

CERMES Technical Report N° 8

Determination of the Socio-economic Importance of the Lobster Fishery of the British Virgin Islands

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2007

ABSTRACT

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The British Virgin Islands is heavily dependent on tourism and the Caribbean spiny lobster (*Panulirus argus*) is one of the delicacies which the visitors enjoy. The British Virgin Islands 1998 Fisheries Management Plan identified signs of overfishing in the lobster fishery throughout the territory with acute overfishing in certain areas. Measures were implemented in the 2003 Fisheries Management Regulations aimed at conserving this species. Among these measures, the closed season for lobster, from March through June, was the one expected by the stakeholders to cause hardship. This closed season was expected to have negative socio-economic impacts on fishers and restaurants. These stakeholders therefore asked for a socio-economic survey to be made. This survey was arranged by the Conservation and Fisheries Department of the Ministry of Labour and Natural Resources which has responsibility for the fishing industry.

The objectives of the survey were to determine the economics of the lobster fishery in respect of expenditure and revenue and describe its social importance to the stakeholders. It was also to update and expand a previous economic survey to specifically include lobster. The survey was also to establish or strengthen linkages among stakeholders for research on the lobster fishery through the use of participatory research methods and to recommend a system of socio-economic monitoring for the lobster fishery. The primary methods for conducting the survey were questionnaires, focus group meetings and key informant interviews.

Results show that most of the lobster fishers have made a significant investment in the fishery and are highly dependent on it for personal income. There is interdependency between fishers and restaurants, and a few family enterprises exist where boat and restaurant are owned by same person. The newly imposed closed season for lobster can cause a loss of income to the stakeholders because of its timing which starts at the peak in tourist arrivals to the territory and continues almost to the end of the tourist season. Some recommendations are made for strengthening the participation of stakeholders in further research on the lobster fisher and for establishing a system for regular socio-economic monitoring.

Keywords: British Virgin Islands, Socio-economic survey, Caribbean spiny lobster

ACKNOWLEDGEMENTS

I am especially grateful to those who made this project possible and the many people who assisted and encouraged me in completing it. I thank the Government of the British Virgin Islands, in particular, the Conservation and Fisheries Department of the Ministry of Labour and Natural Resources, for hosting me and facilitating the research.

Conducting the survey was critical to this project and this task could not have been accomplished without the help of Ms. Abbi Christopher, Mr Samuel Davies, Mr Arlington Pickering, Mr Ken Pemberton, Mrs. Jasmine Hodge-Bannis; to them my thanks are extended. I also wish to express gratitude to the presidents of the Virgin Gorda Fishermen's Cooperative and of the Jost Van Dyke Fisherfolk Association and the participants in the survey.

Much appreciation is expressed to my supervisor, Dr Patrick McConney, Snr. Lecturer CERMES, and my external supervisor, Mrs Christine Chan-A-Shing, the Fisheries Officer (BVI), for their invaluable advice and assistance with this task.

Special thanks to my CERMES colleagues: Danny for his assistance with aspects of the project during our sojourn in The BVI; and to Bertha, Katherine, and Amanda.

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Citation: Franklin, G. 2007. Determination of the socio-economic importance of the lobster fishery of the British Virgin Islands. CERMES Technical Report No. 8. 59pp.

1 INTRODUCTION

The purpose of this paper is to determine the socio-economic importance of the lobster fishery of the British Virgin Islands. This socio-economic study was executed as a research project during an internship hosted by the Conservation and Fisheries Department (CFD) of the Ministry of Natural Resources and Labour of the Government of the British Virgin Islands.

The department seeks to manage the natural resources of the British Virgin Islands in a sustainable manner. It was formed specifically to address the growing environmental stresses that the British Virgin Islands are experiencing.

This socio-economic survey aims to provide knowledge about the importance of the lobster fishery to individuals and groups of stakeholders. It will assist the CFD in gauging the impacts of new fisheries regulations on these stakeholders and in implementing adequate management for the fishery, especially by involving stakeholders in decision-making to help determine whether the lobster closed season will have negative socio-economic impacts.

1.1 Geographic location

The British Virgin Islands (BVI) is an archipelago comprising thirty six islands, islets and cays situated in the Eastern Caribbean at longitude 64°30'W and latitude 18° 30'N (Figure 1.1).

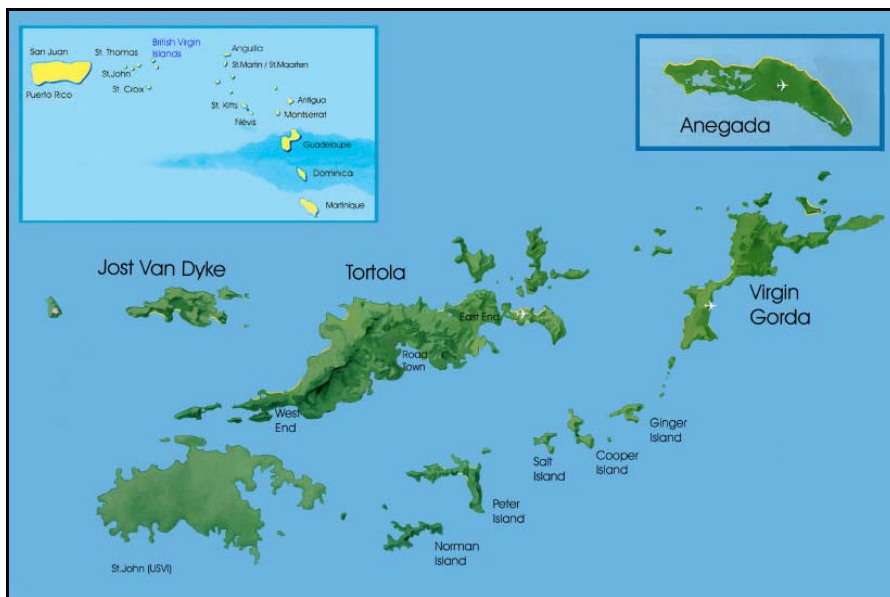


Figure 1.1 Map of British Virgin Islands

Sixteen of these islands are inhabited. The main islands include Tortola which is linked by a bridge to nearby Beef Island, Anegada, Virgin Gorda and Jost Van Dyke. The islands together constitute a total area of 153 km² (59 square miles) with a territorial sea of 1,489 km² (575 square miles) The British Virgin Islands are located on the same geological shelf as Puerto Rico and the US Virgin Islands, with the exception of St. Croix. (The Development Planning Unit, Government of BVI, 2005).

1.2 Fishing area

The total shelf area is approximately 10,393 km² (3,026 square nautical miles) of which about 3,130 km² belong to the BVI. About 90% of the shelf floor lies in water shallower than 60m. (200 ft) and it is dotted with coral reefs and rocks with a total slope length of 176 km.

BVI has an Exclusive Economic Zone of 84,050 km². The area beyond the shallow shelf belonging to the BVI is approximately 74,813 km². Several banks rise above the general shelf floor but the most notable ones associated with fishing are the Barracuda Banks or Sea Mount to the south east of Virgin Gorda, the Barracouta Banks or North Drop to the north of Jost Van Dyke (Government of BVI, 2005).

1.3 Fisheries in the BVI

Fishing is an important source of income for some of the people of the BVI as it is for most of its Caribbean neighbours. However, earnings from fishing contribute a relatively small percentage to the Gross Domestic Product (GDP) when compared with other sectors such as tourism. For example, in 1991 earnings from tourism (the hotel and restaurant sector) accounted for 10.98% of the GDP whereas contributions from fishing towards GDP were merely 1.44%. The trend over the next 5 years was a reduced contribution from fishing and an increase from tourism so that in 1996, the contribution from tourism was 19.66% and that from fishing was 0.73 % (Table 1.1.)

Table 1.1: Contribution from fishing and tourism to GDP, 1991 to 1996

Economic sector	1991	1992	1993	1994	1995	1996
Fishing	1.44	1.63	1.7	0.73	0.92	0.73
Hotels & Restaurants	10.98	11.8	11.39	16.95	17.78	19.66

Source: Development Planning Unit

The three major fisheries contributing to the GDP are the nearshore commercial artisanal fisheries, the offshore pelagic longline fishery and the recreational fisheries. Fishing licence fees contribute to the government revenue.

The artisanal fisheries typically employ small boats, less than 25 ft (7.5 m) in length, and traditional fishing methods such as fish pots, hand line, gill net, seine net, and diving. Most of the artisanal fishing is carried out on the shelf surrounding the islands. Target fish species are demersal reef fish, such as snapper and grouper, inshore pelagics, like the carangids and barracuda, and offshore pelagics, such as tuna, dolphinfish and wahoo. These fisheries also include invertebrates such as conch, whelk and lobster. The offshore longline pelagic fishery is limited in size and few boats now operate. The recreational fisheries are classified into the big-game sport fishery and the pleasure fishery. The big-game sport fishery involves professional angling aimed at marlin and sailfish with boats of 25 to 50 ft in length (7.5 to 15 m). The pleasure fishery involves amateur angling, targeting tarpon and bonefish, where vessel sizes range from 17 to 40 ft in length (5 to 12 m).

The fish resources of the BVI have been divided into five categories: shallow water reef fish, deep slope and bank fish (e.g. snappers and groupers), coastal pelagic fish e.g. (bonito, blue runner, yellowtail and mackerel), large pelagic fish (e.g. tunas, swordfish, dolphin, wahoo and bill fishes) and benthic invertebrates (e.g. crustaceans and molluscs such as lobster, conch and whelk) (Government of BVI, 1997).

Due to concerns of the CFD over the sustainability of some fisheries, the Virgin Islands Fisheries Regulations, 2003, include precautionary management measures to protect a number of species.

Among these measures are closed seasons. For the Caribbean spiny lobster (*Panulirus argus*), the annual closed season extends from March 1st to June 30th. In addition to the closed season, there are minimum size limits, restrictions on catching berried lobsters, and restrictions on spearing, hooking and impaling lobsters. The regulations also stipulate that fish traps or pots must have a biodegradable panel.

According to data collected on the seasonality of fishing gear by the CFD, fish traps are used all year but the department estimated an average of 40 weeks of use due to weather conditions and repair time. Other methods such as the use of hand lines, fishing rods and diving also have a season of an estimated 40 weeks. Horizontal longlines are used for a period of about 22 weeks, from October to May. Although seine nets can be used all year, there are 2 seasons, from November to March for jacks, (*Selar crumenophthalmus*) and from March August for bonito (*Sarda sarda*), hardnose (Blue runner/ *Caranx crysos*) and yellowtail snapper (*Ocyurus chrysurus*).

1.4 Socio-economic impact of lobster fisheries management

Enforcement of the closed season for lobster has been resisted by some stakeholders who reportedly fear loss of income because a major income generating commodity will become unavailable during the height of tourist season. There are accusations that some of the major stakeholders were excluded from consultations on establishing a closed season. Stakeholders also stated that a comprehensive socio-economic survey of the fishery was not done, and this should be an integral part of the decision-making with regard to the closed season (BVI Conservation and Fisheries Department, 1995).

Stakeholders mentioned that the information base for the closed season needs to be strengthened. The requirement for strengthening the biological information base for the lobster closed season is being addressed by a lobster monitoring programme conducted by the CFD in collaboration with the fishers. It involves the sampling of catches by fisheries officers on the fishing boats, sampling of landings at the BVI Fishing Complex, as well as nearshore observation of lobster in selected habitats.

1.5 Host organisation

The Conservation and Fisheries Department is responsible for all aspects of natural resources management in the BVI and is divided into five functional units; the Fisheries Unit, the Environmental Unit, the Environmental Education Unit, the Geographic Information Systems Unit and the Administration Unit. The goal of the fisheries unit is to ensure that stocks are maintained at, or are restored to, levels that can maximise sustainable yield given an appropriate environmentally sound and economically justified effort.

Part of the mandate of the department is to work closely with fishermen to manage the fisheries resources, to monitor the natural environment and wildlife, to map the natural resources of the territory, to provide information on the environment to the public and to develop policies and legislation for managing the natural environment (Virgin Islands Government Gateway, 2006).

1.6 Research objectives

The specific objectives of the project are to:

- Determine the economics of the lobster fishery in respect of expenditure and revenue
- Describe the social importance of the fishery to several categories of stakeholders

- Update and expand a previous economic survey to specifically include lobster.
- Establish or strengthen linkages among stakeholders for research on the lobster fishery through the use of participatory research methods
- Recommend a system of socio-economic monitoring for the lobster fishery

1.7 Organisation of report

The remainder of this paper is arranged as follows: Chapter 2 describes the research methods, Chapter 3 sets out the results of the fishers and restaurant surveys, Chapter 4 discusses results and Chapter 5 is the conclusion and recommendations. Questionnaires used are included in the appendices.

2 METHODOLOGY

The research took the form of a survey of groups of stakeholders, based mainly on two sets of questionnaires and two focus group meetings. Key informants were also interviewed to get a background of the fishery and some of the issues involved. Fieldwork was conducted from August to October 2005 on the four main inhabited islands; Anegada, Tortola, Jost Van dyke and Virgin Gorda. The investigator was based on Tortola and worked with the staff of the CFD. He was assisted by another student from the Centre for Resource Management and Environmental Studies (CERMES), who was also doing research in the BVI. Primary and secondary data were collected.

2.1 Socio-economic surveys

The socio-economic surveys were directed at stakeholders identified as having an interest in the lobster fishery. These included fishers and boat owners, the management of restaurants and hotels, the Ministry of Tourism, the Conservation and Fisheries Department, and the BVI Fishing Complex. For the purpose of this research, it was decided to select two groups who were directly impacted by the closed season regulation. One group comprised fishers and boat owners and the other group was the management of restaurants. Questionnaires were prepared for each to gauge their dependence on the lobster fishery (Appendices 1, 2 and 3). Other information was collected from secondary sources and key informants and aimed at establishing background information on the fishery and on the island in general. In both surveys convenience samples were selected based on the accessibility of respondents so results may not be representative of the fishery.

2.1.1 Fishers questionnaire

The fishers questionnaire of Pomeroy (1999) along with the SocMon Caribbean guidelines (Bunce and Pomeroy, 2003) were used to prepare the fishers questionnaire in the present study. Information was collected on the type of fishing, the income and expenditure in the fishing operation main sources of income in the fishers' households and the number of dependants of fishers. The overall goal was to determine the dependence of the fisher and his household on fishing in general and on lobster fishing in particular. It also provided a sense of his investment and perhaps indebtedness in the fishery.

The boat owners and fishers to be interviewed were selected from a list of known lobster fishers provided from the records of the CFD. The list was supplemented with names provided by the fisheries officers from their personal knowledge, and names were added from records of lobster landings obtained from the BVI Fishing Complex. The final list contained 55 names and was believed by the officers to be fairly complete.

The fishers were contacted either directly by the fisheries officers to arrange interviews for administration of the questionnaire or the opportunity was taken to interview them while they were at meetings scheduled for extension work by the officers. In addition, a few were contacted on an *ad hoc* basis when they visited the CFD office. Twenty-seven questionnaires were administered to fishers on the islands of Tortola, Virgin Gorda, Jost Van Dyke and Anegada. The interviews were conducted either at the fishers' homes, the CFD main office or at a government office on Virgin Gorda that was used by the CFD for meetings.

2.1.2 Restaurant questionnaire

The restaurant questionnaire (Appendix 3) was designed to be self-administered. It targeted operators of independent restaurants and hotels on the same four islands as the fishers questionnaire. Information was collected on the size of the restaurant, the number of staff employed, the number of patrons and the amount of lobster sold.

The list of restaurants was mainly compiled from a listing obtained from the publication "*BVI restaurant and food guide*", which lists most of the restaurants in the BVI, gives their menus and quotes the price range for meals. Names additional of restaurants were provided by members of a fisherfolk organisation.

Thirty restaurants were identified based on them advertising lobster on their menus. These were selected for an initial list of restaurant stakeholders. A further 12 restaurants were added to the list from the knowledge of key informants, bringing the total to 42. Questionnaires were sent to a number of these restaurants but responses to the questionnaires were slow and it was therefore decided to interview the restaurant managers in person. Of the 42 restaurants identified, 19 establishments were contacted, but because many were temporally closed for refurbishment or for other reasons, only 11 questionnaires were completed.

2.1.3 Key informants

Formal and informal key informant interviews provided the opportunity to obtain additional in-depth information on the fishery. They permitted respondents to clarify statements or to further elaborate on brief comments. Formal interviews were used with the fishers and restaurant management as well as the manager of the BVI Fishing Complex. The informal interviews were used with staff from the CFD and the president of the fisherfolk association. Informal interviews were also used with some of the knowledgeable and experienced fishers for more information on fishing gear and techniques.

2.1.4 Focus groups

The focus group is a means to evaluate or acquire knowledge of a specific theme. It is basically an interview of a small number of people (6-10) together and it allows for the gathering of a great deal of information during one session. The group discussion is led by a facilitator who draws out and gathers data from people knowledgeable in the field. Questions are posed to start discussion on the topic. Prior to the session, ground rules for participation are agreed upon with the participants.

Focus group sessions were held on two islands. Invitations to the first session were made via announcement on the radios and invitations posted in strategic areas on Tortola. The second was arranged by the president of the Virgin Gorda Fishermen's Cooperative. The focus group guides are listed in Appendix 4 and 5 respectively.

The first session was held at the CFD located on Tortola. The meeting attendance was low as only 2 fishers and 2 CFD staff members attended, one of the latter, however, being a part-time fisherman. The following topics were discussed at the meeting:

- Background on fishers and fishing in BVI
- Threats
- Fish sales
- Laws, regulations, enforcement
- Registration
- Management - who should manage the fisheries

The second, better attended, focus group meeting was conducted on Virgin Gorda with about eight fishers from that island, members of the Virgin Gorda Fishermen's Cooperative. The purpose of this focus group meeting was to gain insight into the attitudes and perceptions of the fishers towards the resource and towards management issues related to specific parts of the fishers survey.

2.2 Data analysis and interpretation

Questionnaire responses were coded and entered into data tables. Data were analysed using SPSS for Windows (SPSS Inc.). Graphs and charts were generated in order to facilitate visualization and interpretation of the collected data.

The SocMon Caribbean methodology calls for validation meetings to be held with socio-economic assessment participants in order to help confirm and interpret findings through group discussion and feedback from the data collected. There was insufficient time to hold these meetings while in the BVI, but it would be useful for the participants to be made aware of the results set out in this paper. SocMon also calls for identifying key learning and recommendations for adaptive management. These are included in the conclusions and recommendations.

2.3 Limitations

The methodology sought to avoid or overcome many of the limitations of social surveys. These are listed below and were taken into account in the generation and interpretation of results.

- Fishers seemed reluctant to take part in the survey due to concern about possible taxation on their income from fishing, so income estimates may require further validation.
- The refusal of some fishers to be interviewed for unknown reasons may have biased the sample of respondents.
- Only fishers who were known to the officers and who were comfortable being interviewed took part, may have introduced bias.
- Fishing is not full time employment for many fishers, and part-time fishers are elusive.
- Not all fishers are registered with the CFD, so unknown full-time fishers may exist.
- Many restaurants were closed at the time the survey was being conducted.
- The small number of people at the first focus group may have reduced the quality or diversity of data collected during that meeting, but this is not likely.

2.4 Secondary data

Secondary data sources consisted mainly of the records and reports of the CFD, ranging from fisheries statistics to registration records to the reports of previous studies and consultations. The information from these sources is included in the results and discussion.

3 RESULTS

This section presents the results from the fishers and restaurants questionnaires and from the focus group meetings. The fishers' questionnaire examines the basics of the lobster fishery; information on the boats and boat owners; local knowledge of lobster biology; gear used and fishing effort. Income, operating costs, marketing and boat maintenance are also examined. The fishers' attitudes and perceptions with respect to the resource and its management are examined as well. Results from the restaurant survey indicate the status of the business and seasonality of operation. The focus group meetings produced information that directs attention to the threats to the species and the industry, and to legislative and regulation issues. These meetings also produced some recommendations for the lobster fishery.

3.1 Lobster fishery overview

The lobster fishery is one of the commercial artisanal fisheries of the BVI. Most of the fishers use traps while some dive, both free diving and SCUBA. The traps or "pots", as they are commonly called, are rectangular and generally made of wire mesh. There are 2 types of mesh used, a square, welded, plastic coated 2 inch mesh (Figure 3.1) and a galvanised, hexagonal, twisted, "chicken-wire" mesh of about the same mesh size (Figure 3.2). The frame is usually made of welded ½ inch diameter "construction" steel rod commonly used in the building industry. A zinc anode, similar to those used to protect boat propellers from corrosion, is attached to reduce corrosion. Fishers tie the pots in strings or "slings" of 4 to 8 pots with buoys at both ends of each string. The use of strings, even though discouraged by the fisheries regulations, makes it easier to locate and haul the pots.



Figure 3.1: Lobster pot made of square wire mesh



Figure 3.2: Lobster pot made of galvanised "chicken wire" mesh and wood frame

The pots can be used for either fish or lobster but according to fishers, some species of fish, such as triggerfish, attack lobster and fishers say the lobster therefore avoid pots containing such fish. Fishers therefore target either fish or lobster in a number of ways, which include location, depth, bait and pot design. The fisher may set the pots in an area known for either lobster or fish and use bait such as cow skin, to attract lobster. The funnel of the trap for fish is longer and it turns down towards the centre of the trap, while the funnel of the lobster trap tends to be shorter and looks inward. In some cases the funnel of the lobster pot may be wide and shallow, to discourage entry of the deep bodied triggerfish and to give clearance to the lobster's antennae. Some fishers say that the type of wire and its condition also influence whether triggerfish or lobster enter the pot.

Lobster caught in the BVI is used mainly in the tourist industry; most is sold to hotels and restaurants that cater to visitors. There is limited consumption of lobster by the general population. However, there is a reported increase in consumption during the August Festival. Fishers also take home small amounts of their catch. Little is exported officially but fishers have commented that foreign fishers and yachters may be harvesting the resource illegally.

There is a yachting community consisting of visitors from the USVI, Puerto Rico, the USA and other places who sail either their own vessels, or rented or chartered boats. Their consumption of lobster is unknown. They are known to buy from the BVI Fishing Complex. The manager of the complex reported that sometimes a tender from a yacht comes to the complex for lobster but such sales are recorded as individual sales, with no indication as to who bought them. It has been suggested that these visitors also purchase lobster directly from fishers and some fishers suspect that the visitors also fish lobster on their own. A large part of the yachting community comprises Puerto Rican nationals, and some restaurants report that such visitors come to the BVI in the summer and on US public holidays and buy large quantities of lobster.

3.2 Fishers survey

3.2.1 Demographics

The 27 respondents were male, but that is not to say that they are no female fishers on the islands. One was present while her husband was being interviewed and she indicated that she fished occasionally. The president of the Jost Van Dyke Fisherfolk Association is also female. Fishers and staff of the CFD, however, say that there are only a few female fishers in the territory. At least one on Virgin Gorda fishes for lobster.

Most of the respondents (66%) are BV Islanders or “belongers”. The BVI is a British Overseas Territory and cannot confer the right of citizenship. The government therefore confers the status of “belonger” to certain individuals and this carries much of the rights and privileges associated with nationality in an independent country. Of the others, 15% stated they were not “belongers” but were of other Caribbean nationalities such as Vincentian, St Lucian and US citizens. Nineteen percent said they were residents, but they did not volunteer further information on nationality (Figure 3.3). So a third of the respondents were “non-belongers”.

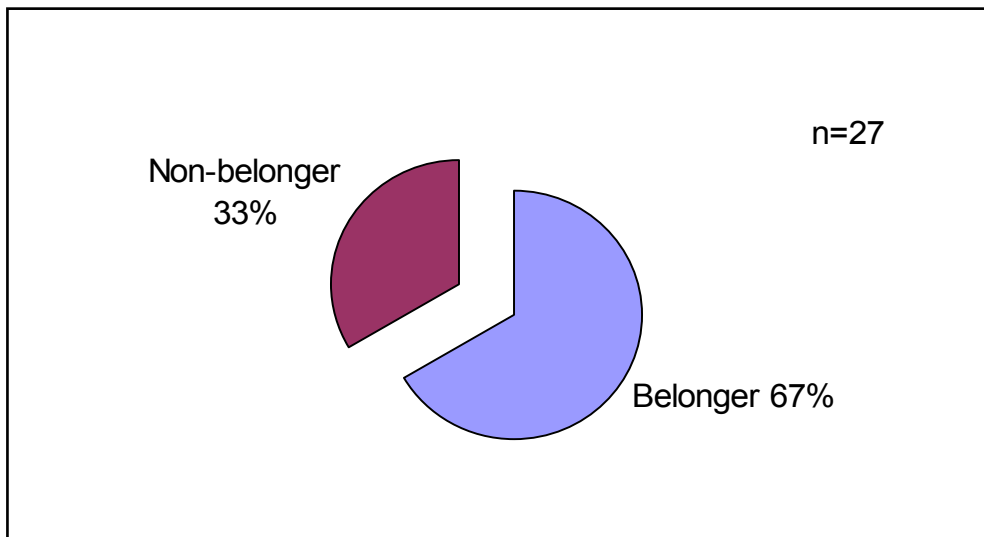


Figure 3.3: Nationality of respondent

Of those surveyed 63% said they had a fisher's licence, 22% did not have and 19% did not say (Figure 3.4). The proportion of fishers with licences is slightly higher for “non-belongers” (67% licensed) than for “belongers” (61% licensed) but the number of responses is small and the large percentage of non-response needs to be taken into account.

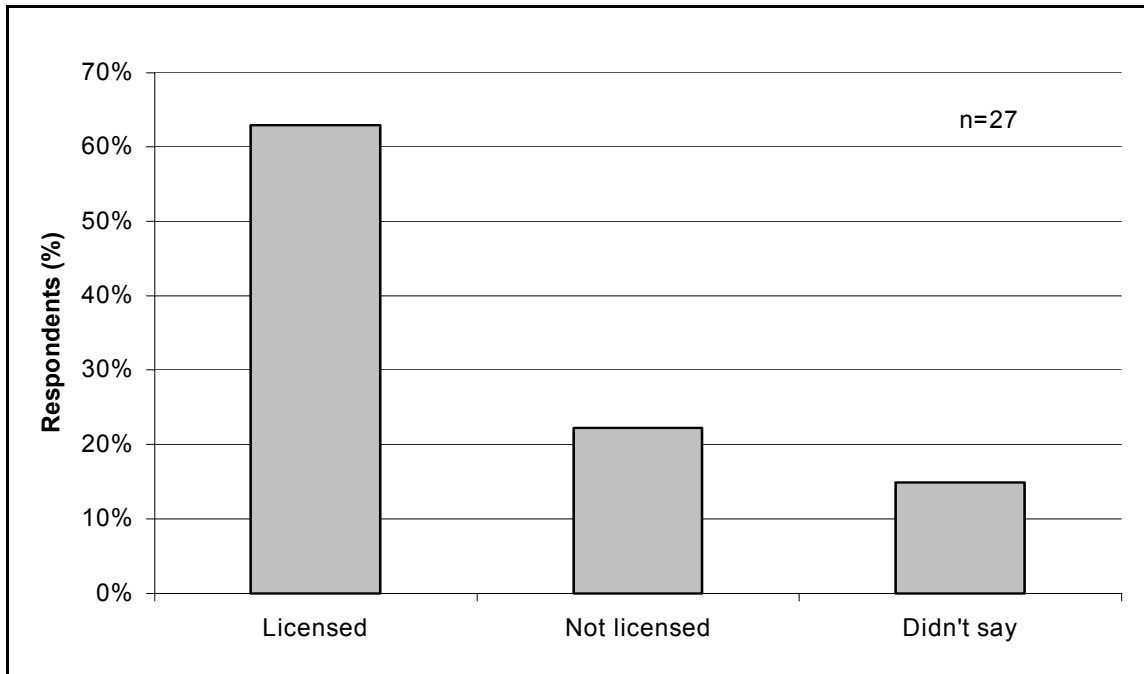


Figure 3.4: Possession of fisher's licence

The fishers interviewed ranged in age from 33 to 78 years. However, most respondents were 50 to 64 years, with few older fishers (Figure 3.5).

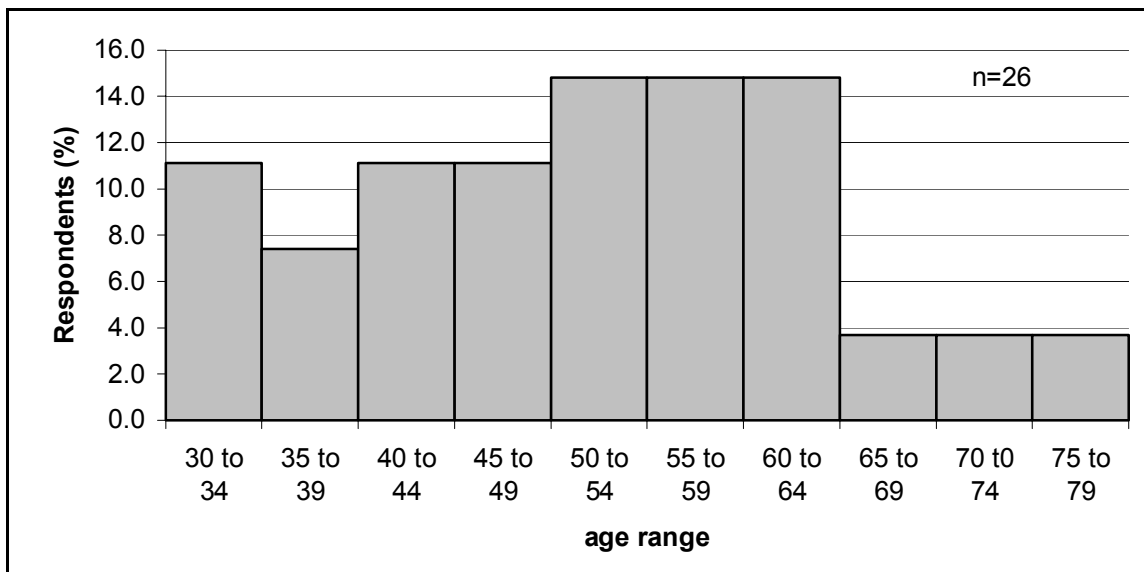


Figure 3.5: Age of fishers

The years spent fishing varied from 5 to 60, and the period spent fishing specifically for lobster ranged from 5 to 40 years (Figure 3.6). One respondent reported fishing for 60 years. The age at which respondents started fishing ranged from 9 to 63 years old with a mean of 25.6. The age at which fishers started to target lobster ranged from 10 to 63 years old but with a higher mean of 29.9. Fishing generally (for species other than lobster) has shown what may be a decline in the past 14 years, perhaps indicating an increasing concentration on lobster.



Figure 3.6: Number of years fishing

3.2.2 Livelihoods

Most of the respondents, 89% (24 respondents) said they were the main providers in their households. Figure 3.7 shows respondents' sources of income besides fishing. The largest group (34.6%) were those who depended on fishing alone, 30.8% had unspecified occupations and construction accounted for 19% of the alternative occupations listed. The remaining respondents were involved equally in farming, hotel, office, and professional work.

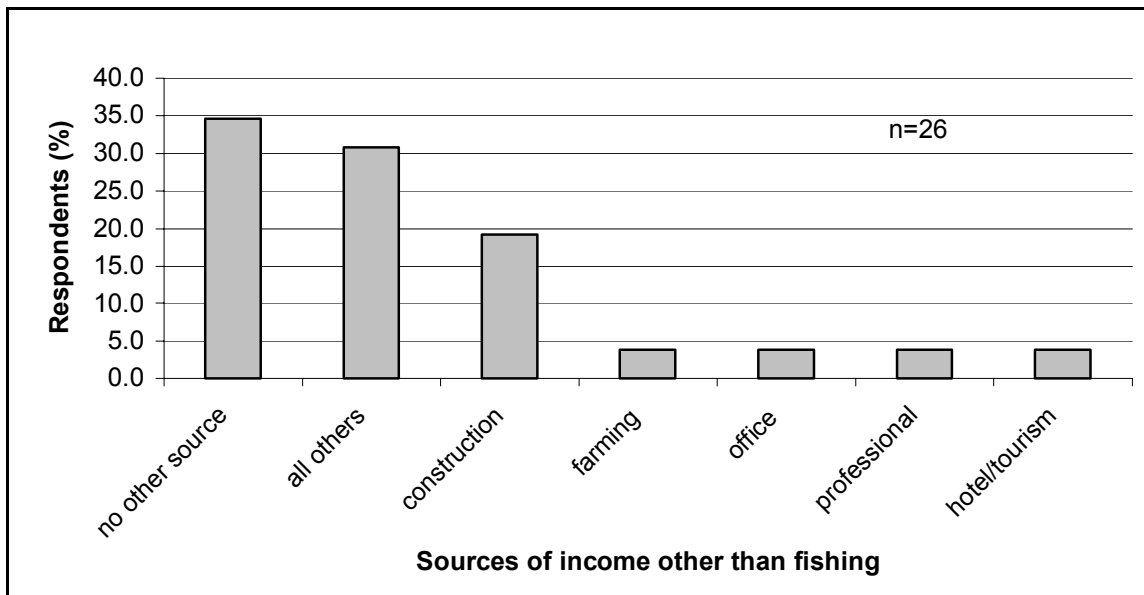


Figure 3.7: Sources of income other than fishing

The majority of respondents, 61.5%, reported making from 76% to 100% of their individual income from fishing. Of those remaining, 15.3% made between 51% and 75% of their income

from that activity. For 11.5%, fishing contributed 25% or less, and also 26 to 50% of income (Figure 3.8).

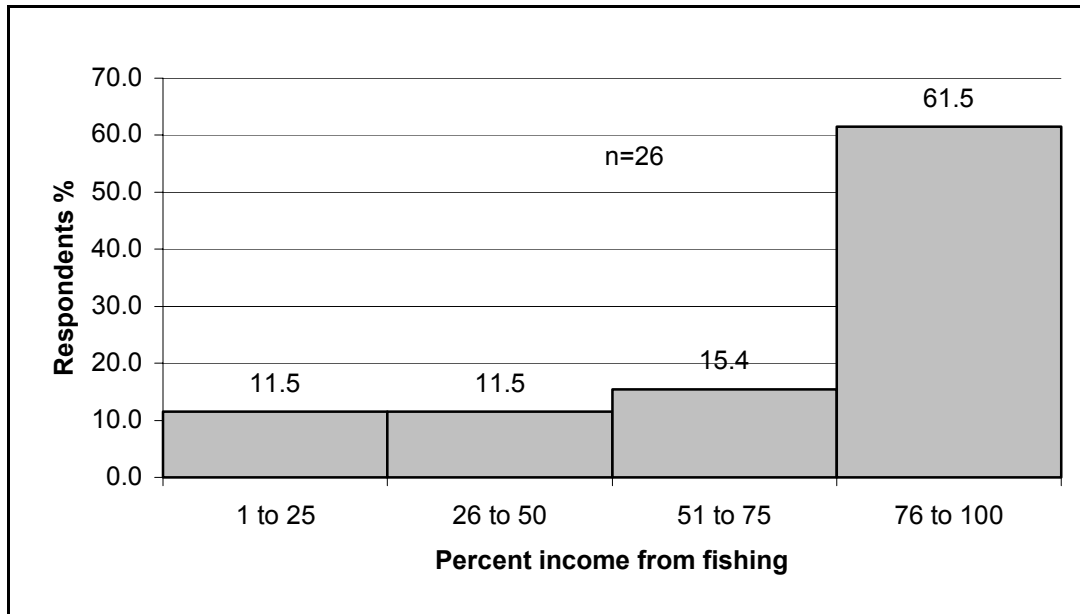


Figure 3.8: Proportion of income from fishing

Over 70% of the respondents targeted both lobster and fish, while 24 % targeted lobster alone and 4% targeted fish alone (Figure 3.9).

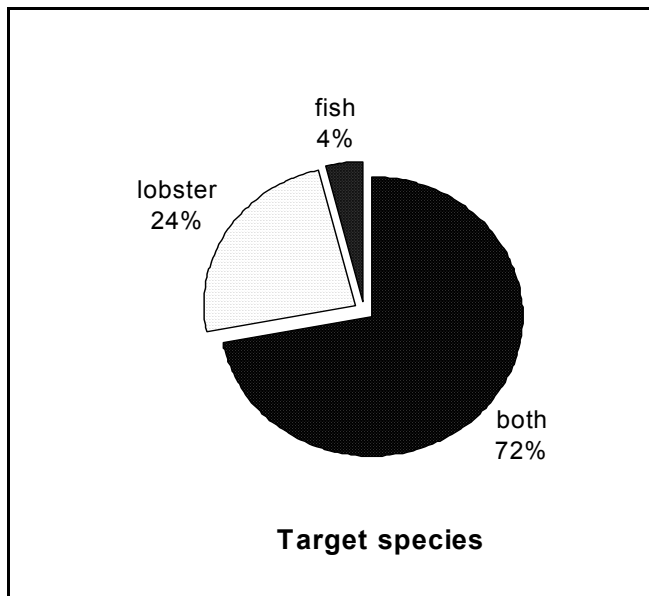


Figure 3.9: Target species of respondents

Sixty-two percent (13 of 21) of the respondents who stated their period for fishing lobster said they fished lobster throughout the year. The others had varying fishing seasons that ranged from 6 to 10 months. One fished from March to June (the current closed season), one in October, five in November and one in December. They also ended their seasons at different times, two in

April, one in May, one in July and two in August. The proportion of fishers operating in each month peaked in March and was lowest in September (Figure 3.10).

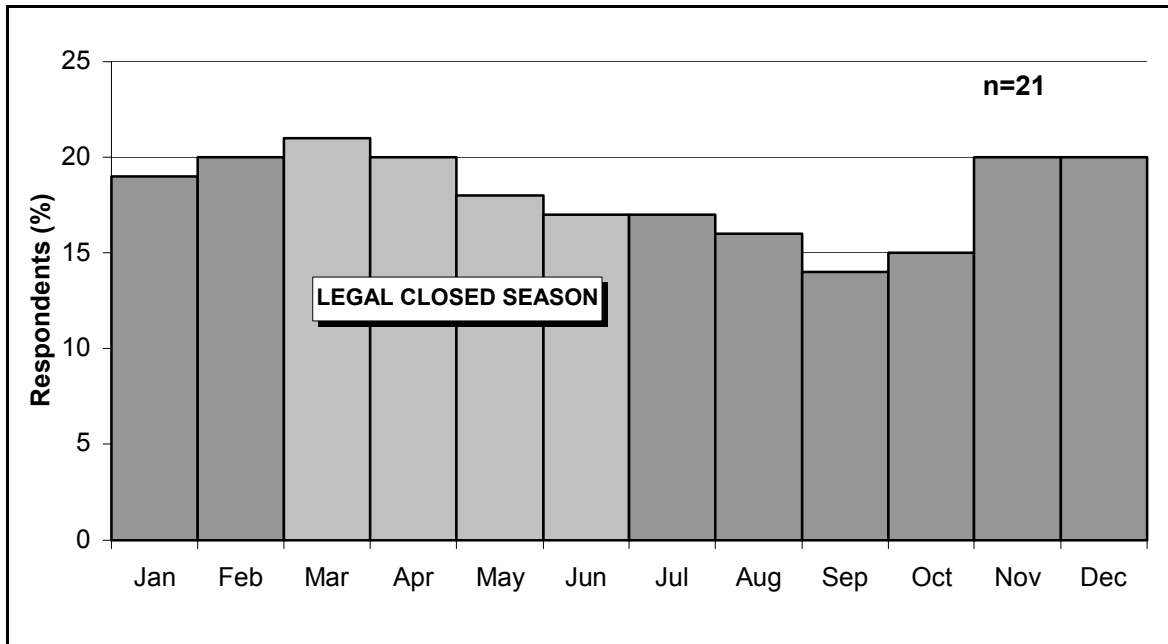


Figure 3.10: Lobster fishing periods

3.2.3 Vessels

As noted in the 1992 BVI Fisheries management Plan, the majority of vessels are manufactured in the USA (CFD. 1998.). They are commercially built vessels with brand names such as "Boston Whaler", "Lindsey" and "Beechcraft". Most are made of fibreglass (91%) but a small proportion is made of either aluminium or a combination of wood and fibreglass. Boat lengths range from 17 to 48 ft. (5.18 to 14.63 m). Boats less than 25 ft (7.62 m) generally had outboard engines, while boats over 26 ft (7.92 m) used inboard engines. Engine horsepower ranged from 40 to 370, with one 48ft boat having two 370 hp diesel engines. Slightly more vessels were in the range from 100-199 hp (29%) than in the flanking categories (Figure 3.11).

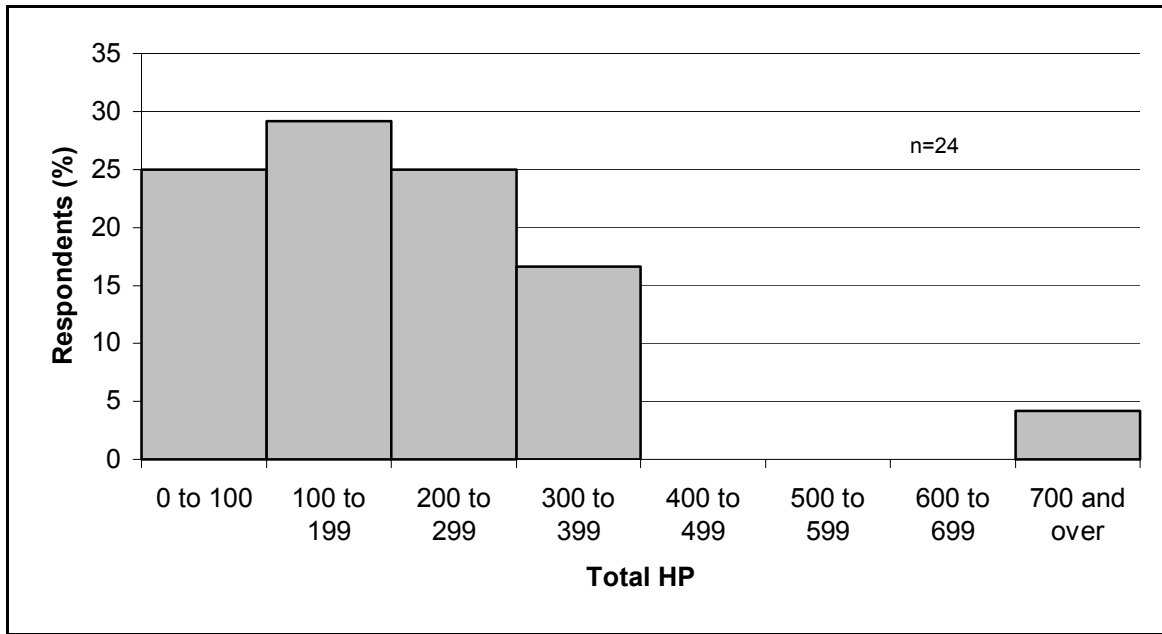


Figure 3.11: Range of boat engine horsepower

Figure 3.12 shows the total value of boat and engine of respondents, with the largest proportion (38.5%) being less than US\$25,000 in investment and declining as the value increased.

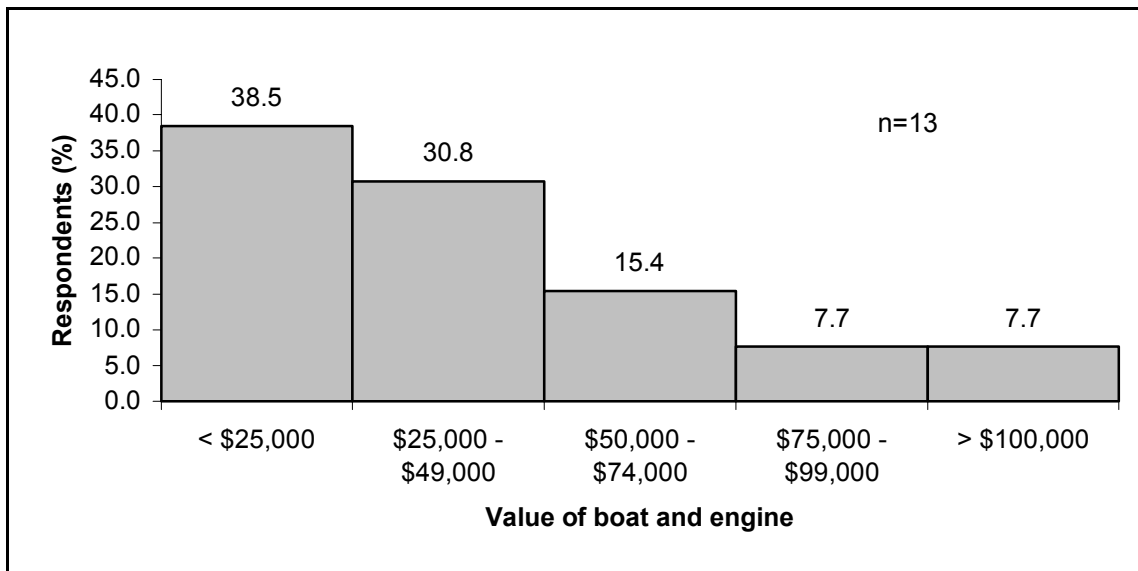


Figure 3.12: Total value of boat and engine

3.2.4 Ownership, kinship and sharing

Most of the respondents (73%) captained their own boat. Two respondents (7.7%) were boat owners but did not captain the vessel; one of these did not fish but employed a fisherman instead. The other did not give full information. Two respondents (7.7%) were captains of boats owned by others, and 2 of the respondents were crew only (Figure 3.13).

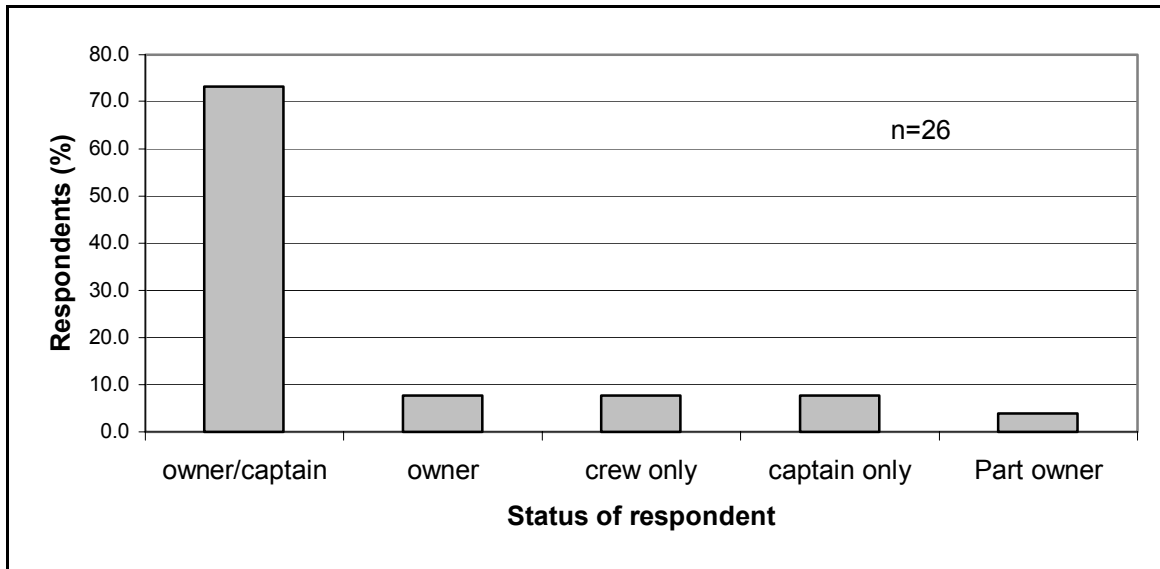
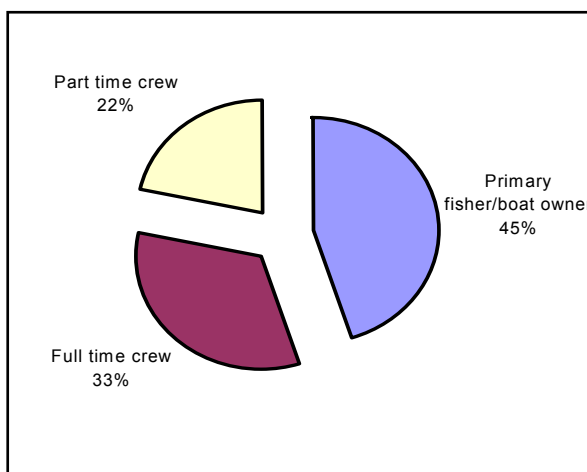


Figure 3.13: Status of respondent on boat

Twenty-one respondents fished on only one boat, while 5 fished on more than one vessel, 4 of these 5 were boat owners. Twenty-five out of twenty-seven respondents gave the number of crew they fished with. There was a total of 33 crewmen among the respondents; 20 full-time and 13 part-time crewmen. Seven respondents fished with one full-time crewman each, and 6 others with 1 part-time crewman each. Those with 2 crewmen each were: 4 with 2 full-time crewmen; 3 with 2 part-time crewmen; and one with 1 part-time and 1 full-time crewman. The largest vessel, 48ft (4.63m) in length, had 3 full-time crewmen and one part-time crewman along with the owner/captain. Four respondents fished alone.

If the 55 fishers named by the fisheries officers were boat owners, and their operations followed the pattern of the survey, then 93% of these (51) carry crew. The 27 primary fishers who were surveyed had a total of 33 crewmen; which suggests 67 crewmen added to the total of 55 fishers. This gives an estimated total of 122 people fishing lobster. There were 20 full time to 13 part time fishers, using the same ratio suggests that there may be 41 full time and 26 part time crew (

Figure 3.14).



With respect to family relationship, 10 of the crewmen (30%) are related to the captains. Five fishers each carried 1 son as crewman, 2 of these sons were full-time and 3 part-time. The other relatives include 1 brother and 1 nephew as full time crewmen. In 3 cases the fishers mentioned that relatives were among the crew but did not specify the nature of the relationship. Twenty-one crew members were not related to the fisher and 2 respondents did not say if relatives were among their crew.

Figure 3.14: Estimated numbers of crew to primary fisher

Fourteen fishers/boats (58%) used a sharing system of some sort while 10 (42%) did not. Of the four respondents (16%) who fished alone, only 1 expressed a sharing system in which half of the proceeds went to the owner/captain and half to the boat. For the others, the actual sharing systems varied, 5 boats (20%) paid a fixed salary to crewmen, while 2 boats (8%) paid a salary based on the catch. The others share money in varying proportions to the owner, captain, crew, boat and gear, with the owner's shares in the range of 20% to 50%, boat shares from 20 to 60% and crew shares from 20 to 40%. Two boats allocated shares to gear.

3.2.5 Local knowledge of lobster biology

The reproductive process of the lobster allows some observed phenomena to be used to indicate the spawning season. The male Caribbean Spiny Lobster (*Panulirus argus*) attaches a spermatophore to the female. This appears as a dark patch on the sternum of the female called a "tar spot". A detailed description is extracted below.

Among the spiny lobsters, females can mate only immediately after they have shed their old shell (moulted) while their new exoskeleton is still soft. In mating, the male lobster transfers a spermatophore (sperm packet) to the female; depending upon the species, he may slip the spermatophore into her genital pore, in which case the eggs are fertilized before they are laid, or may attach a spermatophore to the outside of her shell, in which case the female scratches the spermatophore open to release sperm just as her eggs emerge. Regardless of the system of sperm delivery, female lobsters store sperm (inside or outside their bodies) until conditions are right for "spawning", or fertilization. The female then retains the fertilized eggs on her abdomen for weeks or months until they hatch. Females bearing fertilized eggs are called "berried lobsters" or said to be "in berry" (Bliss 1982, cited in Seafood Watch).

Regarding the biology of the species, 80% of respondents indicated that there is a specific time when lobsters are berried, 12% stated they did not know and 8% said there was no specific time. The months named for berried lobsters ranged from March to September with most identifying the period between May and August as the season.

Forty-four percent of the fishers answering this question indicated that they did not notice a specific time when lobsters had tar spots, 40% said there was a specific time and the remainder said there was none. The months that fishers noticed seeing the tar spot varied from February to December, with most in the period from June to September.

Fifty-six percent said they did not know if there was a specific time when lobsters moult, (shed their shell) while 28% said there was no specific time. Only 16% indicated there was a specific time when lobsters moult. From these few, the time given for moulting ranged from January to August, with most saying from May to August. Some of the respondents stated that they encounter only small numbers of moulting or "soft" lobsters. These findings are displayed in Figure 3.15.

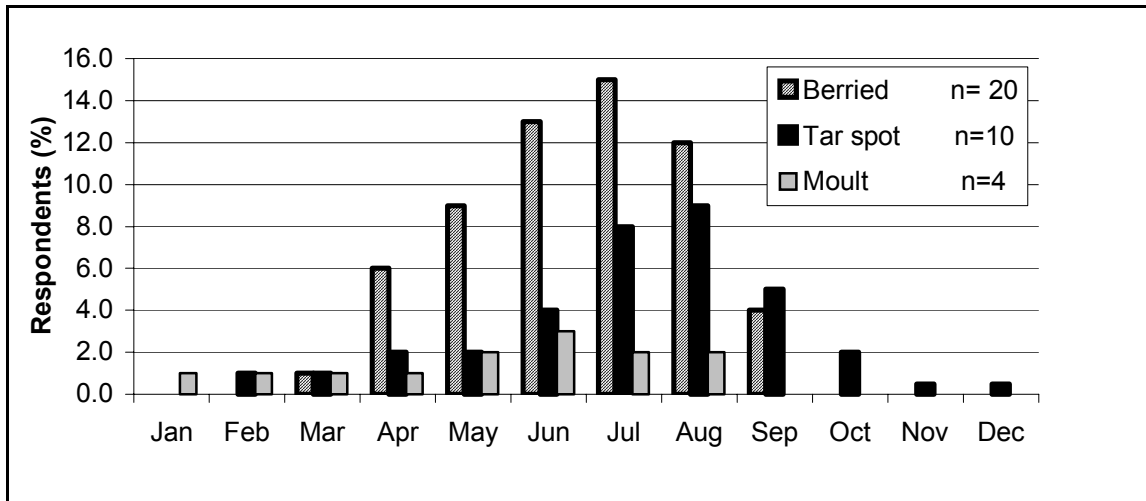


Figure 3.15: Times at which differences related to mating are observed

The majority of respondents (45%) indicated that there was a specific time when there were more male than females lobsters. Forty-one percent indicated that they did not know, while fewer than 14% stated there was no specific time at which differences in relative abundance of either sex were observed. For those noting a difference, the predominant months when more males than females were observed, were from January to September with two peaks, one in April to May and the other July to September. More females were observed in the months March to April, in June and the period August to September (Figure 3.16).

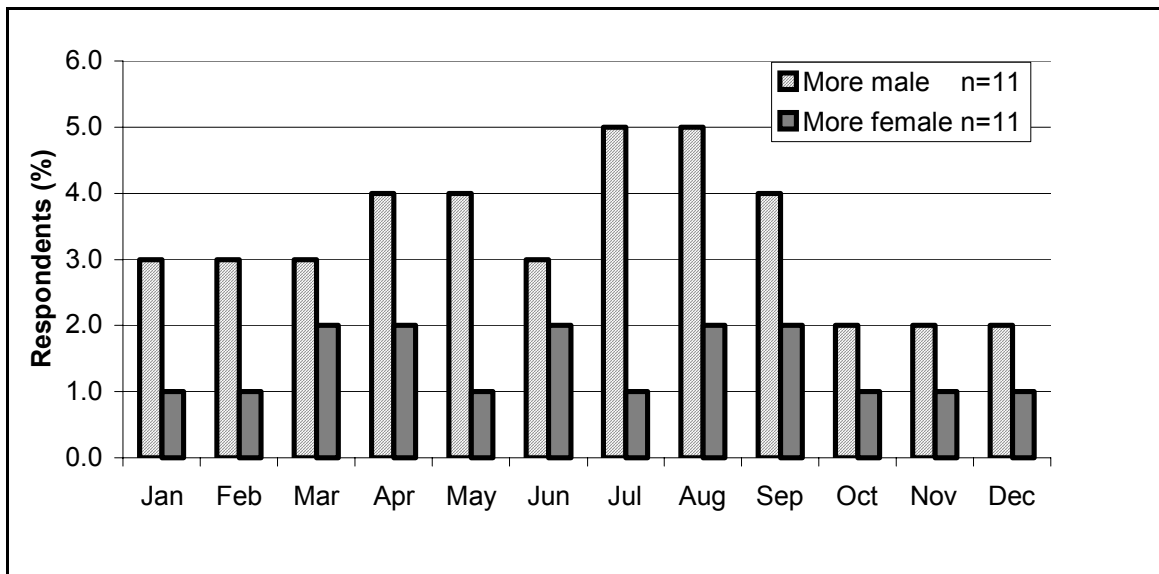


Figure 3.16: Times at which differences in relative abundance of either sex are observed

3.2.6 Catch and effort

Most of the respondents owned their fishing gear (87.5%) while only 12.5 % did not. Forty-six percent of respondents said they dived while doing any kind of fishing, fifty-four percent did not dive, and only 8% of all respondents used SCUBA. Information gathered from the focus group meeting on Virgin Gorda is that divers operate in teams of about 3, one of whom uses SCUBA while the others do not.

Total trip length varied from 2 to 15 hours (Figure 3.17). The largest group of respondents (33%) were at sea from 4 to 6 hours per trip. The next largest group (28%) were at sea for 7-9 hrs. Nineteen percent spent less than 3 hours per trip, while at the other end of the scale, a total of 19% made trips between 10 and 15 hours in length. The actual time spent fishing varied from 1 to 8 hours with 58% spending between 4 and 6 hours. About a quarter, (26%) spent 3 hours or less actually fishing, while 16% fished for 7 to 9 hours.

The majority of respondents (52%) made one trip per week, while 22% made 2 trips and fewer than 9% made 3 trips in 2 weeks (Figure 3.18). The remaining minority (4%) made as many as 4 trips weekly. Considering, however that some fishers rotated hauling between different groups of pots, the actual frequency of hauling for over half the respondents was generally once per week, with about 22% hauling twice per week or more, and another 22% hauling less than once per week. One individual reported hauling pots about once per month, this is probably in the slow season when the demand for lobster is low. Fishers reported either hauling less frequently or leaving the trap doors open in the slow season.

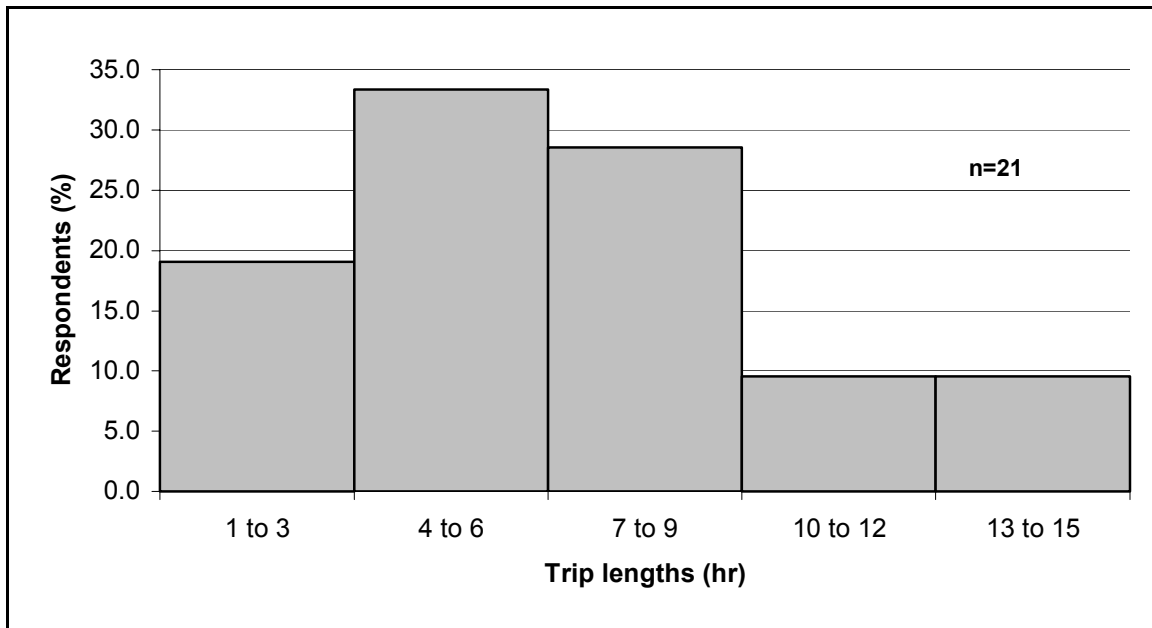


Figure 3.17: Length of fishing trips at sea

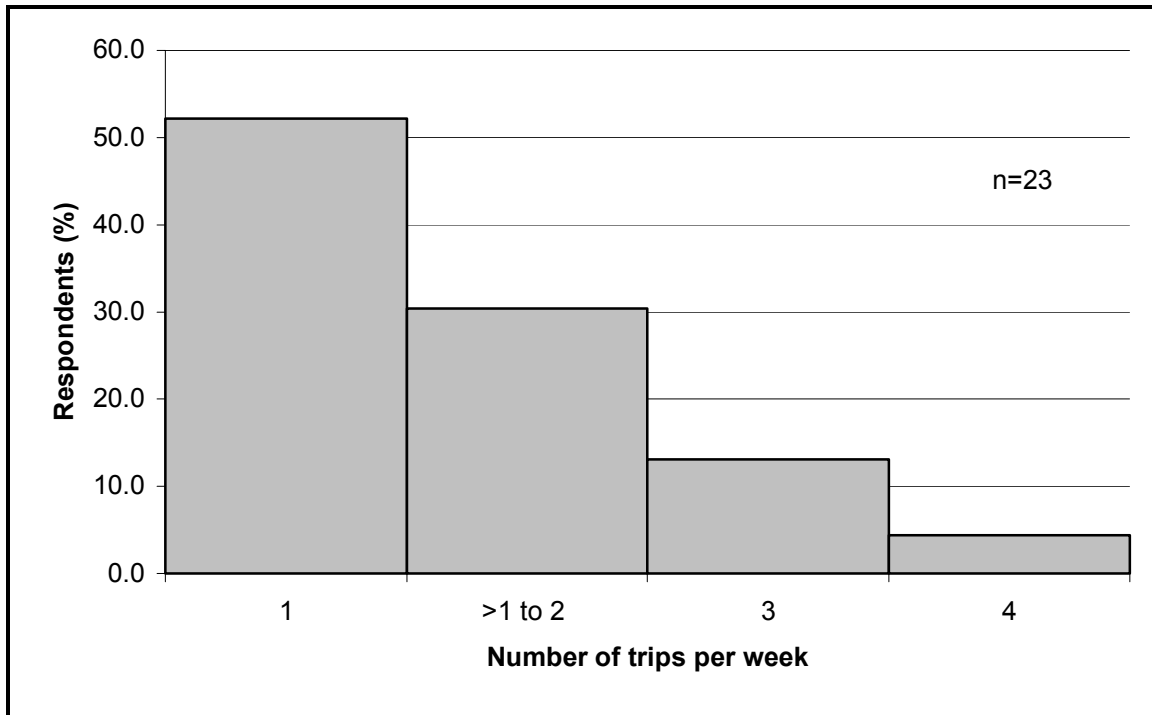


Figure 3.18: Number of trips per week

The total number of traps operated from each boat ranged from 2 to 450 with a maximum of 200 being hauled per trip. The biggest proportion (36%) indicated that they hauled 26 to 50 pots per trip (Figure 3.19).

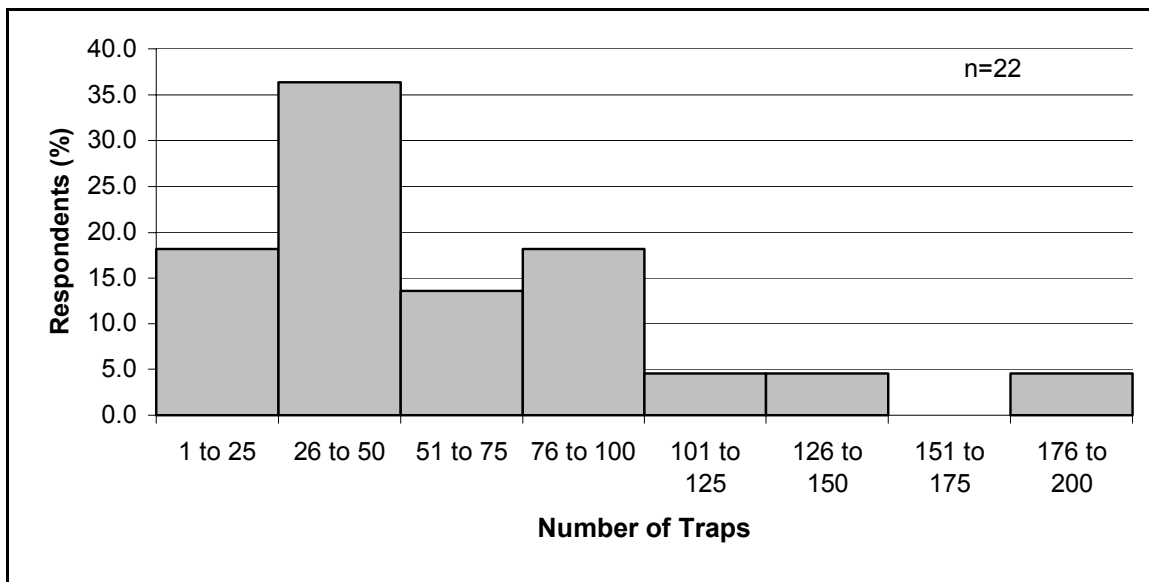


Figure 3.19: Number of traps hauled

Catches of fish from pots ranged from 20 to 300 pounds (9 to 136 kg) per trip with 30% being in the range 26 to 50 pounds (12 to 23 kg) (Figure 3.20).

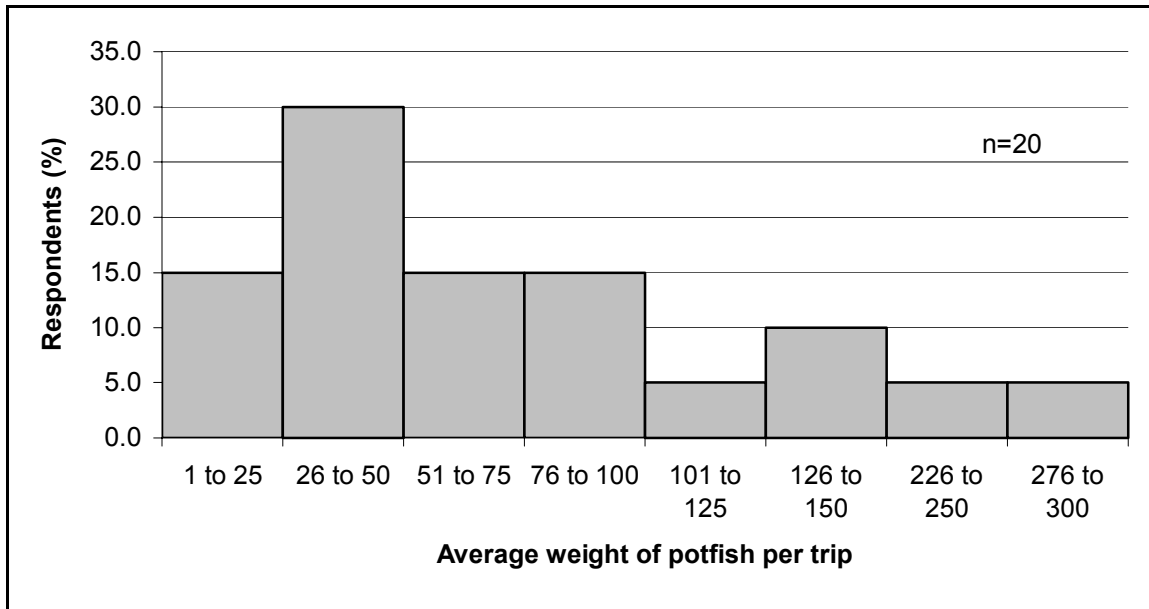


Figure 3.20: Average weight of potfish per trip

Lobster catches per trip (Figure 3.21) were reported to mostly be in the range of 51 to 100 pounds (23 to 45 kg) with another peak at 176 to 200 pounds (80 to 90 kg).

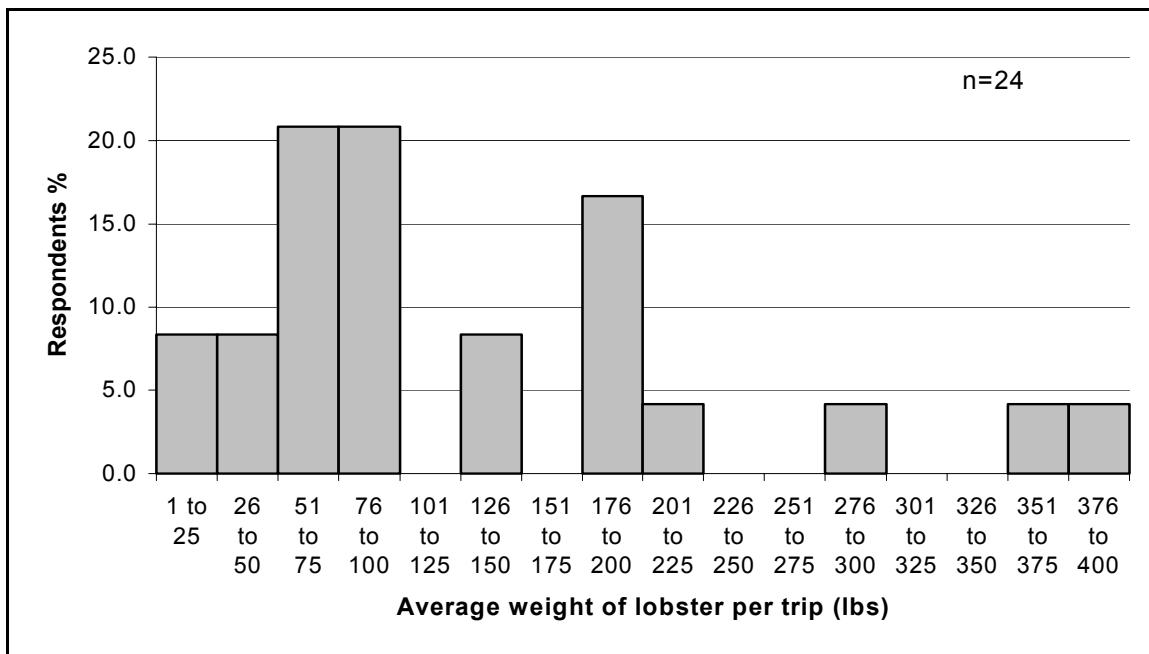


Figure 3.21: Average weight of lobster per trip

Catch per trap ranged from less than half a pound of lobster (0.5 kg) to over 11 pounds (5 kg) per trap with a mean of 3.7 pounds (1.7 kg) (Figure 3.22).

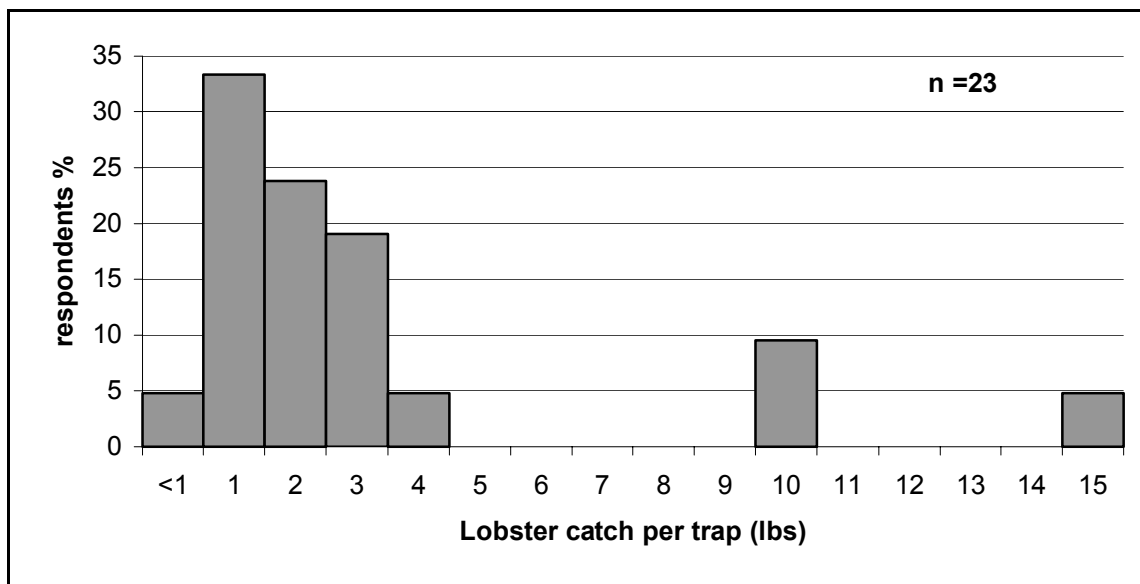


Figure 3.22: Catch per trap for lobster

3.2.7 Revenue

Average annual revenue has been calculated for each respondent, based on the estimated individual catches of lobster and fish along with stated selling prices and trips per week. The length of fishing season for pots was 40 weeks as estimated by the CFD. This number was used for those fishing all year. For those fishing part of the year their stated fishing period (if less than 40 weeks) was used. The calculation used was: Average catch per trip x number of trips per week x average selling price x estimated number of weeks fishing per year, for fish or lobster. The estimated annual gross revenue for each respondent is shown in Table 3.1 (currency is US\$). The estimated annual total income for mixed fishing operations ranged from \$5,400 to \$339,700 with a mean of about \$90,400. Thirty percent of the operations had estimated gross earnings below \$30,000, and another thirty percent had gross earnings between \$40,000 and \$59,000.

Table 3.1: Estimated annual gross revenue from individual fishing enterprises

Annual income from fish	Annual income from lobster	Annual income from other species	Total estimated annual income
\$ 2,500	\$ 2,800		\$ 5,400
	\$ 5,600		\$ 5,600
\$ 5,000	\$ 10,000		\$ 15,000
\$ 6,400	\$ 18,000		\$ 24,400
\$ 4,800	\$ 19,600		\$ 24,400
\$ 5,500	\$ 16,800	\$12,100	\$ 34,400
\$ 12,000	\$ 25,000		\$ 37,100
	\$ 40,000		\$ 40,000
\$ 16,000	\$ 28,000		\$ 44,000
\$ 30,400	\$ 17,200		\$ 47,600
\$ 37,700	\$ 10,500		\$ 48,200
\$ 16,000	\$ 36,400		\$ 52,400
\$ 6,000	\$ 48,000		\$ 54,000
\$ 25,000	\$ 14,400	\$15,400	\$ 54,800

	Annual income from fish	Annual income from lobster	Annual income from other species	Total estimated annual income
	\$ 44,000	\$ 42,000		\$ 86,000
	\$ 5,000	\$ 100,200		\$ 105,200
	\$ 49,500	\$ 61,200		\$ 110,700
	\$ 12,600	\$ 112,000		\$ 124,600
	\$ 98,200	\$ 72,000		\$ 170,200
		\$ 187,900		\$ 187,900
	\$ 82,500	\$ 117,000		\$ 199,500
	\$ 43,100	\$ 225,500		\$ 268,600
	\$114,200	\$ 225,500		\$ 339,700
Total from all respondents	\$616,400	\$1,435,600	\$27,500	\$2,079,700
			Mean	\$ 90,400

Few respondents targeted other species commercially besides fish and lobster. These additional species were conch and whelk, which were caught commercially only for special orders on occasions such as the August Festival. The August Festival commemorates the emancipation proclamation and is celebrated on the first Monday in August. It is the main cultural festival of the BVI. Many BV Islanders, living abroad, return home to join in the celebration. These visitors seek the traditional foods which are not normally available overseas, including conch and whelk, but although lobster is not considered by many to be a traditional delicacy, it is reported that there is an increase in lobster consumption during the festival.

3.2.8 Maintenance and operating costs

Fuel cost per trip ranged from under \$50 to over \$200 with most being \$51 to \$100 per trip (Figure 3.23).

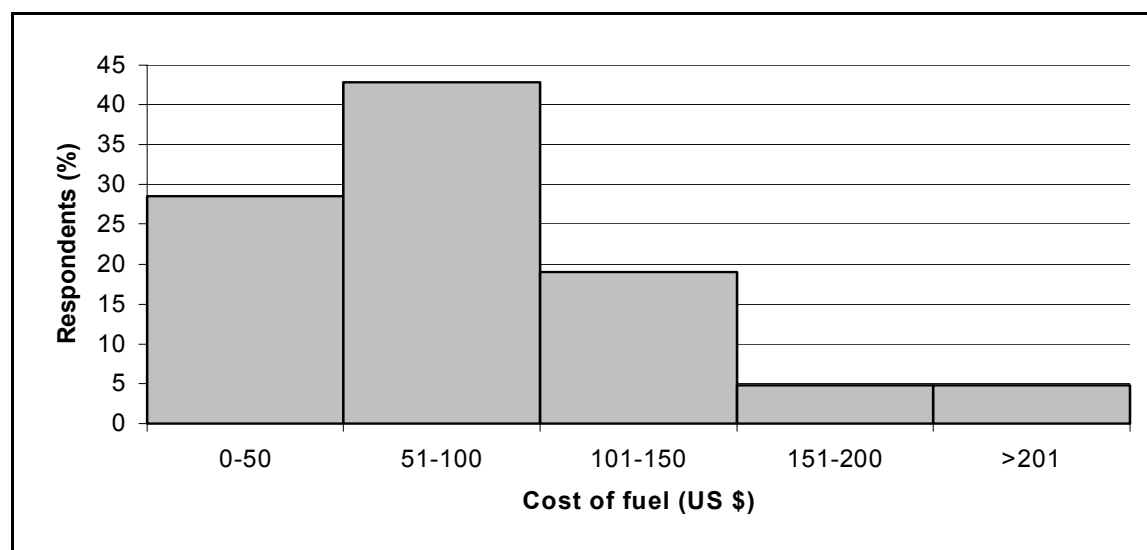


Figure 3.23: Operating fuel cost

Ice is not a major cost for lobster fishers since they keep lobsters alive for sale and need ice only when catching fish. The most ice carried per trip cost \$50 but some fishers carry a single bag of ice which costs \$3 (Figure 3.24). The mode was \$11 to \$20 per trip.

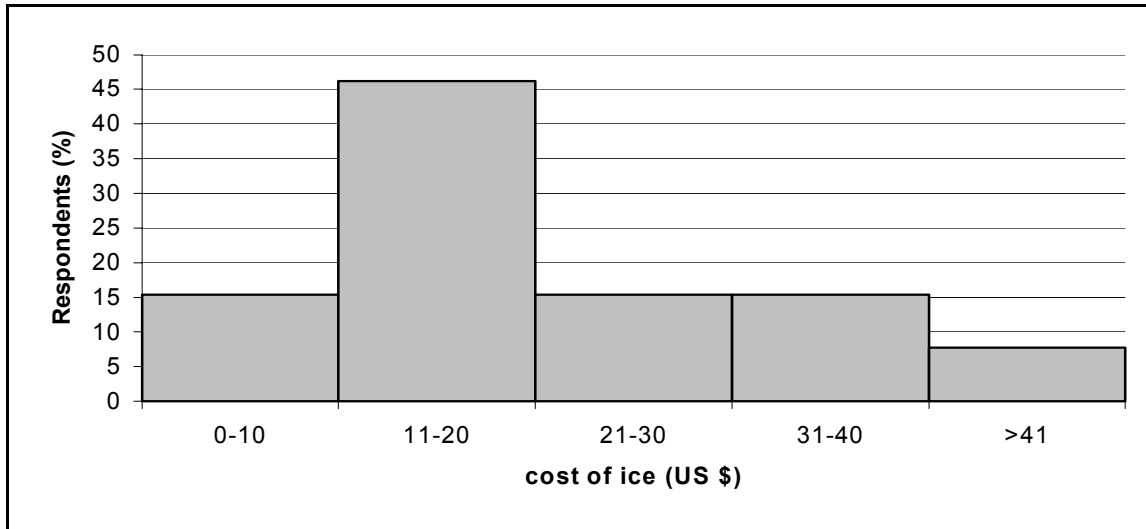


Figure 3.24: Cost of ice per trip

Bait also varied in cost, half of the respondents spent about \$40 to \$60 in bait while the other half spent less (Figure 3.25).

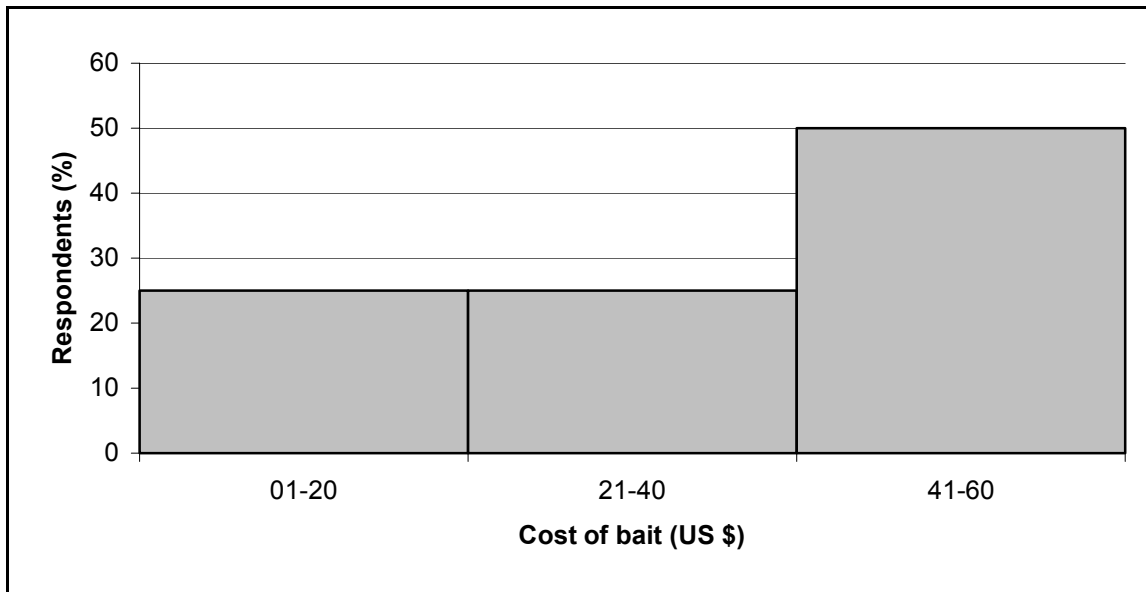


Figure 3.25: Cost of bait

Food was not a major expense on most trips since they did not fish overnight. About half of the respondents spent \$10 or less per trip, while one respondent spent as much as \$55 for a trip with 2 full time crewmen for an average of eight and a half hours at sea per trip. (Figure 3.26)

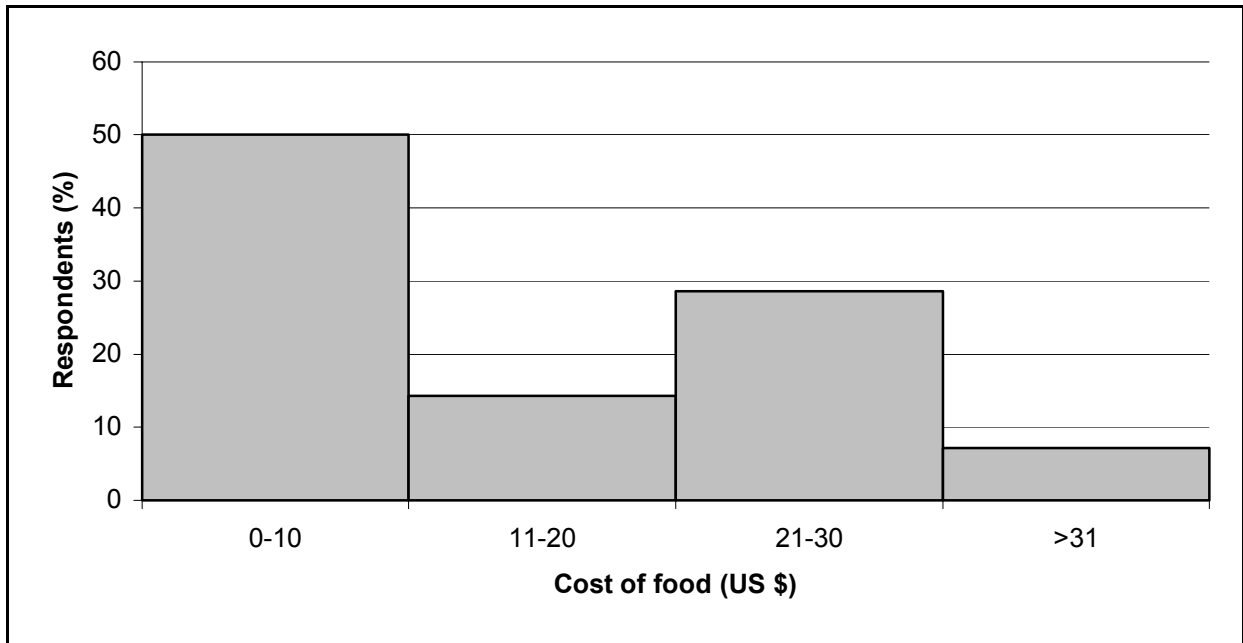


Figure 3.26: Operating cost of food

The majority of respondents (62%) indicated that boats were repaired or maintained annually and 13% did this twice a year. Equal proportions of respondents (31.8%) reported annual maintenance costs between \$100 and \$500, and between \$1000 to \$1500 (Figure 3.27). The range between \$500 and \$1000 accounted for 13.6% of respondents. The remaining respondents had relatively high annual maintenance costs, nine percent spending in the range of \$2,500 to \$3000. Only 25% of respondents had insurance on their boats, 71% did not, while the other 4% did not know if the owner had insured the boat. The annual cost of insurance ranges between \$500 and \$3700.

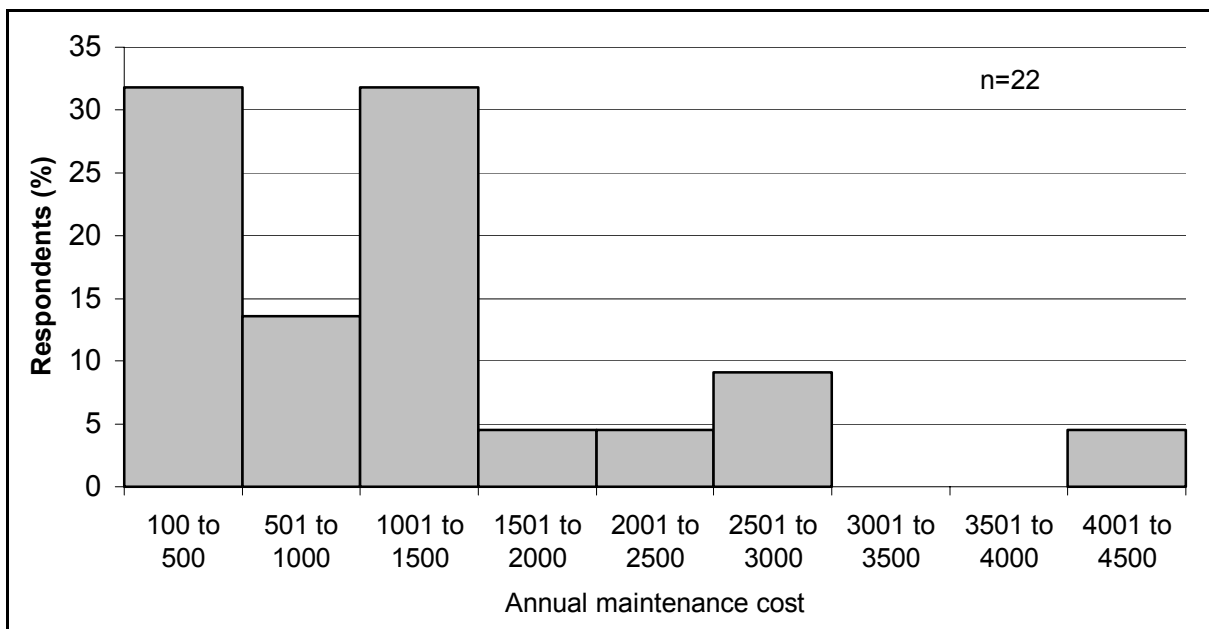


Figure 3.27: Annual maintenance cost of boat.

3.2.9 Marketing arrangements

Fisheries regulations stipulate that unless information to the contrary is gazetted, 60% of catches from local registered fishing vessels and 80% from foreign vessels shall be landed at the BVI Fishing Complex or at a landing site agreed in writing with the Complex. However, most of the lobster (between 90 to 100%) was sold directly to restaurants. Respondents stated that a higher price and close proximity to restaurants were the main reasons.

Prices ranged from \$5.00 to \$7.00 per pound with a mean of \$6.26. An interview with the manager of the BVI Fishing Complex revealed that there is limited consumption of lobster by the general population and he suggested that the price is too high for most householders. The BVI Fishing Complex buys lobster at \$6.00 per pound and sells at \$7.00. During the tourism off season, due to reduced demand from the restaurants, the fishers may drop the price to the complex to \$5.00 per pound. The manager of the complex pointed out that the complex has no holding tanks and the lobsters are kept in traps over the side of the dock. Postharvest losses are higher than normal during this extended holding period.

The respondents sold their fish either to the BVI Fishing Complex or directly to customers. The reasons given for selling to outlets outside of the Complex include custom, convenience and proximity to the chosen outlets. Some fishers found it easier to sell the fish whole to the Complex rather than having to clean it for sale to the public even though the price paid by the Complex may be lower. Some fishers said that they sell to the Complex because doing so allows them to maintain a relationship with the Complex, whereby they can buy fuel and supplies at reduced prices and on credit.

3.2.10 Attitudes and perceptions regarding the resource and management

This was a part of the original questionnaire but due to the length, this section was dropped and only those respondents who were willing to answer the additional questions were asked directly about the attitudes and perceptions towards the resource and management. The questions were also asked as part of the focus group session with the Virgin Gorda Fishers Cooperative.

Everyone claimed to be aware of the regulations regarding lobster fishing and rated the compliance of others with the regulations as generally moderate to acceptable. They rated enforcement as moderate to minimal.

Concerning the abundance of fish and lobster, most felt that the amount of fish and lobster had decreased over the past 5 years, from 2000 to 2005. However, with regard to a 10 year span, from 1995 to 2005, 40% believed there was a decrease in abundance and 30% thought there was no change. No respondents thought that there had been an increase in abundance over the last 10 years.

Regarding the number of fishers, three of seven respondents said there was an increase in the number of fishers in the past 5 years, while three others thought there was a decrease and one thought there was no change in numbers. With regard to any perceived increase in numbers of fishers over the span of the last 10 years, two respondents said the numbers had not changed, one said there was an increase in numbers and one said there was a decrease. The other respondent said he did not know.

Eight of eleven respondents reported an increase in demand for lobster over the past 5 years, with two stating there was no change. One said he did not know. Five out of 10 who responded,

stated that the price for lobster had increased over the past five years, four claimed there was no change and one said prices had decreased.

3.2.11 Lobster closed seasons and other regulations

Eight of eleven respondents were in favour of a lobster closed season, while the remaining three were not. Two out of nine said they had been affected by the BVI closed season, and five said they had not yet been affected but expected they would be. They cited loss of income to both fishers and restaurants as the negative impact. The preferred period for the closed season was June or July to October and the frequency of responses given for the months preferred is shown in Figure 3.28.

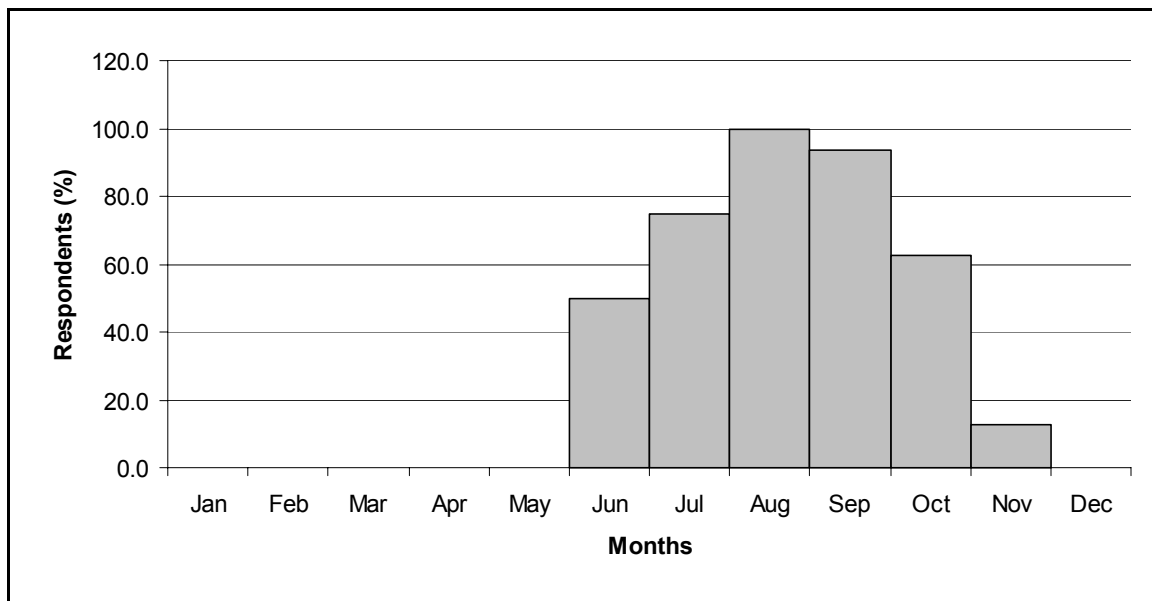


Figure 3.28: Respondents preference for closed season

Declared closed seasons for other Caribbean countries are presented in Table 3.2. The majority of the closed seasons within the Caribbean range between March and July, within which the closed season for the BVI falls (March to June). Those countries closer to the BVI, have closed seasons which start later than the BVI. Jamaica, the Dominican Republic, Florida, Bermuda and the Bahamas all start their season in April. However, Cuba has 2 closed seasons at different locations on the island, one which starts at the beginning of March and closes at the end of May and the other which starts in the middle of March and ends in the middle of June. The US Virgin Islands do not have a closed season for lobster.

Table 3.2: Lobster closed seasons in various Caribbean countries

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Bahamas												
Belize												
Bermuda												
Brazil												
Colombia												
Cuba												
Cuba												
Dominican Republic												
Honduras												
Jamaica												
Mexico												
Nicaragua												
St.Lucia												
USA Florida												
Venezuela												
BVI												
Turks and Caicos												
Puerto Rico												
Grenada												
Cayman Islands												
Dominica												
St Vincent and Grenadines												

Source: Adapted from Dilrosun (2000).

All of those who were asked about the new BVI fishery regulations agreed with the restrictions on size, with at least one commenting that the minimum size was still too small. They also agreed on the restrictions on the use of spear guns, specifically for lobster, which are normally sold live. The reasons being that restaurants prefer live lobster and some fishers stated that lobsters decrease in weight after dying. These respondents also agreed on restrictions on taking berried lobsters. While six were in favour of the ban on taking moulting lobster, three were against it and two gave no response. Some suggested that dropping moulting lobster overboard would be a waste since predators would eat them. Some respondents reported leaving the soft-shelled lobster in the pots as they dropped them back.

Almost all of these respondents thought that fishers and government should make decisions together on management issues. Only one thought that management should be by fishers only. Some stated they did not like government handing down decisions that affected their lives without consultation. When asked if they had been aware of consultations on the new regulations, eight said they had, and two said they had not. Even though they claimed to favour fishers' involvement in management, only two of the eleven were members of a fisherfolk organisation.

3.3 Restaurant survey

3.3.1 Closed restaurants

Of the 42 restaurants identified for the survey, 19 (45.2%) were listed as being closed at some time during the off season in the publication, *The BVI Restaurant and Food Guide*, and nine (21.4%) were listed as being open all season. Only 12 responded to the questionnaire and the management of others did not return the questionnaire or arrange to be interviewed. The restaurant closures extended from August to October (Figure 3.29), so in this period lobster would not be served.

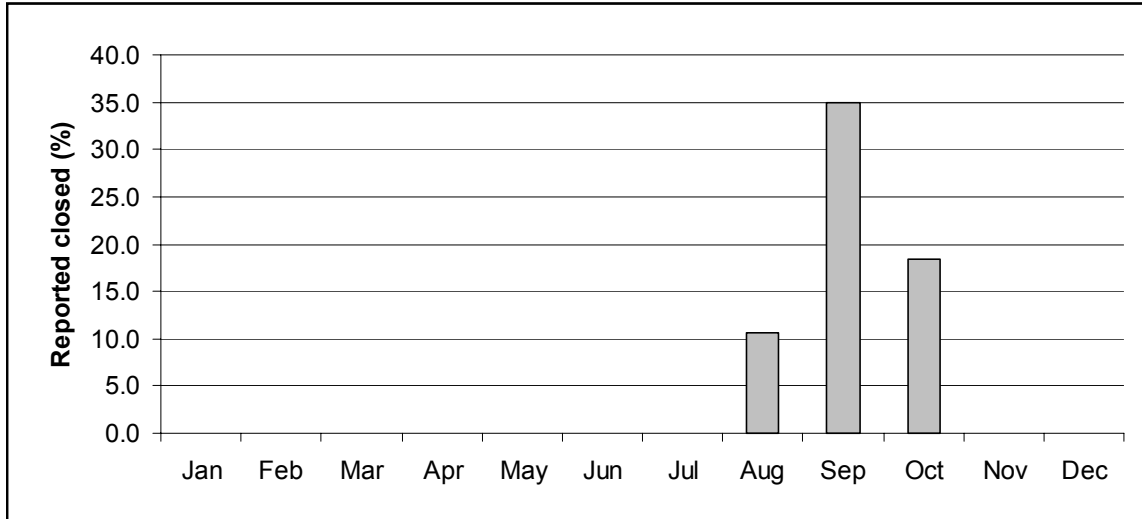


Figure 3.29: Closure of restaurants

The results are therefore biased in the sense that responses came from restaurants that were open in the slow (off-peak) season and there were no responses from those that were closed. Approximately 36% of the restaurants surveyed were in operation between 16 and 30 years, while another 36% were open between 31 and 50 years (Figure 3.30).



Figure 3.30: Number of years for which various restaurants were in operation

3.3.2 Patrons

Numbers of restaurant patrons or guests varied dramatically between peak and off-peak seasons. The reported numbers of guests per week ranged from 75 to 2500 in the peak season depending on the size of the restaurant, while the comparable numbers reported for the off-peak season were between 10 and 1000. For the peak season, 30% of respondents indicated that they had less than 100 guests per week at the restaurant, 30% had between 101 and 200 and 30% had over 1000 guests per week (Figure 3.31). The patrons in the off-peak season were between 0.5% and 65.5% of numbers in the peak season, with a mean of 37%.

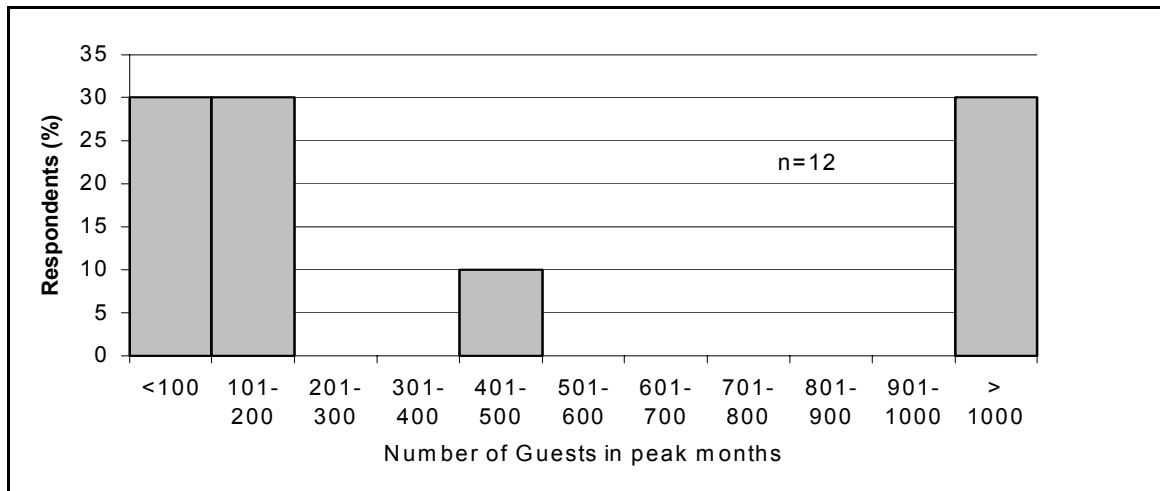


Figure 3.31: Number of guests per week in peak season

For the off-peak months, 50% of the restaurant management reported less than 100 guests per week while ranges between 700 and 800, 800 and 900, 900 and 1000 were reported by 10% each. (Figure 3.32).

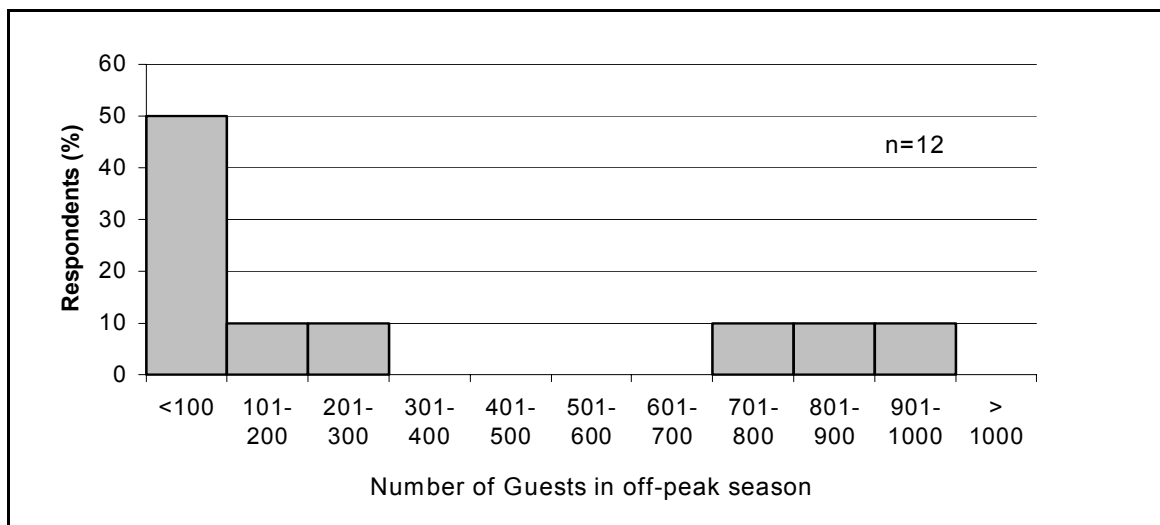


Figure 3.32: Number of guests per week in off-peak season

Half of the respondents indicated that their restaurants are closed at some time during the tourist off season which falls between July and October. Reported lobster purchases (Figure 3.33) and

the restaurants reported peak seasons indicate their main business season extends from November into June.

With regard to purchasing lobster, all restaurants surveyed bought most of their lobster directly from the BVI fishermen but some also bought from the BVI Fishing Complex occasionally. The reported cost of lobster ranged from \$6.00 to \$8.00 per pound. The total monthly restaurants purchases of lobster for those surveyed are shown in Figure 3.35. Seven respondents (58.3%) claimed prices remained constant throughout the year and five (41.7%) claimed the price varied. While this could have given valuable information for determining seasonality the monthly prices were not given.

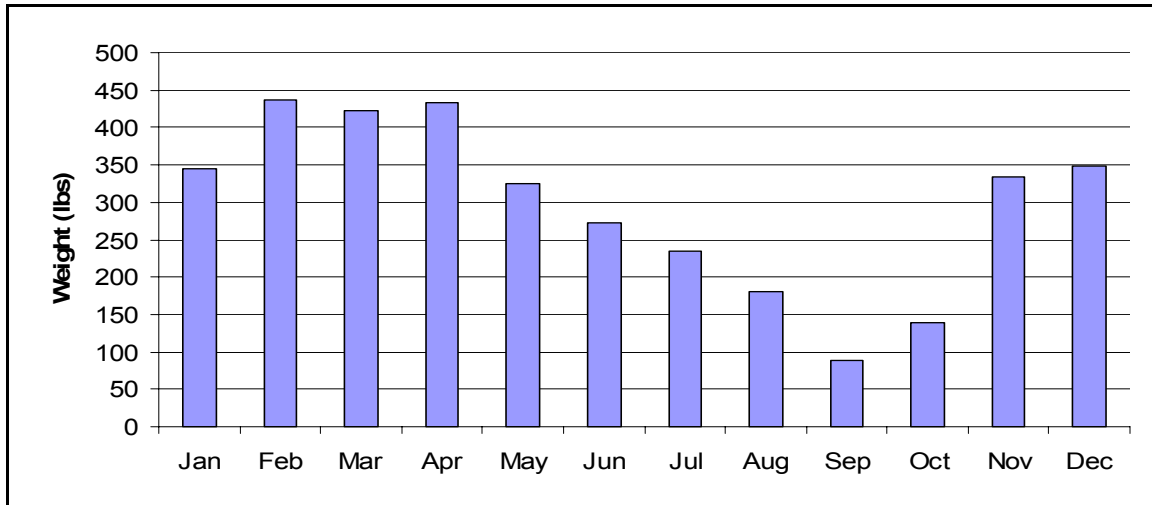


Figure 3.33: Average monthly lobster purchases

3.3.3 Tourist arrivals

Records of tourist arrivals to the BVI from 1996 to 2002 indicate an annual peak in March and a low in September. Figure 3.34 shows average tourist arrivals by month for that period. To the extent that lobster is mainly for tourist consumption the number of visitors may serve as a rough proxy for patterns in market demand.

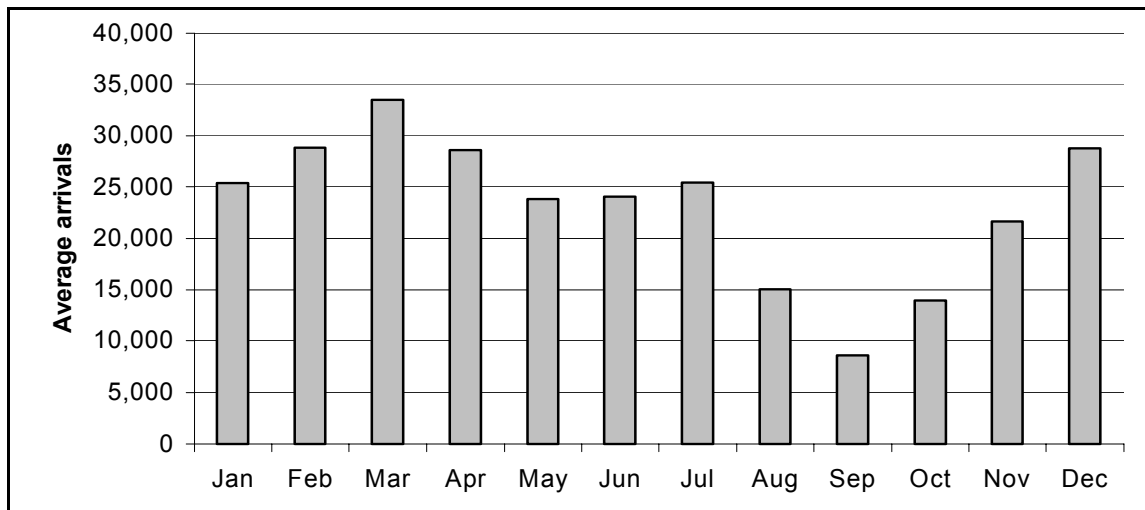


Figure 3.34 Average tourist arrivals by month 1996 to 2002

3.3.4 Restaurant size

The sizes of restaurants varied. While some had as few as 2 employees, one had 30 and another 37. The total numbers for all restaurants surveyed were: 31 male full time employees, 53 full time female, 3 part time male and no seasonal employees. The averages for the restaurants were: 4 male full time and 6 to 7 (6.6) full time female employees.

Of the 12 restaurants surveyed, 6 (50%) have reported remaining the same size over the past five years, while five of them have expanded and one has upgraded facilities. Those that have grown appear to be the larger ones in terms of numbers of guests and employees.

Some restaurants reported they had either grown or improved over the past 5 years. Comparing changes in size with number of guests and number of employees used as indicators of restaurant size, it appears as if the larger restaurants have grown, while the smaller ones have remained the same in that period.

3.4 First focus group meeting

The two focus group meetings allowed fishers to describe some of the major issues affecting the fishery, including threats and legislative issues. The question guides in Appendices 4 and 5 were deviated from in some responses where participants had additional information to share. The main points are set out below. Some relate to the survey questions while others cover new areas.

3.4.1 General recommendations for the lobster fishery

Fisheries stakeholders provided a number of recommendations to assist the lobster fishery. The fishers suggested that there is a need for alternative fisheries in terms of different species, gear, techniques and areas since compliance with the closed season would depend on alternatives to the lobster fishery being available. They said that young fishers need to be trained in fishing and in different techniques and be encouraged to expand and develop the industry. The group believed that most fishers recognise the need for change and for introducing measures to protect the resource for the future although it was noted that some are unwilling to change their methods or target species.

Against a background where fishers believe that the government is not serious in its support of the fishers, it was suggested that the fishermen could keep records that would be shared with the CFD so that the government could better appreciate the economic importance of local fish production.

3.4.2 Entry into fishing and alternative income

It was said that fishing is a tradition in the BVI; many people are involved, some of them do it for recreation and enjoyment. Many were introduced to fishing by their parents and grandparents who took them out at a young age and taught them to make their own small "bay-traps" which were set in shallow water by the children who walked to them and brought in their own fish. The traditional methods are trap, net and handline. Recent changes have introduced issues such as the loss of pots due to theft and to increased boat traffic cutting away the marker buoys.

Having more than one trade, being multi-occupational, is a way of life in the territory and some of the group believed that there are no true full-time fishers. Fishers are typically involved in "general occupations", with construction and trading being named as examples. One fisher said that "Fishing is mainly for survival and is not a money-making thing."

3.4.3 Threats to the lobster fishery

The group was concerned by the continuing loss of habitat, such as mangroves being cleared, due to development. They said that education on the environment is lacking. They believe that fishing is considered to be only a small part of the GNP and therefore is not a priority with the government. The industry therefore is underdeveloped.

Other concerns are that the BVI Fishing Complex imports and exports fish, and thus competes in the local market; the export of fish to St. Thomas in the nearby USVI increases the pressure on the resource. They say that the laws do not protect the fishermen from foreign competition in relation to the importation of fish. Also with regard to the BVI Fishing Complex, most fishers use it as a last resort for various reasons. They feel that the complex should pay market price for their catch; there is only one such complex in the territory and it is inconvenient to get there to sell the catch.

It was said that there were "hot spots" for fishing that no longer exist. Previously there was almost certainty as to what type and size fish could be caught at these places within a short time.

3.4.4 Opinions on fisheries regulations

The fishers were not in favour of the timing of the closed season for lobster, and this is their main concern. Some have suggested storing lobster for use during the closed season as a way to avoid loss of earnings. To increase the supply in the future, some have suggested the farming of lobster by community or family groups.

Some believed that spear fishing and SCUBA should not be outlawed. They say that SCUBA fishing is the sole livelihood of 10 to 15 people and that spear fishing for finfish is more selective in that the fisher can choose what fish to shoot. The use of spear guns is not seen as an issue in the lobster fishery because restaurants buy live lobster and speared lobster would be difficult to sell. The group believed that the regulation should increase the sustainability of the resource, but some fishers are not compliant and have not changed; a trait that is seen as part of their culture.

With regard to enforcement, the fishers said the main issue is a lack of protection from foreign fishers and from illegal activities on the sea in remote or isolated areas since the area is known for drug traffic, smuggling and for illegal entry into other countries.

Concerning boat registration and safety gear, the group believed that generally there is an attitude of stubbornness or independence in the fishers. They do not want to be told what to do, and therefore many have not registered their boats. They are also reluctant to carry safety gear since they say they are not going far. For communication they claim that VHF radio is limited in range 18 to 20 miles, so they prefer to use cellular phones.

3.4.5 Relationship with the fisheries authority

With respect to the fishers' view of government, the group revealed that the fishers are suspicious and wary of government, thinking that government is not serious in their support for the fishers. They cite issues such as:

- The price of fish, which they think is too low.
- Importation of fish should be regulated and not allowed to compete in the local market
- The fishermen have been pushed out from mooring sites and are not considered by government.

- Little consultation was done with the "local man" on the changes to the fisheries regulations. The government should not "just pass the law".
- The conch and lobster open and closed seasons could reflect existing fishing patterns, but instead the legal closed season is at the height of the tourist season.

3.4.6 Where fish is sold

Some of the full-time fishers and most part-time fishers prefer to sell all of their fish to the Complex because of the convenience and time saving of making a single sale in bulk versus making single sales on the street. In addition, householders prefer fish already cleaned which is an additional demand on the fisher. The ex-vessel price at the Complex, however, is considered too low and some blame this on external competition. Because of the rate of exchange, between the US dollar and the EC dollar, the Complex can buy fish cheaply in other islands of the Caribbean. The fishers believe the price paid by the complex should be market driven. There is a lack of storage for lobster at the Complex which causes the lobster sales price to be low at times.

3.5 Second focus group meeting

The second focus group meeting, at the Virgin Gorda Fishermen's Cooperative, was aimed at answering questions related to the attitudes and perceptions of the fishers towards the resource and towards management issues. During the meeting, questions that were originally part of the fishers survey were posed to the group and responses noted.

3.5.1 Number of fishers

An attempt was made to estimate the number of lobster fishers in the BVI. Table 3.3 shows the estimates by area. It was stated that some divers operate in groups of about 3 where one of them uses SCUBA. The total here is 40 divers and 26 pot fishers, but the list was not thought to be complete.

Table 3.3: Estimated number of fishers in the territory

Area	Pot fishers	Divers
Anegada		20
Virgin Gorda	6	2 groups
Tortola - East End	5	
Tortola - Road Town	5	1 group
Tortola - West End	4	3 groups
Jost Van Dyke	6	
Cooper Island		2
Total	26	40

3.5.2 Where fish is sold

Fish is sold to various outlets. Many fishers in the group go to the Complex in Tortola. This maintains a relationship with the complex so they can buy supplies and fuel. Locally they sell to supermarkets and the general public. Lobster is sold mainly to restaurants because of demand, better price and quick payment. The price for lobster at the Complex is fixed but prices vary on the open market. The Complex does not pay immediately and cheques have to be processed. The fishers have various levels of dependence on the lobster fishery for income.

3.5.3 Gear, threats and abundance

Most of the fishers use all types of gear besides pots such as set-lines for snapper and grouper, handline, seine and gill nets, trolling and diving. The main threats seen are from pollution such

as sewage from charter boats, oil slicks and suntan oil on the water as well as a lack of patrol by the CFD. The presence of sharks is also seen as a threat. They believe the abundance of lobster has not changed over the last 5 years, and that lobsters move in a cycle so that they are in different areas at different times. Potential problems for the resource include trawlers from St Martin operating in BVI waters, coral bleaching and traps being poached.

3.5.4 Registration and relationship with the fisheries authority

All of the boats belonging to members of the Co-op are registered as well as some not in the Co-op. According to the records of the co-operative, there are a total of 41 boats listed for Virgin Gorda; 36 have coastal craft licence and 27 have a fishing licence. The Officers and the fishers on Virgin Gorda are building a relationship, but some fishers feel that the CFD is not as tough on Tortola fishermen as on those from Virgin Gorda.

3.5.5 Opinions on fisheries management

The fishers on Virgin Gorda need facilities for handling their catch, they say a landing site with facilities would allow the Co-op to buy all the lobster and sell to the restaurants so they can keep check on compliance with regulations. They have to use the yacht harbour and costs are increasing.

With respect to closed areas, they said that some fishers still set traps in protected areas, and they suggested that those areas should be closed only temporarily, for spawning, etc. The group believes that fishermen should comply with the regulation on not taking berried lobster and some suggested a nursery for holding berried lobster until the eggs are released since others may take them from pots and strip them if they are left in the pots when they are re-set. The statement suggests that stripping or scrubbing of berried lobster is practiced but the matter was not pursued.

With respect to the closed season, most thought it is at the wrong time and that August to October is a better time. They said that lobsters have eggs throughout the year. Some members of the group thought that fishing is not intensive enough to warrant closure of the lobster fishery. In the closed season some fishers do not have other ways of earning income, and cannot get by on a paycheck alone, so will need the additional income from the lobster fishery. Islanders are an industrious people, and find work where they can. Most have other occupations and are fishing "half and half". Some can depend on other jobs and on other fishing such as set line and bottom long line. Net fishing, for example can bring in a lot of money but is seasonal. Some members of the group agreed on the need for a closed season and said most fishers expect some impact on their livelihood from it. They were not optimistic about the effectiveness of the other regulations.

The group was not in favour of some of the regulations restricting fishing gear. They agreed on the prohibition of spear guns for taking lobster, but thought that spear guns were more selective for fish and should be regulated rather than banned. They suggested licensing their use and emphasised that they must be handled carefully around other people and inshore. The group suggested that responsible fishers should have exemptions from that regulation through the CFD, on recommendation from the Co-operative and be allowed to use spear guns. The group also suggested that SCUBA divers can fish responsibly, stating that when lobster are released from traps they may not get back to safety but are safer when released by a diver. They do not expect that the regulation prohibiting taking moulting lobster will have much effect, and say that undersized lobster are left in the pots as they are re-set and remain trapped.

When asked about their opinions on enforcement of regulations the respondents said that it seemed the laws are only enforced on Virgin Gorda fishers. They claimed that many boats in the territory are not marked. They stated there is need for surveillance since the hauling of other people's traps is a big problem. In their view, the use of the biodegradable panel would require surveillance. The use of a panel or funnel made of finer gauge wire that degrades was suggested but some fishers would be reluctant to use a softer material because it may allow sharks to damage the pot.

As with the fishers on Tortola, they got into fishing through introduction by their parents. They started by soaking traps (traps with wooden sticks were weighted and put to soak in shallow water to make them less buoyant). On the question of who should manage fishing with respect to determining rules on who can fish and when, they said the Co-operative should be developed to the point where it can take over part of management. They suggested a system in which the established fishers have a say in who is allowed to enter the fishery.

4 DISCUSSION

Guided by the research objectives, this final chapter interprets the preceding results and provides some conclusions and recommendations based on the findings. The research objectives were to:

- Determine the economics of the lobster fishery in respect of expenditure and revenue
- Describe the social importance of the fishery to several categories of stakeholders
- Update and expand a previous economic survey to specifically include lobster
- Establish or strengthen linkages among stakeholders for research on the lobster fishery through the use of participatory research methods
- Recommend a system of socio-economic monitoring for the lobster fishery.

Because of the very close functional relationship between the social and economic aspects of the lobster fishery it is appropriate to combine the first three objectives as 'socio-economic' to discuss them and their interplay. Discussed next are observations on stakeholder involvement in participatory research and recommendations for socio-economic monitoring of the fishery.

4.1 Socio-economic importance of the lobster fishery

This research updated and expanded a previous economic survey (Pomeroy, 1999) to specifically include lobster and provide current data on costs and earnings. It employed socio-economic methods of investigation (Bunce et al., 2000; Bunce and Pomeroy, 2003) to provide social data. The results are discussed in relation to fishers and restaurateurs (the main groups studied), and then other stakeholders including the fisheries authority and visitors.

4.1.1 Fishers

The lobster fishery is of great social and economic importance to the fishers. It is the main source of income for a large proportion of them. Most fishers have made a significant investment in the industry through ownership of their boats and gear. They sell primarily to the restaurant sector of the tourism and hospitality industry, a major engine of the small economy, which depends on them for their source of lobster. The following paragraphs provide details.

There were no respondents under the age of 30 involved in fishing lobster. A reason may be that young people do not own fishing vessels. Fishers say that younger men are now involved in construction and other jobs "on the land" and are not involved in fishing. Unless people switch to lobster fishing after accumulating capital from other work it is possible that future demographics

will show an aging set of lobster fishers and effort may decline through attrition. A counter to this trend may be influxes of “non-belongers” who maintain or increase the fisher population.

The majority of fishers began targeting lobster some 40 to 45 years ago. That would have been in the early 1960s at about the time when tourism was being developed in the BVI. Lobster fishing would have become a lucrative industry and fishers began to target lobster more so than fish. If tourism remains the market force behind lobster harvest, more so than consumption by the local population or for export, then catch and effort may vary with the fortunes of the tourism industry.

A large proportion of the respondents had no other source of income and therefore depended on fishing as their sole livelihood. Most respondents targeted both fish and lobster. According to the results, 61.5% of respondents reported making over 75% of their personal income from fishing while 15.4 % made between one half to three quarters of their income that way. Because the results further indicate that about 30% of respondents were related to the primary fisher, a loss of income from fishing would involve more than one family member and reduce the likelihood that one can assist the other financially at that time. This further emphasizes that fishing is an important part of the tradition and culture of the BVI upon which entire households and families depend for major or supplementary income. Future analyses should be done at the household level in addition to considering the fishing enterprise itself.

A boat owner, not in the survey, and not fishing commercially, gave the impression that owning a boat in the BVI allows increased physical mobility both in the BVI and the neighbouring USVI. There may be social and economic benefits to owning or operating any boat. Since few of the vessels are highly specialised in design or outfitting, there is a risk that some of this ‘malleable’ fleet may be directed to lobster fishing unless the licensing of fishers and boats is more vigorously enforced and the authorities are able to implement restricted licensing or limited entry along with output or technical controls on harvest.

Calculations based on the percentage of part-time and full-time crew of primary fishers gave an estimated total of about 115 lobster fishers with 91 being involved full-time either as primary fisher/boat owner or full-time crew, and 24 assisting on a part-time basis. However, there appears to be many undocumented fishers, including “non-belongers” and part-timers who may enter and exit the fishery without being monitored.

Even allowing for errors in estimation, there is a substantial number of people who can be affected by a closed season or other regulations, bearing in mind that, coupled with the tourism slow season, it would in effect be a further reduction in the time that money can be made from the fishery. Most of the fishers interviewed were also primary earners in their households which meant their families would also be adversely affected, as previously stated.

Most fishers interviewed owned their fishing gear and the main lobster gear used is the fish pot (lobster traps). Only two respondents interviewed use diving to harvest lobster, while some use diving as their secondary means for catching lobster. This is in agreement with literature which states that fish pots and diving are the main methods for fishing for lobster (Development Planning Unit, 1997). For long term monitoring, large variations in trip length and the numbers of traps hauled per trip would limit the usefulness of a ‘trip’ for estimating effort. Catch per trap may be useful if information on trap sizes and designs is obtained and standardised in catch per unit effort statistics. No adequate time series of lobster catch or effort statistics is currently available.

Based on prices from one of the marine suppliers on Tortola, the required boat safety equipment costs on average US\$1,700. Equipment is also bought from nearby St. Thomas in the USVI and may cost less. The annual maintenance costs given include some major repairs undertaken recently and therefore cannot be taken as recurring every year. Over 38% of respondents have boats valued under \$25,000, and another 31% were valued between \$25,000 and \$49,000. This can be considered a substantial capital investment in fishing.

Lobster is generally sold directly to restaurants by the fishers rather than to the BVI Fishing Complex, because the complex buys at a price many fishers consider to be too low. However during the slow season, lobster purchases by restaurants decrease and some fishers either stop fishing or sell to the Complex, sometimes at a further reduced price. The BVI Fishing Complex is therefore more of an income safety net for fishers than a prime buyer in the marketplace. It is also an easy option for fishers who want the least involvement in marketing their catch. Fisheries authorities need to consider the several socio-economic functions of the Complex in the fishery.

Most of the respondents were aware of the months when lobsters are berried (carrying eggs). However, the majority were unsure about the timing of other biological phenomena such as tarspots, moulting or a difference in proportion of male to female animals. This could be because this information is not used by the fisher for harvest and therefore of no real interest, or that there is no discernable seasonality for some of these phenomena. Comparison of the times at which various biological differences are noted suggest that spawning occurs between June and September although it may start as early as April. A study of the reproductive cycle, showing the sequence and times spent at each phase would be needed to determine if the results are conflicting or can lead to some conclusion as to the actual spawning season of the lobster in the BVI waters. Furthermore, because of the long planktonic phase, it is necessary also to consider the spawning seasons determined for lobster in neighbouring areas and recruitment from these areas. This is important especially for establishing the appropriate time for the closed season. Lobsters are typically protected during their spawning season to give them a chance to reproduce and maintain the stock, but socio-economic arguments can also influence the timing of closure.

Respondents believed that the abundance of fish and lobster has declined and indicated that the number of fishers may have remained the same over the past five years, although some respondents said that many fishers have gone to work “on the land” mostly in construction. Most also believe that there is an increase in demand for lobster which is supported by information from other sources. This combination suggests that the lobster stock may be decreasing. Loss of habitat for juvenile lobster is also a problem which needs to be addressed since that, coupled with increased fishing pressure fuelled by the increasing demand of the tourist industry could seriously stress the resource. Unfortunately, adequate long term records of catches are not available to provide support for changes in stock levels. It has been stated that the BV Islanders tend to keep certain information secret and this has apparently hampered data collection.

Most respondents agreed that there should be a closed season for the lobster fishery. They said that it should fall within the period from June or July to October. However, according to the Caribbean Fishery Management Council (2004) the greatest spawning of lobsters in the area occurs from February to August.

4.1.2 Restaurants

For restaurants, lobsters are one of the main delicacies on their menus. Some of the local/smaller restaurants on Jost Van Dyke have a lobster feast during the August festival. This provides extra

business at a time of the year when business is slow. Restaurants depend on local lobster and the fishers who harvest them, as explained below.

This survey has also contributed to understanding the socio-economic importance of the lobster fishery to the restaurants. Caribbean spiny lobster is among the delicacies marketed to tourists at many restaurants in the islands, and appears to be a major drawing card in many cases. Some restaurants have special lobster promotions both for tourists and for returning BV Islanders. On the outer islands such as Jost Van Dyke and Anegada where lobster dinner is one of the main attractions, the effect of the closed season would be felt by the restaurant owner and employees as well as their dependents, especially in some cases where the restaurant and boat are both family owned and operated. Without suitable alternatives for maintaining the operations of both boat and restaurant, the unavailability of lobster could have a serious effect on those families.

Lobster purchases by the restaurants indicate that the highest demand for lobster runs from November into June (purchases drop below half of the peak by July). This is a longer season than indicated by the Manager of the Fisheries Complex who gave November to the end of March as the peak demand and early to mid August through September as the slow season. Data on tourist arrivals for the period 1996 to 2002 correspond with the pattern of data collected from the restaurants survey and indicate that the peak for tourist arrivals is during March while the slow months are from August to October.

The visits of Puerto Rican yachters on US public holidays also overlap these seasons, with major holidays falling at some of the stated peak times for tourism. Easter falls between March and April, and Thanksgiving is in November. Further evidence for seasonality could have been obtained from prices paid to the fishers for lobster but even though some restaurant managers said the price they paid for lobster changes through the year, they gave no prices to support this. The majority, however, said the price paid was constant. Since the peak for tourist's arrivals overlaps with the lobster closed season, from March to June, this could put the restaurant owners at a disadvantage in terms of lobster purchases.

Although not dealt with in the survey, the presence of the ciguatera in some reef fish species could affect the availability of species and areas available for alternate fishing and inclusion on the menu. Some finfish fisheries target species that carry the toxin and therefore this limits alternatives to the lobster fishery.

One restaurant owner on Jost Van Dyke said that changes in customs procedures had stopped lunchtime visitors from St. Thomas in the USVI from coming over by boat. They used to do a popover for lobster lunch. That implies such may not be readily available in St. Thomas and that is probably due to price since there are claims that BVI fishers sell lobster to St. Thomas. If the closed season is to be maintained, then alternatives would have to be found for the restaurants. This would depend on what species are available that may offer some unique attraction especially to those tourists coming from the neighbouring US islands

4.1.3 Others

Generally the local citizens do not eat a lot of lobster. However the fishermen report taking home some for personal consumption. Returning nationals are also known for consuming lobster during the August festival. The closure of the fishery will have minimal impact upon local food consumption patterns, but a potentially large impact on visitor consumption of lobster (and local income from it) depending on the timing of closure.

The Fisheries Act and regulations were meant to address concerns of over-exploitation in the trap and possibly lobster fisheries by instituting the closed season and other restrictions on harvesting lobster. The requirement for biodegradable escape panels is also aimed to this end, and conversations with fishers indicate that they too are concerned about ghost fishing of abandoned pots. Some fishers interviewed say that others abandon pots for months and go to work "on land", they are reluctant to bring the pots ashore because they are difficult to transport and they rust when removed from the water. One fisher with experience in the USVI stated that fishers in the USVI wire the escape panels shut after the fisheries department inspection. Indicating that education, enforcement and adequate surveillance will be a necessity.

The results of this research strongly suggest that the fisherfolk and fishery authority were correct in their concern over the potentially negative socio-economic impacts of the lobster closed season. It appears that the fisheries authority has limited capacity to manage the lobster fishery given its geographic dispersion and the number of undocumented persons who harvest lobster. In the next section I discuss how linkages among stakeholders play a part in participatory research.

4.2 Linkages among stakeholders for participatory research

During the survey, two associations showed a great deal of interest in the research. The president of the Virgin Gorda Fishermen's Co-operative arranged the focus group meeting on that island and both he and the president of the Jost van Dyke fisherfolk association were helpful in providing background information on the fishery and stakeholders. They both assisted in getting the fisherfolk to participate in the survey despite the general reluctance the fishers had expressed.

The fishers' reluctance to share information needs to be addressed in order for the type of data needed for proper understanding and assessment of the resource and the users to be obtained. To do this, the reason for this reluctance must be addressed. The fishers themselves asked if the information sharing would lead to taxation, and the focus group revealed that people like to keep their business private. The CFD management needs therefore to determine if taxation is really likely and then how best to allay their fear if it is not. They also need to assure the fishers that any sensitive information shared will be kept confidential and will not be shared with other government departments or revealed to other people if indeed they are certain of such privacy.

There is a high level of trust displayed between individual officers and members of the fishing community. This needs to be strengthened and extended to the entire department so that fishers can be assured that the department is working in their immediate interest (development) as well as in the interest of the resource and future generations (conservation). This should encourage the sharing of the fishers catch and effort data with the CFD so that the lobster resource can be properly assessed. In turn, information on the status of the resource can be passed on to the fishers as feedback, and allow both fishers and the CFD to make informed decisions with which the fishers are willing to comply and the authority is willing to enforce.

Other values of the relationship between the CFD and the fishers would be passing on information related to enforcement, where the fishers can feel secure in informing the CFD of problems related to the resource. Because of the decentralisation of the region a greater level of participation is needed from the fishers in terms of passing on real-time enforcement-related information to the authorities. Ultimately, a system of community wardens who may participate in both research and enforcement aspects of management could be experimented with.

Participation by stakeholders is critical to the sustainable use of a resource. This can allow for a move towards collaborative co-management in which both resource users and government agencies such as the CFD can work together on management issues by sharing decision-making responsibility and the authority for taking action. However, a starting point could be consultative co-management. Such an approach is already being called for by the fishers since they have expressed the view that government should have presented the issues to the stakeholders and consulted with them before instituting the regulations. Most of the fishers surveyed believe that both fishers and government should manage the fishery.

As non-government organizations, fisherfolk associations are essential to produce the type of teamwork necessary for co-management, but the associations need to be developed to the point where they have strong internal cohesion and their outlook is more towards management of a resource than towards exploitation (McConney et al., 2003). The associations need to build membership so that they are certain to express the views or interests of most of the fishers or stakeholders they represent and also to be sure that important information is passed to enough of the fishers. The CFD is assisting in the development of the fisherfolk associations which are relatively new.

Another benefit for the fishers in joining fisherfolk organisations is that they would become accustomed to speaking and to being heard and build confidence to get over any real or perceived attitude that government does not listen. The issues of adequate representation and decentralisation have to be addressed if participatory research and management is to be promoted in the BVI.

The CFD is already involved in educational outreach programmes which are essential to educate the public, especially the fishers, on the importance of working together to protect the resource and their livelihood. Such programmes should raise awareness of environmental issues including fisheries, and further strengthen beneficial linkages.

4.3 Socio-economic monitoring for the lobster fishery

The socio-economic information required for long term monitoring would be used to determine the status of the resource and how any management measures are affecting the stakeholders. If it is determined that the present closed season is the best for conservation of the lobster, then the effects on the stakeholders need to be constantly monitored while mitigating measures are being tried. This is the essence of adaptive management, the intended outcome of socio-economic monitoring and use of the resulting information for improving decision-making.

A fuller picture of the fishers' household would be necessary for such a process. The number of members in the household and some idea of the extent of their dependence on the fishery or to what extent they can assist in household finances would be needed. This part of the survey should be extended to the crew as well since they may have different economic status.

Continued monitoring of the economics of the fishery would also be necessary when the closed season is fully implemented to see what effect it is having. This should be done to provide figures both within and outside the closed season within a year or two after it has come completely into effect.

The survey of the restaurants would have to be repeated at a time when the management of more restaurants is available to participate. Data should be collected for an entire year to capture the consequences of and reasons for changes in lobster supply and demand. If lobster is being

exported, this should also be investigated especially if the catch goes directly to another jurisdiction and is not recorded in any current or proposed BVI statistical system. Collecting price data by mapping the entire marketing chain for all marketing channels is very important. It will facilitate an assessment of the value of the fishery that may improve GDP estimations and hence the relative importance of the lobster fishery in policy and management.

For continued and upgraded socio-economic monitoring of the lobster fishery, the CFD needs to know the fishers involved and to have them willing to participate in surveys. As it is, it appears as though the CFD officers know the captains and boat owners fairly well but the crew may not be as well known. If the CFD deals only with the boat owner or captain, then it would be necessary to ensure that records of numbers of crew are also developed.

The fishers need to be educated in the value of record keeping by means of the fishers log books as suggested by the Chief Conservation and Fisheries Officer. Although the immediate effect would appear to be to the benefit of the CFD, it would show the full importance of the lobster fishery to government but would also allow proper management which depends on a quality time series of data to show trends in catch and effort and therefore benefit fishers in the long term.

Regarding methodology, the SocMon Caribbean method adapted for this research is suitable. The variables to be monitored (Bunce and Pomeroy, 2003) should be selected by a multi-stakeholder group with a clear sense of the purpose of monitoring, access to data and the decision-making process using the collected information. Non-survey methods of data visualisation can be used to plot changes in the fisheries (Bunce et al., 2000). This will assist in avoiding the respondent fatigue typical of areas frequently surveyed. Selecting a group for a long term study to which they are committed from the outset may also be advisable. Beyond these measures, the fisheries data collection system needs to be improved, perhaps as a harmonised process under the Caribbean Regional Fisheries Mechanism (CRFM). The BVI may also wish to keep in touch with the work of the spiny lobster working group established under WECAFC.

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6 APPENDICES

Appendix 1: Fisher's questionnaires

Section A

1. Respondent age _____.
2. Sex of respondent (*observed*) Male _____, Female _____.
3. In which area do you live? _____.
4. Are you a believer? Y __, N __, N/R ____
5. If not, what is your citizenship? _____.

6. How long have you been fishing? _____.
7. How long have you been fishing lobster? _____.
8. What is your mooring site _____.
9. What landing sites do you normally use?

_____.

10. Boat

- a) type _____ length _____ feet
- b) engine type: Outboard, Inboard, O/I _____ HP _____
11. What is the current value of the boat and engine? _____, N/R ____.

12. Are you the
Boat owner Y __, N __ Captain? Y __, N __ Crew? Y __, N __, N/R ____.
13. a) Do you normally fish on other boats Y _____, N _____
If yes.
b) How many other boats do you fish on _____

For boat owner/captain. –

14. How many Crew members do you have:

Full time. _____, Part time. _____.

Are any of them related to you?

1. Full time _____, Part time _____, Relationship _____,

2. Full time _____, Part time _____, Relationship _____,

3. Full time _____, Part time _____, Relationship _____,

4. Full time _____, Part time _____, Relationship _____,

15. a) Is there a sharing system for the catch or money? Y ____, N ____, D/K _____

b) How is the catch or money shared?

Owner _____%, Captain _____%, Crew, _____%, Boat _____%,

Engine _____%, Gear _____%, Other _____%, D/K _____

16. How much of your income do you make from fishing?

_____% OR 3/4 ____, 1/2 ____, 1/4 ____.

17. With the exception of fishing, what are your other sources of personal income in order of importance/value?

1 being most important

Farming _____,

Other _____

Business _____,

Office work _____,

Construction _____,

Investment _____,

Household Income

18. Are you the main provider for the household? Y___, N___, NR___

19. Who are the members of your household?

	<i>H1</i>	<i>H2</i>	<i>H3</i>	<i>H4</i>	<i>H5</i>	<i>H6</i>
	Household Members (by role)	Age	Gender	Education level completed if over 16 in age	Primary occupation	Secondary occupation
1						
2						
3						
4						
5						
6						
7						
8						

Wife, Son, etc

Fishing season.

20. What species do you set out to catch?

Lobster___, Fish___, Both___, Any other (name)_____.

21. How do you fish in terms of species and gear throughout the year?

Target species	J	F	M	A	M	J	J	A	S	O	N	D
1.												
Fishing gear(s)						Area(s)						
2.												
Fishing gear(s)						Area(s)						
3.												
Fishing gear(s)						Area(s)						
4.												
Fishing gear(s)						Area(s)						

(use the map, write the grid numbers in the table)

22. Is there a specific time in the year when lobsters are berried / have eggs

Y___, N___, D/K_____.

When is that _____

23. Is there a specific time in the year when lobsters have tar spots

Y___, N___, D/K_____.

When _____

24. Is there a specific time in the year when lobsters moult Y___, N___, D/K_____

(shell light in colour and soft)

When _____

25. Is there a specific time in the year when there are more **male than female** or more **female than male** lobsters Y___, N___, D/K_____.

More **Male**.

J	F	M	A	M	J	J	A	S	O	N	D

More **Female**

J	F	M	A	M	J	J	A	S	O	N	D

(females have an extra claw on last leg- closest to tail - and may have eggs or tar spot,)

Section B

26. Do you own fishing gear?

27. How much gear do you use or own

- Fish pots:** Number _____, Value _____, Lifespan _____, _____
- Lobster pots:** Number _____, Value _____, Lifespan _____, _____
- Hook and line** Number _____, Value _____, Lifespan _____, _____
- Trolling rods** Number _____, Value _____, Lifespan _____, _____
- Vertical long lines** Number _____, Value _____, Lifespan _____, _____
- Horizontal long lines** Number _____, Value _____, Lifespan _____, _____
- Gill net** Number _____, Value _____, Lifespan _____, _____
- Beach seine** Number _____, Value _____, Lifespan _____, _____
- Other** _____, Number _____, Value _____, Lifespan _____, _____

28. Do you dive while fishing? Y ____, N ____, N/R

29. Do you use SCUBA while fishing? Y ____, N ____, N/R

During an average week this season:

30. Number of trips made _____,

31. Number of crew _____,

32. Average total length of trip (*time spent out from shore*) _____ hours,

33. Average time spent using gear _____ hours,

(*using fishing gear: hauling pots or setting and hauling nets or lines, or time spent diving*)

34. Fishing effort:

Number of traps hauled _____.

Number of dives _____

35. Average total catch per trip _____ (lbs)

Fish Species _____ Weight _____ Price per pound \$ _____

Species _____ Weight _____ Price per pound \$ _____

Species _____ Weight _____ Price per pound \$ _____

Lobster Weight _____ Price per pound \$ _____

Other (*Conch, Whelk, any other?*)

Species _____ Weight _____ Price per pound _____

Species _____ Weight _____ Price per pound _____

36. In general, what percentage/proportion of the catch is sold

Fish _____% Lobster _____% Other _____%

37. Who do you sell the catch to

	Fish	Lobster	Other
BVI Fishing Complex			
General public			
Hotel / Restaurant			
Fish Buyer			
Other			

38. What is your reason for choosing this market outlet

Price ____ .Nearness ____ .Have always done it this way ____ Other _____.

39. Average total value per trip \$ _____

40. Average operating cost per trip (*quantities can be substituted*)

Gas \$ _____,

Oil \$ _____,

Engine oil \$ _____,

Ice \$ _____,

Bait \$ _____,

Food \$ _____,

Other (name) _____, \$ _____,

41. On average, how many traps do you lose in a year outside of hurricane damage? _____.

INVESTMENT IN ELECTRONIC EQUIPMENT

42. If you own or use any of the following, what is it's age and value

Equipment	Age	Cost
Fish finder		
GPS		
Depth Sounder		
Other navigation equipment		
VHF Radio		

LICENCES

Do you have the following licences?

FISHING LICENCE Y___, N___, N/R

COASTAL CRAFT LICENCE Y___, N___, N/R

SAFETY EQUIPMENT

43. If you have the following safety gear on board, what is the age and value?

Equipment	Number	Age	Value
Life jackets			
Life rings			
Flares			
Fire extinguisher			
Sound signalling device			
Anchor			
Bilge pump			
Other safety equipment			

MAINTENANCE

44. How often does the boat need repairs _____

45. What is the estimated cost of repair or maintenance each year \$ _____

46. Is the boat or gear insured? Y___, N___, N/R

47. What is the annual cost of insurance for the boat? \$ _____

48. What is the annual cost of insurance for the gear? \$ _____

49. Do you have a loan on the boat.or gear? Y___, N___, N/R

50. What is the amount of the loan?

Appendix 2: Attitudes and Perceptions Regarding Resources and Management
Attitudes and Perceptions Regarding Resources and Management

1. Are you aware of the rules and regulations related to lobster fishing
Y___, N___, N/R___.

2. On a scale of 1 to 5 (1=no compliance, 5=full compliance), to what extent do people comply with fisheries rules and regulations for lobster?
_____ DK___, NR___

3. On a scale of 1 to 5 (1=no enforcement, 5=full enforcement), to what extent are the rules and regulations for lobster enforced? _____

4. Have you noticed a change in abundance of fish or lobster
 - a). between 2000 and 2005 Y___, N___. Increase___, Decrease___
 - b). between 1995 and 2000 Y___, N___ Increase___, Decrease___

5. Have you noticed a change in the number of fishers
 - a). between 2000 and 2005 Y___, N___. Increase___, Decrease___
 - b). between 1995 and 2000 Y___, N___ Increase___, Decrease___

6. Has the demand for lobster changed in the last 5 years? (quantity required)
No change _____, Increasing _____, Decreasing_____.

7. Has the price paid for lobster changed in the last 5 years?
No change _____, Increasing _____, Decreasing_____

9. Do you agree or disagree with having a lobster closed- season.

Agree____, Disagree____, DK____ NR

(closed season is March through June)

If they agree with a closed season,

10. In your opinion, in which months should lobsters not be harvested?

J	F	M	A	M	J	J	A	S	O	N	D

11. Do you agree or disagree with the minimum size restrictions.

Agree____, Disagree____, DK____ NR

(minimum length 3.5 inches; minimum tail weight of 12 ounces [Fisheries Regulations 21.3.b])

12. Do you agree or disagree with the restrictions on gear that can be used.

Agree____, Disagree____,DK____ NR _____.

***(No person may spear, hook or otherwise impale a lobster. – [Fisheries Regulations 21.2.b]
No person may use spear-gun or SCUBA diving equipment for fishing. – [Fisheries Act 50.1] -
)***

13. Do you agree or disagree with the restrictions on taking lobsters with eggs.

Agree____, Disagree____, DK____ NR _____.

14. Do you agree or disagree with the restrictions on taking lobsters that are moulting.

Agree____, Disagree____, DK____ NR _____.

(No person shall harm... have in his possession, sell or purchase a lobster that is undersized, carrying eggs or moulting. [Fisheries Regulations 21.1])

15. Should the government, the fishermen or both make decisions on managing the fisheries

Government only____, Fishers only _____ Both,_____.

16. Have you been affected by the fisheries regulations on lobster (*for example closed season minimum size, fishing method, prohibition from taking berried lobster*)

Y _____, N _____ . DK _____ NR _____ .

17. If not, do you think you will be affected by these regulations?

Y _____, N _____ . NR _____ .

(if yes to either of the 2 questions above)

18. In what way have you been affected or do you think you will be affected by these regulations?

19. Were you aware of any consultation meetings before the regulations were established?

Yes _____, No _____ .

20. What do you think are the major threats to the lobster fishery?

1. _____,
2. _____,
3. _____,
4. _____,
5. _____,

21. Are you a member of a fisherfolk or similar organisation? Y____, N____ .

22. If so, which one? _____.

Appendix 3: Restaurant questionnaire

RESTAURANT QUESTIONNAIRE

Date day _____ / month _____ / year _____

Restaurant name _____

Respondent's name _____

What year was the restaurant opened? _____.

How many people are employed?

	Male	Female	Or give total number
Full time			
Part time			
Seasonal			

Has the restaurant changed in size over the past 5 years?

Grown bigger, [] Grown smaller, [] Remained the same, []

Is there an "off season" when the restaurant is closed? Yes [] No []

When is that? _____.

What are the peak months for business?

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec

If available, what is the average number of guests per week during the “peak” months? _____

What is the average number of guests per week during the other “off-peak” months? _____

What amount of lobster do you buy monthly?

Jan _____

Jul _____

Feb _____

Aug _____

Mar _____

Sept _____

Apr _____

Oct _____

May _____

Nov _____

Jun _____

Dec _____

Where do you buy the lobster and in what proportions?

BVI fishermen _____

Supplier _____

Import _____

Other (name) _____

Does the cost of lobster you buy change during the year? Yes [] No []

What is the purchase price of lobster per pound?

Jan \$ _____

Jul \$ _____

Feb \$ _____

Aug \$ _____

Mar \$ _____

Sept \$ _____

Apr \$ _____

Oct \$ _____

May \$ _____

Nov \$ _____

Jun \$ _____

Dec \$ _____

Appendix 4: First Focus group meeting

How did individuals get into fishing?

What other skills or sources of income do fishers have?

What is the opinion on the various lobster regulations?

- Returning lobster with eggs

- Returning moulting lobster

- The limitation on the size of lobster that can be caught.

- The existence of the closed season

- The use of the biodegradable panel

- The limitation on gear that can be used.

- No SCUBA allowed

- No spearing, hooking or impaling of lobsters

What are the potential effects of the rules:

- on the fishers and their families

- on the restaurants

- on the lobster resource

What is the view on the enforcement of regulations

What is the nature of the relationship with the Conservation and Fisheries Department and with the fisheries officers?

Appendix 5: Second Focus group meeting

What is the estimated number of boats and/or fishers?

Where is the catch sold?

What is the reason for that?

What are the different types of fishing and how many people are involved?

What are the major threats to the lobster fishery?

Have you noticed a change in the abundance of fish over the last 5 years?

Have you noticed a change in the abundance of lobster over the last 5 years?

How is the price of lobster determined?

What is the nature of the relationship with the Conservation and Fisheries Department and with the fisheries officers?

How many boats are registered and what is the reason they are not all registered?

What is the position with safety gear?

Is seaworthiness a concern?

To what extent do fishers depend on the lobster for income?

What is the opinion on the various lobster regulations?

- Returning lobster with eggs
- Returning moulting lobster
- The limitation on the size of lobster that can be caught.
- The existence of the closed season
- The use of the biodegradable panel

The limitation on gear that can be used.

- No SCUBA allowed
- No spearing, hooking or impaling of lobsters

Opinions on enforcement of regulations

Opinions on what should be the closed season based on their knowledge and why

What other sources of income exist especially in the closed season?

What happens in the tourist "off season" re income?

Who should manage fishing with respect to determining rules determining who can fish and when ?

What are the potential effects of the rules:

- on the fishers and their families
- on the restaurants
- on the lobster

How did individuals get into fishing?

What other skills or sources of income do you have?

Appendix 6: Cost of safety equipment

ITEM	SPECIFICATION COMMENTS	QUANTITY	UNIT PRICE
Personal Flotation devices	one for each person on board: type I type II	3 + number of crew	\$99.00 \$24.95
Life buoys (Throw ring) most vessels use 24" ring	For vessels over 16 ft (4.88m) - Most carry 24"	1	\$69.95
Visual distress signal (flares)	Kit with both day and night flares	1	\$104.95
Fire extinguisher	Type II		\$37.95 \$21.95 \$27.95
Sound signalling device horn			\$16 00 \$19.00
Navigation lights	Bow Stern		\$99.95 \$25.15
V.H.F. Radio			\$149.00 \$295.00
Anchor	#8 anchor: Vessels 16 to 24 ft #18 anchor: Vessels 31 to 34 ft	1 1	\$34.95 \$49.95
	Grappling hook (locally made, similar to a creeper hook)	1	
Anchor rope	¾" dia	80 to 150ft (25 to 50m)	\$1.15/ft
bilge pump hand held or electrical		1	\$120
Compass		1	\$130
Docking lines	¾" dia	60 – 100ft (20 to 30m)	\$1.15/ft
Waterproof flashlight		1	\$20
Fenders		3	\$60 \$90
First aid kit		1	\$30

Based on prices above, from one of the marine suppliers on Tortola, required safety equipment costs an average of \$1,700.00. Equipment is also bought from St.Thomas and may therefore cost significantly less although the amount has not been checked.

Appendix 7: Questionnaire on background information from Fishing Complex

Fishers

How many fishers sell lobster to the fishing complex

What is the yearly trend

What price

Buyers

Who buys

General public

Restaurants/hotels

What price

Restaurants and hotels

Do restaurants and hotels buy lobster from the complex

How much

When

What are their other sources

Imports

Is lobster imported

How much

When

By whom

From where

What price

Exports

Is lobster exported

How much

When

By whom

Where

What price

Local consumption

What is the consumption of lobster by BVI local population (general public)

Do they buy a significant amount of lobster

Is it seasonal

Visiting nationals living overseas

Do visiting nationals buy a lot of lobster?

Is there an increase in lobster sales or demand during the festival

Yachting community

Does the yachting community buy lobster

How much

When

Who do they buy it from

Puerto Rican yachting community

Do the Puerto Ricans buy a lot of lobster

Where from

When?