

An Economic and Social Assessment of the Flying fish (pelagic) Fishery of Tobago, Trinidad and Tobago

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ABSTRACT

The oceanic pelagic fishery has historically been the most important commercial fishery of national importance in Trinidad and Tobago. The flying fish fishery accounts for about 70-90% of the total weight of pelagic landings at beaches on the leeward side of Tobago (Pandohee 1996). Fishing effort is seasonal from November of one year to July of the next year. The flying fish fleet consisted of about 75 pirogues and one iceboat between 1988 - 1991. It employed approximately 125 fishermen. Fishing practices involved the use gillnets, small dip-nets and the occasional hook-and-line method. The latter was used to obtain fresh bait needed in the capture of larger pelagics. Landings for the 1990/91 fishing season were estimated at about 359 mt, with an ex-vessel value of at least TT\$395,000, and a retail value in excess of TT\$790,000. Catches were landed at five locations where they were transported by jeeps and "pick-up vans" to the three processing plants on the island at the time. Approximately 75-80% of the processed flying fish continues to be exported. The major portion goes to Barbados and other Caribbean islands. In 1991, one processor secured an order of 40 mt whole flying fish to Japan. Management strategies pertaining to this fishery focus on defining the limits of foreign fishing effort. In January 1991 Trinidad and Tobago and Barbados signed a fishing agreement, which included provisions for Barbadian flying fish vessels to operate off Tobago (Samlalsingh et al. 1992). The pelagic fleet originally consisted of open wooden (bumboats) sailing boats of about 12ft in length, propelled by oars. Following extensive damage to the fishing fleet by hurricane Flora in 1963, and supported by the provision of credit facilities and subsidies by the government, the fleet was largely replaced by motorized vessels (as per records of the Department of Marine Resources and Fisheries, THA).

All coastal communities around the island depend greatly on the fishing fleet and their activities for daily fish sustenance. This has given rise to small (processing) cottage industries, which contribute to supplementing household income. One cottage industry can at times produce, as much as, 90-108lbs of processed flying fish on a daily basis. With the national unemployment rate at 21%, many young men upon completing their secondary school education choose to go into fishing as a career. Only a small percent operate full-time. The majority work for a relative or for some other investor on a regular or part-time basis. Retirees purchased vessels

and hire crew to work, thereby adding to the investment in a growing industry. Training toward obtaining the launch captains and engineers license is an on-going activity. The principal Trainer is a member of the staff of the Department of Marine Resources and Fisheries. The Maritime Services Division conducts examinations twice yearly.

Continued poaching of our country's fishing resources by neighboring countries and some international fishing fleets is of concern, especially with respect to sustainability of the biomass and its ability to support Trinidad and Tobago's need for fish in years to come. Recognizing the need for effective surveillance and management of the fishery resource under each country's jurisdiction, the FAO/UN Code of Responsible Fisheries, Rome 1995, was produced. Article 7, Section 7.1.7 of the document reads: "States should establish, within their respective competencies and capacities, effective mechanisms for fisheries monitoring, surveillance, control and enforcement to ensure compliance with conservation and management measures, as well as those adopted by sub-regional or regional organizations or arrangements". Article 7, Section 7.1.8 reads: "States should take measures to prevent or eliminate excess fishing capacity and should ensure that levels of fishing effort are commensurate with sustainable use of fishery resources as a means of ensuring the effectiveness of conservation and management measures". Against this background the Government of Trinidad and Tobago, in conjunction with the Tobago House of Assembly may initiate discussion with neighboring states re the issue of bilateral fishing agreements.

KEY WORDS: Flying fish, fisheries assessment, socio-economics, Trinidad and Tobago

INTRODUCTION

The fishery resources of Trinidad and Tobago have been put under severe fishing pressure, due mainly to poaching by foreign fleets. Tobago's flying fish and associated ocean pelagic resources are constantly poached between the months of November of one year to June of the following year by neighboring states. Some regional countries are convinced that Tobago is the land of "never ending" flying fish resource. This cannot be taken for granted unless comprehensive assessments of the biomass are done over time and using all the available scientific approaches at our disposal.

The flying fish ("drift") fishery of Tobago prior to the 1960s was very important for the supply of baitfish. This bait was used in the trolling fishery to catch the larger oceanic pelagics associated with the flying fish, such as tuna (*Thunnus albacares*), dolphin fish (*Coryphaena hippurus*), and wahoo (*Acanthocybium solandri*). The flying fish fishery is now of great importance to Trinidad and Tobago as well as the wider Caribbean. Tobagonians learned the important techniques required to catch and de-bone the flying fish from Barbadian fishermen as early as 1962 (R. Morsehead, pers. comm.). Flying fish landings for the period 1979 to 1982

were recorded at 860,833lbs (Table 1), with an ex-vessel value of TT\$430,416.50 and a retail value in excess of TT\$860,833. Landings of larger pelagics were recorded at 40,741lbs, with a retail value of TT\$164,975. Most of the catch was marketed locally through a vessel collector system.

Table 1. Estimated landings of flying fish: 1979 to 1999 Fishing Seasons. Empty cells represent a year with no record. (There is no data for the period 1983-1987).

Season	Flying fish (kgs)	Total Landings (kgs)	% Total Landings
1979	7,251.9	-	-
1980	226,551.4	237,725.9	95.3
1981	65,556.82	70,911.82	92.4
1982	91,927.73	93,916.82	97.9
1983 - 1987	-	-	-
1988	165,868	224,787	73.8
1989	159,104	201,703	78.9
1990	305,104	379,441	80.6
1991	292,711	373,336	78.4
1992	415,484	480,443	86.5
1993	506,750	559,353	90.6
1994	616,742	717,904	85.9
1995	199,198	-	-
1996	240,724	-	-
1997	192,868	-	-
1998	216,214	-	-
1999	177,447	-	-

Pandohee, 1993; Pandohee, 1994; Mohammed, 1996; Fisheries Beach Landings (raw data), GORTT & Actual landings 95 – 99, DMR&F, THA.

Fisheries exports contributed about 3% of the gross domestic product (GDP) in 1999. One processing plant purchased approximately 403,438lbs of whole flying fish during the 1998/1999 fishing season. This plant contributed 995,029 fillets in exports to the gross domestic food production (GDFP), which had a value of approximately TT\$1,293,537.00. In addition to employing fifty-five (55) persons, the plant also contributed 331,676 fillets to national food security that year.

THE FLYING FISH FISHERY OF TRINIDAD AND TOBAGO, AND ITS HISTORICAL EVOLUTION

Historical

Coastal fishing has been undertaken in Trinidad and Tobago waters for centuries. Fishermen traditionally used wooden boats called 'bumboats' rigged with cloth or canvass sail and two wooden oars for propulsion. One or two fishermen on board utilized a few fishing techniques. They sail their vessel with two lines towing at the stern, or they do banking while at anchor or engage in drift banking for demersals. Fishermen had problems with the eggs of the flying fish (*Hirundichthys affinis*) entangling their lines as they came to spawn. The fish were also attracted to the light from the lamps while fishermen fished at nights. This encouraged the

catching of this resource by scooping them out of the sea with baskets made from roseau bamboo. This fish was initially offered for sale in the whole, since the deboning technology was not yet available and utilized. Due to its bony nature, consumers did not readily accept flying fish though it was considered very tasty. Fishermen realized poor sales when the whole fish was offered to customers.

It was not until the early 1960s, that a Tobago processor/businessman (Morsehead per. comm.) contracted some fishermen from Barbados to teach the skill of de-boning the flying fish to his employees. This skill was quickly learned and transferred to many other persons (mainly women) throughout the various fishing communities in Tobago. This generated much needed employment in the processing sector and increased the exploitation of the flying fish resource.

As the years progressed, fishermen began increasing the sizes of their boats. Instead of 'corking' their wooden vessels with cotton twine between the spaces of the board and using tar inside and out to make the vessel waterproof, the use of fiberglass matting became the material of choice. In 1963, Tobago's fishing fleet suffered extensive damages from hurricane "Flora". The government offered subsidies, as well as credit facilities through the Agricultural Development Bank (ADB) and private commercial institutions to the fishermen. These facilities were utilized to replace the old sailing-type vessels with motorized ones- a transition from wooden 'bumboats' to fiberglass pirogues. These new vessels ranged from 22 - 24 feet in length. Today however, vessel sizes range from 22 - 40 ft and are propelled by outboard gas engines ranging from 15 - 100 hp, as well as inboard diesel engines ranging from 125 to 335 hp (Table 2). Vessels now have bait wells and larger storage holds to carry more fish and ice over a longer period. All open multi-gear pirogues are called day boats, while the larger, hooded, multi-gear vessels are referred to as multipurpose boats, iceboats, or overnight vessels. The gradual increase in landings in the pelagic fishery was realized with the introduction of iceboats. Most countries in the Eastern Caribbean are presently expanding, or intend to expand, their oceanic pelagic fishing fleets, primarily by increasing fishing fleet size but also by changing boat type (Hunte 1995). Thus, the fisheries are moving from "small-scale artisanal" towards "large-scale commercial" operations, with considerably more capital being invested in the fleets today than in the past. Large-scale commercial fisheries catch more fish, but they do so at a price. Compared with small-scale artisanal fisheries, they employ far fewer fishermen, the capital cost of each job on a fishing vessel is far greater, considerably more fuel is consumed overall, and typically fewer fish are harvested per ton of fuel consumed.

The fishing trade is fast losing its stigma as being a 'poor man's' job, or one for dropouts of the education system, where it is chosen as a last resort after they cannot find 'white collared' jobs. Over the last five (5) years, many young men upon leaving school go directly into fishing as a career.

Table 2. Propulsion System (Engines)

Engine Type	Horse Power													Total
	40	45	48	55	60	65	72	75	100	130	200	225	335	
Yamaha*	-	-	10	31	2	-	-	6	-	-	-	-	-	49
Mariner*	2	-	-	7	2	-	-	-	-	-	-	-	-	11
Johnson*	-	-	-	-	-	2	-	-	-	-	-	-	-	2
Evinrude*	-	2	-	2	-	-	-	-	-	-	-	-	-	4
Ford+	-	-	-	-	-	-	2	-	-	-	-	-	-	2
Detroit+	-	-	-	-	-	-	-	-	-	-	1	1	1	2
John Deere+	-	-	-	-	-	-	-	-	-	1	-	-	-	1
Volvo Penta+	-	-	-	-	-	-	-	-	-	-	1	-	-	1
Total	2	2	10	40	4	2	2	6	0	1	1	1	1	72

*Gasoline Outboard Engine; +Diesel Inboard Engine

Some of the following reasons were given as to why they chose fishing as their sole means of livelihood;

- i) They have experience as part of being a crewmember on fishing trips,
- ii) They grew up on the beachfront and in a fishing community,
- iii) Family members have vessels engaged in fishing,
- iv) They see it as something worthwhile, which gives them independence,
- v) They have the ability to earn a living and have some financial security, and
- vi) They have a real career choice.

Technological

Advances in technology in the flying fish industry in Tobago from the early beginnings in the 1960s have been gradual. Today, there are four (4) major and three (3) minor fish processing plants in the Southwest that process the flying fish. Fish processed from these plants are sold locally, nationally, regionally, and internationally. Many small cottage-type industries exist and they contribute significantly to the Gross Domestic Product. All processed fish are consumed locally from these cottage-type industries.

The vessels initially used ranged from 8 to 12 feet in length and had one ended or double ended bows. These fishermen were mainly subsistence fishers who had other means of income to support their families. Children assisted their parents (and the activity of 'lend hand' became very popular) in the mending of nets, hauling nets, mounting lines and nets, and repairing boats.

The Department of Marine Resources and Fisheries in collaboration with Caribbean Fisheries Training and Development Institute (CFTDI) embarked on an island-wide extension service and training programme to train interested persons and fisherfolk in the capture, processing, storage, and marketing of the flying fish. This was facilitated by the re-institution of the collection of catch and effort statistics in Trinidad and Tobago under the Eastern Caribbean Flying fish Project and funded by International Research Centre of Canada (IDRC) of Canada. Today, the government of Trinidad and Tobago, in collaboration with the Japanese government/JICA, continues to train fisherfolk in fishing technology, fish handling and processing, engine repairs and maintenance, and marine fisheries resources management.

Socio-Economics

Flying fish were previously taken as a by-catch and contributed greatly to the discards of the fishery because there was little knowledge on how to use the resource. This changed over time and now flying fish constitute a very valuable commercial resource. Although small in body size, the flying fish constitutes the highest fishery product by volume and weight when landed. Households near or within the fishing communities depend largely on the flying fish trade for their livelihood. Some persons possessing the skill of de-boning the flying fish can be seen at landing sites receiving a few pounds of fish after assisting with offloading or cleaning the vessel. Both women and men get into the fray to de-bone flying fish at

the landing sites with fishing centres, for a fee, and encourage the increased consumption of flying fish. An untold number of fishers are engaged in this practice, and contribute significantly to the labor force, and subsequently the reduction in the unemployment rate on the island.

In the 1970s the local fishing industry underwent rapid expansion due to increased investment from both private and government sectors. The construction of a dry goods and cold storage complex in the southwest area of Tobago resulted in further development of the processing industry. Over the years processors used this facility for the storage of whole and processed fish. Presently, all processors have acquired their own in-house cold storage facilities due to high storage costs and the frequent failure of the private plant.

The boat building and repair industry in Tobago is almost nonexistent. Only one boat building and repair shop exists in the northwestern end of the island. Many fishers are now able to repair their own vessels because of frequent training sessions facilitated by the government and private entities. In Trinidad numerous boat building and repair shops exist. These also facilitate fishermen from Tobago who may need their services.

The private, commercial, and public lending agencies, such as credit unions and the ADB, continue to invest in the fishing industry in providing loans for boats and engines. The fisheries department provides extension services (e.g. boat, engine, and fishermen registration) and facilitates the incentives that are offered by government for commercial fishing such as the waiver of Value Added Tax (V.A.T) and gas rebates. The provision of ten (10) fishing centres around the island gives support to the industry. These contain lockers for the storage of engines and other gear and tackling. Water and electricity are also provided at no cost to the fishermen, and all operational costs are borne by the State. Some fishing centres have cleaners, and at times other times cleaning supplies are procured for the fishermen to keep the fishing centres in a clean and sanitary condition.

THE FISHING FLEET

Structure and Size of Fishing Fleet

Tobago's flying fish fishermen practice towing one to two lines either at the stern of the vessel or on two bamboo poles on the port and starboard side as the vessel travels to the fishing ground. On reaching the fishing grounds (5 – 30 miles from shore), and from any point along the western or northwestern (Caribbean Sea) side of the island monofilament nets between 4 - 7 meters long and about 2 - 2.5 meters deep are deployed. The nets are secured on the port side of the vessels. Fish attraction devices (FADS) are also deployed with these nets and about 6 - 8 nylon lines, each about 30 - 60 meters long are also used with one hook each. The drift and trolling fishery is pursued by about 228 fishermen from approximately 126

pirogues and ¹ice-boats (6 - 12 m in length), most of which are powered by either out board gas engines (2 x 30 - 75 hp) or diesel inboard (75 - 335 hp) engines (larger vessels). The typical crew consists of one to two fishermen for the pirogues and two to three for the ice-boats. The pirogues (day boats) fish for a period of one day. The larger multipurpose vessels fish for three days, with a two-day rest period. Fishing activity begins from as early as 6 a.m. to as late as 9 p.m. the same day (10 - 15 hours) for the day boats, and to some 72 hours later for iceboats.

The flying fish season runs from as early as November of one year until late July of the following year, while the trolling season begins as soon as the flying fish season ends (July to November). It is mainly concentrated in the southwestern part of the island and includes fishermen from the ports at Buccoo Point, Mt Irvine, Pigeon Point and Scarborough. Fishermen between Castara and Charlotteville fish from the head of the island to Sisters Rock from January to December, and fishermen from Speyside, Roxborough, Studley Park fish between Little Tobago and Bacolet Point from January to December. Some fish potting is done within the two seasons during the year. Multi-gear fishing is practiced throughout.

Fishermen secure loans from the local Agricultural Development Bank (ADB) at interest rates ranging from 15% to 17% per annum, as well as, from commercial banks at rates of 15 to 19%. A fisherman needs to procure at least 30% of his finance before he can secure the rest in loan funds from the lending institution. The loan repayment period ranges from 5 - 7 years for boats and 1 - 3 years for engines. Each client requiring a loan is treated on an individual basis and the lending rate increases as the risk increases.

There is a share system in effect for catch distribution between the boat owner and crew. The following is applicable to the Southwest Tobago:

- i) 50%-50% - (catch divided into two, between the boat and crew; or 50% for boat and the other 50% divided among owner, captain and crew)
- ii) 60%-40% - (catch divided into two, 60% for owner/boat and the other 40% among the crew)

There are several fisher-folk organizations on the island. These include:

- i) Castara Fishermen's Association
- ii) Parlatuvier Fishermen's Association
- iii) Tobago Marketing Cooperative Society
- iv) Tobago Fishing Coop. Soc. Ltd
- v) Tobago Fishermen Federation
- vi) Studley Park Fishermen's Association
- vii) South West Tobago Fishermen's Association
- viii) Roxborough Fishermen's Association
- ix) Bloody Bay Fishermen's Association

¹ Iceboats are large multi- purpose vessels that can stay out at sea for long periods (2 days or more).

- x) Blackrock/Plymouth Fishermen's Association
- xi) All Tobago Fisherfolk Association (ATFA – The umbrella body for all fisherfolk organizations).

Other Notable Socio-cultural Information

- i) The Tobago Fishing Cooperative Society Ltd., in Charlotteville is the only one that operates a gas station and tackle shop, a mini-mart, and process a small percentage of fish.
- ii) Primary education and primary health facilities are easily available to all throughout the island. There are five health centres, ten primary schools, five secondary schools, one UWIDITE campus, a technical school and a community college in southwestern Tobago.
- iii) Housing communities set up by the National Housing Authority and private investors exist throughout the island. These facilities are accessible to all those who wish to acquire land or property. In the Southwest five of such communities exists (Bon Accord, Mt Pleasant, Buccoo, Old Grange, Signal Hill and Friendsfield).

DISTRIBUTION AND MARKETING OF FLYING FISH

Upon arrival at the landing site, the flying fish from the ice-boats are put into sturdy plastic (80 - 100lbs) baskets then offloaded into large plastic bins on the processors' truck, where they are iced before being transported to the processing plants. Some day boat fishermen who have their own private vehicle usually make arrangements to deliver their catch to the plant, while the catch from other fishermen are picked up by the processor. The processor buys the catch at wholesale prices and pays the fishermen at an agreed time.

Some flying fish and associated large pelagics are offered for sale to the public at the landing sites. Some fishermen will have a sales-person at the site to conduct retail sale, while other fishermen do the sales themselves. Some hawkers (fish vendors) with vehicles buy large pelagics at a higher wholesale price than the processors. These vendors will truck the fish around through the villages for sale at retail prices. Fish taken to processing plants is processed, packaged and sold to local supermarkets, as well as, exported to Trinidad, other Caribbean countries, Canada, Europe, the United States, and Asia.

INSTITUTIONAL, POLICY AND MANAGEMENT ASPECTS

Open-access fishing has been common practice in Trinidad and Tobago's waters for decades. It has been rumored that the waters around Tobago have enormous quantities of fish to supply its people for decades. It has been said, "we have a billion dollar industry just waiting to be tapped". There have been many requests from various international companies wanting to fish or to set up processing plants in Trinidad and Tobago. The government through its fisheries division (Trinidad)

and department (Tobago) and the proactive fishing communities have seen the need to conserve and preserve their fisheries resources by looking at the best management options. Policies are being devised toward management of the archipelagic waters within the unitary state with specific reference to management the policies regarding the flying fish resources within the territorial waters and the 200 mile exclusive economic zone of Tobago.

In 1991 the government of Trinidad and Tobago entered into a bilateral fishing agreement with the government of Barbados to fish for flying fish and other large pelagics in the waters around Tobago. This fishing agreement ended, and since then no other agreement has been established. Government must, and should move to get the proper tools to ensure effective surveillance of its territorial sea, update fisheries legislation, and provide the basic infrastructure (landing facilities and fishing centers) for fishermen to carry out their daily operations in the various fishing communities.

CAPITAL INVESTMENT, INCOME AND EXPENDITURE IN THE CAPTURE SECTOR

The Department of Marine Resources and Fisheries collects catch and effort data from 25% of the landing sites around Tobago. Not all of the landings however, are recorded because of severe personnel shortage and time constraints. Interviews with fisherfolk confirmed information on fuel, ice, food and maintenance costs. Catch value was calculated using figures from the Fisheries Division that has been monitoring market prices since 1979.

Most of the boat owners interviewed had no insurance coverage but supplied data on the loan structures from the commercial banks and the Agricultural Development Bank (ADB). These loan structures were confirmed with the Agricultural Development Bank.

Capital Investments

The current cost of a fully equipped day-boat is approximately TT\$72,000.00 while a typical iceboat (including gear and equipment) built in Trinidad and Tobago costs around TT\$400,000.00. As shown in Table 3, a bank loan at the ADB for up to 70% of the boat value may be obtained for a fishing boat, at an annual interest rate of 16% for all vessels (the related information is shown in Table 3). For loans that are repaid evenly over the 5 years on a typical day boat, the annual repayment cost to the principal would be TT\$10,080. Annual interest cost at 16% would be TT\$8,064.00 for the first year devaluing to TT\$1,612.80 in the fifth year.

The loan requirements for an ice-boat are shown in Table 3. The annual repayment cost to the principal would be TT\$40,000. Annual interest cost at 16% would be TT\$44,800 for the first year, depreciating to TT\$6,400 in the seventh year.

For the typical ²iceboat, insurance is TT\$8,000.00 per year. The life of a fishing vessel is taken as approximately 15 years for a typical day-boat and 25 years for a typical iceboat. Depreciation costs for the vessel and the cost of the engines for both fishing vessels are shown in Table 3.

Table 3. Summary of estimated average costs (TT\$) of a typical day-boat and a typical iceboat in the Tobago pelagic fishing fleet.

Cost	Day-Boat	Ice-Boat
Capital: average total	72,000	400,000
Loan:		
Maximum loan (% value)	70	70
Maximum loan (\$ value)	50,400	280,000
Max. Repayment time (yrs)	5	7
Interest rate (%)	16	16
Average annual repayment	10,080	40,000
Insurance: annual premium	-	8,000
Depreciation: annual	400	2,304
Hull and engine (annual)	-	4,000
Gear (annual)	3,500	6,000
Expenditure/Operational:		
Fuel/Oil (per trip)	400	500
Fuel (annual)	80,000	32,000
Ice (per trip)	-	2,900
Ice (annual)	-	17,400
Food (per trip)	50	600
Food (annual)	10,000	32,400
Fishers ID Renewal	10	30

¹Day- boats rarely carry ice. In the past five years, the Department of Marine Resources and Fisheries has made a concerted effort to educate the fishers on the importance of icing the fish caught

²Only 1 boat owner interviewed confirmed that he possessed insurance. Most ice-boats owners in Tobago have no insurance coverage. Insurance for day boats (pirogues) is done in Trinidad.

Expenditure/Operating Costs

All the maintenance costs and expenditure are shown in Table 3. Food supplies for each crewmember is minimal for day-boats, being TT\$50.00 per trip. The annual cost of crew supplies is therefore TT\$10,000. Food supplies for the three-man iceboat crew is TT\$600.00 per trip. The annual cost of food supplies is therefore TT\$32,400.

Landings and Income

Catch rates vary annually, reflecting variation in fish abundance due to market forces at the time, sea conditions in the year and weather conditions from time to time. However, from interviews with the fishermen the average catch of flying fish per trip is approximately 2,000lbs and large pelagics 150lbs for a typical day-boat. The average annual catch of flying fish per vessel is 400,000lbs and large pelagics at 30,000lbs for a typical day-boat. This gives a catch per metric ton of fuel consumed of 117.6 MT of flying fish and 8.8 MT of large pelagics for the day-boats. The catch of flying fish from a typical iceboat per trip averages 3,700lbs and large pelagics at 1,244lbs. The average annual catch of flying fish is 236,800lbs and 79,616lbs of large pelagics per iceboat. This gives a catch per metric ton of fuel consumed of 15.6 MT of flying fish and 5.2 MT of large pelagics per iceboat. This means that the former is considerably more favorable at present because of the greater number of trips per unit; as such day-boats are more productive and more efficient than ice-boats in terms of catch per unit effort and not necessary in terms of unit of fuel consumed. Analysis of costs and benefits for an average flying fish unit is given in Table 4.

OVERALL EVALUATION OF TOBAGO'S FISHING INDUSTRY

Fishing is an important though relatively under developed industry in Tobago. It is by far the main economic support for many coastal communities around the island. Records from the Department of Marine Resources and Fisheries, Division of Agriculture, Marine Affairs and the Environment show that there are twenty-two (22) major landing beaches, ten (10) with fish landing centres. There are onethousand and thirty-nine (1,039) registered fishermen operating six hundred and ninety-four (694) fishing boats (including ten (10) multipurpose fishing vessels). They harvest some nineteen (19) species of fish and shellfish utilizing eleven (11) different fishing methods from the marine environment around Tobago. The estimated total catch recorded from 1996 was 182,706kg (182.71 metric tonnes). A large proportion of the fish caught off the waters of Tobago is processed and marketed locally, regionally and internationally by some ten (10) fish processing plants on the island.

Table 4. Analysis of Costs and Benefits for an Average Flying Fish Unit with Depreciation Standardized (EC\$)

Country Vessel Type	Tobago *	
	Dayboat	Iceboat
Total value of Investment:		
Boat	12,711	127,110
Engine	16,948	21,185
Gear	847	21,185
Total	30,506	169,480
Income:		
Flying Fish	338,960	200,864
Other Species	88,977	236,133
Total	427,937	436,797
%ff	79	46
Expenditure:		
Fuel	33,896	13,558
Oil		
Ice	0	78,639
Food	4,237	16,270
Market Fees	0	0
License	4	13
Crew shares	192,572	196,559
Vessel Insurance*	0	565
Social Insurance	0	0
*Maintenance & Repairs:		
Boat*	1,130	5,084
Engine*	0	1,525
Gear	1,483	2,542
Total	2,613	9,152
Other Costs	0	0
Total Costs/Expenses	233,322	314,756
Gross Cash Flow	194,615	122,042
Depreciation:		
Boat*	847	8,474
Engine*	5,649	4,237
Gear	424	7,062
Total	6,920	19,773
Interest Charges*	1,224	10,204
Net Cash Flow	186,470	92,066
Return on Investment (%)	611	54
(Net Cash Flow/Total Investment)		

Tobago: 2/3 (8 months/12months) of the costs (for dayboats ONLY, and NOT iceboats) are attributed to the flying fish and large pelagic

The fishing activity in Tobago is mainly artesional and seasonal. The main species caught include: flying fish, albacore, anchovy, barracuda, bonito, cavalli, dolphin fish, grouper, silver snapper, jacks, kingfish, lobster, marlin, chub, salmon, shark, ocean guard, tuna, wahoo and red snapper. The snappers and groupers though fished all-year by some fishermen are caught mainly during the period June to December. The flying fish (the main specie targeted) and other species associated with this fishery: Dolphin fish, albacore, yellowfin tuna, sail fish, shark, and marlin are mainly caught during the period November to July. It is estimated that the flying fish fishery accounts for some 75% of Tobago's fishing industry. This is also reflected in the similar figure seen in the ADB's entire loan portfolio in Tobago (75%), as well as, the overall percentage of all agro-products exported from this island (80%). Flying fish is important to Tobago, and there has been capitalization for the industry on the island. Flying fish is therefore needed all year to sustain this capitalization.

Small, open-deck vessels, 7 to 9 meters in length and constructed from wood or fiberglass (pirogues/bum boats) make up the majority of the fishing fleet. Outboard engines commonly ranging from 45 to 90 horsepower (Hp) propel them. The vessels are usually without modern equipment, communication systems or cold storage facilities.

IDENTIFIED NATIONAL ISSUES OF REGIONAL RELEVANCE FOR FLYING FISH MANAGEMENT

National issues of regional relevance for the management of flying fish are important for the entire fishery. The development of Tobago's Fishing Industry has suffered many set backs over the years. Among the many factors inhibiting the fishing industry's growth and development are the following:

- i) *Weak Administration* — Inadequate institutional capacity for the administration of the Fisheries Sector. Inadequate fisheries surveillance and enforcement capacity,
- ii) *Inadequate Infrastructure* — Sub-standard or non-existent fish landing port facilities at the main fish landing sites. Adequate facilities are required at landing sites to facilitate commercial fishing and to meet both ISO and HACCP standards,
- iii) Sub-standard or non-existent cold storage and fish holding facilities at the main seaport and airport,
- iv) *Inadequate Technology* — Limited post harvest management technology, necessary to ensure quality and reduce wastage of fish. Insufficient training done- this is needed so as to suitably qualify fishermen and processors in quality assurance, marketing etc.,
- v) *Other* — The need for improved cooperation among fishermen, processors and other users of the resource cannot be over-emphasized. There have

been positive steps in this direction with the formation of the All Tobago Fisher-folk Association (ATFA) and the regular meeting of the Fishing Industry Group chaired by the Department of Marine Resources, THA and facilitated by TIDCO, Tobago;

- vi) Limited or non-existent national standards to ensure international market compliance of the local fish and fishing product, and
- vii) Problems re access to beaches, as well as the provision of adequate facilities for the industry at some landing sites.

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