Report of the

CFU/FAO FISHERIES STATISTICS AND DATA MANAGEMENT WORKSHOP

University of the West Indies, Cave Hill Campus, Barbados, 10–22 March 2003
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PREPARATION OF THIS REPORT

This is the final version of the report of the CFU/FAO Fisheries Statistics and Data Management Workshop held at the University of the West Indies, Cave Hill Campus, Barbados, from 10 to 22 March 2003. It was approved by the CARICOM Fisheries Unit (CFU) and the Fishery Information, Data and Statistics Unit of the FAO Fisheries Department.

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ABSTRACT

The CARICOM Fisheries Unit (CFU) and the FAO collaborated in providing fisheries data-managers from the CARIFORUM (CARICOM plus the Dominican Republic and the British Dependent Territories of Anguilla, British Virgin Islands and Turks and Caicos Islands and Montserrat), with guidance to improve their collecting, processing, storage and reporting capabilities of information on the status and trends of their marine capture fisheries.

The participants received step-by-step guidance on the methodological and operational concepts contained in the FAO Fisheries Technical Paper No. 425, *Sample-based fishery surveys: A technical handbook* (2002). They were also trained to use a CFU-developed data storage software – CARIFIS – to query, analyse and report on their national fisheries statistics. A proposal to expand the existing data collection systems to capture the social and economic information about the national fisheries sector was presented and discussed.

The discussions that followed the presentations on “Sample-based fishery surveys” identified issues such as multiple fishing gear, migration of fishing units among multiple landing sites and multiple landing by the same fishing units as constraints in previously used national frame surveys. Suggestions for refining CARIFIS and correcting errors/omissions in the software were collected after the practical demonstrations. Similarly, participant observations and suggestions on the proposal to expand existing data collection systems to incorporate social and economic information on the fisheries sector were collected.
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List of Acronyms

ARTFISH – Approaches, Rules and Techniques for Fisheries Statistical Monitoring
BARNUFO – Barbados Union of Fisherfolk Organization
BFC – Bridgetown Fisheries Complex
BVI – British Virgin Islands
CARICOM – Caribbean Community
CARIFIS – Caribbean Fisheries Information System
CARIFORUM – Caribbean Forum of African Caribbean and Pacific (ACP) States
CERMES – Centre for Resource Management and Environmental Studies
CFU – CARICOM Fisheries Unit
CPUE – Catch per Unit Effort
CRFM – Caribbean Regional Fisheries Mechanism
DECR – Department of Environmental and Control Resources
DFMR – Department of Fisheries and Marine Resources
DOF – Department of Fisheries
DPU – Development Planning Unit
EFZ – Exclusive Fishery Zone
FAD – Fish Aggregating Device
FIDI – Fishery Information, Data and Statistics Unit
FRP – Fibre reinforced plastic
GDP – Gross Domestic Product
HP – Horsepower
ICRAFD – Integrated Caribbean Regional Agriculture and Fisheries Development Project
LRS – Licensing and Registration System Database
PROPESCAR-SUR – Proyecto de promoción de la pesca costera artesanal de la región sur

RAU – Resource Assessment Unit

SSFA – Stations of Service of Fisheries Administration

STATIN – Statistical Institute of Jamaica

TAC – Total Allowable Catch

TCI – Turks and Caicos Islands

TIP – Trip Interview Programme

USVI – US Virgin Islands

UWI – University of the West Indies

WECAFC – Western Central Atlantic Fishery Commission
INTRODUCTION

1. During the recent FAO Technical Consultation on Improving Information on Status and Trends of Capture Fisheries (March 2002) the delegates agreed on a “draft strategy” to address the needs for improving fisheries information. The “strategy” was subsequently endorsed by the Twenty-fifth session of the FAO Committee on Fisheries (February 2003) and recommended to the FAO Council for final approval.

2. The strategy listed a number of “required actions” for its implementation. Those actions included the need for capacity building in developing countries and the need for those countries to cooperate through their regional fishery organizations, and where necessary with FAO, to develop and adopt pragmatic and effective systems of data collection.

3. In an effort to enhance the capacity of their member countries in the Caribbean subregion, FAO and the CARICOM (through its Fisheries Unit [CFU]) collaborated in a workshop to improve information and data collection systems in their small-scale multispecies fisheries.

4. The workshop was convened to achieve the following:
   i) Train participants to utilize improved approaches and techniques for conducting sample-based fishery surveys, and analysing the data collected (using modules from the FAO ARTFISH software).
   ii) Train participants to use the CARIFIS database (upgraded TIP/LRS database) as a tool for data storage, querying/analysis and reporting.
   iii) Review and determine the best approaches and prepare national plans for the implementation of the recommendations from the Consultant’s Report: “Expansion of Existing Data Collection Systems to Capture, Store and Manage Social and Economic Data from the Fisheries Sector”.

OPENING CEREMONY

5. The workshop was held in the Computer Centre of the University of the West Indies, Cave Hill Campus, Barbados, at the kind invitation of the Government of Barbados.

6. Twenty-eight participants from Anguilla, Antigua and Barbuda, Barbados, Belize, Commonwealth of the Bahamas, Commonwealth of Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, Montserrat, Saint Christopher and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Turks and Caicos Islands, CARICOM Fisheries Unit (CFU), and FAO attended the Workshop. The List of Participants is given in Appendix A of this Report.

7. At the Opening Ceremony, Mr Stephen Willoughby, Chief Fisheries Officer of Barbados, welcomed the participants on behalf of the Minister of Agriculture and Rural Development and the Government of Barbados. In his opening remarks, he reminded participants of the current efforts to secure the future viability of our marine resources through various environmental mechanisms and focus on sustainable exploitation. In highlighting the importance of fisheries to regional communities, Mr Willoughby noted the importance of fisheries information to the establishment of
a common fisheries regime as was recently mandated by the intersessional meeting of the CARICOM Heads of Government (February, 2003).

8. In his welcoming remarks, Mr Milton Haughton, Scientific Director of the CFU thanked the Government of Barbados, the FAO and the UWI for co-hosting the workshop. He expressed the Unit’s appreciation of the utility of working with governments and other regional and international organizations in trying to address fisheries issues that are common and sometimes overlapping. Mr Haughton advised the participants that the CFU was aware that countries wanted to achieve sustainable management of their marine resources; but he cautioned that much work and information were still needed to understand the systems and to fashion a management model that was more in keeping with the needs of the region.

9. While highlighting the significance of the workshop in strengthening the technical capacity of the Fisheries Departments in order to promote fisheries management and development, Mr Haughton spoke of its significance in institutional and partnership building. He also spoke of the imminent launch of the Caribbean Regional Fisheries Mechanism (CRFM) and its future role in promoting the development of a common fisheries regime for the CARICOM states.

10. Mr Constantine Stamatopoulos, Senior Fisheries Data Officer, FAO, welcomed the participants on behalf of the FAO Director General, Mr Jacques Diouf. He also expressed FAO’s appreciation to the collaborating organizations for facilitating the delivery of a fisheries statistical training package that saw its genesis in an earlier workshop recommendation of the Working Party on Assessment of Marine Fishery Resources of the Western Central Atlantic Fishery Commission (WECAFC), which was held in Jamaica.

11. Ms Hazel Oxenford, Acting Director of the Centre for Resource Management and Environment Studies (CERMES) of the University of the West Indies (UWI), made welcoming remarks to the participants and apologized for the absence of Mr Wayne Hunte, Vice Principal/Director of Graduate Studies of the UWI. She indicated that the UWI was pleased to be facilitating the workshop with tangible support, especially since the workshop was paying attention to improving fisheries data and analysis. She also expressed the willingness of the UWI to work with other regional institutions whenever possible to deliver useful service, not only in fisheries, but also in other areas of national and regional resource management development.

INTRODUCTION OF PARTICIPANTS AND WORKSHOP ARRANGEMENTS

12. Participants and resource persons introduced themselves. The Agenda for the Workshop, consisting of three components: Sample-based Fishery Surveys, CARIFIS and Expansion of Existing Data Collection Systems to Capture, Store and Manage Social and Economic Data from the Fisheries Sector, was approved by participants.

13. The Agenda appears as Appendix B of this report. The Senior Biologist/Resource Assessment Unit Leader, Mr Terrence Phillips, served as chairman/rapporteur for the duration of the workshop.

COUNTRY PRESENTATIONS AND DISCUSSION

14. Country presentations covering the importance of fisheries, description of the fisheries, methods of data collection and data management and procedures for quality control were made by the respective country representatives.
Anguilla

15. The Exclusive Fishery Zone (EFZ) of Anguilla shares a common boundary on the south with the French islands of Saint Martin and Saint Barthelemy, on the west with the British Virgin Islands, on the east with Antigua and Barbuda, and extends a full 200 miles into the Atlantic Ocean to the north. Just over 2000 km² of the EFZ is submerged shelf, which supports the island’s fishing industry. It is estimated that the fishing industry of Anguilla contributes about 2 percent to the Gross Domestic Product (GDP). It is essentially artisanal, with between 250 and 300 fishers operating in the fishery. They utilize about 250 open vessels ranging from 12 to 32 feet, powered by outboard engines, and operating within a radius of 40 miles from the shore. Traditional Antillean fish traps, either “S”, “Z” or arrowhead design, seine nets, hand lines and scuba gear are utilized by the fishers, who target demersal species of finfish and spiny lobsters. Before the early 1990s, it was estimated that about 40 percent of all finfish and 75 percent of all lobster caught by Anguillian fishermen were exported to Saint Martin, Saint Thomas and Puerto Rico, with Saint Martin receiving the bulk of the exports. However, with the growth of the tourist industry on Anguilla, it is now estimated that export figures of fish are below ten percent.

16. At the moment, no data is being collected by the Department of Fisheries and Marine Resources (DFMR). Before the inception of DFMR in 1991, the then Department of Agriculture and Fisheries was responsible for fisheries management. However, this was a difficult task as two staff with one shared vehicle manned the DOF, while at the same time, fishers were marketing their catch directly to Saint Martin. Sampling for catch and effort data was initiated in 1986, but this was carried out opportunistically depending on the availability of transport. Periodic sampling at the DFMR began in 1992, but due to limited staffing and additional workloads (habitat monitoring and marine park duties included), little data was collected. This continued up until around 1996 when fishers became uncooperative with the data collectors because of perceived grievances with the Department and policy makers. The data collected during those times were not stored, computerized, analysed or resulted in any reports. It can be said that data collection, analysis, and reporting are non-existent at DFMR at the moment, but the Department was planning to address the matter this year. The department has an ongoing vessel registration programme, in which owners are required to license new vessels which enter the fishery for the first time for a small fee and then renew their licences annually.

Antigua and Barbuda

17. The islands of Antigua and Barbuda form an archipelagic state in the Lesser Antilles island chain, bordered to the east by the Atlantic Ocean and to the west by the Caribbean Sea, while the uninhabited island Redonda lies to the south west of Antigua. It is estimated that Antigua and Barbuda has a shelf area of approximately 3 568 km². In 2002, the GDP for Antigua and Barbuda was EC$1 546.16 million with fisheries contributing EC$30.9 million. The population of the islands in 1997 was estimated at 69 890, with a labour force of about 30 000, of which approximately 1 200 were employed in the fisheries sector. The fishing industry of Antigua and Barbuda is based almost entirely on the harvesting of demersal or reef species. These resources are probably overexploited and fishers are now recognizing the need for venturing further out to sea in search of offshore banks and targeting migratory species. Fishers operate from 18 landing sites around Antigua and 4 in Barbuda. The main fishing gears are fish traps, hook and line, gillnets, vertical long lines and scuba diving, with trap fishing being most prevalent in Antigua for demersal species and in Barbuda for catching lobster. There has been a steady increase in the number of fishers and fishing vessels registered with the Fisheries Division over the last five years.
18. The general staff of the Fisheries Division does data collection in Antigua and Barbuda. Data collection is done using a random sampling method, at fish landing sites and the public fish market. Most of the data is usually collected outside of normal working hours, beginning as early as 4:00 am and as late as 6:00 or 7:00 pm. Data collectors usually have to compensate for these hours by taking time off during normal working hours which reduces the time available for storing and analysing the data collected. The catch, effort and biological data collected are stored and analysed in Microsoft Excel. Records of fishers and vessel registration are stored in the Licensing and Registration System database (LRS), which is complemented by an Access database. The reason for complementing LRS with Access is because it is much easier to do instant reports on the user-friendly interface. The catch and effort data are used to estimate annual landings, as well as catch per unit of effort for vessels by length class. Data entry is normally done by a member of staff, with quality checks being done by the data analyst.

19. The coastal shelf area around Barbados is estimated at 320 km² to the 180m depth-contour located at an average distance of 1.8 m from shore. In 2001, total GDP at factor cost was estimated at BDS4 222.6 million of which the fisheries sector contributed $20.7 million (0.5 million). During the period 1982 to 2001, the fisheries sector contributed between 0.5 percent and 1.0 percent annually to the GDP of the island. It has been estimated that 2 200 persons are employed in the fishing harvest sector and between 200 and 500 persons are employed in the post-harvest sector, mainly as vendors and processors. In 2001, a total of 954 vessels were registered as fishing vessels in Barbados comprising: 471 moses ranging in hull lengths from 8’ to 38’, typically propelled by either oars or by 5-75 HP out-board engines; 289 dayboats ranging from 18' to 40', overall length and propelled by 15 to 300 HP onboard engines; 163 iceboats ranging from 33' to 55' overall length and propelled by 25 to 450 HP onboard engines and 31 longliners ranging in overall length from 38' to 80' and propelled by 135 to 470 HP engines. Barbados has a comparatively small island shelf (approximately 320 km²). As a result, most fishing effort has traditionally been focused on pelagic species rather than demersal species, using such gear as fish traps of various shapes, handlines, seine nets, spearguns, troll-lines, cast nets, longlines and scuba.

20. The major local fisheries are: shallow shelf reef fishes (parrotfish, surgeonfish, grunts, hind and triggerfishes, with some squirrel-fishes, moray eels, and lobsters being taken occasionally); deep-slope and bank reef fishes (snapper, large jacks and groupers); coastal pelagics (jacks, herrings, silversides, anchovies, ballyhoo, robins or scads, barracuda, garfish, small tunas such as skipjack and bonito); large pelagics (yellowfin tunas, wahoo, billfishes, dolphinfish, swordfish, mackerels and occasionally shark); flyingfish; sea urchins; sea turtles (hawksbill turtle, green turtle and the leatherback turtle, with a harvesting moratorium for all species being in place since 1998); lobsters and conch.

21. Vessel information (type, length, engine power, etc.) is first recorded by fishing boat inspectors in the field. The information is then transferred to a card filing system and inputted into LRS. The data entry operator retains copies of the registration database, but the active database is maintained and updated by the vessel inspectorate on a separate computer. Annual archiving of the LRS database was only started in 1999.

22. Fish landings have been recorded at the island’s markets since the early 1950s. Tolls are paid based on the quantity and types of fish landed at the market. At the market, fish are placed into broad taxonomic groupings and weighed for the calculation of the tolls payable. The weights of fish within each group are recorded in toll books. At the end of each day, the weights of each fish group
are totalled and this information, along with the number of boats that landed fish on the day is reported on standardized data summary sheets. The summarized data is then submitted to the Fisheries Division at the end of the month. In addition to fish landings, the prices received at the market for each type of fish are recorded and periodically forwarded to the Fisheries Division. Data collection at secondary sites is the responsibility of shed keepers employed by the Fisheries Division. Estimates of the quantities and types of fish landed at tertiary sites are obtained through regular, scheduled visits to the sites. The sites are visited on a rotational basis for the collection of catch and effort data. This data collection system is, however, presently being revised and a system whereby specific index sites are visited on a regular basis, will be put into place.

23. Basic morphometric data on certain key fish species (yellowfin tuna, dolphin and wahoo) as well as more detailed information on fishing operations (e.g. types of gear used to catch the sampled fish, length of fishing trip, approximate location of fishing activities, etc.) are collected by dockside sampling and interviews with captains for randomly selected longliner and iceboat trips. Most of this data is collected from the main markets, the BFC and Oistins. A data entry operator is in charge of the computerized recording of all fisheries data and fisher registration data. Catch and effort as well as biological information of the fish is recorded in the Trip Interview Programme (TIP). Toll book records continue to be the main sources of fish landing data collected from the markets and these records are entered directly into TIP. The landings records are periodically backed up during the course of the year, while the active database is retained for continual updating on a computer. At the end of each calendar year, the TIP database is closed and copies backed up on floppy disks, the hard drive of the data entry operator’s computer, the network server and magnetic tape.

24. In an attempt to collect vital trip information and more precise catch and effort data, the Fisheries Division, in collaboration with the Barbados Union of Fisherfolk Organisations (BARNUFO), produced the first draft trip logbooks for the iceboat and longliner fleets. The logbooks are currently being used and assessed by volunteer fishers. Following this, the format will be finally revised on the advice of the fishers.

25. Apart from the CFRAMP-supported assessments of the status of Eastern Caribbean dolphin and wahoo stocks, and of the flying fish stocks by the WECAFC ad hoc working group, no other major stock assessments have been performed using the local fisheries databases. The information has so far been mainly presented in ways that are more useful for general and economic descriptions and analyses of the fisheries than for stock assessment purposes. The potential usefulness of this information in the management of key fisheries has not yet been fully realized.

**Belize**

26. Over the last decade, the fishing industry of Belize has made a significant contribution to the development of the country by providing direct employment for fishers and processing personnel. The fisheries sector ranks as the third largest foreign exchange earner in the country and contributed 7.2 percent of the Gross Domestic Product in 2001. The fishing industry is divided into the wild capture fisheries and aquaculture. Fishing activities are restricted to the continental platform due to the small size of vessels used (30 ft and smaller) for the capture fisheries and the coastal plains for shrimp aquaculture. There are 3,200 registered fishers, 430 licensed fishing vessels and 15 well-developed shrimp farms.

27. At present, there is a data collection programme for the lobster and conch fishery, but the gathering of the data has not been consistent over the last four years. Stock assessments have been
done for the lobster and conch fishery, and in both cases, it was concluded that the stocks were fully exploited and any increase in effort should not be recommended. British Virgin Islands

28. The British Virgin Islands (BVI) is composed of over 60 islands and cays and is located 90 nautical miles south east of Puerto Rico. The total landmass is 182 km², with a population of 22 000 persons. The BVI, with the exception of Saint Croix, exist on the same geological shelf as Puerto Rico and the US Virgin Islands, with the total shelf area being approximately 3 026 square nautical miles (10 393 km²), of which about 30 percent belongs to the BVI. Approximately 90 percent of the BVI portion of the shelf is bedded with coral reef and rocks. The pelagic area beyond the shallow shelf belonging to the BVI is approximately 830 000 squared nautical miles (274 813 km²). The fishing industry is culturally and economically important to the BVI. A 1988 report by the Development Planning Unit (DPU) of the Ministry of Finance stated that fishing contributed about 2.5 percent to the BVI’s Gross Domestic Product in that year, but it failed to indicate that fish provided a valuable source of protein to the local population.

29. In the past, fishing gear and craft were traditional and unsophisticated, seemingly requiring no special skills to operate them, with benefits from fishing being either subsistence or commercial on a small scale. But now, the fishing industry has changed radically, requiring fishers to operate large vessels and use modern equipment, navigation aids, and fishing gear. The two main types of fisheries are the small-scale (commercial) and recreational fisheries. There is a third fishery in the BVI, the offshore longline pelagic fishery, but only one longline vessel operates in it. There are about 300 commercial fishers, with 50 percent of the fishers owning fishing gear and the remainder acting as helpers or employees of the gear owners. The main fishing gear used by the artisanal fisher is the fish trap, with others including hooks and line and fishing nets (mainly gillnets and seine nets). The species of fish landed are blue tang, doctor fish, parrotfish, grunts, triggerfish, snappers and groupers. Most fishers market their own catch at various places within the territory usually at or near landing sites, with an appreciable number of fishers selling their catch directly to the hotels and restaurants and a small number selling their fish to the BVI Fishing Company. Recreational fishers who operate within BVI waters are based outside the territory, and are primarily visitors who fish for pleasure. The boats are either chartered or privately owned and the fishers fish individually or in organized tournaments. In 1991, the Conservation and Fisheries Department issued 127 licenses in respect of recreational fishing boats, with about 80 percent being issued to foreign boats, most operating from the neighbouring USVI. Foreign vessel licences have since been suspended.

30. Catch, effort and biological data are collected from the government owned fishing complex three times a week. The data collected is entered in a Microsoft Access database. The Information Officer and Fisheries Officer conduct quality checks of the data. Monthly reports, including catch composition by fishing gear, are prepared.

Commonwealth of the Bahamas

31. The fishing industry is important to the Bahamas both socially and economically. The commercial fishing sector is a net contributor to the economy, with contribution to the GDP ranging between 1.4 and 2.5 percent annually. The fisheries of the Bahamas are open access, but restricted to Bahamian citizens. It is based primarily on the shallow water banks of the country, principally the Little Bahama Bank and the Great Bahama Bank. The principal categories of fish species caught in commercial quantities from the Exclusive Fishery Zone (EFZ) are the spiny lobster, conch, shallow and deepwater scalefish, sponges, marine turtles and the queen conch. The labour force estimates from the 1995 census indicated that there were about 9 300 persons employed on a permanent basis in the
commercial fishery sector, with fishers comprising about 93 percent of this total. The remaining persons are employed mainly as workers in either processing plants or buying stations throughout the country. The commercial fishing fleet consists of approximately 650 active and licensed vessels, each having a length greater than 6.1 m, and about 1 500 smaller boats which are not required by law to be licensed for commercial fishing. Fishers use a variety of gears and fishing methods, such as nets, hook and line, impaling gear, pots or traps, and casitas or condos.

32. The Department has officers in New Providence, Andros, Abaco and Grand Bahama who visit the landing sites to collect catch and effort data on a daily basis. Also, all processing plants are required by law to submit to the Department monthly purchase reports that detail total purchases by weight and value, the source of the resource and date of purchase. Further, the data collectors record all marine resources shipped from the Family Islands to New Providence as freight landings in New Providence, which are then correctly associated with their island of origin. The catch and effort data are recorded into a Microsoft Access database, and the final results are compiled and included in the Department's monthly reports. Recorded total catch figures are available for the entire country based on data supplied to the Department. One of the major problems with the catch and effort data recording system involves the lack of manpower and equipment available to collect the data. Also, the very archipelagic nature of the Bahamas makes data collection as well as the enforcement of fisheries regulations quite difficult. Efforts continue to be made to correct this situation. The registration of fishing vessels, permits/licenses, duty free concessions and all fishery exports are recorded in Microsoft Excel.

33. Over two thousand measurements of crawfish carapace length and commercial size categories were used to develop morphometric relationships, which were in turn used to convert the Departments fifteen years of commercial weight categories into length frequency data that could be used for stock assessment purposes. Since 1999, the Department has also collected over 500 length and width measurements of Nassau grouper at various landing sites in New Providence, Grand Bahama, Abaco and Long Island. Gonad samples have been collected for 350 specimens of the fish measured. This data is currently being analysed by University of Miami and the Department of Fisheries.

Commonwealth of Dominica

34. The Commonwealth of Dominica has relied on agriculture and fishing as a means of self-sustenance. The majority of the communities and villages are located on or near the coast, making the harvesting of fish easier and more efficient. A number of farmers who reside in these coastal communities are also fishers. With the downturn in the banana industry, some farmers are crossing over to fishing as a main source of income. Approximately 4 000 of the population of 70 000 are employed in various aspects of the fishing industry. About 80 percent of the 4 000 are fishers, registered and unregistered, full time and part time. After poultry, fish is the most consumed of all meats by the Dominican population. The contribution of fisheries to the GDP of Dominica is 1.7 percent. There are four main boat types in use: keel, canoe, FRP and longliner, with most being open wooden boats. Fiber-glassed vessels are becoming more popular. The main species caught are marlin, tunas, dolphin fish, jacks, robins, flying fish, snappers, ocean triggerfish, lobsters and groupers.

35. The method of data collection used is random sampling. The Data Collectors are required to collect at least one third of the total landings for each day that sampling is done (five out of seven days per week). The data are entered in the Daily Catch and Effort Forms and stored in the Trip Interview Program (TIP). At present, there are no trained analysts and no specialized analytical software, so little data analysis is being done. Some of the measures in place for quality control in the data management system include quarterly data collectors’ meetings, workshops for data
collectors as well as fishers, and supervision of data collectors by extension staff and the data manager.

**Dominican Republic**

36. The fisheries sector of the Dominican Republic is important to the economy and is mainly artisanal. Imports of fish and fish products account for more than 50 percent of local consumption. About 46,500 persons are employed directly and indirectly in fishing and related activities, with approximately 10,000 being artisanal fishers. The fishing fleet is made up of about 3,750 vessels, with the fishing gear and operations being S and Z traps, gillnets, trammel nets, cast nets, surface lines, longlines, bottom vertical lines, trawls, beach seines, and free and hookah diving. Both demersal and pelagic fish resources are being exploited, including conch, spiny lobster shrimp, snappers, groupers, scombrids and grunts. In terms of volume, queen conch is the most important fishery resource, while in terms of value, the spiny lobster is the most important fishery resource.

37. In 2000, the Dominican Republic established Stations of Service of Fisheries Administration (SSFA) in critical areas of marine and freshwater fisheries. The SSFAs are units of the Directorate of Fisheries in the Sub-ministry of Coastal and Marine Resources, with one of their objectives being the gathering of catch, effort and biological data at the various landing sites. To date, despite many efforts to make these units fully operational, as part of the national network for data collection and analysis of fisheries, the Directorate has not succeeded in changing the traditional system of data collection in which the inspector is responsible for both data collection and enforcement. As such, the collection and analysis of catch and effort data is only being carried out by PROPESCAR-SUR, which provides technical and logistical support to the Directorate of Fisheries in the southwestern part of the country.

**Grenada**

38. The fisheries sector is very important to the national economy, with the sector providing livelihood and sustenance to the country by contributing to employment generation, foreign exchange earnings and savings, food security, poverty alleviation, the development of rural and coastal communities, recreation and tourism. The average annual production during the last five years compared to the preceding period increased from 1,844 metric tonnes to 2,155 metric tonnes, an increase of 17 percent, with a corresponding increase in the current ex-vessel value of production from EC$11,591,213 to EC$16,893,398; an increase of 46 percent. One of the main areas of economic contribution to the national economy is from access gained to the North American market from exports of fresh fish on ice (mainly yellowfin tuna). Exports during the last five years when compared to the preceding period increased from 519 metric tonnes to 573 metric tonnes, an increase of ten percent. Gross Domestic Product for the sector is approximately 1.5 percent, although it is believed that this figure is an underestimation. Total employment in the industry is approximately 2,500 persons, which represent six percent of the labour force. Of this amount, 2,100 are directly employed in commercial fishing, while 400 are indirectly employed in processing, marketing, boat building, boat repair, etc. The fisheries sector is artisanal in nature, with the fishers operating mainly on a commercial basis, and subsistence fishing is less of a feature. There are forty-five landing sites, of these seven are primary, thirty-six are secondary and two are tertiary sites. There are five exporting/processing plants that mainly export to North America, but also supply the local market such as hotels, restaurants and supermarkets, and import fresh fish when there is a scarcity on the local market.
39. For management purposes, the sector is broken down into about 10 major categories, namely: (i) large oceanic pelagic fishery for yellowfin tuna and billfish harvested with surface longline along the west coast, and dolphin fish, wahoo and king mackerel harvested on the east coast using troll lines; (ii) small oceanic pelagic fishery for skipjack tuna and blackfin tuna harvested with troll lines along the east coast; (iii) small coastal pelagic fishery for bigeye scad and round scad harvested with beach seine nets along the west, north and northeast coasts; (iv) shallow reef and bank fishery for coney, red hind and parrotfish harvested with handlines, vertical handlines and bottom longlines, along the south and north coasts; (v) deep slope fishery for groupers, snappers, and red hind using bottom longlines, handlines and vertical longlines, along the south and north coasts; (vi) lobster fishery harvested by scuba diving along the south and north coasts; (vii) conch fishery harvested by scuba diving along the north and south coasts; (viii) turtle fishery harvested by gillnet and free diving, mainly along the north and south coasts; (ix) sea urchin fishery harvested by hand using scuba gear, mainly along the south and southeast coasts; and (x) sea urchin fishery harvested by free diving.

40. Catch and effort data are collected in the form of a census using daily market logs from the seven primary landing sites, and from processing plants through purchase slips. There is no data collection at secondary landing sites, but raising factors are used in order to arrive at total estimated landings. All data collected was previously stored in TIP. However, due to some internal problems experienced with the program, data is now being stored in Excel. Until 1998, biological data (length frequency and maturity data) were collected on blackfin tuna, skipjack, wahoo, king mackerel, etc, on the east coast, but it was discontinued due to lack of funding for the programme. Data was also collected on sailfish and blue marlin, from the annual Billfish Tournament, but since 2000 data collection has ceased due to conditions imposed by the organizers that the tournament must operate a tag and release program in order to attract participation and sponsorship. The data collected was stored in TIP, with Excel being used subsequently.

41. A computerized database on Licensing and Registration of fishing vessels and fishermen has been kept in the Fisheries Division since 1992. Information for the database is obtained from fisheries census and ad hoc surveys, and is updated from the annual licensing programme. LRS was previously used for storage, but data is currently stored in Excel. Data is also collected on export and import of fish and fish products, and stored in Excel. Monthly reports on quantity and value of catch by species, location and vessel type are prepared. Effort data is also available. Raw data is sent to the CARICOM Fisheries Unit and the International Commission for the Conservation of Atlantic Tunas. Quarterly reports on the number of registered fishermen and fishing vessels by vessel type and size category, gear type and fishery type are prepared. Monthly reports on quantity and value of exports by species and destination are prepared. The market managers and extension staff supervise data collection at the primary landing sites. They routinely monitor the collection procedures to ensure that all fish landed are properly recorded by species and weight and other information relevant to the trip. The senior data entry clerk monitors the quality of the data entered on a daily basis and the data manager scrutinizes the data management system.

Guyana

42. Guyana occupies a total area of about 215,000 km² with most of the population living along the coastal plain. The fishing industry has grown considerably in recent years and is making an increasing contribution to the development of Guyana both as a source of foreign exchange and a source of employment for the local population. The 1992 contribution to the GDP was about eight percent. The fishing industry also provides about 10,000 jobs in the harvesting and post-harvest production areas. The fish harvested is important locally as an easily accessible protein source with
estimated annual consumption reaching 60 kg per person. The local fishing industry is made up of three main sectors: industrial, artisanal and inland fisheries. The industrial is made up of 130 trawlers, mainly owned by the industrial processing plants; the artisanal sector comprises an estimated 1 300 vessels distributed over the fishing regions; and the inland sector is comprised mainly of subsistence fishers and some aquaculture operations.

43. Catch and effort data are collected from both the industrial and artisanal fleets on a monthly basis. The sites and number of gears to be sampled are randomly selected. Length frequency data is also collected during the sampling trips. At present, the Fisheries Department is implementing an observer program for the industrial trawl fleet. Data for all sampling trips are stored as hard copies at the main office, and is entered into the TIP and LRS database programs Production reports are prepared on a monthly and annual basis.

Haiti

44. Fishing is very important in Haiti for social and economic reasons, with fish being a main source of protein. The number of people dependent on fishing for an income is growing, with an estimated 30 000 people earning incomes so far. The value of landings has been estimated at US$30 million, with the fishing sector contributing 2.5 percent to the GDP. The fisheries in Haiti are made up of three components, namely the marine and inland fisheries, and aquaculture.

45. There is no regular data collection programme in place. Data are only collected from the registration of the amount of marine products to be exported. In order to improve on this situation, a data collection program is now being developed with assistance from the CARICOM Fisheries Unit (CFU). The aim of this programme is to undertake a census of the marine fishery to assist in the design of a comprehensive sampling programme for Haiti, in order to facilitate decisions regarding fisheries management and development. The improvement of the system will require substantial efforts from the Government, with support from regional and international organizations.

Jamaica

46. The island of Jamaica, approximately 145 km south of Cuba and 161 km west of Haiti, was declared an archipelagic state in 1996. The maritime space is estimated at 274 000 km², which is approximately 25 times the size of mainland Jamaica. The contribution to GDP in 2001 by the agricultural sector was JS1 451 million, with fishing contributing JS86.4 million (at constant 1986 prices). Fishing was estimated to contribute 0.4 percent to the GDP. Fisheries production in 2001 was estimated at 6 327.84 metric tonnes, with total exports being 956.013 metric tonnes, valued at JS$437 912 645.

47. In 1996, a stratified random sampling plan for all the major fisheries was developed using data from the Licensing and Registration (LRS) database, with the data being verified through actual field surveys. Data collected in the field is routinely entered into the TIP and LRS databases. From these databases, reports such as numbers of fishers by landing site, boats by landing site, fishing gear by boats, etc. are generated. Throughout each day or at the end of a workweek, a “Quality Control Report”, (QC Report) is done. LRS and TIP databases are backed up or secured using PKZIP and IOMEGAWARE. Data is stored at both on-site and off-site locations. The data is used to estimate total landings, with calculations being done by stratum.
Montserrat

48. At present, Montserrat has approximately 60 fishermen operating 30 boats out of two ports, namely, Carrs Bay, which is the primary port and Bumkum Bay that accommodates a weekend fishery. Boats are of the dinghy type, usually made of a combination of wood and fibre glass and range in size from 12 to just over 30 feet. The gears used are mainly traps (pots), hand lines and long lines, with a few seine nets. Fishing is concentrated between 0 and 2 nautical miles offshore, mainly on the eastern and western sides of the island. The species groups traditionally exploited are the shallow shelf and reef fish and the coastal pelagics. These species are moderately to heavily exploited and are unlikely to support increased fishing effort. The deep slope and bank fish are underexploited and the status of the large pelagics is mostly unknown but thought to be adequate to support further exploitation.

49. The data collection system is implemented in the form of a census. A data collector is stationed at Carrs Bay for five days a week and is expected to collect all catch and effort data. Data from the minor site and that generated on weekends is collected from discussions with the fishermen. Fish catch has been relatively constant for the past five years at approximately 70,000 pounds.

Saint Christopher and Nevis

50. The fisheries are artisanal, with the Fisheries Management Unit dividing the species groups into coastal pelagics, ocean pelagics, reef and bank/deep slope, lobster and conch fisheries for management. The coastal pelagic fishery (jacks, gars, ballyhoo, small tunas) has been a main contributor of fresh fish over the years, with seven vessels using seine nets being involved in the fishery. About 30 persons are employed in this fishery. In 2002, it was estimated that this fishery contributed just under 290,000 lbs of fresh fish to the estimated landings. The ocean pelagic fishery (large tunas, billfish, dolphin fish, mackerels) is being exploited on a regular basis by about twenty-five fishers using fifteen vessels, outfitted with trolling hooks and lines. Some fishers have been using Fish Aggregating Devices (FADs) in conjunction with long line to catch yellow fin tunas. In 2002, it was estimated that this fishery contributed ten percent of the total estimated landings. The reef and bank/deep slope fishery employs the largest number of fishers and vessels, with over 70 percent of the registered fishers and 75 percent of the vessels being involved in this fishery. In spite of this, the fishery accounted for just 40.9 percent of the estimated landings in 2002. The harvesting methods include fish traps, hand lines, gill nets and spear guns.

51. The Caribbean spiny lobster is part of the reef fishery but has been separated for management due to its importance to the economy and very long life cycle. Lobsters are taken in the same traps that catch reef fish. Lobsters are therefore taken all year round. Lobsters are usually caught in small numbers and stored in a holding cage until they are sold. During 2002, it was observed that the estimated landings were significantly lower than previous years. Conch is taken mainly by fishers using scuba gear, with some fishers operating without permits and others being uncertified divers. The number of fishers involved in this fishery is about twenty. The estimated contribution for 2002 was just over ten percent of the total estimated fish landings.

52. The Fisheries Department collects fish landing data using a census at all the major landing sites in Saint Christopher. This data is then raised using approved raising factors. However, there is some vital information that has not been forthcoming from the fishers. Fishing effort and other economic data has been difficult to obtain over the years. It is envisaged that another frame survey will be conducted in the very near future. No biological data is collected. Social data is collected
only on registration of fishers. Data is being stored in Excel and is entered on a daily basis. Reports on the estimated total landings and values of important species are presented monthly and annually to the Department of Agriculture and the Eastern Caribbean Central Bank. This information, including the number of fishers and vessels, is also submitted to FAO annually.

Saint Lucia

53. Saint Lucia is found north of Saint Vincent and the Grenadines and south of Martinique, with the Caribbean Sea washing the shores on the western side of the island and the Atlantic, the eastern shores. It has many fishing communities, where various types of fishing activities take place. Fishing is an important source of employment and income to many, especially traditional fishers, who have been fishing all their lives. The major fisheries resources of Saint Lucia comprise demersal, coastal pelagic and offshore pelagic species. Fishing remains artisanal in nature and is carried out by 2,137 fishers, using about 1,078 registered fishing vessels, with over 80 percent being open fibreglass pirogues. The main types of fishing gear used are handlines, fish traps, trolling gear, gillnets, seine nets and vertical longlines. The distribution and dominance of these gears around the island are determined by a combination of factors including the species availability and the nearshore marine environment. The 2001 landings revealed that the total level of effort was 30,835 fishing trips resulting in a catch of 1,967 metric tonnes.

54. The main aim of the data collection system is to monitor the status of the fishing industry. It is focused mainly on gathering data and performing simple analyses. The full potential of the system has yet to be realized due to administrative, financial and human resource constraints. The current data collection system includes several components such as gathering of catch, effort and biological data, registration of fishers and vessels, scuba diving establishments, sports fishing vessels; snorkel establishments; registration of dive and snorkel leaders and speargun fishers, in addition to licensing data of fishing vessels. The catch and effort data collection component is based on a stratified random sampling system of three major spatial strata: primary, secondary and tertiary landing sites, based on the number of vessel operating, the fishery types and the volume of fish landed. Although biological data have been collected on several occasions for various species, collection of such data has not been sustained after the termination of externally funded projects. Presently, summaries of landings and effort by species, by site, by day and by gear can be generated for sampled areas. Total landings by species and groups of species as well as by fishery have also been generated.

55. For catch and effort data, once a batch of data has been entered, it is checked for errors (by the entry clerk), then stored on diskette using Winzip. After the second integrity check and correction is completed, two copies of data are backed up on diskettes and stored in two locations, which are off the Department’s premise. Collectors are monitored regularly by the Department personnel. Fisheries extension officers are responsible for registering and licensing fishers and vessels. After registration, the data entry clerk is responsible for entering the information in the database program (LRS). Periodical, integrity checks are carried out by the supervisor to determine the accuracy of the data in this database. Backups of licences and registration data are done on diskettes and by hard copy filing.

Saint Vincent and the Grenadines

56. The fishing industry of Saint Vincent and the Grenadines generates some EC$8 million annually representing about 2 percent of the GDP, with exports from fish earning an estimated EC$2 million, while imports average around $2.5 million. It is considered to be a small-scale
fishery, with two fishing seasons: a high season, from January to June, when large pelagics are a significant contributor to the catch, and a low season, from July to December, when demersals are the main species targeted. The number of full and part-time fishers is about 2,500, representing approximately 5 percent of the country's labour force.

57. The Fisheries Division uses a stratified sampling method to collect data from fishers at the various landing sites throughout the state. Catch, effort, and biological data are collected and entered into the Trip Interview Programme (TIP) after quality checks are done. Monthly, quarterly, and annual reports are produced, providing information on landings, exports, and values by landing site. The data unit also has the capacity to provide information on catch per unit of effort and gear specific information. Over the years, stock and biological assessments on some species have been conducted jointly with the CARICOM Fisheries Unit and also by staff members as part of their MSc theses.

Suriname

58. The fisheries sector in Suriname makes an important contribution to the economy, with fisheries contributing 4 percent to the GDP. Besides that, this sector contributes to food security, with fish and fish products supplying 30 to 40 percent of the protein requirements, and foreign exchange earnings. Nearly 8,000 people are employed in this sector, with a high percentage being women. The fisheries sector is divided into the deep-sea fisheries, coastal fisheries, brackish water fisheries, freshwater fisheries, and aquaculture.

59. Data collection in Suriname started in early 1960 at the Central market, where catch data were recorded. In 1982, a project was started to establish a national fisheries information system. This led to the creation of a data collection system by 1990, with data being collected at the landing sites and from some of the industrial trawlers. In 1993, an observer program was started for shrimp trawlers. Biological data are collected under the observer program as well as at landing sites and processing companies. Economic data is collected at the Central Market in Paramaribo.

60. Due to many constraints, the onshore data collection program has concentrated on catch and effort data, while the observer program is now restricted to a small pelagic fishery pilot project. Over the years, the catch and effort data have been collected and stored in a variety of formats, with the data from recent years being stored in Excel in the form specified by the FISH project. Data collected by the observers and from onshore biological sampling are stored in Excel. In 1995, a census was conducted, but the data has not been analysed. In 2000, the data collection and management systems for the marine fisheries in Suriname were reviewed under the ICRAFD Project and recommendations made for their refinement.

Trinidad and Tobago

61. The fisheries sector of Trinidad and Tobago contributes approximately 0.2 percent to the GDP (1998 estimate), with annual fish exports averaging just over 6,100 t at TT$59 million for the period, 1997-2001, and annual landings for the period, 1999-2000, averaging 14,000 t with an ex-vessel value of TT$130 million. The fisheries sector contributes significantly to rural stability, employing an estimated 6,000 persons, some 3,469 of whom are fishers operating some 1,570 vessels. The fishing industry in Trinidad is largely artisanal, but includes some semi-industrial and industrial vessels and is characterized by multispecies and multigear fisheries. The fisheries include the artisanal gillnet and line fishery targeting the coastal pelagics; artisanal, semi-industrial and industrial trawl fisheries targeting shrimp; artisanal and semi-industrial fishpot and line
fisheries targeting the hard bottom demersals, namely snappers and groupers; industrial longline, semi-industrial, multi-purpose as well as recreational fisheries targeting the oceanic large pelagics, including tunas and swordfish.

62. The data collection system of the Fisheries Division includes collection of information on fishers, fishing vessels, engines and gear; fish landings and fishing effort data; biological data; fish exports and imports; fisheries economic data. Fisher, vessel and engine information is collected through Registration Forms. Data on fisheries subsidies, fish imports and exports are obtained through application forms submitted to the Division. Economic data collection is limited largely to ad hoc costs and earnings studies of specific fisheries. With regard to data storage, the fisher, vessel and engine data are computerized in the Licensing and Registration System (LRS); the landings and effort data are in Oracle; the export data and biological data are in Microsoft Access; and the economic data in Microsoft Excel. Other data are not yet computerized.

63. The biological data collection programme, which commenced in 1991, is limited to the major commercially important species. The programme involves shore-based sampling of catches from trawlers for shrimp lengths, as well as artisanal gillnets and pelagic handlines for length, weight, maturity, sex, and age for carite, kingfish and shark. In addition to the ongoing shore-based programme, an at-sea sampling programme was initiated for the artisanal and semi-industrial trawl fishery in 1999 to capture data on discards. There are also plans to implement an Observer Programme in 2003 for the offshore trawl, longline and multigear fleets.

64. Quality control in the catch and effort data system includes clarification of queries with data collectors, annual data collectors’ training workshops, the incorporation of controls in the database to prevent invalid data entry, and verification of data entered. Similar systems are implemented for the biological data system.

Turks and Caicos Islands

65. The Turks and Caicos Islands (TCI) are a group of calcareous islands located at the southern end of the Bahamian archipelago in the Atlantic Ocean, divided by three shallow water banks: the Caicos Bank, the Turks Bank and the Mouchoir Bank. Separating the Caicos Bank from the Turks Bank is a deep-water passage known as the Turks Island Passage ranging in depth from 1 500 to 2 000 metres in some areas. The principally exploited resources of the commercial fisheries are conch and lobster. The fishing industry is currently the oldest industry in the Turks and Caicos and represents almost 100 percent of export for the country. It is an important sector in terms of production, employment, exports and government revenue. Annual value of production (including domestic consumption) is estimated at about US$4 million or about ten percent of the country’s GDP. A recent socio-economic study of the fishing industry indicated that the fishing industry provided direct employment for approximately eight percent of the country’s labour force in the harvesting (370 fishers) and processing (80 plant workers) sectors. This is further accentuated on the lesser-developed Caicos Islands, such as South Caicos, where the fishing industry is very important in providing economic stability and maintaining the structure and cohesion of the community. On South Caicos, fishing provides employment, not only for the established full-time fishers, but also for a large number of part-time fishers who derive a small but significant income from fishing.

66. The catch data are recorded for conch meat and whole lobster landed by each fishing boat in the processing plant at the end of each fishing day. Additional data such as the number of fishers per boat and unit cost per pound of product are also recorded. In addition to catch, effort and
economic data, landings have been sampled since 1989, recording details of the fishing trip, such as
the fishing ground, as well as taking measurements from the catch. Such measurements include the
carapace length and the presence of a spermatophore (tar spot) on female lobsters, lip thickness,
maturity stages and shell length for conchs, wherever possible. Supplemental data are also
collected, such as unaccounted catch, which are sold to local restaurants, fish-markets and hotels
for local consumption, with receipt booklets being distributed to all establishments engaged in the
sale of marine products. Copies of the sale receipts are returned to the Department once the booklet
is completely filled out. Exports classified by lobster tail weight exist for the periods 1974-1983
and 1989 onwards. These incomplete size frequency data were used to convert mass to numbers
landed. For the missing years, the average size has been estimated from the mean size for the
preceding and succeeding years. Daily landings and effort (boat days) are available from 1977 to
2001, with the exception of the 1984 and 1985 seasons when effort data were not collected.
Summary total landings for each month exist from 1966, when the lobster fishery expansion began.

67. A modified version of the Schaefer Model was used to model the fishery and compared to
the observed catch and effort time series for the queen conch fishery. The model fitted the Catch
Per Unit Effort (CPUE) time series reasonably well. However, there has been evident discrepancy
since the introduction of the Total Allowable Catch (TAC of quota) system in 1992. The model
consistently fails to predict the CPUE in recent years forecasting a decline, which has never
materialized. In 2000-2001, visual assessments of the Caicos Banks were conducted to
independently assess the stock biomass and estimate the Maximum Sustainable Yield (MSY). The
results of the visual survey were used to crosscheck estimates derived from the Schaefer Dynamic
Model.

68. Database for DOS data management system was the data management system used from
1988 to 1999, but this application has become obsolete. As such, there is need for a data
management system that is user-friendly and effective. The Department of Environmental and
Coastal Resources (DECR) anticipates computerizing all data collected by the Department by
2004-2005. This includes fishing licences, landings, local consumption of marine products, export,
yearly breaches of fishery regulations, along with data collected, which are not related to the
management of the fisheries industry but related to the protection of the overall environment of the
Turks and Caicos Islands. Currently, data are simply inputted into Microsoft Excel. Without a data
management system in place, very little manipulation of the data has been attempted other than
monthly and yearly landings. Quality control of the data simply involves reviewing the raw data
before filing.

SAMPLE-BASED FISHERY SURVEYS

69. This component of the Workshop was intended to train participants to utilize improved
approaches and techniques for conducting cost effective and sustainable, sample-based fishery
surveys, and analysing the data collected. Participants used the FAO Fisheries Technical Paper 425:
Sample-based fishery surveys: A technical handbook, as the basic document for discussion and
exchange of views. Some of the topics discussed included: Utility of Fishery Data, Concepts in
Estimating Catch, Concepts in Estimating Effort, General Sampling Considerations, Surveys for
Basic Fishery Data, Active Days Surveys, Frame Surveys, Boat Activity Surveys, Landing
Surveys, Data Processing, Data Storage and Dissemination. The computer software ARTFISH was
used to present and discuss case studies. Mr Constantine Stamatopolous, Senior Fishery Data
Officer, FAO, was the lead presenter for this section of the Workshop.
70. As part of the contribution to the discussion on Sample-based Fishery Surveys, the representative from Jamaica, Ms Avery Galbraith, Senior Fisheries Officer, made a presentation of a Case Study on the Marine Fishery Census of Jamaica 1998. The Census was undertaken by the Fisheries Division, Ministry of Agriculture, and the Statistical Institute of Jamaica (STATIN), with technical assistance from the CARICOM Fisheries Resource Assessment and Management Programme (CFRAMP). The objectives were to count all fishing vessels by gear at each landing site, and to validate the vessel and owner/captain data stored in the Licensing and Registration System.

71. The Census was divided into four phases, with phase one addressing the initial planning phase during which the project concept and methodology was developed. Phase two addressed the development of questionnaires and an interviewer’s instruction manual. Phase three addressed pre-testing of the questionnaires, training of field workers and supervisors, and implementation of the census in the field; while phase four dealt with data entry, analysis, and reporting. Based on the outcome of the census, recommendations were made for the refinement of the data collection and management system for the marine capture fishery of Jamaica.

72. Following the presentations and discussions on sample-based fishery surveys, participants identified and further discussed data collection and analysis issues relating to the following: multiple fishing gears, migration of fishing units, multiple landings by the same fishing unit; outdated frame surveys; alteration of fishing gear performance; impact of FADS and stratification of fishing areas.

CARIFIS

73. This component of the Workshop was to introduce and train participants to use the CARIFIS database (upgraded TIP/LRS database) as a tool for data storage, querying and reporting. Presentations were made on the development of the Caribbean Fisheries Information System (CARIFIS) software; installation and system requirements; features of CARIFIS; networking capabilities; structure of the database; data entry and quality control, querying and reporting and accessing CARIFIS from Excel and SPSS. Resource persons conducted practical sessions for the participants on data entry, querying and reporting, with suggestions for refinement being noted and errors/bugs in the software being recorded for correction.

74. Following the presentations, discussions and practical sessions, participants made the recommendations below:

(i) Data Entry: There should be a pop-up to remind the data operator to post in order to save the record.

(ii) Data Entry: For Total Effort at Site, include as an option the generation of the total number of boats from the LRS data, in addition to adding the number of vessels from the site.

(iii) Data Entry: The data entry operator should only be required to save once in doing a record rather than having to say at intervals.

(iv) Networking: The networking capabilities of CARIFIS should be enhanced as some countries operate separate units for data entry and licensing and registration of fishing vessels.
(v) There should be a section in CARIFIS for the inclusion of Frame Survey/Census data.

(vi) Transfer of legacy TIP and LRS databases to CARIFIS: Each country should review their databases with a view to identifying fields that were utilized for data other than the intended data to facilitate the building of the routine for the transfer of legacy databases to CARIFIS.

(vii) A data entry operator should not be able to delete a record (e.g. fisher) if it is linked to another aspect of the database. An attempt to delete such a record should yield a pop-up “Do you wish to delete this record?”

(viii) Year/Month/Day should be placed below or above each date field.

(ix) Administration: The country list should be amended to include Anguilla, British Virgin Islands, Suriname, The Bahamas and Turks and Caicos.

(x) Fish Register: An error message should show up when the First Issue date is greater than the Application date.

(xi) Vessel Registration: Under Help – Some of the gear descriptions should be improved

(xii) Trip Interview: Total Effort at Site - Remove the constraint that boats fishing must be less than or equal to total number of boats, and review the description in Help.

(xiii) Trip Interview: Total Effort at Site – Effort History – should have a ceiling on the In-days with regard the Number of Previous Trips.

(xiv) Trip Interview: Catch – the data entry operator should have should have the option of species or code.

(xv) In addition to Help, a manual should be developed for CARIFIS, using the manuals developed for TIP and LRS as guides.

(xvi) Processing Plant: should add freezing and cold storage capacities.

(xvii) Processing Plant: should put the location of the main market, e.g. United States of America, under Market.

(xviii) Registration numbers should be able to be PC-generated or put in manually.

(xix) Aquaculture: Registration - systems should be explained in Help.

(xx) Aquaculture: This section should be further developed to enable the estimation of production and value, with a section for inputting field data.

(xxi) Legal Charges: A field should be included to identify the species involved.
Legal Charges: Should include the name of the Officer making the arrest, the Charge Date, Time of the Offence, Nationality of the Offender and Type of Evidence, possibly using Memo fields where appropriate.

Legal Charges: legal charges should generate a record/reference that can archived.

Loans: Should include a field for Collateral.

All presentations made by the trainers should be amended based on suggestions from participants and placed on compact disc. Copies should be provided for each country for use in training as well as an aid to data entry operators.

Participants and resource persons looked at the way forward for introducing CARIFIS to the Fisheries Departments of CARIFORUM/CARICOM member states and made the following recommendations:

(i) If feasible, the errors identified as well as the suggestions made for modifications during the Workshop should be forwarded to the Consultant for his attention, and the updated CARIFIS forwarded to countries by the end of May 2003.

(ii) A compact disc with the amended presentations by the resource persons should be compiled by CFU and forwarded to countries by the end of April 2003.

(iii) Participants should begin testing of the current version of CARIFIS using real data and provide feedback by sending error and other reports to cframp@btl.net and cfusvg@vincysurf.com.

(iv) On receipt of the upgraded version of CARIFIS, participants would continue to carry out rigorous testing using real data and continue to provide feedback to CFU, until the end of November 2003.

(v) Countries should be provided with computers and printers or scanners or digital cameras, depending on appropriateness and costs, to facilitate the introduction and effective utilization of CARIFIS. It was pointed out to participants that cost and available funds would be the determining factors in the type of equipment provided.

(vi) With regard the transfer of the legacy databases for TIP and LRS to CARIFIS, countries should review their TIP and LRS databases and identify all fields that were used for entering records for which the field was not intended. In order to assist in this exercise CFU undertook to provide guidelines, including the fields in TIP and LRS, for the review by the end of May 2003.

(vii) The Consultant, CRFM Data Manager, and at least one or two other regional programmers (preferably from the public sector) should undertake the task of loading the legacy databases from TIP and LRS to CARIFIS for at least one or two countries. This would involve developing the routines for the importing of the data as well as training the CRFM Data Manager and the regional programmer(s) to undertake the tasks for the other countries.
(viii) The CRFM Data Manager and the regional programmer(s) should then be tasked with the loading of the legacy databases for the other countries, either on a country by country basis or in a workshop setting. The participants opined that a country by country basis would be the better approach as issues encountered in an on the spot transfer could be better addressed.

(ix) CFU should seek to urgently recruit a Data Manager as it was recognized that this individual would be crucial to the support and development of CARIFIS.

(x) A CARIFIS Working Group supported by the CRFM Data Manager and a few regional programmers, drawn preferably from the public sector, should be tasked with the maintenance of CARIFIS over its short to medium term development.

(xi) CFU should provide some assistance to countries storing catch, effort, biological, licensing and registration data in Excel and Access to facilitate the transfer of the data to CARIFIS.

(xii) The testing period for CARIFIS should last from 31 April to 30 November 2003, with the start-up date for the use of CARIFIS in countries being 31 January 2004.

(xiii) CFU should prepare a schedule reflecting the activities leading to the start-up for CARIFIS in January 2004.

76. The resource persons for the CARIFIS component of the Workshop were: Ms S. Reynolds, DOF, Jamaica; Ms S. Constantine, CFU; Ms W. Joseph, DOF, Saint Lucia; Ms C. Jardine, DOF, Saint Vincent and the Grenadines; Mr A. Jackman, DOF, Barbados; Mr S. Singh-Renton, CFU, and Mr T. Phillips, CFU.

EXPANSION OF THE EXISTING DATA COLLECTION SYSTEMS TO CAPTURE, STORE AND MANAGE SOCIAL AND ECONOMIC DATA FROM THE FISHERIES SECTOR

77. A presentation on the report “Expansion of Existing Data Collection Systems to Capture, Store and Manage Social and Economic Data from the Fisheries Sector”, was made by Mr R. Banks, SCALES Inc., with the focus being on the collection of economic data to show the importance of fisheries within the different economies.

78. Following the presentation, the Consultant and participants reviewed an Excel model which had been designed to cater for a simplistic derivation of data focusing on fishing segments, high and low seasons, catches in these seasons, variable costs, the wage remuneration system, and the derivation of fixed and depreciated costs. Based on the review, a number of observations were made and errors identified. These included:

- The need to indicate vessel-identification number to ensure consistency in approach to sampling for the high and low season.
- The need for more species to be listed (expanding from the current 3 to 6).
- 20 -

- The need to introduce imperial measures (lbs, gals). These are in any event interchangeable without impacting on the model’s calculations.

- The need to record landing charges as related to the weight of fish as opposed to the value. In some cases value may still prevail and as such the formula can be altered.

- The need to clarify the issue of wage shares leading to the calculation of crew and skipper earnings.

- For transport to relate to the weight of fish as opposed to value, and only to be recorded as a cost item as and when the fisher was directly responsible for transporting the catch to the market / other sales outlet.

- The need to enter into “life expectancy” of vessel assets irrespective of whether the asset existed or not.

79. Participants recommended that the Report and Excel Model be amended and circulated by CFU to the respective countries.

80. Based on a decision to amend the Agenda from one of countries which is preparing national data collections plans for social and economic data to address the issues identified under this section/component, the participants were divided into the Working Groups as follows:

- Trap fisheries
- Trawl fisheries for penaeid shrimp and seabob, and Chinese seines
- Netting and lining

81. The tasks required of them were:

- Clarification of the segments required for the economic analysis within the CARIFORUM/ CARICOM network.

- Sample sizes required.

- The strengths and weaknesses of the approach to economic data collection.

- The need for seasonal differentiation.

- Whether the existing data collectors were suitable for the tasks required.

- Whether there was a need to extend data collection to include the onshore processing sector.

- Proposed plan of action.

82. The summarized outputs from the Groups were as follows:
(i) **Identification of the required segments:** Table 1 identifies the working groups’ perceptions on fishing segments. This table would be added to the Final Report.

(ii) **Sample sizes required:** The sample sizes recommended by the working groups were ten percent as and when numbers within the sample exceed 100 and 10 percent as and when vessel numbers were less than 100. If staff resource deployment was an issue in countries where there was shortage of staff, or where the number of segments were too many to cover in any one year, it was suggested that sample sizes could be reduced for some segments for a limited period, alternating the data collection from one segment to the next in each year. Data would still be collected for each segment but from a smaller sample (but from the same group of vessels previously selected). The important issue is to ensure consistency in targeting specific segments by each island at the same time. This would allow data comparisons between countries to be made.

(iii) **Strengths and weaknesses of the approach:** The views were that economic data would complement the existing data collected but staffing and the need for training data collectors were principal constraints.

(iv) **Fishing seasons:** In most, but not all fisheries, there were changing catches (species and quantities) between seasons. As such, data recording for both seasons (high and low) was required.

(v) **Capacity of data collectors:** Training was required of existing data collectors. In some cases, this would require the hiring of additional personnel.

(vi) **Extension of the survey:** It was acknowledged that, where possible, data collection should include an assessment of the economic value of the onshore sector.

(vii) **Proposed plan of action:** To design an action plan that focuses on coordinated data collection initiatives, which use the model in the following ways:

- preparation of economic outputs from the perspective of illustrating the importance of fisheries in national terms;
- preparation of economic data which can be used as indicators of the relative importance of each fishery within a country, and to compare the same fisheries between countries;
- preparation of a socio-economic database;
- output indicators to measure the effects of policies;
- a database to use in order to measure the impact of natural and man made interactions, management restraints and disasters; and
- the use of data for bio-economic modelling.
Table 1. Summary of different segments identified in the CARICOM countries

<table>
<thead>
<tr>
<th>Trap fisheries</th>
<th>No. of countries</th>
<th>No. of countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traps (&lt;12’) (unmechanized)</td>
<td>13</td>
<td>Cast net</td>
</tr>
<tr>
<td>Traps (&lt;12’) (mechanized)</td>
<td>13</td>
<td>Drift net</td>
</tr>
<tr>
<td>Traps (12-30’) (unmechanized)</td>
<td>12 &lt; 10 m</td>
<td>2</td>
</tr>
<tr>
<td>Traps (12-30’) (mechanized)</td>
<td>12 &gt; 10 m</td>
<td>2</td>
</tr>
<tr>
<td>Traps &gt;30’</td>
<td>4</td>
<td>Chinese seine</td>
</tr>
<tr>
<td>Scuba/free diving</td>
<td>&lt; 10 m</td>
<td>2</td>
</tr>
<tr>
<td>Scuba diving (conch) (&lt;10 m)</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Scuba diving (conch) (&gt; 10 m)</td>
<td>4</td>
<td>Bank net</td>
</tr>
<tr>
<td>Scuba, hooker and free diving (&lt; 10 m)</td>
<td>6</td>
<td>Seine net &lt; 10 m</td>
</tr>
<tr>
<td>Scuba, hooker and free diving (&gt; 10 m)</td>
<td>4</td>
<td>Shrimp trawl</td>
</tr>
<tr>
<td>Handline/troll</td>
<td>&lt; 10 m</td>
<td>1</td>
</tr>
<tr>
<td>&lt;20’</td>
<td>15</td>
<td>10-12 m</td>
</tr>
<tr>
<td>20-30’</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>30-&lt;</td>
<td>8</td>
<td>Seabob</td>
</tr>
<tr>
<td>Longline</td>
<td>Finfish trawl</td>
<td>1</td>
</tr>
<tr>
<td>&lt;25’</td>
<td>11</td>
<td>Bank net/pin seine</td>
</tr>
<tr>
<td>25-34’</td>
<td>Beach seine fisheries</td>
<td>2</td>
</tr>
<tr>
<td>35 +’</td>
<td>5</td>
<td>Sea urchin</td>
</tr>
<tr>
<td>Gillnet</td>
<td>4</td>
<td>Mixed ++</td>
</tr>
<tr>
<td>&lt;25’</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>&gt;25’</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

OTHER MATTERS

83. Participants from countries with coral reef fisheries were requested by FAO to provide, in writing, knowledge/experiences relating to statistical monitoring, with a brief description of their respective fisheries.

84. Mr P. McConney, Outreach Coordinator, CERMES, UWI, made a brief presentation on the Project for Socio-economic Monitoring for Caribbean Coastal Management, and provided each participant with a copies of the Socio-economic Manual for Coral Reef Management, and the draft Socio-economic Monitoring Guidelines for Coastal Managers in the Caribbean for review. It was pointed out that the review process would be followed by a regional workshop on using the guidelines in Barbados in July 2003. Participants undertook to review the draft guidelines and provide feedback by 31 May 2003.

CLOSING

85. The Workshop ended on 22 March 2003, with closing remarks by Mr Randolph Walters, on behalf of FAO, and Mr Terrence Phillips on behalf of CFU. They thanked the participants for maintaining a high level of interest and involvement throughout the sessions of the Workshop. They also urged the participants to participate in the follow-up activities as well as to apply the knowledge gained in the management and development of the fisheries sectors in their respective countries. They also extended thanks to Mr Stamatopoulos and all the resource persons and CERMES, UWI, for collaborating in the conducting of the workshop, and the Government of Barbados for co-hosting it.
86. Mr Christopher Parker, of the Barbados Fisheries Division, thanked FAO and CFU for organizing and convening the Workshop, on behalf of his colleagues (the participants) and on behalf of the Government of Barbados.
APPENDIX A

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APPENDIX B

AGENDA

1. Opening Ceremony
2. Introduction of Participants and Workshop Arrangements
3. Country Presentations and Discussions
4. Introduction – Importance and Utility of Basic Fishery Data
7. General Sampling Considerations
8. Surveys for Basic Fishery Data
9. Active Days Surveys
10. Frame Surveys
11. Display of examples and discussion
12. Boat Activity Surveys
13. Landing Surveys
14. Data Processing
15. Data Storage and Dissemination
16. Introduction to CARIFIS
17. CARIFIS Training – Data Entry
18. CARIFIS – Querying and Reporting
19. CARIFIS Training – Review of Data Entry, Querying and Reporting
20. Way Forward – Support and Training to CARIFORUM/CARICOM member states for ongoing testing of the software and importing TIP/LRS data into CARIFIS
21. Expansion of Existing Data Collection System to Capture, Store and Manage Social and Economic Data from the Fisheries Sector.

22. Preparation of National Plans for the implementation of the recommendations in the Consultant’s Report: Expansion of Existing Data Collection System to Capture, Store and Manage Social and Economic Data from the Fisheries Sector.

23. Closing
The CARICOM Fisheries Unit (CFU) and the Food and Agriculture Organization of the United Nations (FAO) collaborated in providing fisheries data managers from the CARIFORUM (CARICOM plus the Dominican Republic and the British Dependent Territories of Anguilla, British Virgin Islands and Turks and Caicos Islands and Montserrat), with guidance to improve their collecting, processing, storage and reporting capabilities of information on the status and trends of their marine capture fisheries.

The participants received step-by-step guidance on the methodological and operational concepts contained in the FAO Fisheries Technical Paper No. 425, Sample-based fishery surveys: A technical handbook (2002). They were also trained to use a CFU-developed data storage software – CARIFIS – to query, analyse and report on their national fisheries statistics. A proposal to expand the existing data collection systems to capture the social and economic information about the national fisheries sector was presented and discussed.