRL
12100.1	Fish - preserved in oil, n.o.p.	15%	15%	35%	-	15%
12105.1	Bonito - preserved in oil	9.3%	9.3%	35%	-	9.3%
12200.1	Herring (not including kippered herring in sealed containers) packed in oil or otherwise, in sealed containers	10%	10%	35%	-	10%
	Fish - prepared or preserved, n.o.p:					
12301.1	Kippered herring in sealed containers	7.5%	7.5%	30%	-	7.5%
12302.1	Salmon	6.4%	6.4%	30%	-	6.4%
12303.1	All other fish, n.o.p.	11%	11%	30%	-	11%
	New Zealand Trade Agreement:					
12303	Canned white bait - Free					
12310.1	Frozen tuna loins for use in the manufacture of canned tuna	Free	Free	30%	-	Free
12400.1	Shellfish - fresh, n.o.p.	Free	Free	25%	-	Free
12405.1	Shellfish - prepared or preserved, n.o.p.	9.8%	9.8%	30%	-	9.8%
	New Zealand Trade Agreement:					
EX	Shellfish known as Toheroas, in sealed tin containers, including liquid contents (Free)					
12410.1	Squid, octopus and cuttlefish	Free	Free	Free	-	Free
12500.1	Oysters, shelled; cans containing shelled oysters	Free	Free	25%	-	Free
12505.1	Oysters, prepared or preserved, in the shell	6.9%	6.9%	25%	-	6.9%
12505.2	Oysters, smoked, whether or not in cans or other airtight containers	6.4%	6.4%	25%	-	6.4%
12600.1	Clams, in sealed containers	10%	10%	40%	-	10%
12700.1	Crustaceans - fresh, n.o.p; crustaceans prepared or preserved, n.o.p.	8%	8%	25%	-	8%
	New Zealand Trade Agreement:					
12700.2	Canned crayfish (Free)					
12800.1	Lobster or lobster meat - fresh or boiled	Free	Free	25%	-	Free
12805.1	Lobsters, prepared or preserved	9.8%	9.8%	30%	-	9.8%
12900.1	Crabs, in sealed containers	10%	10%	40%	-	10%

Valid from Jan. 1984

CODE	CATEGORIES	DUTY				
		BPT	MFNT	GT	GPT	UK IRL
13000.1	Shrimp	Free	Free	25%	-	Free
13100.1	Turtles, leeches	Free	Free		Free	Free
13200.1	Oysters, seed and breeding, imported for the purpose of being planted in Canadian waters; live fish and fish eggs for propagating purposes	Free	Free	Free	-	Free
13300.1	All other articles the produce of the fisheries, n.o.p. Fish caught by fishermen in vessels registered in Canada or owned by any person domiciled in Canada, and the products thereof carried from the fisheries in such vessels, shall be admitted into Canada free of duty. The Minister may make such regulations, if any, as are deemed necessary for carrying out the provisions of this section	7.3%	7.3%	25%	-	7.3%
13300.2	Caviar - sturgeon roe being prepared	-	-	-	Free	-
13303.1	Fish solubles	Free	Free	25%	-	Free
13305.1	Trout, live, imported by commercial trout farms	Free	Free	25%	-	Free
26500.1	Whale oil, including spermaceti	12.5%	12.5%	30%	-	12.5%
26505.1	Fish oils, n.o.p.	12.5%	13.1%	22.5%	7.5%	12.5%
26507.1	Menhaden oil	12.5%	12.8%	22.5%	-	12.5%
26510.1	Cod liver oil, crude or refined	Free	13.1%	22.5%	-	6%
66335.1	Fish meal	Free	8.8%	25%	-	5%
83000.1	Fish oils in their natural condition, or oils so treated as to increase their content of vitamin	Free	Free	Free	Free	Free

Note :

BPT - British Preferential Tariff, applies to Commonwealth countries except Ireland and the United Kingdom.

MFNT - Most Favoured Nation Tariff, applies to all GATT contracting countries.

GT - General Tariff, applies to countries with no special agreement with Canada.

GPT - General Preference Tariff, applies to less-developed countries; see G.S.P. section for further details.

UK/IRL - United Kingdom and Ireland Tariff offers speciam concessions to these countries.

APPENDIX F

FUTURE VESSELS

New career in Barbados

NAMED the *Crustacean*, a 26 ft long Farley trihedral hulled workboat is now fishing out of Barbados. She was moulded and fitted out by Farley Workboats of Hamble in England and is designed for general purpose inshore fishing in the tropics.

She has a forward lantern-style wheelhouse offset to give plenty of working space around her Spencer-Carter 1400 lb slave hauler. This is bulkhead mounted with hauling being carried out through a davit and open sided block. Dual station controls are fitted on the outside of the wheelhouse.

Powered by a Volvo AQ AD 40, 160 hp diesel driving through a 280 drive, the boat can do over 28 knots.

She is owned by Hal Hutchinson — a Barbadian who has served over 22 years in the Royal Navy — she is to play a key role in the Hutchinsons' new life.

Hal first became interested in fishing when posted to Lossiemouth in Scotland. Then after being pensioned off from the Navy, he sailed aboard local crabbers working out of ports near his home.

Mr. Hutchinson is to try shellfishing drift netting for flying fish, squid jigging and lining for red snapper for starters and then concentrate on the most lucrative fishery.

Unsure of where to collect together the very varied types of fishing gear he needed and requiring advice on the selection of suitable electronics, he contacted Melmarine of Bournemouth who supplied most of the fishing gear, a Lowrance Mach 2 and a Navico 5600 VHF.

One of the biggest headaches facing Mr. Hutchinson was how to get the boat to Barbados at a reasonable cost. Eventually the *Crustacean* sailed as deck cargo.

The *Crustacean*, ready to fish for several species.

SOURCE: Fishing News International

June 1986

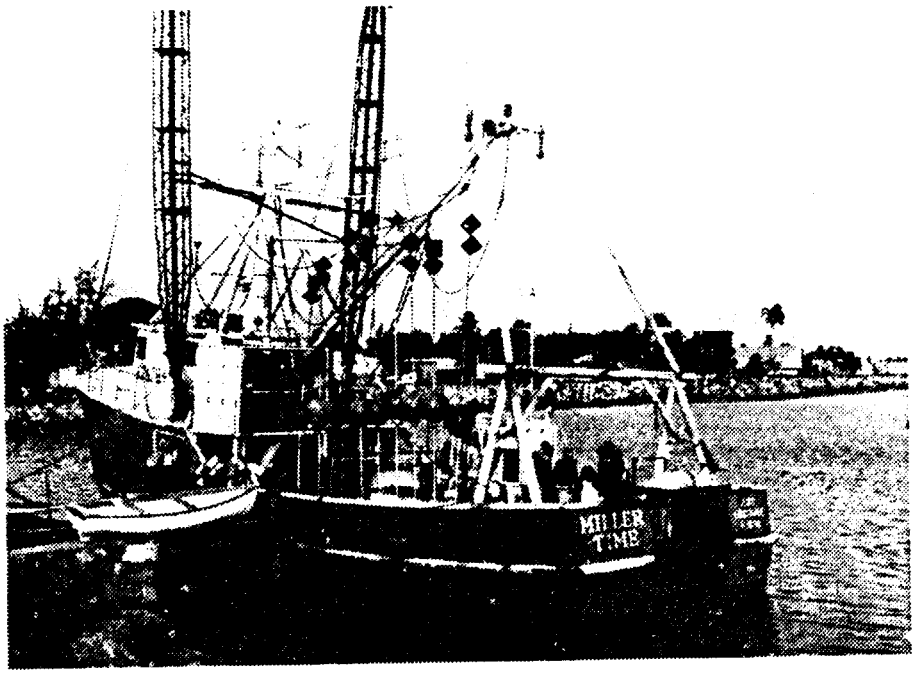
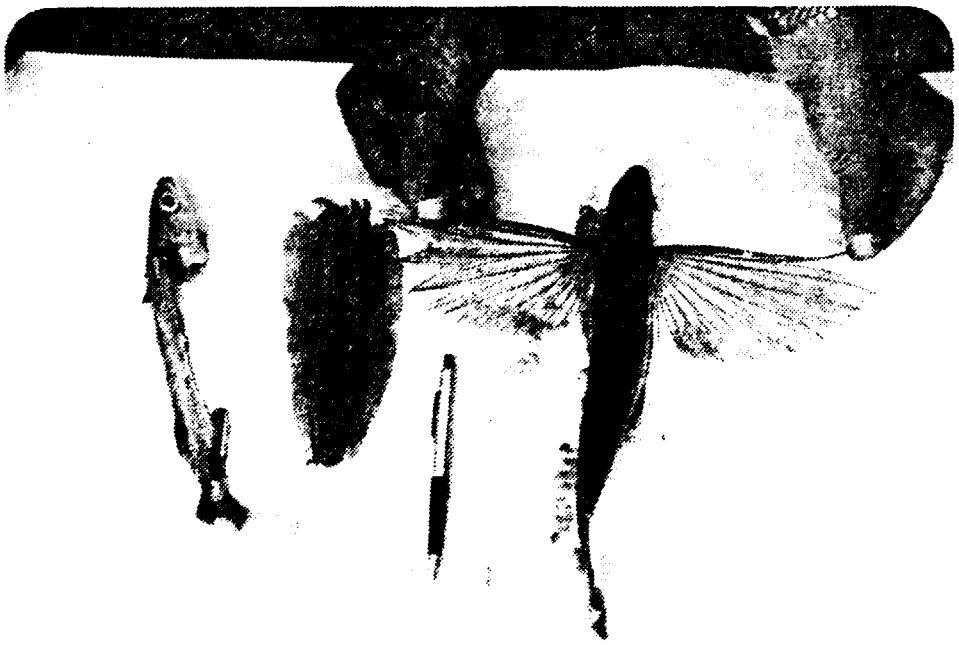


Photo of U.S.A. Swordfishing vessel in Bridgetown Harbour for minor gear repairs. May 1986.

APPENDIX G

FLYING FISH PHOTOGRAPHS



Photos of Flying Fish
and Filletting

APPENDIX H

UNITS, STANDARDS AND YIELDS

APPENDIX H: Units, Standards and Yields

Where no other explanation is provided, the following units are used in the report:

$ = U.S. Dollars
BD$ = Barbados Dollars, (value as of June 1986, 1BD$ = 0.5 U.S.$)
kg = kilogram = 2.2 lbs (pounds)
mt = metric ton = 1000 kg
km = kilometers = .621 mi (mile)
m = meter = 3.281 ft (feet)
nm = nautical mile = 1.85 km approx.
degrees C = degrees centigrade

Based on a series of interviews and measurements in Barbados, the following sizes and yields of the Flying Fish have been determined:

3 whole Flying Fish = 0.5 kg
therefore,
6 whole Flying Fish = 1.0 kg

5 Flying Fish fillets = 1 package = 0.25 kg
therefore,
1.0 kg of Flying Fish fillets = 20 whole Flying Fish
thus,
Product yield 6/20 = 30%
Waste = 70%