

CRFM Fishery Report 2007



VOLUME 1, Suppl. 1-

National Reports

Report of Third Annual Scientific Meeting -
Kingstown, St. Vincent and the Grenadines
17-26 July 2007

**CRFM Secretariat,
Belize & St. Vincent and the Grenadines
2007**

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CRFM FISHERY REPORT - 2007. Volume 1, Suppl. 1 – National Reports. Report of Third Annual Scientific Meeting – Kingstown, St. Vincent and the Grenadines, 17-26 July 2007

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Foreword

The 2007 CRFM Annual Scientific Meeting took place during 17-26 July 2007. During this Meeting, CRFM Resource Working Groups examined data from eleven fisheries: the Nassau grouper (*Epinephelus striatus*) fishery of Belize; the queen conch (*Strombus gigas*) fisheries of St. Lucia and the Turks and Caicos Islands; the spiny lobster (*Panulirus argus*) fisheries of Jamaica and the Turks and Caicos Islands; the shrimp (*Farfantepenaeus subtilis* and *Farfantepenaeus brasiliensis*) fishery of Suriname; the Atlantic Seabob (*Xiphopenaeus kroyeri*) fishery of Guyana; the bangamary (*Macrodon ancylodon*) fishery of Guyana; the seatrout (*Cynoscion virescens*) fishery of Guyana; the king mackerel (*Scomberomorus cavalla*) fishery of Trinidad and Tobago; the wahoo (*Acanthocybium solandri*) fishery of the Eastern Caribbean. The Meeting also reviewed and adopted the Report of the Second Meeting of CRFM's Ad Hoc Working Group on Methods. A working draft of a CRFM Data Policy Outline was also reviewed and discussed during the Meeting.

The Report of the 2007 CRFM Annual Scientific Meeting is published in two Volumes: Volume 1 contains the proceedings of the plenary sessions and the full reports of the CRFM Resource Working Groups for 2007. National reports, submitted for consideration by the Meeting, are published as Supplement 1 to Volume 1, while the Report of the Second Meeting of the Ad Hoc Working Group on Methods is published as Supplement 2 to Volume 1. Volume 2 contains the fishery management advisory summaries, which are the same as the first 7 sections (sections 1 to 1.7) of each of the fishery reports that are provided in full (sections 1 to 1.8) in Volume 1.

Volume 1 is intended to serve as the primary reference for fishery assessment scientists, while Volume 2 is intended to serve as the main reference for managers and stakeholders.

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ANGUILLA NATIONAL REPORT

*By: James Gumbs and Kenroy Rawlins
Department of Fisheries and Marine Resources*

1.0 Introduction

Anguilla, a flat coralline island (highest point 213 feet above sea level) with a land area of 91 km², has an Exclusive Fishery Zone (EFZ) of some 85 000 km². The EFZ shares a common boundary on the south with the French islands of St. Martin and St. Barthelemy, on the west with the British Virgin Islands, and on the east with Antigua and Barbuda. It extends the full 200 nautical miles to the north. Only approximately 2 000 km² of the EFZ is submerged shelf and it is this area that currently supports the greater part of Anguilla's fishing industry.

Historically, fishing has been an important activity in Anguilla. Indeed, it supplies residents with fresh fish, which has always been an important part of Anguillians' protein diet. Current estimates have indicated that there are approximately 500 fishers operating in the fishing industry in Anguilla, half being part-time fishers. Although the available statistical data relating to the fishery is sparse and weak, it is estimated that the industry contributes about 2% to Anguilla's annual Gross Domestic Product.

The fishing industry in Anguilla remains undeveloped and there are no centralized commercial processing plants with the exception of a small-scale establishment owned and operated by a local fisher. At the moment, the fishing industry in Anguilla is one of open access where persons enter the fisheries at will and this has led to what is generally believed to be an over-fished near-shore resource.

2.0 Fishery and Fleet Descriptions

The commercial fishery of Anguilla is essentially artisanal with fishers primarily utilising open, un-decked vessels, which are only out to sea for a day (~ 5am – 2 pm). A few fishers line fish at night on the reefs around the nearby offshore cays of Dog Islands, Scrub and Seal Islands, while only two fishing vessels spend up to 48 hours at sea. Traditionally, the fishing vessels operated quite close to the shore, but due to the now relatively low catches near-shore, fishing vessels are currently operating 40 miles or more from the mainland.

Fishing gear include the traditional Antillean fish traps of either Z or arrowhead design in addition to seine nets, hand lines, SCUBA gear, rigs and long-lines. In the past, stick frames were used to construct the Antillean fish traps. Today, however, steel frames are the most widely used material. The targeted fish species are lobsters (both *Panulirus argus* and *P. guttatus*), conchs, reef and deep slope finfish, coastal pelagics and ocean pelagics.

The Lobster Fishery is a well established fishery with it's beginnings in the late 1960s. It is by far the most prosperous fishery in Anguilla with an estimated 100 fishers involved on a full-time basis. The spiny lobster is the main targeted lobster species and is caught with Antillean fish traps baited with imported cowhide. The traps are set at depths between 90 and 180 feet of water. The spotted spiny lobster, locally called 'crayfish', is also targeted by some fishers on shallow reefs in waters less than 30 feet in depth. Unlike the spiny lobster traps, crayfish traps are baited

with reef fish. The main period for lobster fishing is between October and April, with catches falling by as much as 70% during the summer months.

The Conch Fishery is a minor fishery with a small number of fishers (less than 10) targeting the queen conch (*Strombus gigas*). In the past, fishers would free-dive for conchs on seagrass beds in depths of no more than 30 feet of water. The demand for conchs determines the amount of time that these few fishers go out to sea.

The Finfish Fishery is characterized by the use of traditional Antillean fish traps, hand lines with baited hooks, poles and rigs. Traps are set in shallow reef and seagrass areas (less than 30 feet) or in deep slope areas at depths of up to 600 feet of water. Fish such as red hinds, butterfish, grunts, doctor fish, goatfish and squirrel fish comprise the catch from the shallow areas. Snappers and groupers, meanwhile, are the targeted species in the deep slope areas. The peak period for the deep slope areas is during the winter months.

The Seine Net Fishery is a seasonal fishery usually conducted during the spring to summer months when there is an inshore schooling of pelagic fish. The targeted species in this fishery are horse-eye jacks, crevalle jacks, bonitos, and bar jacks. The fish are encircled with a net either from the beach or in the open water. This type of fishing involves the use of boats with persons in the water either snorkelling or diving as required.

The Offshore Long-line Fishery is a new emerging fishery with less than five boats operating on a limited scale. The targeted species are dolphinfish, wahoo, tuna, marlin and swordfish. Most of the boats go out to sea on a ‘to order’ basis and spend less than a day fishing around fish aggregating devices that have been placed in the water specifically for this type of fishing activity.

Table 1: Vessels size categories and numbers per category

Size Category (ft)	Number of vessels
0-20	101
20-30	188
30-60	38
> 60	2
Total	327

The Anguillian fishing industry utilises some 300 fishing boats, the majority being open vessels with the exception of about 5 that are decked. The fleet of open vessels mostly ranges from about 15-35 feet in length, although approximately 5 vessels are 40 to 45 feet and two are over 50 feet in length (see Table 1). All of the vessels are powered by outboard gasoline engines ranging from 25 to 400 horsepower, with the exception of about 4 vessels that are powered by inboard diesel engines. Boats targeting finfish usually set between 30 and 75 traps while those targeting lobsters set between 75 and 100 traps. About 80 percent of the boats are fitted with a mechanical winch for hauling traps. The number of seine nets being utilized in Anguilla is believed to be no more than 15. The length of the nets is usually between 150 and 300 feet long and about 30 feet deep with a one-inch square mesh.

3.0 National Fisheries Policy and Management Objectives

The general national fisheries management objective is to ensure the sustainable utilization of the fishery resources for maximum economic and recreational benefit of the people living in Anguilla. In doing so, measures are taken to ensure that the lobster fishery, in particular, does not become industrialized and that it is open only to residents of Anguilla. In addition, the only fishery that is opened to persons outside of Anguilla (on a limited basis) is the offshore pelagic fishery.

4.0 Research

Currently, the Department is involved in coral reef and seagrass bed monitoring as well as in-water assessments of sea turtle populations. There is also an ongoing project to identify the peak spawning periods for the spotted spiny lobster. There are plans to conduct a fishery census later this year, which would provide the Department with a list of all the fishers and their boats, the gear types used, and their numbers. In addition, the census will provide the Department with up-to-date information on the areas fished. There are also plans to start the collection of catch and effort data from the fishery on a consistent basis, which will be followed by a lobster and conch assessment early next year. A planned project to identify and document fish spawning sites around Anguilla and a study into the causes of coral reef die-off on near-shore coral reefs around the islands and its cays will also be implemented next year.

5.0 Legislation and Management Regulations

The Fisheries Protection Act of 1986 and the Fisheries Protection Regulations of 1988 (and subsequent amendments) are the sole pieces of legislation governing fishing and the fishing industry on Anguilla. Anyone interested in partaking in the fishing industry must be in possession of a relevant valid licence. Categories of licences issued include: Commercial Fisherman's Licence; Sport Fishing Licence; Fishing Vessel Licence; Sport Fishing Vessel Licence; and Process or Export Licence.

Embedded in the Fisheries Protection Regulations are a number of conservation measures, which prohibit, *inter alia*:

- The use of gillnets;
- The taking of sea turtles;
- The use of fish traps with a wire mesh size of less than 1.5 inches;
- The taking of lobsters with a carapace length of less than 95 mm or egg-bearing and moulting lobsters;
- The taking of conch with a shell length of less than 18 cm;
- The use of explosives, lime, leach, or any other noxious substance when fishing; and
- The taking of marine products using SCUBA or spear gun unless the person is a resident of Anguilla.

It should be noted that the Fisheries Protection Act and Regulations are currently being revised.

Monitoring, control and surveillance take place via a system of sporadic patrols at sea using the Fisheries Department vessel or through joint patrols with the Royal Anguilla Police Force, Customs, and Immigration. In addition, Fisheries Officers make inspections at landing sites, hotels and restaurants, and roadside fish vendors.

6.0 References

Jones, T. P. (1985). The Fishing Industry of Anguilla 1985. A report prepared for the Anguillian Government and Commonwealth Secretariat.
Statistics Department. 2007. www.gov.ai/statistics/.

BAHAMAS NATIONAL REPORT

By: Lester Gittens

Department of Marine Resources

Ministry of Agriculture and Marine Resources

1.0 Introduction

The Bahamas covers an area greater than 343,450 km². Of this, 154,553 km² comprise shallow waters (up to 200 m depth). The shallow water banks have an average depth around 9 m but water depth can plummet to between 370 m and 3 700 m along the edge.

In terms of landings value the most important fished resources obtained from the Bahamian Exclusive Fishery Zone include spiny lobster (*Panulirus argus*), queen conch (*Strombus gigas*), various snapper species and Nassau grouper (*Epinephelus striatus*) according to CY2006 figures. This report will focus on the spiny lobster which accounted for 82% (\$75 million) of landings value and 55% (6.1 million lbs of tails) of landings weight in 2006.

2.0 Description of the Fisheries and Fleets

The commercial fishing industry of The Bahamas is based primarily on the Little Bahama Bank and the Great Bahama Bank. Approximately 95% of fishers target spiny lobster. Spiny lobsters are also obtained from Cay Sal Bank although this is to a lesser extent than the other major banks.

Commercial fishing vessels range in size from 11 ft to 100 ft. A fisheries census conducted in 1995 showed that there were approximately 9,300 fulltime fishers and over 4,000 small boats and vessels.

Most fishing vessels take part in the commercial fishery. There is often a “mothership” that works with up to eight vessels. Some vessels stay at sea up to five weeks and may land up to 40,000 lbs at one time. Virtually all landings from the fishery are lobster tails.

Fishing gears that are utilized include spears, the lobster hook, compressors, lobster traps and casitas. Of these, a license is required for compressors and lobster traps. The maximum number of traps that can be used is indicated on the permit. The traps must also be of specific dimensions (91.4 cm x 61 cm x 61 cm with slats no less than 2.54 cm apart) unless there is authorization to do otherwise.

Most lobsters are caught with the aid of casitas (locally known as condominiums). Casitas have increased in popularity since the late 1980s and usually consist of a sheet of zinc placed on concrete blocks or wood. It is estimated that during 1995-1997 the proportion of lobsters caught using casitas vs. other fishing gear peaked and has remained unchanged. A casita is not usually removed from the sea except to be relocated although relocation is not very common. A typical casita lasts about five years. Large scale replacement occurs following hurricanes.

When lobsters aggregate under a casita, a fisher simply lifts the sheet of zinc, uses one end of a lobster hook to catch a lobster and the other end to pierce the exoskeleton on the ventral surface of the thorax. This immobilizes the lobster. The majority of lobsters under the casita are caught before they find refuge elsewhere.

Fishing effort for lobster is not constant throughout the open season. A number of part time fishers only fish during the opening of the lobster season in August. In addition some of the fulltime fishers with very large vessels elect to only undertake only a few 4-5 week trips starting at the beginning of the lobster season and finishing with a few months left in the open season.

3.0 Data Collection and Handling

Catch and effort data are collected by interviewing fishers and by inspection of landings. However, collection of landings statistics in this manner for the entire Bahamas is constrained by having few data collectors and multiple landing sites on multiple islands.

Catch statistics are supplemented by purchase reports submitted by processing plants. Islands with major fishing communities also have processing plants that purchase a large portion of the fishery products landed on those islands. Access to these reports allows the Department to improve estimates of the total weight of fishery product landed, the total weight exported, the local value of landings, the value of exports, landings by major-island and exports by island. Purchase reports also reflect the weight of exports per year per commercial size category per processing plant for spiny lobsters and thus reflect annual cohort size classes to a limited extent. Further information on annual cohort size classes is obtained by sampling lobster tail lengths from major processing plants.

Lobster data collected from processing plants is considered largely complete because it is believed that over 90% of lobsters landed are exported and thus recorded. The year-to-year differences in recorded landings are considered reflective of actual trends in landings for lobster. The total fishing effort for lobster is unknown.

4.0 Policies and Legislation

Government policy presently reserves the commercial fishing industry, as far as is practical, for the exploitation by Bahamian Nationals. Only commercial fishing vessels that are 100% Bahamian owned are considered Bahamian and therefore allowed to fish within the country's Exclusive Economic Zone. In addition only Bahamian citizens can take part in commercial fishing unless the individual is in possession of a spousal permit or a work permit that specifically allows fishing.

The primary management objective for the spiny lobster fishery, although not official as yet, is to ensure that spiny lobsters are harvested for maximum economic benefit and that this is done in a sustainable manner.

Legislation affecting fisheries includes The Fisheries Resources (Jurisdiction and Conservation) Act 1977 and the Wildlife Conservation and Trade Act 2004.

A summary of regulations from the Fisheries Act that apply to all Bahamian fisheries are seen below: -

- SCUBA diving for any fisheries resource is prohibited.
- Compressors can be used for commercial fishing, but only during the lobster season (August 1 to March 31). In order to use a compressor the fisherman must have a permit from the Department of Fisheries, which is issued only to trained, certified divers.

- Compressors can only be used in waters between 30 ft and 60 ft.

Approval has also been given for five areas to be designated as marine protected areas. These marine protected areas are expected to positively impact a number of fisheries resources. Public consultations have been held and declaration of the boundaries under The Fisheries Act is expected in the near future.

There are also other regulations and or policies that are species specific. Regulations specific to the lobster fishery according to the Fisheries Act include:-

1. It is illegal to capture, possess or sell egg-bearing spiny lobster
2. It is illegal to remove the eggs from a spiny lobster
3. It is illegal to possess a spiny lobster that has had the swimmerettes removed
4. There is a closed season during the period April 1st through July 31st.
5. The minimum harvestable size for a spiny lobster is 82.55 mm carapace length or 139.7 mm tail length. The tail length regulation is only enforced when the carapace is absent.

Regulations pertaining to foreign sports fishers were changed in 2007. A maximum of 6 lobsters is allowed aboard a vessel at any one time. This has changed from 6 lobsters per person aboard a vessel.

With regards to the Fisheries Act enforcement is the responsibility of the Department of Marine Resources, The Royal Bahamas Defence Force, The Royal Bahamas Police Force and The Customs Department.

BELIZE NATIONAL FISHERIES REPORT 2007

By: Ramon A. Carcamo Jr.

Belize Fisheries Department, Ministry of Agriculture & Fisheries

1.0 Introduction

Commercial fishing began in Belize since the 1950's; however it was not until the early 1960's that the Belizean fishermen began to organize themselves into cooperatives, which resulted in substantial increases in their incomes. At the initial stage the conch fishery was the most dominant commodity being fished in Belize. However, as the industry evolved and the international markets' demand for spiny lobster increased, so the lobsters became the primary marine commodity from the 1960's onwards. The fishing industry of Belize has contributed significantly to the development of the country by providing direct employment to fishermen, and processing plant personnel. In addition, it has added to foreign exchange earnings thereby strengthening the country's economy. The fishing industry is divided into two main sectors, the *wild capture fisheries* and the *aquaculture sector*. For the year 2005 the Belize fishing industry contributed 3.8 % to the Gross Domestic Product (GDP) of the country (Central Statistical Office, 2006).

2.0 Description of the Fishery

2.1 Lobster fishery

This fishery has dominated the capture fisheries sector in Belize over the last three (3) decades by being the most productive and the most important income generating artisanal fishery. The fishery is a seasonal fishery, which has an eight-month open season. The importance of the fishery can be attributed to the high market demand and the lucrative price. The lobsters are caught using lobster traps, free dive using hook sticks and shades made from different materials. The lobster continues to be caught at the 6 fishing zones in Belize. The traps are set in the sea-grass beds behind the reef crest in shallow waters (3-20 m). The two boat types normally used are: small motor vessels "skiff" (5-10 m) with between 15 and 200 Hp engines, and sailing vessels ranging between (10 – 11.5 m) with auxiliary outboard motors (Annex 1). The skiffs are usually used by the fishermen who have traps, while those on the sailing vessels are free dives (FAO, 1965). There were 2,131 fishers registered and 653 fishing vessels licensed in 2006.

Lobsters landed at the fishing cooperatives are in the form of tails and head meat. Lobster production by the Fishermen Co-operatives has been fairly stable over the last 10 years, with values ranging between 196,765.5 kg (432,884 lbs) and 283,940 kg (624,668 lbs) with over 190,846.8 kg (419,863 lbs) of lobster tails and 17,197.7 kg (37,835 lbs) of head meat being produced in 2006. This showed a decrease of 14.6 % in lobster tails and 16.27 % in head meat production when compared to the year 2005 (Figure 1).

LOBSTER PRODUCTION IN POUNDS FOR 1977-2006

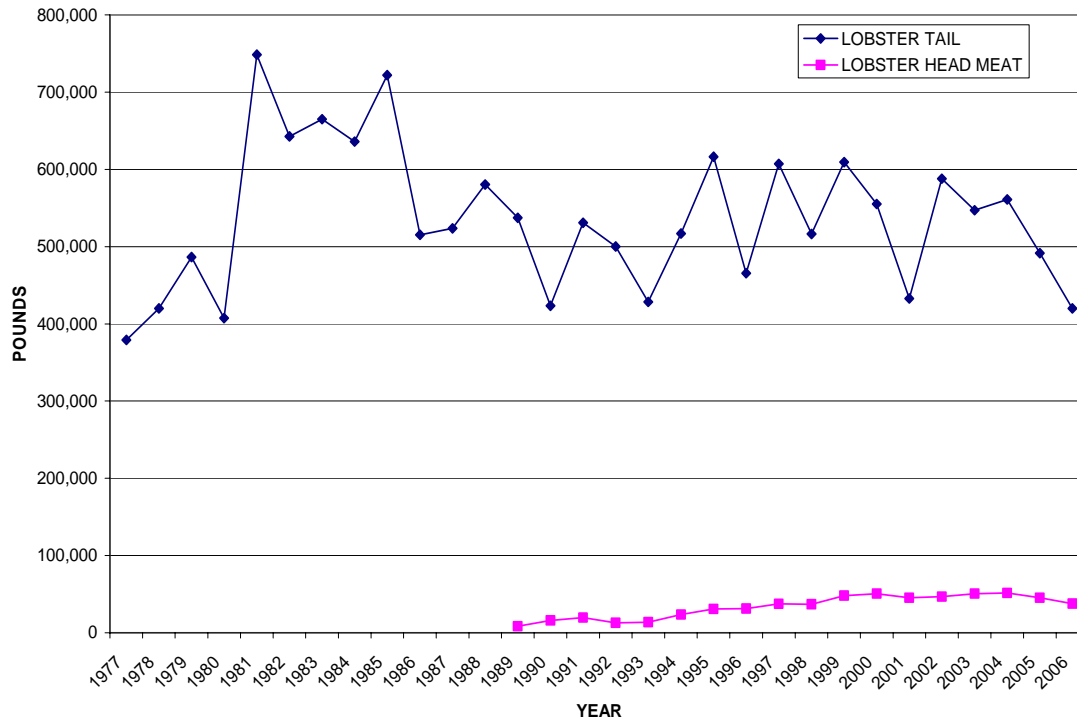


Figure 1: Annual Lobster Production from 1977 – 2006.

Over the last eighteen years lobster tails exports have remained fairly stable, ranging between 181,818.2 kg (400,000 pounds) and 272,727 kg (600,000 pounds). In 2005, the lobster fishery earned over \$13.7 million and \$253.8 thousand in foreign exchange on 207,690.9 kg (456,920 lbs.) and 16,477.3 kg (36,250 lbs.) of processed lobster tails and head meat exported to the U.S.A., respectively. This showed a decrease in foreign exchange earnings of 8.7% for lobster tails and an increase of 56.5 % for head meat when compared to 2004 (Figure 2).

LOBSTER EXPORT IN POUNDS FOR 1977-2005

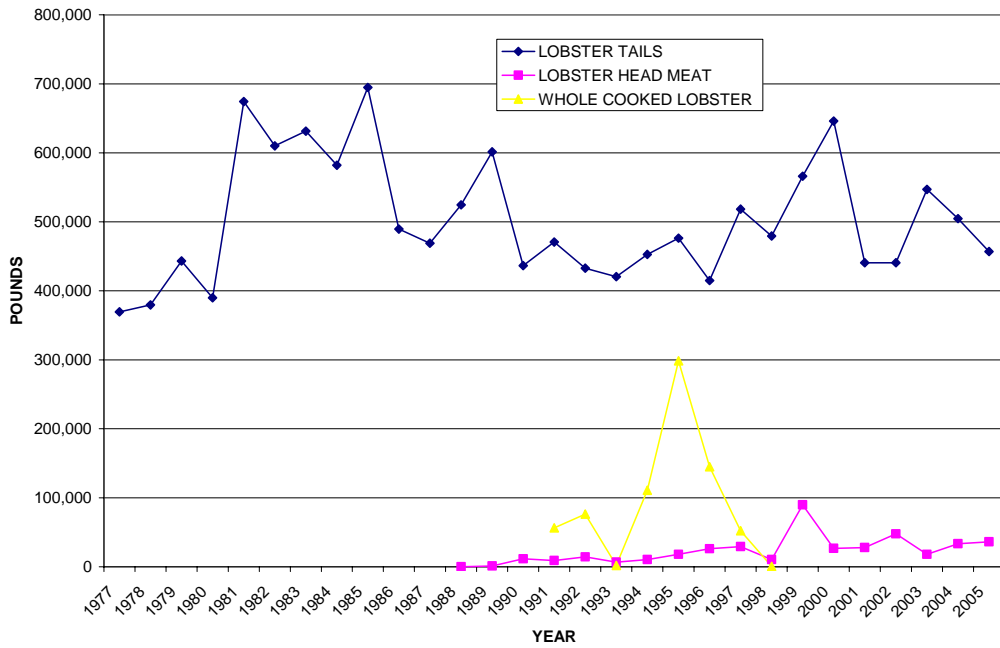


Figure 2: Annual Lobster Exportation Weights from 1977 – 2005

González (2007) made a first attempt in approximating the lobster population of Belize using cohort analysis. The results indicated that the fishing mortality was high, being 0.7 year^{-1} and with annual extractions ranging between 40% to 60 % (average 55% for the period) of the stock. This was contrary to what was reported by Medley (2005).

The analysis of total exports by tail weight metric tonnes (MT) shows that nearly 80% of the tails are between 4 to 5 ounces (Figure 3).

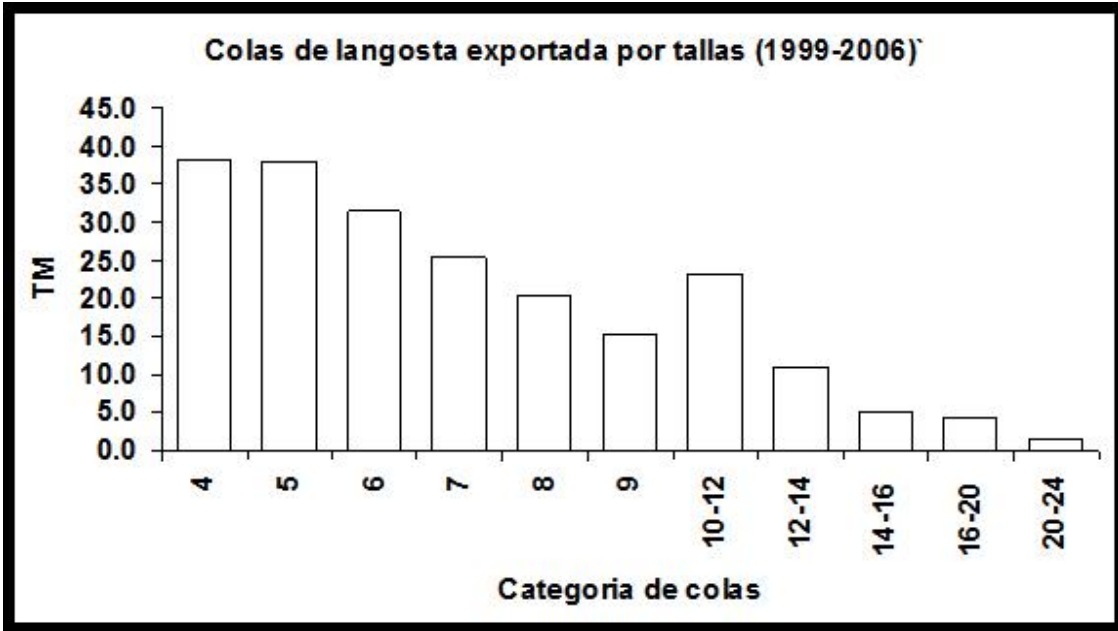


Figure 3: Exports of Lobster Tails by Weight in Ounces for the Period 1999 to 2006

In the analysis of individual cooperatives, it was observed that Northern Fishermen Cooperative was responsible for harvesting a significant percentage (25%) of minimum size lobster tails (4 ounces, 25%). This is fundamentally due to the fact that a large number of lobster fishers from this cooperative work in the northern fishing region of the country where the highest abundance of small lobsters are found. Nationally, 17.9% of lobster exports correspond to the 4-ounce weight category from 1999- 2006 (Figure 4).

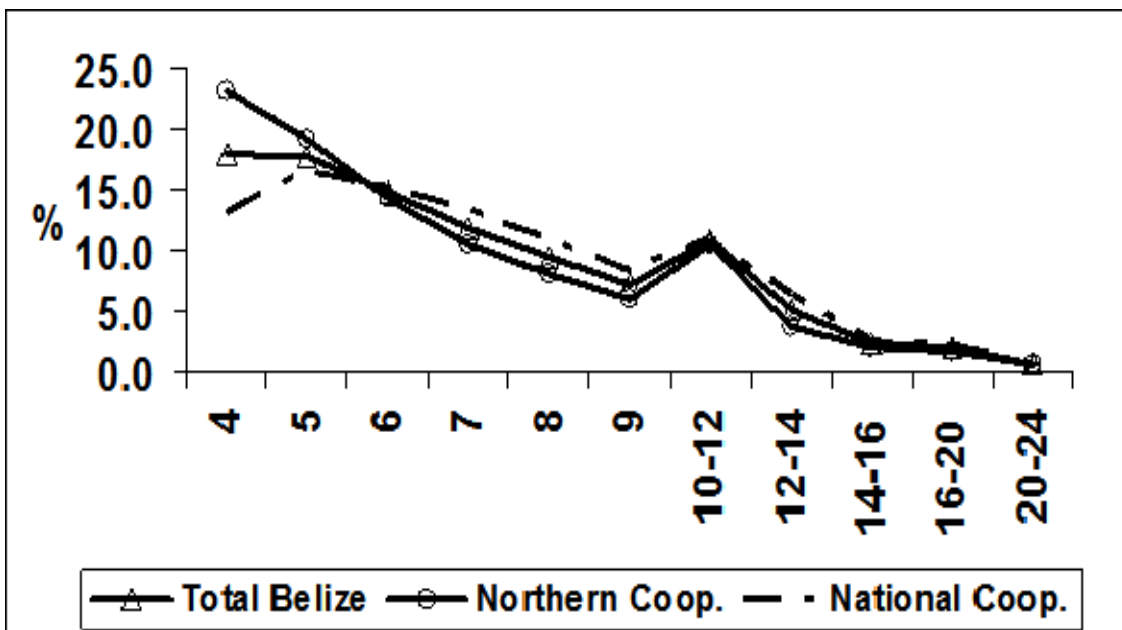


Figure 4: Export of Lobster Tails by Weight Class in Ounces for the Period 1999 to 2006.

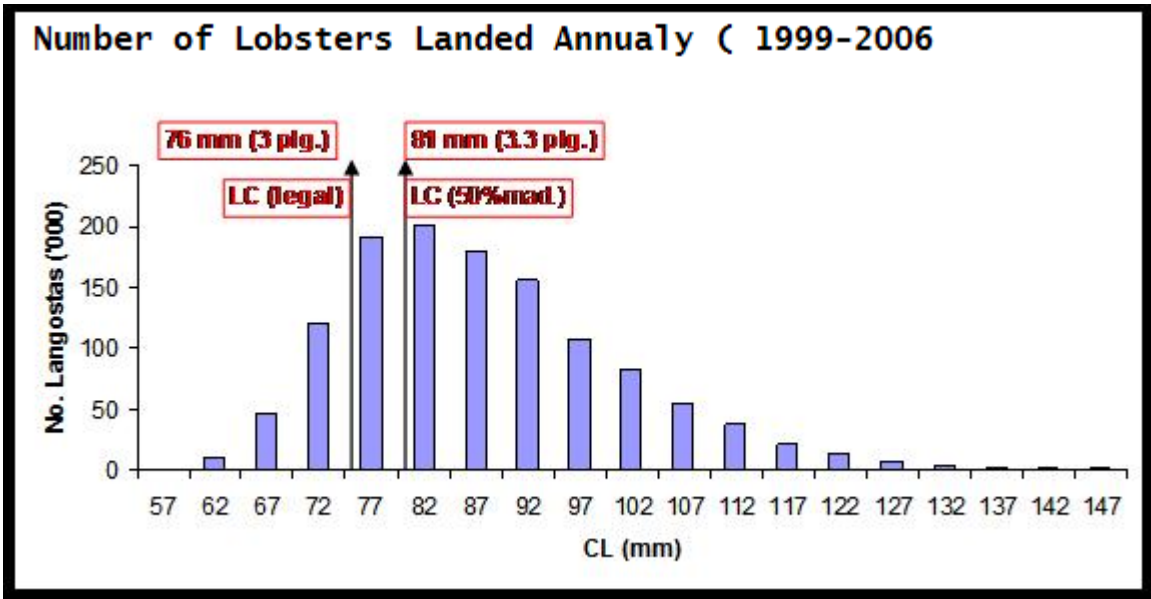


Figure 5: Belize Lobster Landings by Carapace Length for Period 1999 to 2006.

The transformations done to estimate carapace length from the lobster tail weights for the period 1999 – 2006 indicated that on average, 14% of tails exported were below the minimum legal size of 76 mm in carapace length. Also, 29% were below the minimum size of first maturity, which is usually at 81 mm (3.3 inches) in carapace length (Cruz y de León, 1991).

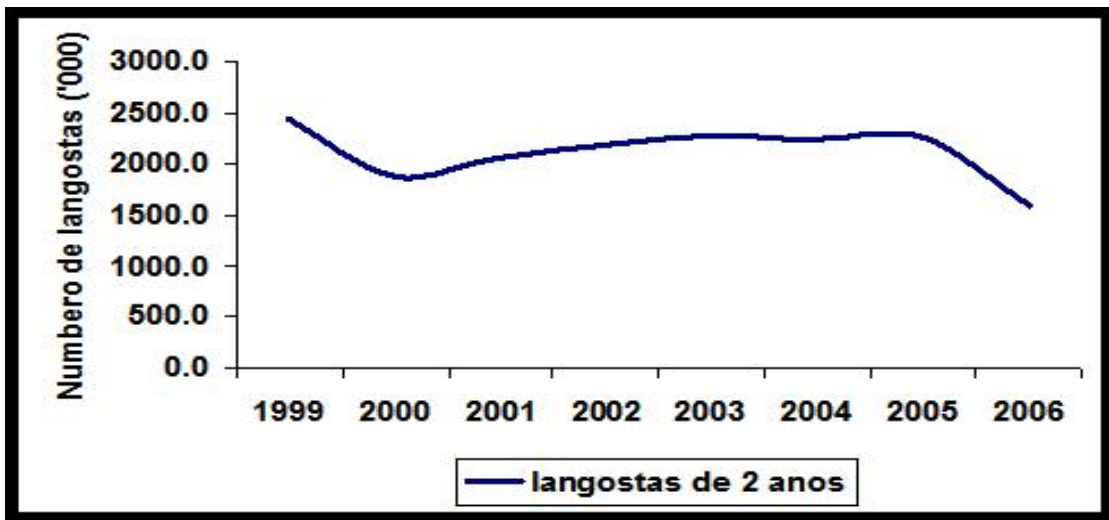


Figure 6: Belize lobster recruitment pattern during the period 1999-2006.

The recruitment to the fishery (2-year old animals) shows that a decrease occurred from 1999-2000 and a slight recovery and stabilization from 2001-2005. However, there is clear decline in 2006 (Figure 6).

Lobster fishery regulations

1. No person shall take in the waters of Belize or buy, sell or have in his possession lobster:
 - (a) if the carapace length is less than 74 mm or the tail weight is less than 113.4 g;
 - (b) between the 15th February and the 14th June, inclusive, in any year;
 - (c) that is berried, has eggs or spawn;
 - (d) that has had the berries, eggs or spawn removed;
 - (e) that is moulting or has a soft shell;
 - (f) fillet or diced lobster tail meat, except under a special permit issued by the Fisheries Administrator.
2. Notwithstanding the provisions of subregulation (1) above -
 - (a) Lobster with a carapace length of less than 74 mm may be taken in the waters of Belize for aquaculture purposes under a special licence granted by the Minister;
 - (b) Lobster that is berried, (has eggs), may be taken in the waters of Belize for aquaculture purposes under a special licence granted by the Minister.
3. No person shall detach or otherwise remove from any female lobster any eggs or spawn or the setae or fibre to which any eggs or spawn are or have been attached.
4. No person shall take any soft shelled crustacean.
5. No person shall take fish (definition includes lobster) in the waters of Belize using SCUBA equipment except under special permit from the Fisheries Administrator.
6. No person shall with intent to take fish (definition includes lobster), use any trap or other device constructed of net or wire in any area within a distance approximately of one km of the barrier reef.

2.2 Conch fishery

In Belize the Queen Conch fishery is still a commercially valuable resource second only to the lobster fishery. This species has been fished for over forty years for local consumption and for thirty years it has been exploited commercially. Exports generated \$7.8 million Belize dollars in 2005. Prior to the commercial exploitation, the Queen Conch had been fished for subsistence purposes. The fishery is still classified as an artisanal fishery in Belize. Conch meat production from the five Fishermen Co-operatives has continuously increased since 1999 with over 314,682.7 kg (692,302 lbs.) produced in 2006, which was an increase of 9.36% compared to 2005 (Figure 7). In 2006 the fishing cooperatives exported 314,431 kg (691,750 lbs.) of conch meat to the U.S.A. valued at \$ 6.7 M Bze (Figure 8).

CONCH EXPORT IN POUNDS FOR 1960-2006

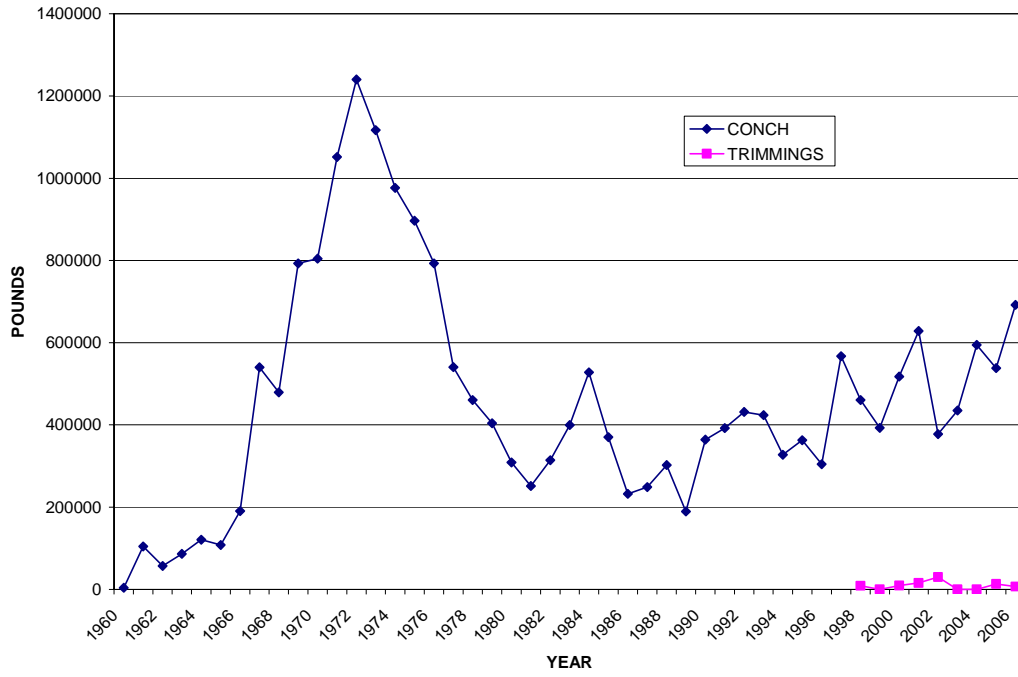


Figure 7: Annual Conch Meat Production from 1960 To 2007

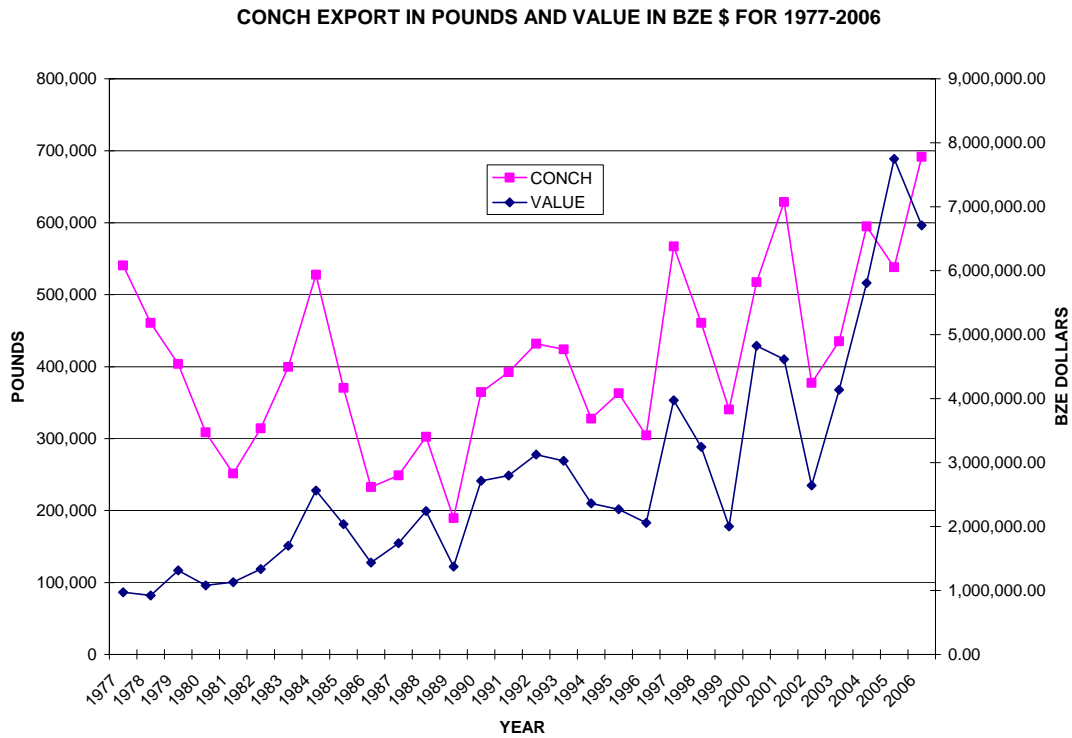


Figure 8: Annual Conch Meat Exportation from 1977 To 2007

In 2003 the Belize Fisheries Department conducted a national assessment of the Queen Conch population in Belize. One of the conclusions was that the population of conch in Belize had increased by three fold as compared to the results obtained from the 1996 population assessment. This increase in abundance was significant in the Northern and Central fishing zones of Belize. It was also concluded that the no-take areas and deep water areas consisted higher densities of conchs as compared to shallow fished areas (Appeldoorn, 2003).

Also in 2004 the Fisheries Department conducted another national assessment of the conch population in Belize. It was estimated that the legal conch densities were significantly higher in no-take zones in the marine reserves. Furthermore, adults were on average, larger in deep areas, indicating that adult populations arise primarily from direct larval settlement and not from migration from shallow areas. So, it was found the marine reserves contained a high proportion of very small adults of conchs (Appeldoorn, 2004).

Furthermore, in 2006 the Fisheries Department conducted another conch population assessment. It was determined that the legal size conch abundance was estimated to be approximately 9,508,049(95% C.I., 6,355,871--12,660,224) individuals, which translated into 1,620,690 kg (3,565,518 lbs) (95% C.I., 2,383,452--4,747,584) of conch. Schaefer Model resulted in MSY of 494,006.8 kg (1,086,815 lbs) (95% C.I., 811,371—1,369,515). Fox Model resulted in MSY of 425,202.7 kg (935,446 lbs) (95% C.I., 745,741—1,140,173).

Conch fishery regulations

- Market clean conch weight should exceed 3 ounces or 85g
- The shell length should exceed 7 inches or 17.6 cm
- Closed Season (From 1 Jul -30 Sept)

Other Measures

- Quota (Set by Fisheries Administrator)
- Gear restrictions (No SCUBA diving)
- Area closure (8 marine reserves)
- Diced conch is prohibited

2.3 Marine Shrimp Fishery

In 2005, 31,801.8 kg (69,964 lbs) of marine shrimp was produced showing a decrease of 57.0% in production compared to 2004. This decrease was due to the late harvesting of shrimp during the opening of the season. This production represented 5.4% of the total wild caught marine commodities produced (Figure 9).

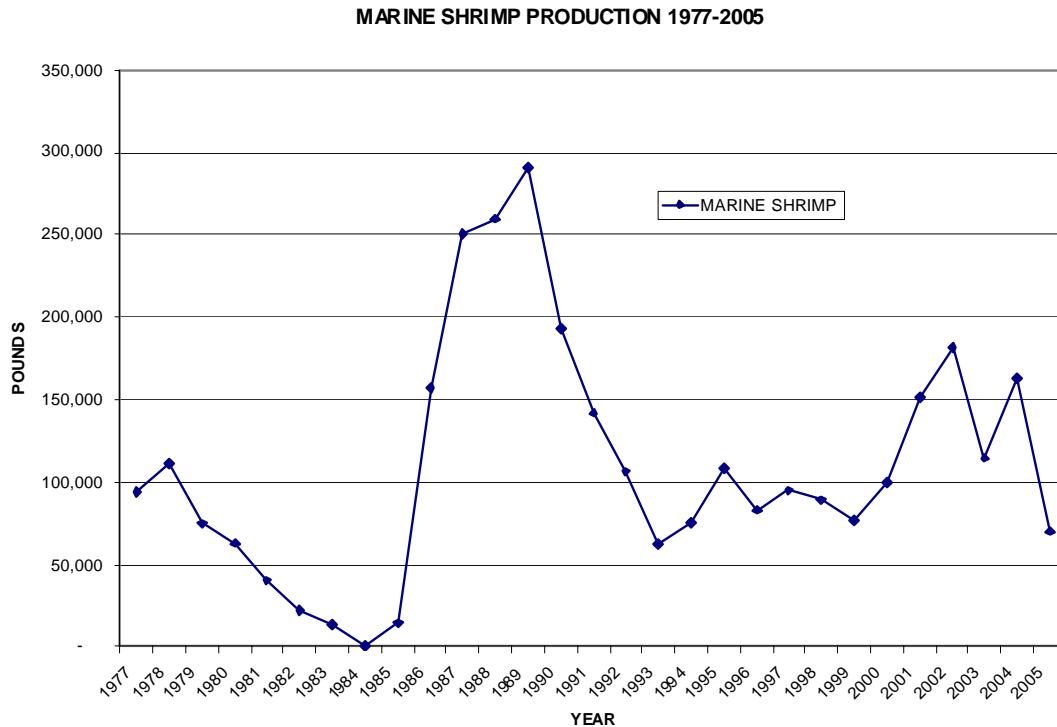


Figure 9: Pink Shrimp Production from 1977 To 2006

The status of the marine shrimp fishery has been determined as over fished, even though an assessment conducted in 2003 recommended that the fishing effort be reduced and the fishery would probably start to recover.

2.4 Finfish fishery

Whole fish and fish fillet production by the Fishermen Cooperatives for 2005 amounted to 7537.7 kg (16,583 lbs.) and 15,930.9 kg (35,048 lbs.), respectively. This showed a decrease of 19.6% and 8.3% for whole fish and fish fillet production compared for the year 2004, respectively (Figure 10).

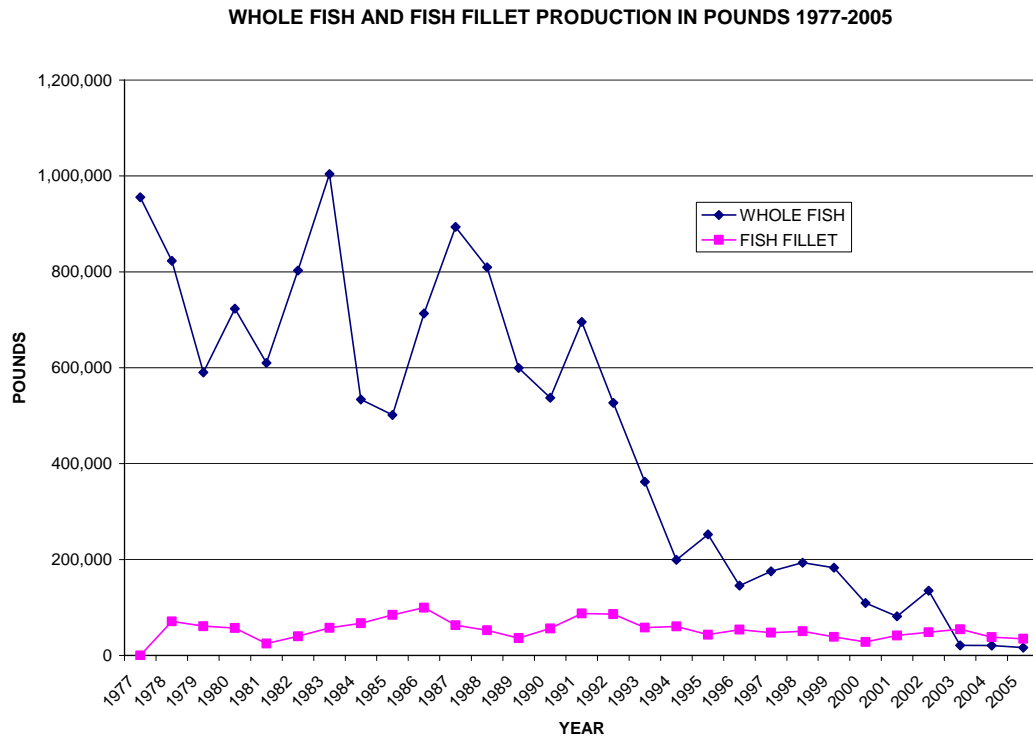


Figure 10: Finfish Production from 1977 to 2005.

FINFISH EXPORTS FOR 1977-2005

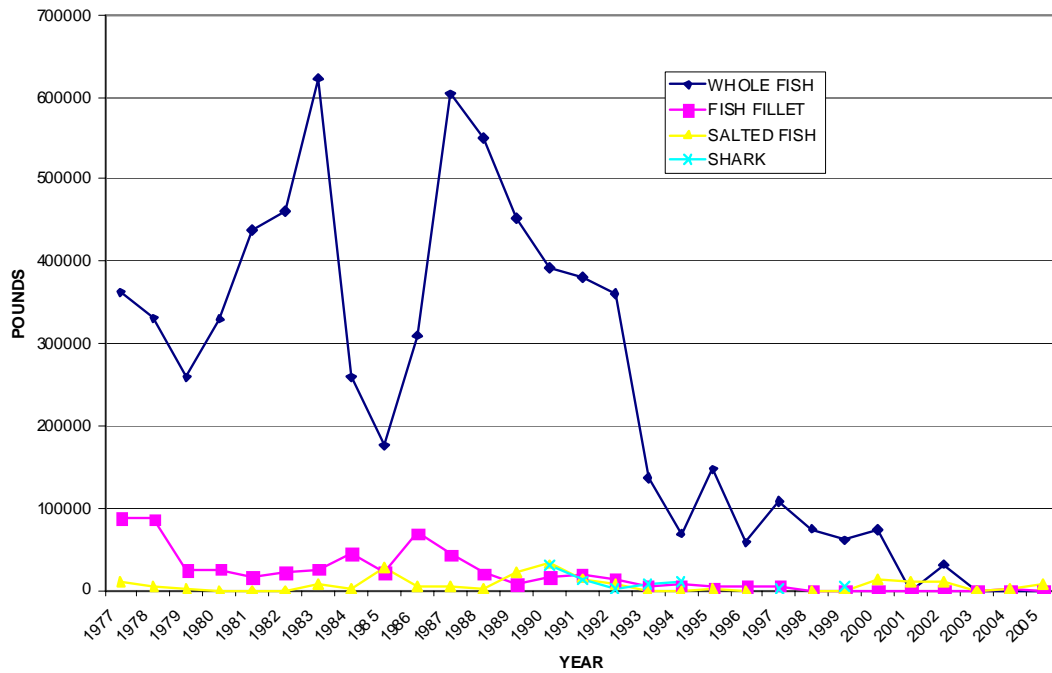


Figure 11: Finfish Exports for 1977 - 2005

In 2005 the finfish fishery earned \$9,375 Belize dollars in foreign exchange on 3,409 kg (7,500 lbs.) of processed salted fish. This showed an increase of 179.4% in foreign exchange earnings compared to 2004 (Figure 11).

2.5 Marine Aquarium Fishery

One hundred and fifteen thousand two hundred and twenty two (115,222) fishes valued at \$216,737.00 were exported for the year 2005. This showed an increased of 86.2% in the amount of fish exported and 20.2% in earnings compared to 2004 (Figure 12).

The companies that are presently exporting aquarium fishes and aquatic invertebrates are Tropical Fish Export, DD Export, Bela-Carib, and Marine Life Belize Company.

AQUARIUM FISHES AND AQUATIC INVERTEBRATES EXPORT FOR 2000-05

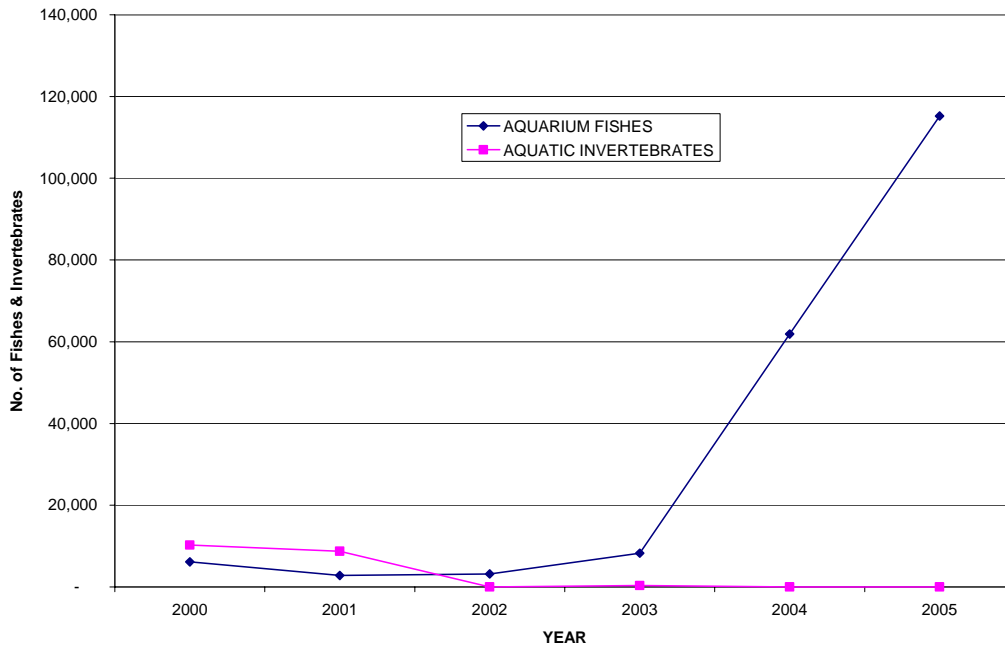


Figure 12: Aquarium Fishes and Aquatic Invertebrates Export for 2000-05

2.6 Other Commodities

Eight thousand seven hundred and forty five (8,745) pounds of stone crab claws and 352 lbs. of squid were produced in 2005. This showed an increase of 21.6% and 60.0% in stone crab claws and squid production, respectively. Squid harvested are caught as a by-product in the shrimp trawlers nets.

Four thousand 1818 kg (4,000) pounds of stone crab claws valued at \$55,198.00 were exported in 2004. This showed an increased of 44.9% in the amount of crab claws exported and 45.8% in foreign exchange earnings compared to 2004.

3.0 Other Issued Licenses

The table below shows other licenses issued by the Fisheries Department over the past five years.

Table 13: Other Licenses Issued From 2001-2005.

ISSUED LICENSES FROM 2001-2005					
Licenses	2001	2002	2003	2004	2005
Research	33	54	43	35	16
Aquarium License	3	3	3	3	5
Aquaculture Operation`	9	10	7	4	5
Black Coral	18	36	26	40	39
Seafood Export Permits	2,577	2811	2786	2646	2564
Fish Exporters	13	14	18	15	21

4.0 Arrests and Convictions

The Conservation Compliance Unit (CCU) and the marine reserves rangers from the Fisheries Department are responsible for the monitoring and enforcement of the Fisheries Regulations. The table below shows the number of arrests and convictions, boats, engines and weight of marine product confiscated and fines charged for 2003-05.

Table 14: Fisheries Arrests and Convictions Data.

TYPE	2003	2004	2005
Arrests (#)	47	67	56
Convictions (#)	45	56	56
Boats Confiscated (#)	3	2	-
Conch Confiscated (lbs.)	6,175	2,655	2,787
Engines Confiscated (#)	3	2	-
Lobster Confiscated (lbs.)	1,148	149	165
Fines Charged (BZ \$)	85,975	112,698	121,770
Value of Engines & Boats (BZ \$)	45,000	32,000	-
Value of Nets (BZ \$)	12,000	-	8,000
TOTAL VALUE (BZ \$)	142,975	144,698	129,770

5.0 References

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- Carcamo, R. (2006). Stock Assessment of the Queen Conch (*Strombus gigas*) population of Belize.
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- Gonzalez, M. (2007). Reporte Del Entrenamiento Tecnico Al Departamento De Pesqueries De Belize.

Annex 1.



Figure 1: Fiberglass skiffs used by fishers for fishing purposes



Figure 2: Wooden sails boats equipped with an auxiliary engine used by fishermen for harvesting both lobster and conch.

GUYANA NATIONAL REPORT

Executive Summary

Guyana has a land area of 215,000 km², 432 km of Atlantic coastline and 48,000 km² of continental shelf averaging 88 km in width. Its EEZ is approximately 138,240 km². The country's extensive river system is the Essequibo, which, along with several others, discharges immense volumes of fresh water into coastal marine areas.

Guyana's marine environment is also heavily influenced by the Amazon whose outflow into the Atlantic south and east of Guyana is estimated at a rate of 200,000 cubic metres per second. The Amazon waters move in a northwesterly direction along the coast of South America and, on account of the heavy particles, is brown in colour. This deep brown colour is evident 40-50 km from the Guyanese coastline and extends as far north as Venezuela. Accordingly, the marine conditions off Guyana are estuarine and support benthic fauna such as shrimp and a variety of demersal fish species.

The fishery sector is of critical importance to the economy and social well being in Guyana. Fish is a major source of animal protein in Guyana. This sector is also a great contributor: to our National Gross Domestic Product, to export earnings, to employment, income and government revenue. In addition, Guyana's Fisheries are divided into three main components, with further subdivisions as follows:

Marine Fishery

- (i) The Offshore Industrial (Trawl) Fishery
- (ii) The Inshore Artisanal Fishery
- (iii) The semi-industrial Fishery

Inland Fishery

- (i) Subsistence Fishery
- (ii) Ornamental Fish Fishery

Aquaculture

- (i) Brackish-water Culture
- (ii) Fresh-water Culture

Different species of fish are harvested from these three main components by the use of a variety of gear types e.g. Hook & Line, Pot Traps etc.

On the other hand, our fishery sectors are faced with constraints like any other fishery sector. There is the need for enforcement of Legislation and Management Regulations and the National Fisheries Policy and Management Plan has to be approved and implemented. Moreover there is the need for development and research and training.

1.0 Fisheries and the National Economy

The fishery sector is of critical importance to the economy and to social well being in Guyana. Indeed, the economic contribution of the fisheries has grown dramatically in recent years. The importance of fisheries is evident in five key areas:

1.1 Food Supplies

Fish is the major source of animal protein in Guyana. It is estimated that per capita annual consumption of fish rose from 9 to 27 kilograms between 1980 and 1988, and was nearly 45 kilograms in 1991. In 1996, it was 59.8 kg. It is estimated that the value is around 60 kg (FAO data).

1.2 Contribution to the Guyana Economy

The Guyana Bureau of Statistics estimates that the primary sector of fisheries contributed G\$154 million to the total Gross Domestic Product (GDP) or value added in 2003, about 1.59 percent of the total GDP.

1.3 Contributions to Export Earning

Guyana's 2006 export earnings from fisheries were approximately G\$11.4 billion, while in 2005 it was G\$10.2 billion. Exports in finfish and by-products in 2006 were 8120.36mt and in 2005 were 9313.32mt. Prawns and seabob exports were 648.15mt and 9039.3mt in 2004 respectively.

1.4 Contribution of Employment and Incomes

The fishing industry employs some 5,300 people in harvesting and 6,300 in processing and marketing. More than 11,000 jobs depend directly on the fishing industry and many more people benefit indirectly from fishing-related occupations, such as boat building, supply, and repair. A high proportion of workers in processing, distribution and retail are women. Region 4 has a particularly high concentration of women in all activities of the sector.

1.5 Government Revenues derived from the Fisheries

Export taxes

Licence fees and consumption taxes on imported fuel for fishing vessels and licence fees for fishing vessels.

Exclusive Economic Zone (EEZ)

Guyana has a coastline of 432 km and a continental shelf area of 48,665 km². The average width of the continental shelf is 112.6 km, while the area of the EEZ is 138,240 km². Resources being exploited within the EEZ are mainly the demersal resources (shrimp and ground fish).

Fishing Area

The EEZ, for statistical purposes, has been divided longitudinally into nine (9) Fishing Zones, each separated by 30-degree intervals. Artisanal users operate on the continental shelf at distances up to 56 km (30 miles) from the shore, all along the coast.

2.0 Description of the Fisheries

The Fisheries Sub-sectors of Guyana comprise three main components, each with further subdivisions as follows:

2.1 Marine Fishery

The Offshore Industrial (Trawl) Fishery

The Inshore Artisanal Fishery

The semi industrial Fishery

2.2 Inland Fishery

(i) Subsistence Fishery

(ii) Ornamental Fish Fishery

2.3 Aquaculture

(i) Brackish-water Culture

(ii) Fresh-water Culture

2.4 Offshore Industrial Fisheries

The Offshore Industrial Fishery consists of 146 trawlers, 6 major processing plants, 9 small processing plants, and numerous wharves and dry docking facilities. Forty-eight percent of these vessels exploit mainly penaeid shrimp (*P. brasiliensis*, *P. notialis*, *P. schmitti*, and *P. subtilis*) with finfish and small amounts of squid (*Loligo* spp.) and lobster (*Panulirus* spp.) as by-catch. The remaining percentage mainly exploits seabob (*Xiphopenaeus kroyeri*) and various finfish species (*Macrodon ancylodon*, *Micropogonias furnieri*, *Nebris microps*, *Arius* spp., *Cynoscion* spp.), with small quantities of penaeid shrimp as by-catch.

2.5 Inshore Artisanal Fishery

Inshore Artisanal Fishery consists of approximately 1129 vessels. Gear types used in this fishery include: pin seine, chinese seine (a fyke net), cadell lines, drift seines and circle seines (modified gillnets). The larger vessels have ice boxes and go on fishing trips that last as long as 12 or more days, while smaller vessels may or may not have ice boxes. Catch include mullet, queriman, Mugil sp., Snook (*Centropomus undecimalis*), Grey Snapper (*Cynoscion acoupa*), Sea Trout (*Cynoscion virescens*), Butterfish (*Nebris microps*), Croaker (*Micropogonias furnieri*), Pagee (*Lobotes surinamensis*), Bangamary (*Macrodon ancylodon*), Gillbacker (*Arius parkeri*), Tarpon (*Tarpon atlanticus*) and other catfishes (*Ariidae*). By-product as well as operators in this fishery varies according to gear type.

	Chinese Seine	Cadell Line	Gillnet Nylon	Gillnet Polyethylene /Driftnet Cruiser	Gillnet Polyethylene Gillnet/ Inboard	Pin Seine	Tie Seine	Back Cabin
# of Vessels	285	55	342	326	80	17	9	15
# of Fishers	855	165	1368	1956	400	51	18	75

2.6 Gear Types

The vessels targeting red snapper use either hook and line or pots and traps which are constructed of wood. The hook and line fishing method is used for fishing red snappers in deep water over the slope off the Guianas.

2.7 Hook and Line

Hook and lines are used while fishing with bait, usually sardines. A fisherman holds each line which is made of nylon wire. Each vessel is equipped with 6-9 lines with five (5) hooks per line.

The length of the line varies between 30-60 metres whilst the size of the hook ranges from 5-6. The target catch of hook and line is *Lutjanus* species (red snapper), while the by-catch is lane snapper and vermillion snapper.

2.8 Pots and Traps

The gear is made of nylon or plastic wire mesh and is flat and hexagonal, with two of the sides forming a concave, funnel-shaped angle. Each vessel is equipped with 40-65 traps with a mesh size of 1/4 inches. The traps are often laid out in-groups of 2 or 3 units connected by a rope. The crew size varies from 5-6. The target species for pots and traps is *Lutjanus* spp. (red snapper), while the by catch landed include cavalli, Spanish mackerel, grouper, etc.

2.9 Chinese seine (Fishing Strategy)

These fishing operations work in relation to the tide and fishers spend between 6 to 12 hours per day fishing. Some operators would fish both tides per day. The seines are attached to poles and set on mud banks, mainly in the river mouths, where tidal currents sweep the fish and shrimp into them. The seines are set at depths between 2 and 6 fathoms, at a distance of about one-five mile from the shore. The crew size on these vessels ranges between 2 and 4 persons and the catch consists primarily of *N. schmitti* (whitebelly shrimp), *Xiphopenaeus kroyeri* (seabob), *Macrodon ancylodon* (bangamary), *Nebris microps* (butterfish).

2.10 Cadell Line (Fishing Strategy)

Before each trip, the hooks are baited mainly with bangamary and stored in the trays. Keybrand hooks are normally used. These vessels operate on a daily basis with each fishing trip lasting for approximately 12 hours. Most of the fishing activities occur at nights between 10-12 miles from the coast in waters approximately 5-10 fathoms deep. Crew size on a cadell vessel ranges from 2 to 4 persons and the catch consists mainly of *Arius parkieri* (gillbacker), *Bagre bagre* (catfish), *G. Arius* (cuirass), (*Arius phrygiatus*) kwakwari and various species of shark which are sometimes landed headless and gutted.

2.11 Pin Seine (Fishing Strategy)

Pin seine fishing is practised mainly in Regions 2 and 6. The net is set at high tide in the intertidal zone and a row of stakes is arranged in a semicircle to hold the net in a vertical position. During the ebbing tide the fish are trapped and then retrieved from the mud flats by the use of "catamarang", which is an upward-curved mud-riding board of about 2m (6.6 ft) in length and 60 cm (23.6 in) wide fitted with a fin underneath and a box for storing fish. Catches include *Mugilidae* spp. (mullet), *Mugil* sp. (queriman), *Centropomus* sp. (snook), *Macrodon ancylodon* (bangamary), *Micropogonias furnieri* (croaker), and catfishes of the family Ariidae.

2.12 Gillnets (Fishing Strategy)

Gillnets (polyethylene) vary in length from 1,000 to 1,600 m and are 4 m deep with a stretched mesh measure of 20 cm. Nets are set and hauled manually from the boats. The catch consists mainly of gray snapper, *Cynoscion acoupa*; sea trout, *Cynoscion virescens*; bashaw, *Cynoscion jamaicensis*; pagee, *Lobotes surinamensis*; tarpon, *Tarpon atlanticus*; gillbacker, *Arius grandicassis*; mackerel, *Scomberomorus maculatus*; and sharks, *Carcharhinus* spp. (Chakalall and Dragovich, 1979). Some 400 vessels are involved in gillnet fishing.

2.13 Constraints of the fishing industry

- Lack of adequate scientific information and data on the resources.
- Lack of technical and financial assistance for the marine fishery from government and foreign organizations.

- Illegal and unregulated fishing.
- Inadequate monitoring and surveillance of fishing.
- Lack of skilled human resources.
- Status of the economy (fluctuation of currency, unrest etc.)

3.0 National Fisheries Policy and Management Objectives

Offshore Industrial Large Penaeid Shrimp Fishery, Industrial Seabob Fishery, Inshore Artisanal Fishery (Pin Seines, Chinese Seines, Cadell Lines, Gillnets) & Snapper/Grouper – Deep Slope Fishery:

- To rebuild and identify target and limit reference points for the Fishery.
- To maintain all non-target species, associated and dependent species above 50% of their mean biomass levels in the absence of fishing activities.
- To stabilise the net incomes of the operators in the large penaeid shrimp fishery.
- To include as many of the existing participants in the fishery as possible given the biological, ecological and economic objectives listed above

Small Pelagic Fishery

- Investigate the feasibility of a directed fishery. Based on the above, investigate the potential for operating a cannery and/or fishmeal plant.

Large Pelagic Fishery

- To develop the capacity for maximizing catches of large pelagics inhabiting or migrating through the EEZ.
- To establish management linkages with international regulatory bodies, such as ICCAT, in order to access vital information to properly manage these fishes.

4.0 Research

Currently, there is no research being carried out.

5.0 Legislation and Management Regulations

Act and Regulations in Force: Fisheries Act 2002 (replaced the 1959 Fisheries Act and portions of the 1977 Marine Boundaries Act).

The DOF liaises closely with the Coast Guard and Marine Police on fisheries enforcement issues, but neither agency has adequate surveillance vessels. The Department of Fisheries monitors compliance with the TED requirements and utilizes its staff (TED Inspectors) for the inspections.

Despite some attempts by the fishing industry to regulate itself (e.g. aerial surveillance of offshore shrimp vessels; providing a patrol vessel for the exclusive use of the Coast Guard), more effective enforcement is required to reduce illegal foreign fishing and over-the-side sales and piracy. Foreign poaching seems to be the greatest concern in the snapper/grouper and shrimp fisheries. Theft of engines and fishing gear and the destruction of nets by other fishing vessels are problematic in the artisanal fishery.

Some of the issues affecting the effectiveness of conducting monitoring, control and surveillance have been the lack of resources, the large expanse of the maritime zones of Guyana, operational problems of the Coast Guard and the unresolved maritime boundary delimitation agreements with neighbouring states.

Data Collection Programme

The data collection system consists of the inshore and offshore and logbook programme. This programme involves the collection of catch, effort, and biological data from the various fisheries. The logbook and observer programmes are also part of the data collection programme.

Artisanal and Industrial data collection programme

The data collection programme is a random stratified programme. Stratification is done by vessel/gear type. The landings, employment and value of the catch were important factors that led to this type of stratification, and determined the number of vessels to be sampled per month per gear type.

At the start of every month, sampling schedules are prepared in the three Regions for data collection. A total of 82 vessels are chosen to be sampled for data. These vessels are randomly selected from landing sites in the Regions. They include 20 chinese seine, 17 gillnet nylon, 4 cadell. 15 gillnet (outboard), 6 gillnet (inboard), 4 pin seine, 3 handlines and 2 traps for the artisanal fishery and 6 seabob and 5 prawns for the industrial fishery.

The vessels sampled in Region 4 are all the industrial vessels and forty-two artisanal. In Regions, 6 and 2 the number of vessels sampled is 13 and 14 respectively.

The number of vessels being targeted for data collection has been reduced due to the manpower shortage. Only 65 vessels are being sampled per month. Sampling is done three days per week, Tuesday to Thursday and at least two trips are scheduled per day. The number of vessels targeted per trip would depend on the landing site being targeted, the number of data collectors and the number of vessels at the site. Catch and effort and biological data are collected from the vessels selected randomly at the landing sites.

Limitations and strengths of sampling Plan

Limitations

- Sampling days are fixed and this does not give a true representation of fishing activities at landing sites.
- Inadequate resources to conduct activity.
- Ineffective supervision of data collectors.
- Ineffectiveness of community participation.

Strengths

With the introduction of the data collection programme for the artisanal fisheries, production estimates for the artisanal fishery were revised for previous years and the estimates prepared now are more precise.

6.0 References

Chakalall, B., and Dragovich, A. (1979). Artisanal Fishery of Guyana. 13p.

Appendices

Table 1: Showing the contribution to GDP and Growth rate

	2006	2005	2004	2003	2002	2001	2000	1999	1998
Fishing Contribution to GDP (G\$M)	156	161	157	159	159	165	164	143	142
Annual Growth Rates (%)	-3.2	2.6	-1.0	0.0	-4.0	1.0	14.1	1.0	-2.6

(Source: Bureau of Statistics)

Table 2: Showing Guyana Exports of Marine Products, 1998-2006(Metric Tonnes)

Year	1999	2000	2001	2002	2003	2004	2005	2006
Prawn	1280	1076	924	682	518	648.15	909.9	871.55
Seabob & Whitebelly	4902	7199	10923	9071	11534	9039.3	9077	8591.3
Finfish and by-products	4870	5268	6768	9339	9834	12026.2	9313.32	8,120.36
Crabmeat	25	3.33	3	24	15	22.61	18.47	13.86
Total Export	11,077	13,546	18,618	19,116	21,901	21,736.26	19,318.69	17,597.07

Table 3: Showing Annual Exports for 1998-2006: Foreign Trade

Year	Amount (mt)	Value G \$
1998	11,627	6.5 billion
1999	11,170	9.0 billion
2000	13,547	7.2 billion
2001	18,340	11.0 billion
2002	19,322	11.5 billion
2003	21,901	11.2 billion
2004	21757.41	12.6 billion
2005	17,597.07	10.2 billion
2006	19,318.69	11.4 billion

Table 4: Production Statistics for fish and Shrimp from 1998-2006(Metric Tonnes)

Metric Tonnes

ITEM	1999	2000	2001	2002	2003	2004	2005	2006
SHRIMP / PRAWNS								
(Whole Weight)	1,595.1	1,132	1,608	1,522	1,161	1,293	1020	1,663
(Tail Weight)	996.4	707	1,005	952	726	808	638	1,039
SHRIMP /SEABOB &	9,393.7	16,098	21,097	18,405	19,017	14,485	13,363	13,010
No. of Trawlers	80	81	80	80	121	139	127	127
SHRIMP /SEABOB & WHITEBELLY - (Artisanal)	3,397.1	635	1,164	730	188	357	1,500	1,382
		1,464	1382	1,400	2,218	2,470	2,254	2,830
TOTAL SHRIMP	14,385.9	19,329	25,251	22,057	22,584	18,605	18,137	18,885
FIN – FISH - (Industrial)	932.5	1,139	942	3,175	3,311	1,486	962	955
TOTALFIN-FISH (Industrial)	932.5	1139	942	3,175	3,311	1486	962	9955
FIN – FISH- (Artisanal)	34,051.0	28,629	25,426	21,587	29,801	26,501	29,010	24,295
No. of Boats	1331	1300	1325	1300	1300	1100	1128	1,128
Red Snapper	273.0	510	524	424	612	540	341	424
No. of Boats	39		48	60	75	45	40	40
TOTAL FIN –FISH	35,257	30,278	26,892	25,186	33,724	28,527	30,313	25,674

NATIONAL REPORT ON THE SPINY LOBSTER FISHERY IN JAMAICA

By: Anginette Murray

Ministry of Agriculture and Lands, Fisheries Division

1.0 Introduction

Jamaica is located about 145 km south of Cuba and 161 km west of Haiti. The island is 236 km long, between 35 and 82 km wide, with a total area of 10,940 sq. km and a coastline of approximately 885 km. The irregular coastline is punctuated by numerous coastal features such as harbours, bays, beaches, estuaries, mangrove, swamps, rocky shores, cays, coral reefs, and lagoons. Jamaica has a tropical maritime climate which is influenced by north east trade winds and land sea breezes. Average temperature is 27° C, ranging from 23° C in winter to 28° C in summer.

The fishing sector in 2005 contributed 0.31% to the Real Gross Domestic Product (GDP) for Jamaica, a 25% decline from the previous year.

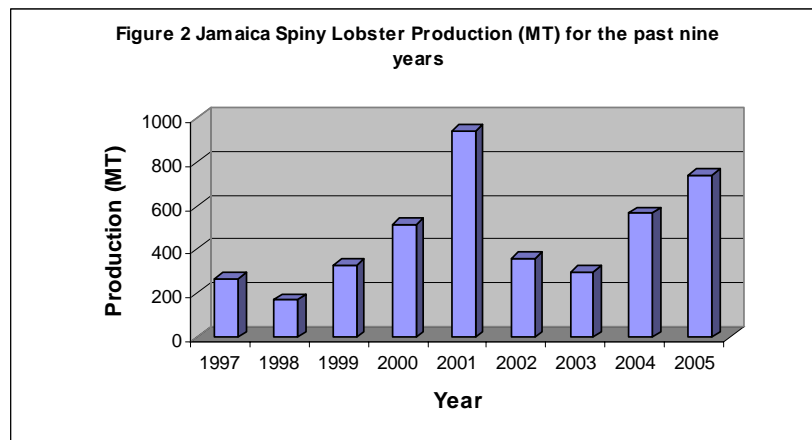
The fisheries of Jamaica have over 20,000 fishers (16,840 registered fishers in May 2007); most of these are artisanal fishers operating from open canoes or reinforced fiberglass-type boats powered by either outboard motors or oars. There are approximately 9,000 boats (4,640 registered boats in May 2007), ranging from 4 to 9 metres, operating from 187 fishing beaches distributed around the Jamaican territorial waters. Vessels 12m and above, powered by inboard engines are considered industrial vessels.

2.0 Description of the fishery

The spiny lobster, *Panulirus argus*, is widely distributed in the coastal waters and on the offshore banks around Jamaica. This resource is a delicacy and therefore highly priced and lobsters represent an important component of the total landings of the Jamaican commercial fishery. There are six types of lobsters that are found in Jamaican waters viz., *Panulirus argus*, *Panulirus guttatus*, *Justitia longimanus*, *Palinurellus gundlachi*, *Scyllarides aequinoctialis* and *Parribacus antarcticus*. *Panulirus guttatus* and *Panulirus argus* are the only two species that are commercially valuable (Aiken, 1984). Large concentrations of lobsters are found on the Pedro Banks (Figure 1) which account for about 60 percent of the total landings in the industrial fishery. During the 1980s about 60 percent of total lobster landings came from the Pedro Banks but declined to 20 percent in 1996-1997 (FAO in press). The contribution of lobsters landed in Jamaica that comes from both the island shelf and the banks has not been recently quantified. Figure 2 shows the total production for the past nine years.



Figure 1: Jamaica's Fishing Grounds (Offshore and Inshore Banks)



Fishing for lobster is done mainly on the island shelf and the banks (Pedro Bank, Morant Bank and Formigas Bank). The fishery has two components, artisanal and industrial.

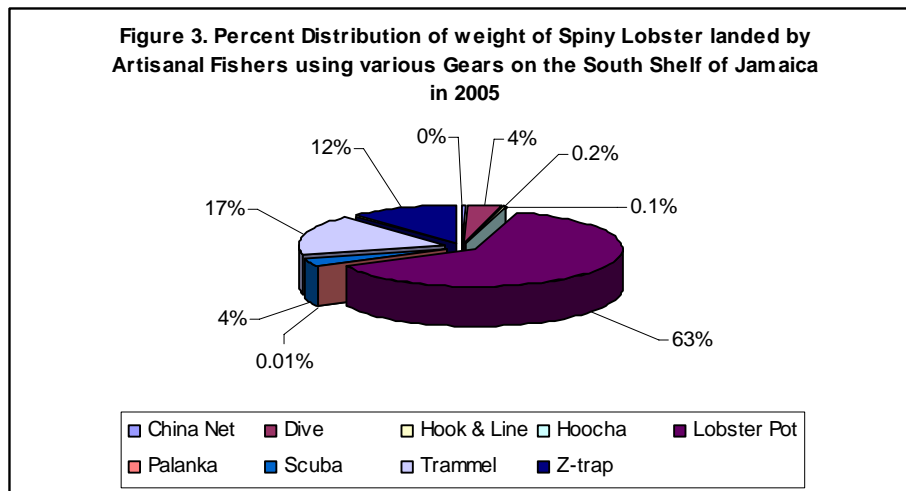
2.1 The artisanal fishery

This fishery is targeted by two categories of fishers:

- a) Mainland artisanal fishers using Antillean Z-traps, diving (free lung, SCUBA and Hookah) and gill nets. The lobster is sold to the catering and tourist industry and households and some also goes to the processing plants.
- b) Offshore artisanal fishers based mainly on Pedro and Morant Banks. Fishers in this category are mainly divers. The lobster is marketed to 'packer boats' which subsequently distribute the lobsters to the same markets as the mainland artisanal fishers.

The crew size for the artisanal fishery is mainly three. The fish pot or trap is considered to be the primary gear; however, lobsters are usually by-catch in the trap fishery. Divers on the mainland target lobsters. A maximum of ten divers may travel in one vessel to respective fishing grounds, where the captain keeps watch while the divers harvest lobsters. Trammel net is also a commonly used gear. Lobster is sold locally to the public either at the boat side or via vendors. Vendors

then distribute the lobster to the catering industry. Sometimes the catch is sold to respective fish processors. Figure 3 shows the weight of spiny lobsters caught by artisanal fishers using various gear types for 2005.



2.2 The industrial fishery

Fishers within this fishery are based on the mainland but operate mainly on the Pedro and Morant Banks from 20-35 m length vessels. These fishers are licensed to use Florida traps only. Most times they are contracted by the processors to whom they solely sell their catch. Fish processors cater primarily for the export market.

About ten industrial licences were issued to fish lobsters on the Pedro Bank using Florida traps in 2006. These vessels are operated by 4 companies, are steel hulled, measure 20 m x 5.7 m x 3 m and have inboard engine(s) up to 500 hp. Crew size on these vessels ranges from 8 – 12 persons. Vessels transport about 1000 traps and about 500 traps are deployed in the water at any one time. The average immersion time is about three days. Fishers spend up to three months at sea before returning to the mainland. Smaller quantities of lobsters may be transported back to the mainland by other vessels en route to the mainland. Lobsters are mainly exported to the United States, Canada, Panama, Netherlands Antilles, Cayman Islands and Martinique. The spiny lobster fishery is the second most lucrative export fishery. In 2001 the total production of lobster was estimated to be 308.92 MT valuing US \$2,084,818.05. Landings for lobsters usually peak in March and late September.

3.0 Biology/Research

Several studies on lobsters have been conducted over the years, a few of which are mentioned here. Studies conducted by Aiken (1977, 1983), Munro (1983) and Haughton (1988) confirmed a significant reduction in the mean and modal size of the lobster populations in Jamaica. Haughton and King (1988) reported that the fishing effort has increased significantly and the present level of fishing mortality appears to be greater than the optimum required for the fishery. Kong in 1991 conducted a tagging study however recovery was too small for any significant quantitative analysis. Young (1992) did a study on puerulus settlement rates on the south coast of Jamaica and found that settlement was continuous throughout the year. Gittens (2001) reported that 30 percent of lobsters landed from the Pedro Bank were below size at 50 percent maturity and that spawning stock biomass is low. Gittens also suggested that recruitment over fishing may be occurring, however, the effects may not be seen locally due to new recruits originating from a shared regional stock.

The Fisheries Division in 1975 reported that 76 percent of the commercially harvested lobsters comprised immature females (by comparison, Florida showed 17-21 percent immature females), suggesting that there was an urgent need for strict management and protection. For 2005, 30 percent of the total lobster sampled was under the minimum size as described in The Fishing Industry Act of 1975.

The Fisheries Division is embarking on a new project called The Lobster Casita Project which seeks to investigate a more efficient and sustainable system for the lobster fisheries. This will be achieved through:

- Investigating the use of casitas in major fishery areas.
- Establishing juvenile enhancement systems
- Establishing pueruli (lobster larvae) monitoring programmes, which is useful for forecasting lobster catches.
-

The pilot project is being conducted in Bowden Bay, St. Thomas.

4.0 Management Regulations

The Fishing Industry Act of 1975 recommended a minimum size for spiny lobsters (*Panulirus argus*) of 7.62 cm (3 ins). Aiken (1977) recommended a gradual increase to 85 mm carapace length (CL) and Haughton *et al.* (1986) also called for an increase in the minimum size limit to 89 mm CL as they found that about 55 percent of the females were mature at this length. It is illegal to land lobsters below this minimum size or offer such lobsters for sale. Female lobsters with eggs are also protected by the Act. Both provisions carry a maximum penalty of J\$500 or six months in jail. This penalty is inadequate and certainly does not serve as a deterrent to offenders. However, the Act is being revised to implement fines of a greater magnitude.

In order to combat the decline of lobsters, further management measures were implemented including; a closed season which runs from April 1 to June 30 annually. Further restrictions were placed on the industrial vessels which include; limited entry and gear restriction (Florida traps only).

Licences for the industrial lobster fishery are granted with the following conditions:

- a) All licensed lobster fishing vessels shall fish only in the areas specified by the licence

- b) No fishing shall take place on the island shelf of Jamaica or on any proximal bank
- c) All licensed lobster motor fishing vessels shall only fish, catch or land spiny lobster and no other species.
- d) All lobsters caught, except undersized and/or berried which should be returned to the sea, shall be landed on mainland Jamaica no later than eight weeks after the commencement of each fishing trip.

Lack of adequate resources continue to incapacitate the effective enforcement of management regulations.

5.0 Monitoring, Control and Surveillance

Lobster closed season runs from April 1 to June 30, annually. Joint patrols are done with Police, Game Wardens and Fishery Inspectors at sea, in food establishments and on fishing beaches. Persons who intend to store lobsters during this period are asked to voluntarily declare the amounts to the Director of Fisheries prior to the commencement of the closed season. Inspection teams then verify these amounts at these locations and issue a declaration certificate and inspection receipt.

The remaining three Quarters are used to undertake enforcement through the deployment of teams from the various supporting entities along with the Fisheries Division.

6.0 Available data

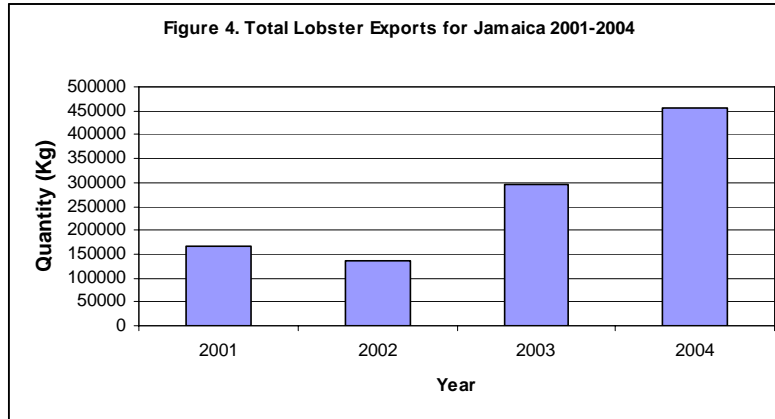
6.1 Fishery-dependent

The Data Collection Programme of the Fisheries Division was initiated in September, 1996 with assistance from the CARICOM Fisheries Resource Management Programme (CFRAMP). Catch and effort data is collected by gear from artisanal fishers through random stratified sampling. Data from the industrial fishers is collected by census. Biological data is collected where possible, usually on three gear types (SCUBA, free lung and gill net).

At the processing plants lobsters are landed tailed. The data collectors, therefore, measure tail length which then needs to be converted to whole weight and carapace length. Morphometric studies (carapace length, tail length, weight, telson length and carapace depth) were done on the Pedro Bank in an effort to easily convert from one measurement to another, while considering scientifically-based anomalies through these conversions.

6.2 Socio-economic

Since 1962, the exports of lobsters have increased significantly, from 0.68 percent in 1962 to 69 percent in 1995. Presently lobster is exported as frozen, live, fresh, dried salted or in brine. In 2004 the country exported 457,068 kg of lobsters valuing US\$4,130,567.74. Figure 4 shows lobster exports from 2001 to 2004.



Lobster is an important and sought after delicacy in the Jamaican tourist industry, luring visitors to savour the mouth-watering taste. A major portion of the lobsters landed in western Jamaica goes to the tourist industry. This portion has not yet been quantified. The peak demand for lobsters within the export and tourist industries is just before the start of the three-month Close Season. This demand coincides with increased fishing effort as consumers try to stock up on lobster. This clearly has management implications and in the new Fisheries Act, recommendations will be made to implement a total ban on the possession of lobsters during the Close Season. Table 1 shows a comparison of landings of lobster and other species groups in 2003.

Table 1: Quantity of fish type landed (2003) and the value.

Fish type	Quantity (MT)	Value (JA\$)
Finfish	5172.54	1,026,304,351
Conch	546	216,668,088
Shrimp	-	-
Lobster	300	92,593,200

7.0 Status of the Stocks

According to Munro, the lobster populations in Jamaica have changed considerably since 1983. Kelly (2002) noted that fishing effort had increased significantly in the preceding recent years and that the present level of fishing mortality appeared to be greater than the optimum recommended for the fishery in 2002. FAO (1993) declared that from a biological perspective, fishing mortality should be reduced to minimize the risk of over-exploitation.

The data available for the assessment of the spiny lobster fishery of Jamaica for the period of 1995 to 2006 were: 1) catch and effort data for various landing sites along the southern coast, and to a lesser extent, Pedro Bank; and 2) length frequency data from various landing sites along the southern coast with a few from the major fishing ground Pedro Bank. These were then used to determine the recruitment index and trends in the mean carapace length as discussed below.

7.1 Recruitment Index

In an attempt to identify and establish a recruitment index, the available catch and effort data submitted for 1996-2006 were examined. The data were divided into two categories according to fishing grounds – Pedro Bank and Southern shelf (which includes fishing grounds in close proximity to the south island shelf). The data from the southern shelf were obtained from major landing sites along the South coast. Total monthly CPUE was calculated by summing the catch and effort separately across the years and then dividing the summed catch by the summed effort. Figure 5 shows the total monthly CPUE from the south coast of mainland Jamaica.

Figure 5. CPUE from landings from the southern shelf

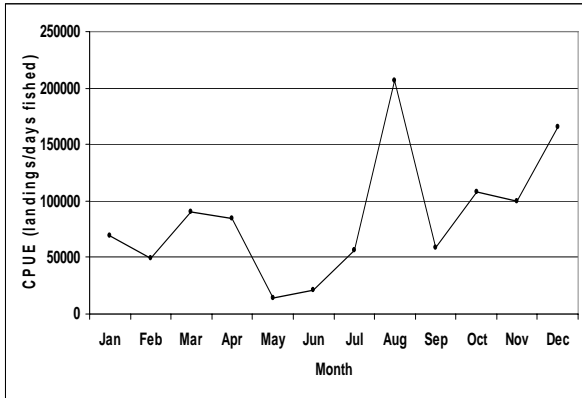
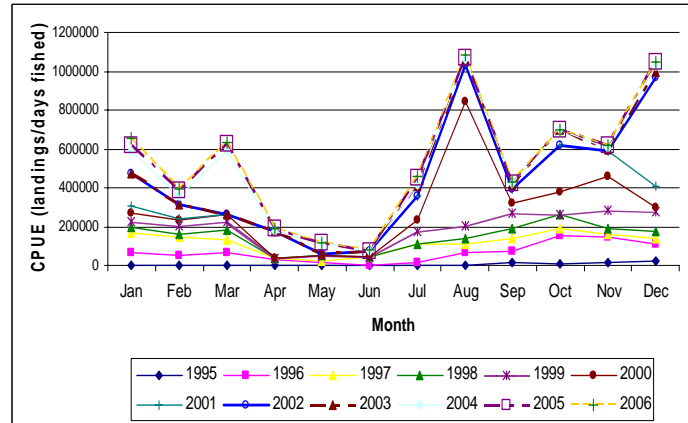


Figure 6. CPUE from landings of Southern shelf 1995-2006



Since Jamaica has a closed season from April 1 to June 30 it was expected that in July the highest CPUE should have been attained. From the above figure it is quite clear that the expected pulse occurred in August, one month after the re-opening of the fishery. This suggests the possibility that recruitment may be occurring in August. Figure 6 shows the monthly CPUE for each of the available years and an observable similar trend is seen throughout most of the years, particularly the more recent years. Results are not consistent, however and it may be that either the sampling system is inadequate or the season closure is not effectively enforced.

CPUE data for the main fishing ground of Jamaica, that is Pedro Bank, is quite limited. It should be noted that the present sampling plan on the Bank is once per quarter, except the quarter for which the closed season occurs. This means that sampling on the Bank is done three times per year. Based on the data provided for Pedro Bank, sampling was not carried out in the same month of each year, and this makes it difficult to discern seasonal trends. Nonetheless, these data were plotted: Figure 7 shows the CPUE of Pedro Bank landings for the years 2003, 2005 and 2006. The figure does show an increase in CPUE across the quarters. No data was available for 2004 as during this year three major hurricanes crossed the bank.

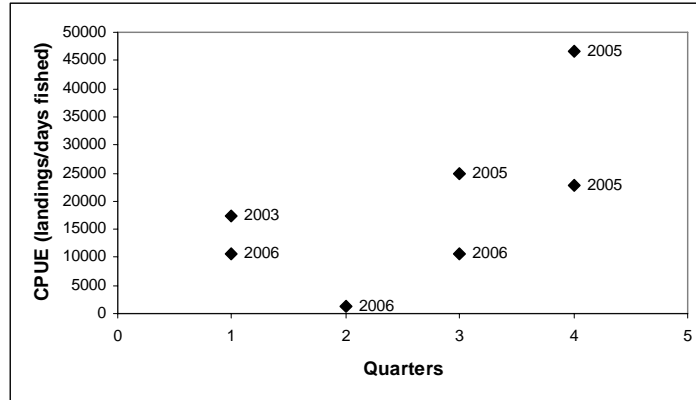


Figure 7: CPUE of Pedro Bank landings for the years 2003, 2005 and 2006.

7.2 Trends in Mean Carapace Length

7.2.1 Seasonal Patterns

An observable marked decline in the mean length (in this case carapace length) was observed in the monthly landings. This can be viewed as an indication that recruitment is taking place on a notable scale. Figure 8 shows the mean carapace length for lobsters taken by the artisanal fishers along the south coast of Jamaica. Between January and March there is a decline in the mean CL. The lowest mean CL values were observed in March and August which lie at the margins of the present closed fishing season. It is possible therefore, that recruitment is occurring from the beginning of the year to as far as two months beyond the present closed season, with the strongest period being in the first quarter. It is unfortunate in this case that no data are available for the closed season which would have helped to give a better picture of what is happening.

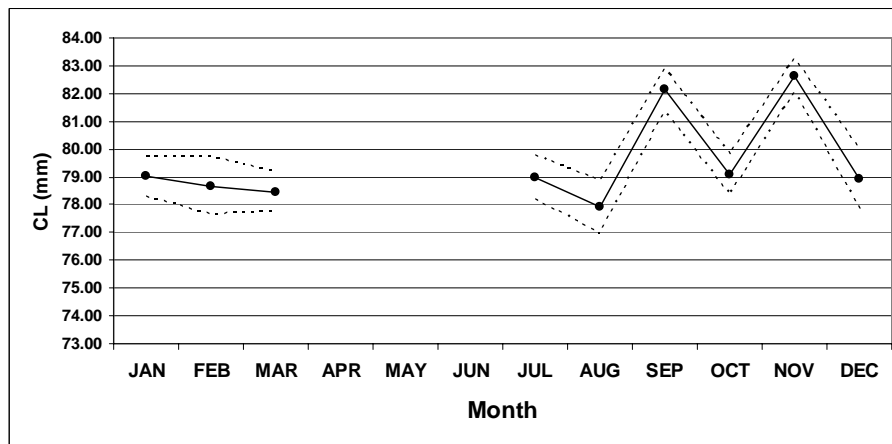


Figure 8: Seasonal trends in mean CL showing 95% CI's - South Jamaica

The trend that occurs here is quite similar to that of Cuba's. Cuba has over 40 years of data for the entire island. They have found that to the east of the island recruitment takes place between February and June each year and to a lesser extent August to September (de Leon M.E., 2006, pers. comm.). This location is quite close to Jamaica and it is believed that a similar situation may also occur. This is quite important for the decision makers who may either; 1) change the lobster closed season to commence in March at the first instance and then to February; or 2) keep the present closed season as is but designate certain areas as being closed to fishing during the

recruitment period to protect the juveniles. In order for the second option to be implemented, further studies would need to be conducted to identify these areas of interest.

Benefits associated with increasing the duration of the lobster closed season are 1) protection of stock that is being recruited to the fishery and 2) protection of females with matured ovaries.

7.2.2 Gear Analysis

Figure 9a illustrates the mean CL across the various gears used by artisanal fishers on both the Pedro Bank and southern shelf combined. This graph indicates that Hookah lands the largest sized lobster of all gears. What was not reported however, in this case were both the landing site and fishing ground exploited by these fishers. This is cause for concern as it is uncertain whether lobsters were actually taken from the island’s shelf or Pedro Bank. Another area of concern is the pros and cons of use of this gear. Admittedly, Hookah allows divers to remain under water for longer periods of time thereby increasing the fishing effort as well as access to greater depths where larger lobsters are found. However, the consequence is that the target now becomes the spawning stock. Larger/older lobsters tend to reproduce/spawn more frequently than younger matured ones. Hence, excessive removal of this stock this leads to a reduction in recruitment.

The change in mean CL in the annual time series cannot be explained by changes in gears as all fishing gears show very similar selectivity, with the exception of hookah which lands the largest lobster, see also Figure 9b.

Figure 9a Change in mean CL with gear on Southern shelf and Pedro Bank, showing 95% CIs

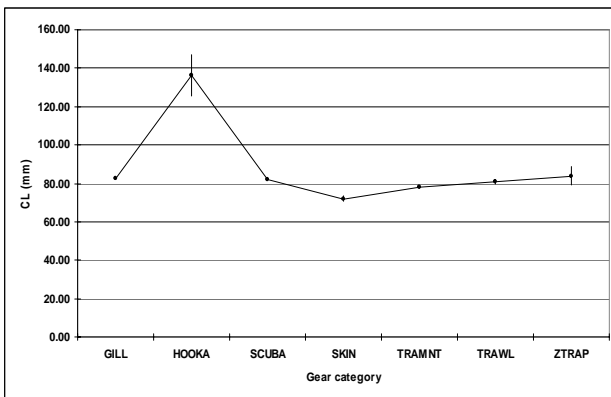


Figure 9b Change in mean CL with gear on Southern shelf, showing 95% CIs

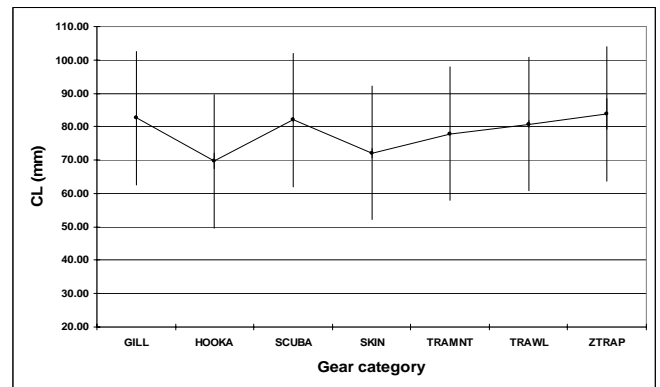


Figure 9b, which eliminated the Pedro Bank data, shows that scuba divers landed lobsters below the legal size. In most cases the fishing ground was not indicated but it is possible that these fishers are targeting the grounds of recruitment as in the case of skin divers (see below).

Gill nets and Z-traps are the gears that yield the second highest mean CL followed by Scuba, Trawl and Trammel net in both figures.

Considerations need to be given to the area of skin diving as this form of fishing practice lands lobsters well below the legal size. The divers are restricted to shallow water depths which may possibly lobster recruitment grounds. Since this is not a major gear/fishing method since 2002

(Figure 10) it is recommended that considerations be made on how to manage these fishers as they may just be a few subsistence fishers.

Figure 10 shows the frequency distribution of the total number of lobsters landed by gear used during the period 1996-2006. During the period of 1996-2001 skin divers were quite predominant. The figure also shows what appears to be a shift in the use of the principal gear of scuba diving in the late 1990's to trammel nets. These are not conclusive statements as the sample size varied over time as well as the fishing grounds also changed. Hence different sampling/landings sites contributed the different gears represented. Consequently, it is not clear as to whether the observed decrease in mean CL in 2005-2006 is a real decrease rather than a simple reflection in the distribution of sampling.

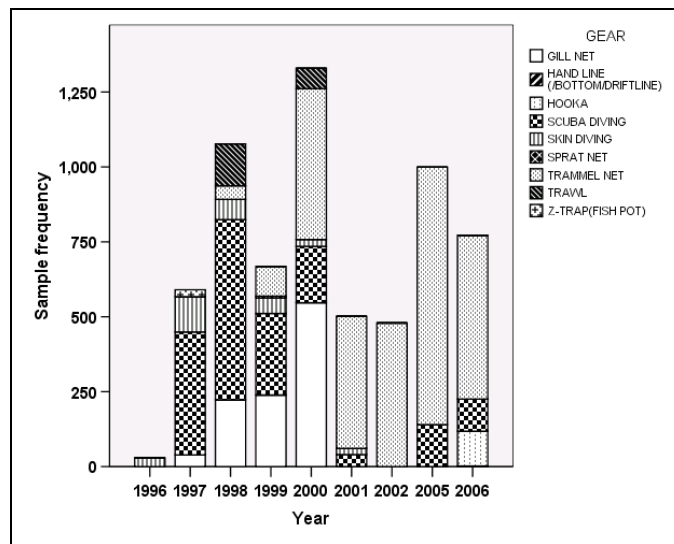


Figure 10: Frequency distribution of the total number of lobsters landed by gear used during the period 1996-2006.

7.2.3 Yearly trends of mean CL

The mean CL for a ten year period is shown in Figure 11 below. It should be noted that years 1996 and 2006 represent an incomplete data set where the former only had one month's data while the latter was data up to the present time of this analysis. It is unclear why there was an observable decline in 2005 but it might be related to the adverse weather conditions experienced in the previous year causing the relocation of larger lobsters to deeper waters.

The overall fall in size between 2002 and 2005 implies either fishing mortality has increased or there is increasing infringement of the minimum size, or both. It is noticeable that there was an overall increase in mean CL from 1997-2002. The sharp decline following an absence of data collection is surprising and will need to be verified by data collection in further years.

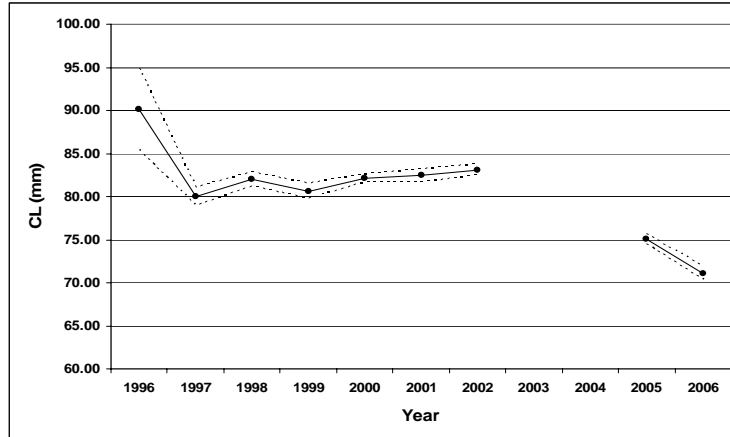


Figure 11: Change in mean CL during 1996-2006, showing 95% CIs - South Jamaica

7.3 Summary of Major Problems

- Complex artisanal fishery
- Poor cooperation from fishers (especially industrial) in providing catch and effort data
- Poaching
- Resource constraints
- Minimal monitoring, control and surveillance during open season as well as closed.
- Insufficient economic data
- Degradation or destruction of critical habitats / pollution concerns
- IUU fishing

8.0 Future for the Fishery

The Fisheries Division will try to quantify the socio-economic value of the lobster fishery in Jamaica, especially to draw the attention of government to the importance of the fishery. The lobster fishery attracts foreign exchange through export and within the tourist industry and surely Jamaica will want to preserve the fishery for continued and enhanced economic rewards.

There is still not enough data on the fishery and this need to be addressed urgently. The present management strategies will have to be improved and periodically assessed to evaluate their efficacy in curbing the decline of the lobster stocks. A regional management approach is mandatory and the Caribbean Large Marine Ecosystem (CLME) project will address this problem to some degree. The Fisheries Division must also attract the attention it needs from the government and must be institutionally strengthened to efficiently execute its mandate.

Jamaica must address at least some of its national fisheries issues in order to play a more effective role in the overall regional management of lobsters. Other recommendations for increased management of the fishery include:

- Ensure that current closed season is enforced (there is evidence of some landings during closed seasons).
- Increase the closed season to start in March and eventually February to protect recruited stock and females that have matured ovaries.

- Establish no take zones to protect recruited stock.
- Increase the minimum carapace length with increased enforcement.
- Reduce fishing effort (limit entry) and begin to change the open access regime.
- Possible ban on skin diving and SCUBA as a fishing method for lobsters.
- Increase coverage in collecting biological, catch and effort and socio-economic data from fish processing plants.
- Establish Marine Reserves with adequate monitoring.
- Collaborate with research institutions such as the University of the West Indies (UWI) to get assistance in collecting data and the analysis of such.
- Ongoing public education to sensitize fishers, other stakeholders and the general public on spiny lobster management.
- Encourage co-management approaches in regulatory efforts

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ST. LUCIA NATIONAL REPORT

By: Susanna De Beauville-Scott, Fisheries Biologist,
Department of Fisheries, Ministry of Agriculture, Forestry and Fisheries

1.0 Background

1.1 Description of the fishery

The Queen conch, *Strombus gigas*, is one of the single species nearshore fisheries of Saint Lucia. For the most part, fishers harvest stocks using SCUBA gear. However, conch is still harvested with gill nets and by free diving in areas along the west and southwest coasts (Rambally, 1999).

Conch is commercially exploited by over 40 fishers in depths ranging from 11 m to 43 m. Fishers mainly operate out of fibreglass pirogues ranging in length from 7.02 – 8.45 m, powered by outboard engines of 115 – 250 hp. Walker (2003) reported that while conch are targeted commercially by some fishers throughout the year, other fishers focus their efforts on this resource during the low period for “offshore” pelagic species, for, on average, five months. Fishers of this resource can be divided into part-time and full-time. Full-time fishers conduct dives on an average of four times each week, alternating harvesting and rest days, whilst part-time fishers operate twice each week (DOF- Conch divers’ survey, 1999). Walker (2003) reported that the majority of divers conduct greater than three dives per trip and approximately 100 – 500 individual conch are landed per trip. However, the quantity of conch landed per trip is dependent on the number of divers and the number of dives conducted during the trip. Subsistence exploitation in shallower areas occurs, but the extent is unknown.

Due to the nature of the fishery, the marketing system and an informal policy of the Department of Fisheries, the majority of conch harvested are landed whole (live) and then sold immediately.

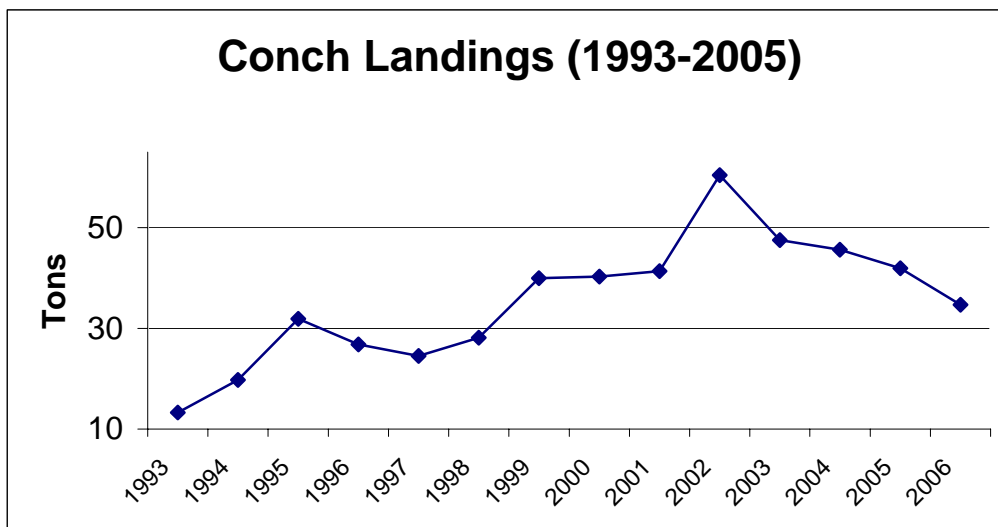


Figure 1: Estimated catch of conch landed during the period 1993-2006

1.2 Description of the resource

There have been no recent density studies in the field. The last of such surveys was carried out in the early 1980s, and was very limited, giving rough density estimates for a few conch populations in the north and south of the island. As such, the current status of conch stocks in the waters of Saint Lucia is virtually unknown (Nichols and Jennings-Clark, 1994). However, it is noted that presently nearshore stocks have been over exploited and existing stocks are mostly located in deep water, requiring SCUBA gear for harvesting.

Information obtained from a survey of vessels targeting conch resources (Walker, 2003), indicated that divers harvest conch regularly from various areas off Cas en Bas, Esperance, Grand Anse, Gros Islet, Mennard and Marisule in the north; Vieux Fort and Caille Bleu in the south; and Dennery on the east coast. Conch vessels target, on average, three areas on a rotational basis. At this point, the northern population is thought to be more heavily exploited than the southern population.

In 1996, a conch biological data collection initiative commenced and extended for a period of two years. The main aim of this initiative was to gather information in order to assess the status of the conch resources of the island so as to guide management decisions. Previous to this data collection exercise, the fishery was severely under recorded and information required to conduct basic monitoring of the resources was unavailable and in some cases, had never been collected. The following summarizes some preliminary findings of this study:

Strombus gigas harvested by commercial fishers from fishing areas in the north and south were sampled. Fishers involved in the study were asked to land all sizes of conch. Harvesting was done using SCUBA gear only.

A total of 4,390 conch were sampled: 3114, from the northern fishing ground and 1276 from the southern fishing ground. Less than eight percent (7.4 %) of the sampled conch were immature, that is, did not have a flared lip. Sex was determined for a total of 317 conch of which just over 45 % were female. For both areas, lip thickness showed a predominance of conch in the 15 –27 mm size classes, with the greatest percentage in the 24 – 26 mm size classes. Very few conch with lip thickness less than 5 mm were landed.

The mean shell length, lip thickness, total weight and meat weight were larger in the south compared to the north.

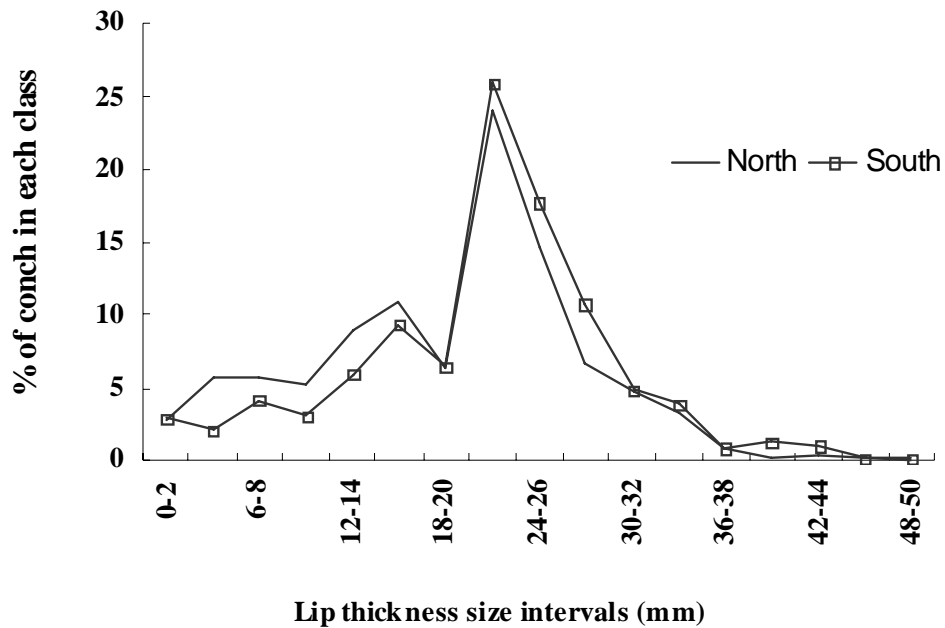


Figure 2: Lip thickness composition of queen conch sampled in the northern and southern fishing areas.

- For both fishing areas, the majority of conch were found in the 200 – 280 mm size classes. But, peaks were obtained in the 260 mm – 279 mm range for the south and 220 – 239 mm range for the north. The majority of conch found in the south were of a larger total shell length compared to those from the north. Over 99% of the total conch harvested had shell lengths greater than 180 mm, that is, the minimum size limit.

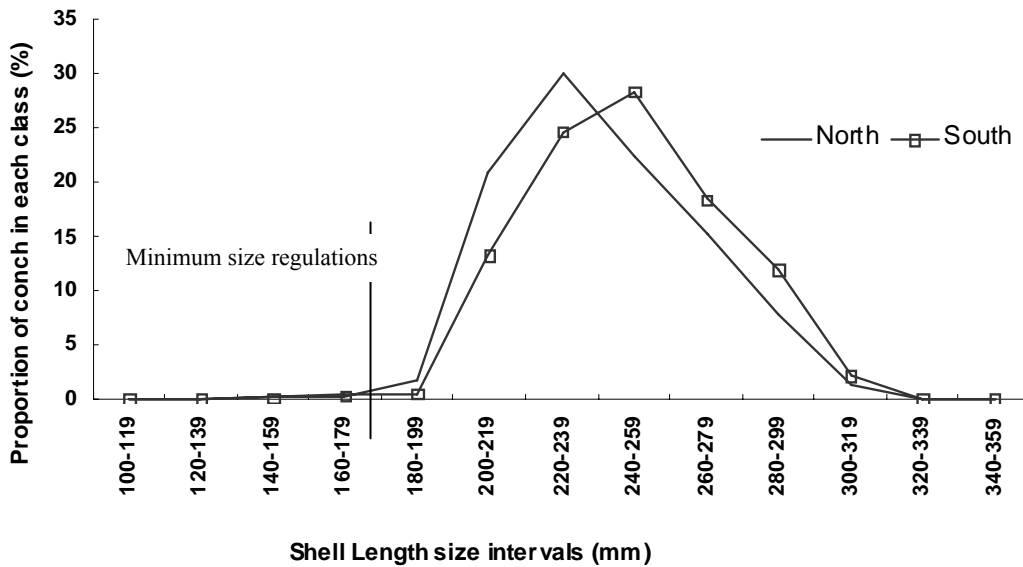


Figure 3: Shell length composition of queen conch sampled in the northern and southern fishing areas.

The mean shell length, lip thickness, total weight and meat weight were larger in the south compared to the north (Table 1).

Table 1: Summary Statistics for length, weight and lip thickness by sampling area.
N= Number of individuals; S.D.= standard Deviation; F = Females, M = Males

Area	Shell Length (mm)			Meat Weight (g)			Lip Thickness (mm)		
	<i>N</i>	<i>Mean</i>	<i>S.D</i>	<i>N</i>	<i>Mean</i>	<i>S.D</i>	<i>N</i>	<i>Mean</i>	<i>S.D</i>
North									
All	3114	239.44	26.95	149	283.28	100.31	3114	19.19	8.42
M	72	225.26	13.65	78	295.51	102.07	77	22.58	7.91
F	77	230.99	718.89	71	270.07	96.80	72	23.51	7.51
South									
All	1276	246.25	27.03	49*	331.63	132.50	1276	21.37	8.27
M	73	233.53	13.87	13	370.17	146.18	73	28.32	9.64
F	96	238.59	24.92	34	322.68	84.64	96	28.33	10.01

*Sex was not determined for three conch in the sample.

- Analyses revealed that although less than 10% of the conch sampled were immature (without a flared lip), less than 0.5 % were less than 180 mm total length, meaning that the majority of conch landed are above the minimum size limit articulated in the Fisheries Regulations No. 10 of 1994. This supports the conclusion drawn from the crude method adopted previously, where monitoring landings was done by examining stock-piles of discarded conch shells. Examinations indicated that the fishery was targeting mainly adults, since juvenile landings were negligible. Stocks are thought to be sustaining the current level of fishing, although shallow water stocks have been over exploited.
- Conch matures at about 2.5 – 3 years, when shell lip has completely formed and thickens to 5 mm (Appeldorn, 1994). From preliminary analyses, the majority of conch landed appeared to be older than 3 years.

1.3 Current status of issues affecting the management of queen conch fisheries

The following summarizes the information on demand, market and other issues affecting the conch fishery:

- Currently, the major market for conch meat is the local market, which serves both the tourism sector and nationals. Over the past few years, there has been a growing demand for conch meat as a result of activities such as seafood festivals, developed in several communities to stimulate economic development in these communities. To date, these festivals take place weekly in four major communities namely, Gros Islet, Dennery, Anse La Raye and Vieux Fort.
- From a survey conducted by Walker (2003) the local markets identified for conch were the Saint Lucia Fish Marketing Co-operation, hotels, restaurants, seafood festival vendors and the public. This survey also revealed that there is a daily demand for the product, unlike in the past, when conch had to be enclosed in nearshore pens until sale was obtained.
- Sale of conch shells, especially in the tourism sector is another area for economic benefits. Shells are polished and sold as souvenirs. In 2002, the Standing Committee of CITES withdrew recommendations to suspend imports of conch from Saint Lucia and

COP 12 agreed that shells of the Queen conch would qualify as exempt from the provision of Articles III, IV and V of the Convention under the category of personal and household effect. Under Resolution, Conf. 12.9 “Queen conch (*Strombus gigas*) shell – up to three per person do not require export or import permits, or re-export certificates, for personal or household effects for the dead specimens, parts and derivatives.” Before 2002, the number of shells leaving the island was monitored by the provision of CITES permits. However, this avenue for recording trade under four shells no longer exists.

- Although biological data have been collected in the past for this species, the collection of such data has not been sustained after the termination of externally funded projects.
- Morphological differences among various conch populations in Saint Lucia have implications for management measures e.g. especially for those relating to shell length and weight.
- Information on stocks is still scarce, especially information on density, abundance and distribution. This scarcity of information limits informed management decisions.
- Although stocks are thought to be sustaining the current level of fishing pressure, fishers have moved from the nearshore depleted resources to resources offshore. However, more recently, reports suggest that the depths at which the conch are now found is becoming an even greater limiting factor on the number of dives that are being conducted.
- In general, fisheries management and enforcement agencies have limited surveillance and enforcement capacities.

2.0 Data System

2.1 Collection

The first fisheries data collection system for the island was implemented in 1979. Since then, the system has undergone considerable refinement and revision, in an effort to satisfy the information required for decision-making and sound management advice, whilst responding to numerous changes in the fisheries sector, in recognition of human resource and financial limitations (W B. Joseph, unpublished a). Over the past decade, very little information on major single species fisheries, such as conch, has been collected on a consistent basis.

The main aim of the data collection system is to monitor the status of the stocks that are being exploited. However, due to the nature of different fisheries, fishermen’s perceptions or behaviour and both national and global economic issues, strategies implemented to gather necessary information require constant modification, in order to capture in a timely manner, the changes occurring in the fishery. Nonetheless, due to administrative, financial and human resource constraints, there is often a time lag in modification of these strategies, and therefore, there can be instances of lack of current specific data to guide particular management decisions.

Overall, the current fisheries data collection systems include several components such as gathering of data on catch, effort, registration of fishermen and vessels, SCUBA diving and snorkelling establishments, sports fishing vessels and spear gun fishers, in addition to licensing data of fishers and fishing vessels, dive and snorkel leaders.

The catch and effort data collection plan is based on a stratified random sampling regime of three major strata: primary, secondary and tertiary landing sites, based on the number of vessels operating, the fishery types and the volume of fish landed (W.B. Joseph, unpublished b). Of the 23 landing sites from which the fisheries operate, catch and effort data are collected from eight on a regular basis. Under this sampling plan, conch landings were only captured for Gros Islet in the north, where the majority of conch were landed. In 2001, the sampling plan was revised to include two other sites along the southwest, where fishers from one of these sites are also known to target conch. This revision has improved the information base for this species. Analysis of data collected in 2002 showed that conch was now landed at four landing sites: Gros Islet, Castries, Laborie and Vieux Fort.

Due to traditional practices in the fishery, collection of adequate data on landings of this resource has been challenging. However, during the jointly funded CFRAMP and Government of Saint Lucia funded conch biological data collection programme, sufficient data were collected and many lessons learnt. One such lesson is that it is essential that data collection for this fishery be undertaken as part of a collaborative framework between management agencies and fishers.

2.2 Data Analysis and Management

Catch and effort data are analyzed twice a year, using a raising factor function, based on the fishing activity (total number of vessels and number of fishing days) and effort of collectors based on a stratified sampling plan (days and vessels sampled by collectors).

For all catch and effort data, integrity checks are carried out both prior and preceding data entry. Prior to data entry, data sheets are checked for errors and omissions with the data collectors whilst subsequent to data entry into Trip Interview Programme (TIP) data are also validated and verified for errors and omissions.

Data are backed up and stored on diskettes at regular intervals throughout the year using WINZIP. A copy is made when the last batch of data are entered for the calendar year. Data are stored on site as well as off location.

Data collected by the administration of questionnaires are stored in an electronic form. All data sheets are filed using the Data Management Unit filing system.

3.0 Policies and Legislation

3.1 Fisheries Management Plan

Two management objectives have been defined for this resource and are articulated in the *Plan for Managing the Fisheries of Saint Lucia (2001- 2005)*. They include rebuilding the nearshore stocks and ensuring sustainable use of this resource. Options identified for attaining these objectives include initiating a flared lip thickness restriction, controlling effort through a licensing system, implementing closed areas and/or seasons, and co-management arrangements with resource users.

It should be noted that this fishery management plan is currently under review.

3.2 Fisheries Legislation

At the national level, Fisheries Regulations in place since 1994, provide protection for this resource. This legislation states:

- I. No person shall -
 - a. take from the fishery waters, sell, purchase, or at any time have in his possession any immature conch; or
 - b. take from the fishery waters, expose for sale, purchase or at any time have in his possession any conch during the closed season for conch as specified by the Minister by notice published in the Gazette and in a newspaper which is printed or circulated in the State.

- II. In this Regulation -
 - a. “conch” includes the whole or any part of any conch;
 - b. “immature conch” means a conch with -
 - i. a total weight of less than one kilogramme;
 - ii. meat weight of less than 280 grammes after removal of the digestive gland;
 - iii. a shell which is smaller than eighteen centimetres in length; or
 - iv. a shell which does not have a flared lip.

However, in 2000, the Department of Fisheries with assistance from FAO, embarked on an initiative to revise the fisheries legislation. The following are proposed amendments for the new fisheries legislation as they pertain to conch:

- Inclusion of a lip thickness in the definition of an immature conch (less than 5 mm).
- Removal of the stipulated shell length limit.
- Provision for closed areas.
- Provision for a national permit system for harvesting of conch.

Further, the current fisheries legislation allows a maximum fine of \$5000.00 for each offence and/or incarceration. However, the newly drafted fisheries legislation proposes to increase the fines relating to various fishery offences.

Convention on International Trade of Endangered Species (CITES)

Saint Lucia is currently in the process of finalizing and institutionalising national CITES enabling legislation. Fines being proposed in the draft CITES legislation range from EC\$10,000.00 – EC\$200,000.00, depending on the offence.

Apart from the three conch limit mentioned earlier, the import and export all conch and conch products are regulated under the CITES restrictions.

4.0 Proposed Study

Notably, in August, 2003, the CITES Secretariat issued a notification (Resolution Conf. 12.8), requiring that over the next 18 months, Saint Lucia and other countries engaging in conch export, conduct population assessments and other pertinent research relating to the management of queen conch.

Subsequent to this, Saint Lucia developed a proposal to undertake a number of activities, namely:

Historical survey

- Develop a detailed questionnaire to capture historical, anecdotal information on the conch fishery. This survey instrument will focus on social and geographical issues, catch and effort, demand, economics and trade, resource use, awareness and trends.
- Identify older, past or present conch fishers to be interviewed, using the questionnaire.

Preliminary surveys

- Conduct preliminary surveys with conch fishers to identify suitable areas for survey activities.
- Based on results from preliminary surveys, study sites will be selected for research.

Assessment surveys

- The location of each study site will be recorded using a global positioning system.
- A field data sheet will be designed to record data collected during assessment surveys. This sheet will contain fields for recording information regarding the habitat, conch and dives.

Collate data and information

- Publish the findings of surveys in a comprehensive booklet on the conch fishery (a past, present and future outlook).
- Disseminate the booklet to relevant agencies and persons.

Note that some work in this regard has commenced and efforts are underway to obtain funding for other aspects of the study.

5.0 References

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SURINAME NATIONAL REPORT

1.0 Introduction

Suriname is an independent country, on the northern coast of South America, with a land area of 163,265 km², a shelf area of 54,550 km² and a continental coastline of 380 km. The capital is Paramaribo and the total population was estimated in 2004 at 492,829 heads.

The agriculture sector is very important for the social well being of the people, in terms of food security, job opportunities and income generated from exported items. The execution of the agriculture policy is also geared towards achieving the Millennium Development Goals. Developments in this sector could help eliminate poverty and hunger, improve the living standards for rural communities, and enable the sustainable exploitation of resources for a sound environment and gender equity.

In 1978 the EEZ was proclaimed and the industrial fishery, which had been established earlier, became important to the country. In September 2005 fuel prices increased dramatically and led to many implications for the agriculture sector.

Fish for direct human consumption in 2004 accounted for 32,777 tons live weight, and an export weight of 19,380 tons and imported products were 931.83 tons. The per capita consumption was 30 kg of fish.

TYPE	UNIT	2000	2001	2002	2003	2004	2005
Total agriculture imports (crops, live stock and fishery)	1000 ton	126	143	138	148	140	158
	USD mln	76	81	81	91	106	123
	%	15	18	16	13	14	16
Total Agriculture exports	1000 ton	100	101	99	65	94	99
	USD mln	56	60	57	50	58	60
	%	12	16	13	8	7	6
Crops exports	1000 ton	86	86	80	46	75	77
	USD mln	21	13	16	10	19	21
Fishery exports	1000 ton	13	14	18	17	16	17
	USD mln	34	40	40	37	36	34
Exports other agriculture products	1000 ton	1	1	1	2	3	4
	USD mln	1	2	1	3	3	5
Active occupied persons (working)	Available jobs	95.374	97.872	105.129	111.547	112.175	156.705
Active persons in agricultural sector including processing		11.646	10.839	9.386	9.634	10.865	13.896
Agricultural contribution of available jobs	%	12	11	9	9	10	9

Source: ABS, Statistical yearbook 2005

2.0 Fishery and Fleet Description

In Suriname the major fisheries resources are the marine resources, which are exploited by shrimp trawling fleets, finfish trawling fleets, Red snapper and Mackerel handliners and Large Pelagic longliners. Large canoe type vessels with inboard and outboard engines using drifting gillnet, pin seine and the bottom longlines are used in the coastal areas.

In the river, mouth fishing is done by canoe type boats. Chinese seines do have 3 different types, of which one is mainly for catching finfish. Therefore they are categories as large (FJ, for fish), medium (FK) and small (FN) for seabob, and white belly shrimp and juvenile's fish caught together in the net. The Chinese seines use polyethylene net of different sizes.

Fixed gillnets used in the lagoons are made with a number of nylon nets which are 20m in length. The nets are attached to poles on the top side as well as the bottom side and the mesh size used ranges from 3 cm up to 4.5 cm. River seine boats use gillnets with mesh size ranging from 5 – 6 cm. The net is set in a circular way using one boat.

In the 1990s some companies started with the culture of the white leg shrimp (*Litopenaeus vannamei*) and the Tilapia Red Hybrid. These have had some success because the shrimp farms were still operating in 2004. The main geographic area of industrial aquaculture is the district Commeqijne, located in the coastal area mid-east of Suriname. The main geographic areas of small aquaculture are the districts Nickerie, Saramacca and Paramaribo.

Estimated catch by fisheries in ton			
	2004	2005	2006
<u>fish</u>			
COASTAL FLEETS	9,710	9,097.7	12.966
TRAWLERS	4,943	5,370	6.096
TUNA LONGLINE	90	78	-----
RED SNAPPER	963	944	
<u>shrimp</u>			
<i>Xyphopenaeus kroyeri</i>	24.304	20.609	23.090
Prawns (Penaeid)	1.900	1.900	982,4
Aquaculture	288	242	

3.0 National Fisheries Policy and Management Objectives

The role of the fisheries sector could be expressed as followed:

- Assurance of reasonable animal proteins (fish production) for the local population. There should be enough healthy and safe food for everybody at anytime that should be derived from own fish production. Food security and safety are the leading themes of the policy.
- Provides jobs (primary and secondary level)
- Create more qualitative job opportunities and reasonable incomes. Diversity of the sector is also important.
- Creates a balance of payment through export of fish and shrimp products
- Contribute to the GDP of the country
- Contribute to the national budget through fees and income tax
- Stimulate and support new fishing techniques to increase production on a sustainable level
- Promote the exploitation of the non-traditional species, such as small and large pelagics

Artisanal fishermen still using traditional methods and are reluctant to use new techniques. There is need for knowledge and awareness on new views on quality, competing cost price.

It is difficult to identify universal management objectives that would be valid for all resources. On the contrary, the objectives and/or their priority order will vary with the type of resource and the type of fishery, and so will the strategies and the types of measures to be taken to achieve them. There are, however, global objectives that are pursued by fishery management as a whole in Suriname, such as:

- Long term conservation of the resources.
- Maximisation of the long-term production of fish; contribution to the protein supply to the local market; production of affordable protein. These objectives can be seen as different expressions of achieving MSY (Maximum Sustainable Yield). It should be noted that MSY estimates, when they are derived from survey data, as in Suriname, tend to be optimistic, and therefore should be treated with caution.
- Maximisation of the long-term economic yield (MEY): the level of harvest required to achieve this objective is always lower than the MSY level.
- Contribution to the trade balance; generation of foreign currency; maximisation of exports. These objectives may coincide with MSY or MEY.
- Contribution to employment; maximisation of the number of households making a living out of the fishery, directly or indirectly; maintaining or improving living standards of the communities that depend on fishing and related activities.
- Solution of conflicts between different exploitation modes and/or stakeholders.

General statistics and information on fleets (2006)							
	# of licenses	Engine (Hp)	Gear type	Unit of effort	Fishing area	Target species	Sampling programme
Industrial fleets							
Shrimptrawlers	37	400-500	Bottom trawl	} Days at sea	<u>Sea (EEZ)</u> ≥ 15 fathom 10-18 fathom ≥ 15 fathom ≥ 15 fathom	<i>Penaeus subtilis, P.brasiliensis</i>	
Seabobtrawlers	25	400-500	Bottom trawl			<i>Xyphopenaeus kroyeri</i>	
Fishtrawlers	30	350-800	Bottom & Pelagic trawl			<i>Lutjanus synagris, Cynoscion virescens, Scombridae</i>	
Snapperboats	66	200-500	Vertical Hand lines			<i>Lutjanus purpureus</i>	
coastal fleet							
Decked boats (inboard)	59	48-165	} Drifting gillnet Njawarie (Pin seine) Bottom Longline	} Days at sea	<u>Sea (Coastal)</u> 0-8 fathom	<i>Cynoscion acoupa, C. virescens Arius parkeri, A. proops, Macrodon ancylodon, Nebris microps,</i>	
Open boats (outboard)	363	25-125					
Inland and estuary fleet							
Chinese seine	247	10-65	seine	1 day	<u>Rivers</u> River&mouth	<i>Xyphopenaeus kroyeri, Nematopalaemon schmitti</i>	
Longline	40	15-40	Bottom Longline	1 day	River&mouth	<i>Arius passany, A. couma, A. proops</i>	
Drifting gillnet	137	6-55	gillnet	1 day	River&mouth	<i>C. virescens, A. proops,</i>	
Sport	73		gillnet		Rivers	<i>Plagioscion surinamensis</i>	
Fixed gillnet	7	6-40	gillnet	1 day	Rivers	<i>Plagioscion surinamensis, hyplphthalmus edentatus</i>	
Dragnet	1	None		1 day	Rivers	River shrimp	
Riverseine	8	14-15	Incircling net	1 day	Rivers	<i>Plagioscion surinamensis</i>	
Lagoon gillnet	65	6-15	gillnet	Days	Lagoons	<i>Mugilidae, Centropomidae Tilapia mossambica</i>	

4.0 Research

The fisheries department is planning the introduction of closed seasons/areas from 2009, therefore, research will be conducted. The fisheries department will obtain information through an observer program to be conducted in 2007 and 2008; and assessment with the help of a consultant. Observers will be placed on all trawlers for at least one trip during July 2007 and August 2008. In 2008, 3 – 4 seminars will be held with all stakeholders to arrive at the suitable time and area for closure of fishing.

In 2008 a bio-economic study also will be conducted to analyze the true benefits, especially from the shrimp fishery.

Development prospects

The Ministry of Agriculture, Animal Husbandry and Fisheries has made up an Agricultural Sector Plan, a document that includes all projects to be conducted within the period of 2006 – 2010. The following projects are selected for Fisheries.

- Fish Inspection Institute was established in April 2007. All arrangements have been made and the equipment needed will be bought. The institute will be located at Cevihas, Bethesda.
- Fisheries Act, this act will replace the Decree C-14 for marine fisheries. There is a draft act since 1995, which has been delayed for several reasons.
- Aquaculture Act, this is new, but there is a draft also dated 2004. Changes are being made to get this act passed by the Assembly.
- National Residue Plan for fisheries products, this laboratory facility is very important in the aquaculture sector.
- Fish Disease Monitoring Plan, also important in the aquaculture sector.
- Integrated Rice-Fish culture in the district of Nickerie.

At Cevihas, Paramaribo a Small-Scale fisheries center, donated by JICA (Japan International Cooperation Agency) was built. This will be a landing site for artisanal fishing boats that satisfy the standards provided for in the Fish Inspection Act at Cevihas, targeting for 172 boats which has been forced to use unsanitary, inefficient landing sites. Also, enhancing maintenance and increase of yield and assurance and improvement of quality of marine products supplied by artisanal fishermen.

5.0 Legislation and Management Regulations

The Fisheries Laws in Suriname till this date are:

1. The Fish stock protection Act: effective in 1961 and was last revised in 1981. This Act contains the procedure for fishing license in the inland waterways of Suriname.
2. The Sea fisheries Act: effective in 1980 and was last revised in 1981. This Act contains the procedures for fishing in the Territorial Waters and the Exclusive Economic Zone.

3. The Fish Inspection Act: effective in 2000. This Act contains the guidelines for exporting fish and fish products to the European Union, Canada and the United States of America.
4. The Fish Inspection Decree: effective in 2002. This Decree is to implement some of the articles of the Fish Inspection Act.

Due to circumstances the Act regarding Aquaculture is still a draft. With the exception of the Fish Inspection Act and the Fish Inspection Decree, the other abovementioned Acts need to be revised. The Aquaculture and the Fisheries Act (a junction of the Fish stock protection Act and the Sea fisheries Act) are scheduled to be effective by 2007.

Some of the reasons for the Fisheries Act are:

1. Parts of the Sea fisheries Act are not in accordance with international agreements, such as the United Nations Conventions Law of the Sea (UNCLOS).
2. The fact that the inland fisheries can not always be clearly defined from the inshore fisheries. The new Fisheries Act will provide articles that apply to the fishing activities in the Surinamese waters and the protection of the marine environment.

The fisheries Act is intended to facilitate the sustainable exploitation of the fish stock in Surinamese waters.

On January 7th 2005, at the Ministry of Agriculture, Animal Husbandry and Fisheries, the Board of Deliberation for Coastal & Marine Fisheries was inaugurated, according to article 26 of the Sea fisheries Act of December 2001. The main duty of this board is to advise the minister on fisheries matter, such as licenses and fishing regulations.

Management Regulations

Vessel Monitoring System

All fishery types are regulated by fishing operation into zones. Complaints have been made that fish trawlers do not operate in the designated zone which causes a lot of conflict among the different fishery types. Therefore, the Fisheries Department had started in January 2007 with a VMS to control all activities by the trawl fleets, using the ARGOS system.

Control of fishing effort

Since licensing is compulsory for all fishing units, fishing effort can be limited by restricting the number of fishing licenses. This is feasible for the part of the fleet delivering the catch in Suriname. Control at sea is, of course, required to prevent illegal fishing. A maximum number of licenses are agreed to every year for the types of fisheries exploiting stocks which are believed to reach or exceed the Maximum Sustainable Yield (MSY).

Monitoring

Because fisheries can alter the state of the resources more or less quickly, monitoring (statistical and biological) is always necessary, and co-operation on this matter should be put as a standard condition for the right to fish. Possible monitoring systems include the reporting of catch and effort by the fishermen, the registering of the landings by enumerators, the recording of data by observers on board, logbooks, etc.

TURKS AND CAICOS ISLANDS NATIONAL REPORT ON THE QUEEN CONCH AND LOBSTER FISHERIES 2006/2007

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1.0 Introduction

The Turks and Caicos Islands (TCI) fisheries have been viewed as small in comparison to others in the Caribbean region. However, the TCI is and remains a strong leader in its collection of fisheries data. Even with tourism valued as the most important industry in the TCI, fishing remains as a historical and current strength to the people of the TCI.

In terms of export earnings the most valuable industry is the marine fisheries including queen conch (*Strombus gigas*) and spiny lobster (*Panulirus argus*). Most of the catch continues to be landed at the various processing plants within the TCI. The TCI has taken the direction within its Management Plan to diversify its fisheries. With this in mind, more data will be collected to provide facilitate more analysis.

2.0 Description of Fisheries and Fleet

Commercial fishing in The Turks and Caicos Islands is based on the shallow water banks, primarily the Caicos Bank and the Turks Bank. The Mouchoir Bank is considered within the territorial water of the TCI; however, the increased distance requires larger boats which are not greatly utilized in the TCI. The vessels most often utilized in the TCI are small retrofitted V-hull boats ranging in length from 18 ft-20 ft with 85-115 hp out board engines. Two trap boats collect lobster and finfish, while three other vessels are utilized specifically for landing of scalefish with banned reels (i.e. grouper and red fish).

Commercial fishermen from the TCI often work more than one fishery at a time. Using only free diving methods with no underwater breathing apparatus, fishers are found diving in depths ranging from 3 metres to 30 metres. The normal day for a fisher entails leaving the dock between 7:00 and 8:00 am and returning between 4:00 and 5:00 pm; this is considered as one boat-day. During the open season of lobster, fishermen largely capture spiny lobster and land them whole. Near the end of the lobster season (around February or March), the fishermen re-prioritize capture and start landing queen conch, landed whole without shell. However, within the past couple of years, there is an increase in opportunistic fishers capturing scalefish for local markets.

Within the past ten years, the commercial fisheries have directly employed an average of 377 fishers per year. In the 2006/2007 fishing season, the number of commercially licensed persons was at 407. Similarly the number of commercially licensed vessels average at 154 licensed vessels but in 2006-2007 there were 170 commercially licensed vessels.

As stated above, effort is measured in both boat-days and also man-days. Individual boats carry between one to four men on the vessel each day for diving, knocking and keep-up. When a vessel lands its product, the number of fishers per vessel is recorded, allowing for an effort of man-days to be determined.

3.0 National Fisheries Policy and Management Objectives

Policy Summary

Although protection of fisheries resources is implicit in the overall development strategy of the TCI, the importance of the fisheries sector in present and future development and the fragility of the resource base warrant the establishment of a specific policy for the industry.

The Fisheries Policy aims to ensure the sustainable use of the living marine resources and ecosystems through increased cooperation and collaboration with all the stakeholders for the improved welfare of the people of the TCI. It is founded on the belief that all natural marine living resources of the TCI, as well as the environment in which they exist and in which mariculture/aquaculture activities may occur, are national assets and the heritage of all the people, and should be managed and developed for the benefit of present and future generations in the country.

The long-term vision of the Government of the TCI includes:

- Pursuance of well-informed strategic, economic and financial policies, which promote sustainable development and a decent standard of living for the people of the TCI.
- Achievement of greater functional and geographical diversification of economic activity, so as to reduce the TCI's economic vulnerability and to spread the benefits of economic growth more widely among its inhabitants.
- Implementation of policies and strategies to protect the interest of the TCI Islanders, thereby empowering them to derive optimum benefits from the development of the TCI.
- Initiation of measures contributing to the fusion of a dignified and confident nation at peace with itself and the world, a nation whose people believe in themselves and who, in their entrepreneurial, professional and other daily pursuits, are energized by dignity and national pride.
- Provision of sound health and educational services, which are available to all.
- To use our natural resources wisely, being fair to present and future generations.

Management Objectives:

- Ensure that the catch in any one-year does not exceed the Maximum Sustainable Yield.
- Restore and maintain populations of marine species to sustainable levels.
- Conserve local populations of endangered species and ensure sustainable harvesting and trade.
- Promote and enhance scientific research capabilities in order to obtain relevant information on the fisheries resources such as carrying capacity, stock status, etc.
- Enhance income generation by a factor of 15% by improving and creating market opportunities for fish and fish products at the national, regional and international levels.
- Ensure that the benefits from the exploitation of the fisheries resources are optimised by Belongers.
- Promote diversification in resource exploitation of the TCI fisheries.
- Streamline, monitor and regulate the importation of marine products.
- Establish mechanism to reduce overcapitalisation in the fishing industry.
- Develop and seek opportunities for resource users to obtain financial assistance /credit from credit agencies.
- Achieve environmental and developmental awareness of marine resources in all sectors of society from primary school through adulthood.
- Ensure that post harvest handling, processing and distribution of fish and fishery products is carried out in a manner that maintains quality, and nutritional value.

- Develop and implement food processing and handling guidelines/regulations for quality assurance.
- Improve the manpower and resources of the Fisheries Division to ensure effective monitoring, control and surveillance of fishing activities.
- Promote and maintain a “Zero Tolerance” in enforcement of the legislations.
- Develop and Implement strategies to deter and combat Illegal, Unregulated and Unreported (IUU) fishing in the waters of the Turks and Caicos Islands
- Improve stakeholder participation in the management of the marine resources.
- Achieve inter and intra-agency collaboration on the matters that may affect the fisheries resources and associated habitats.
- Improve relationship with other Overseas Territories in the management of the marine resources and the environment.
- Improve TCI’s collaboration and participation in regional and international initiatives in the management of the fisheries resources.
- Promote talks to delineate and conclude maritime boundaries discourse among the TCI and The Dominican Republic as well as The Bahamas.
- Develop and implement mariculture/aquaculture guidelines and regulations.
- Promote and encourage mariculture/aquaculture of indigenous species of invertebrates and fish as a means of diversifying income and diet.
- Achieve environmental and developmental awareness of marine resources in all sectors of society from primary school through adulthood.

4.0 Research

Monitoring Activities:

- Catch and effort data for spiny lobster and queen conch are being recorded at the landing docks. Conch catches are recorded at the docks as weight of unclean meat when removed from the shell. Lobster on the other hand, is recorded as weight of whole lobster at the time of landing. Effort is recorded in both boat-days and man-days. (Figures 1 and 2)
- Export data for lobster and queen conch (including exports from the conch farm) are also being monitored. Using the CITES permit mechanism, the export of queen conchs are well documented. In 2005, the DECR has targeted documentation of export of other non-endangered species such as spiny lobster which does not require a CITES permit. The submission of export data prior to export is not mandatory as in the case of endangered species. However, with proactive participation of the DECR, exporters are producing information on weight and size of exports.
- The Department of Environment and Coastal Resources (Fisheries Sub-unit) has collected local consumption data of marine products to determine the seafood consumption rate which is incorporated in stock assessment models to determine the status of fish stocks in the Turks and Caicos Islands. To increase local consumption data collection, all facilities that offer marine products for sale (e.g. restaurants, hotels, fish vendors, supermarkets etc.) are asked to complete a predefined form and submit it to the Department monthly.
- From 1992, monitoring of the morphometric measurements of spiny lobsters has been carried out at the processing plants. However, with shortage of staff and a shift in management objectives, there are some gaps in the data. The DECR has resumed the morphometric measuring in the 2004-2005 fishing season to the present season. Likewise, samples of queen conchs are collected from different regions of the Caicos and Turks Banks and morphometric parameters are measured.

- The Department realized that the spiny lobster is fluctuating in catch. This could be attributed to a variety of reasons. The Department is currently conducting research to determine the rate at which spiny lobster are retained on the Banks of the Turks and Caicos Islands and are ultimately recruited into the fishery. Casitas have been deployed and are currently being monitored. A private consultant has also deployed collectors and they also are being monitored. The intension of this research is to determine the recruitment of juvenile lobsters in commercially important fishing grounds and possibly predict the sustainability of the resource and provide information to improve the management strategies for the DECR.
- Data on large and coastal pelagics are collected during local fishing tournaments. The data are stored and shared with international monitoring organizations such as ICCAT and the FAO.
- Areas which are delineated and protected as fisheries protected zones are also being monitored to determine the effectiveness of these areas in increasing stock size outside the protected area zone.
- Catch data from confiscated international vessels poaching in the waters of the Turks and Caicos Islands are also monitored. These vessels usually fish on the Mouchoir Bank, and in waters which local fishers do not utilize and dare to venture to. By monitoring the catches from these vessels, the Department anticipates the use of these data to assess the status of the fish stocks in these areas.
- The Department is also actively monitoring the number of persons, number and sizes of vessels, sizes of engines, and gear types being used in each fishery through the licensing system so as to determine “effective effort” exerted on the respective fisheries.
- Although the Department has conducted numerous socio-economic surveys in the past, this research approach for the most part have been underutilized. Many of the socio-economic surveys have been in collaboration with individuals and or institutions, looking at the following:
 - Social Capital
 - Resource utilization
 - Local consumption

5.0 Legislation and Management Regulations

- Fisheries Protection Ordinance. Cap. 104: This is the main legislation which provides the legal basis and regulations for managing the fishery resources of the Turks and Caicos Islands. (Strongest Legislation based for monitoring, enforcement and surveillance)

Other Fisheries Related Legislation

- Fishery Limit. Cap. 105: Defines the Territorial Waters and Economic Exclusion Zones (EEZ) of the Turks and Caicos Islands.
- National Park Ordinance. Cap. 80: Provides the legal basis for the establishment and management of marine protected areas such as National Parks, Marine Reserves, and Sanctuaries.
- Coastal Protection Ordinance: This legislation combines several pieces of legislations, such as the national parks ordinance, fisheries protection ordinance and others to provide protection for the coastal zone.
- Endangered Species Bill: This legislation is currently in draft form. On completion, it will provide the legal basis for protection of endangered species in

the Turks and Caicos Islands. (Will provide the backing for monitoring of exports such as CITES)

- Wild Birds Protection Ordinance. Cap. 84: Allows for the management of ancillary species in order to protect biodiversity
- Mineral (Exploration and Exploitation) Ordinance. Cap. 79: Provides for the protection of the marine habitat from direct mining impacts or from indirect terrestrial mining activities.

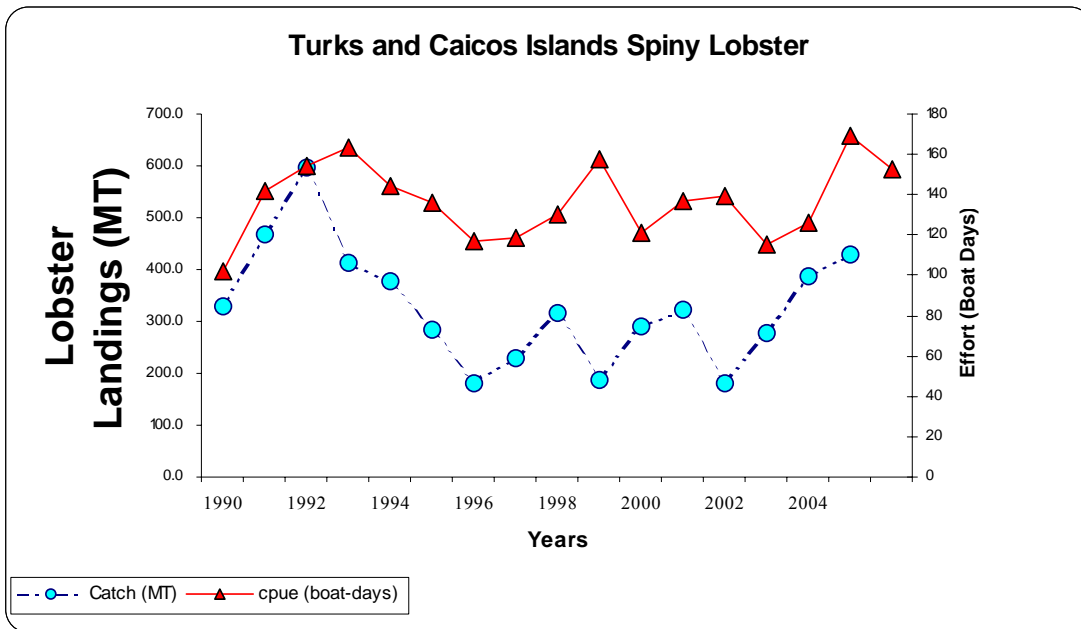


Figure 1: Graph of Spiny Lobster catch landings and effort (boat-days) for the past ten (10) years in the Turks and Caicos Islands.

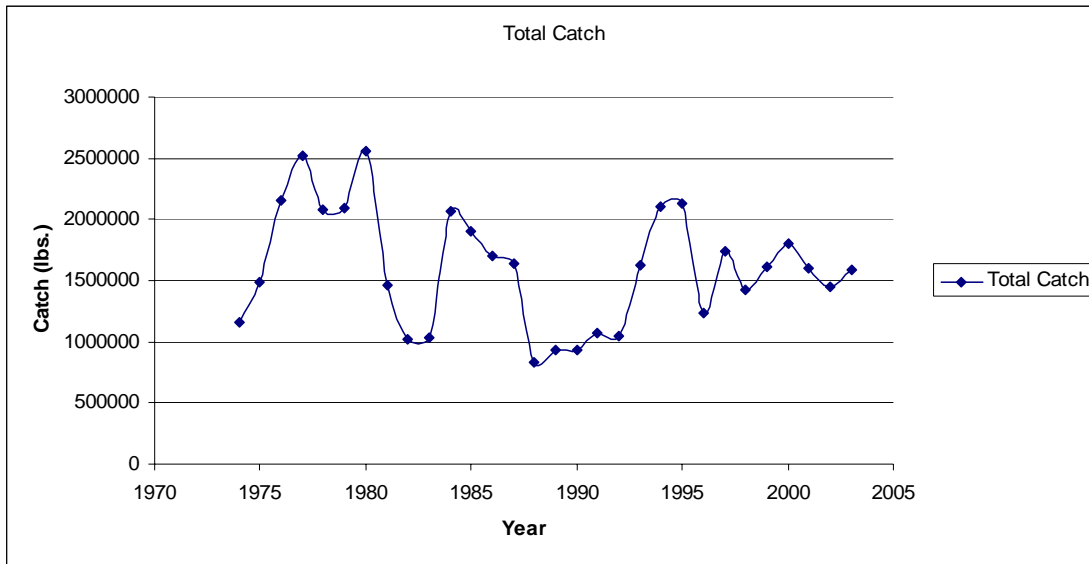


Figure 2: Graph of Queen Conch catch landings for the past thirty-five (35) years in the Turks and Caicos Islands.