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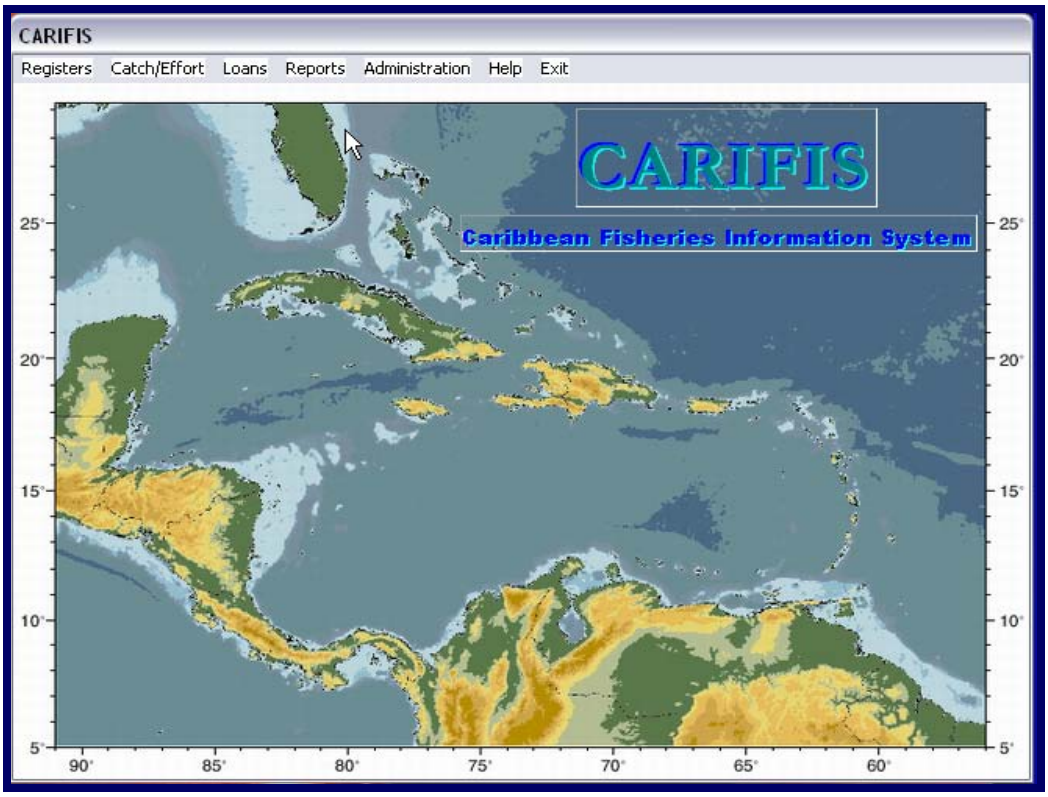
Overview of the Status of Performance of CARIFIS in CRFM Member States, and Options for the Way Forward



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Overview of the Status of Performance of CARIFIS in CRFM Member States, and Options for the Way Forward

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EXECUTIVE SUMMARY

The Caribbean Fisheries Information System (CARIFIS) (CRFM, 2004) is a software package that facilitates storage of data on fishing industry operations, and which offers some reporting functions as well. It includes databases for fisheries; catch and effort, licensing and registration data. CARIFIS has been available to the Caribbean Regional Fisheries Mechanism (CRFM) Member States since 2004, and the CRFM Secretariat has provided ongoing support for its implementation. A survey of the 17 Member States showed that 41% (7 of the 17 Member States[1]) currently use CARIFIS and 59% (10 of the 17 Member States) do not. Of the 10 respondents not using CARIFIS, 50% (5 respondents) would like to have their data transferred to CARIFIS.

The main reasons cited for non-use of CARIFIS (historically and currently) were technical issues with the software and training needs. 86% of the countries already using CARIFIS indicated that de-bugging of the programme, upgrading of CARIFIS to make it Vista/Windows 2007 compatible, and training in querying and reporting were the priority areas to be addressed for making CARIFIS more useful to them.

Fifty-nine percent (59%) of respondents indicated that they would like to see CARIFIS upgraded and modernized, while 23% would not like to see CARIFIS upgraded and modernized (18% abstained). The main reasons given for answering "yes" to the upgrading and modernizing of CARIFIS could be categorized as *"Upgrading and modernizing CARIFIS would fix problems/bugs etc. now found in the existing version of CARIFIS"* and the main reasons given for answering "no" to the upgrading and modernizing of CARIFIS could be categorized as; *"consolidating of, and moving database systems to a common platform."*

The main recommendations from the survey are:

1. CARIFIS should be fixed, upgraded and modernized to ensure that the Member States without their own national fisheries systems or Member States wishing to continue with CARIFIS use have the option for use of the database (12 Member States fall in this category).

2. The priority CARIFIS problems to be addressed are:
   - de-bugging of the programme;
   - upgrading of CARIFIS to make it Vista/Windows 2007 compatible, resolving the issues with the querying and reporting section of the programme; and
   - training in the use of CARIFIS.

3. The CRFM Secretariat should build its capacity to assist Member States with technical and training needs related to CARIFIS.

[1] One Member State did not return a completed questionnaire but indicated that CARIFIS was not used by its Fisheries Division

1. BACKGROUND

The Caribbean Fisheries Information System (CARIFIS) (CRFM, 2004) is a fisheries database (a software package). It is owned and used by Member States of the Caribbean Regional Fisheries Mechanism (CRFM).

The entities of the database are:

1. **Fisher Register and Licensing**: Data entry and edit forms are available for the register and licence information for each fisher.

2. **Vessel Register and Licensing**: Data entry and edit forms are available for the register and licence information for each vessel. Vessels are linked to owners, crew and others (including fishers) through the address book.

3. **Processing Facility Register**: Data entry and edit forms are available for the register and licence information for each processing facility.

4. **Aquaculture Facility Register**: Data entry and edit forms are available for the register and licence information for each aquaculture facility.

5. **Loans Register**: The loans register accommodate information about the loan itself, such as the loan amount, the repayment schedule and the equipment it was used to purchase.

6. **Legal Infractions Register**: The legal infractions register records any legal actions taken against individuals. Information such as the charge and charge date are linked to a person in the address book.

7. **Trip Interview (catch and effort data)**: Trip interviews are carried out through site visits to the landings site. On each site visit, several trips may be recorded. Each trip may use several gear, each gear may catch several types of fish and each type of fish may be sampled several times for scientific information. This complicated data collection system is stored as links between these individual data types. In addition, trips may be linked to the vessel register for the main vessel and the address book for crew.

8. **Fish Biological Data**: Under the Trip Interview entity there is a form for entering individual length, weight, age, etc. of fish.

9. **The Reports and Query Interface**: This interface allows the user to design reports and queries for printing.

The data is held and managed by a server program, Microsoft Visual Foxpro 6.0. This program runs separately to the application. This allows the data to be on any computer on a network and be accessed by several users at a time. Also, the database will always be available to users in any other program, such as MS Excel.

CARIFIS was developed from the upgrading and amalgamating of two older databases: the Trip Interview Program (TIP) and the Licensing and Registration System (LRS), which were provided to CARICOM Member States under the CARICOM Fisheries Resource Assessment and Management Programme (CFRAMP) and used by Member States to store and manage fisheries data from 1992 to 2004 (at least two Member States still use these databases).

Between 1999 and 2000, Member States began experiencing difficulties with the TIP and LRS software, the main problems being that the systems were not year 2000 (Y2K) compliant (Y2K compliant versions had been developed but were not functioning properly); and the technology used in developing the TIP and LRS databases was DOS based, and DOS technology was fast becoming obsolete. The decision was therefore taken to upgrade the TIP and LRS software, which included: developing Windows versions and upgrading and improving the databases to make them more relevant and user-friendly. This decision resulted in the amalgamation of the TIP and LRS to form a new upgraded database: the Caribbean Regional Fisheries Information System (CARIFIS). The development of CARIFIS started in 2001 and implementation of CARIFIS in Member States commenced on 31 January 2004.

A brief summary of the transition from TIP and LRS and the process of development of CARIFIS is as follows:

1. First Workshop of Regional Experts to Review and Upgrade TIP and LRS Software Programs, St. Vincent and the Grenadines, 25 – 27 July 2001.

2. Second Workshop of Regional Experts to Review and Test the Alpha Version of the Software, Jamaica, 6 – 9 November 2001.

3. Ad hoc Workshop to Review and Test the second Version of CARIFIS, St. Vincent and the Grenadines, 24 – 27 September 2002.

4. CARIFIS Training of Trainers Workshop, St. Vincent and the Grenadines, 2 – 6 December 2002.

5. CFU / FAO Fisheries Statistics and Data Management Workshop, Barbados, 10 – 22 March 2003. This Workshop recommended: continued development and implementation of CARIFIS in the Member States, setting a startup date of 31 January 2004, and provided technical support and training to Member States.

6. Major services provided from 2004 – 2006 include: computers to operate the software; in-country training in the use of CARIFIS; assistance to begin the transfer of the TIP and LRS legacy databases to CARIFIS; compilation and distribution of training material to support the use of CARIFIS.

7. Further services provided to Member States for the implementation of CARIFIS included: the provision of computers for operation of the software, compilation and distribution of training material to support the use of CARIFIS (including the development of the CARIFIS Training CD), in-country training in the use of CARIFIS and in-country provision of technical assistance for the implementation of CARIFIS, including review and transfer of legacy (TIP and LRS data) databases to CARIFIS.

In spite of the extensive efforts, most Member States have not been able to reap the full benefits of the use of the CARIFIS software. A 2008 review by the LAPE project, Mohammed *et al* (2008) concluded that the use of the regional fisheries statistical system (CARIFIS) database was still limited and that there remained data management issues which were major impediments to full implementation of CARIFIS in national fisheries statistics systems.

The Second Meeting of the CRFM Data, Methods and Training Working Group (DMTWG) held on June 16 and 23 June 2011 in St. Vincent and the Grenadines, received a presentation on CARIFIS from the IC-Net contracted Consultant, Ms. Sherill Barnwell, who was contracted to work on CARIFIS issues in St. Vincent and the Grenadines under the Statistical Pilot Project conducted as part of the Japan International

Cooperation Agency (JICA) Master Plan Study, *CRFM / JICA Formulation of a Master Plan on Sustainable Use of Fisheries Resources for Coastal Community Development in the Caribbean.* The presentation discussed some of the current challenges common to users of CARIFIS. These included the querying and reporting facility; incompatibility with Windows 7 and Vista operating systems; retention of skilled and trained staff (given high staff turnover rates and lack of knowledge transfer); and the absence of the dedicated support of a Data Manager at the CRFM level. Following on from the discussions, the DMTWG recommended that the CRFM Secretariat should seek to determine if Member States wished to continue with the use and development of CARIFIS. To this end, it was recommended that a CARIFIS survey be conducted during August / September 2011. This report presents an overview of the results of the survey.

2. OBJECTIVES OF THE SURVEY

The main objectives of the CARIFIS survey were as follows:

1. To determine the level of implementation of CARIFIS in CRFM Member States;

2. To determine the level of implementation of other fisheries database systems in CRFM Member States;

3. To determine whether or not Member States wished to continue to operate and develop CARIFIS.

4. To initiate discussions on developing a CRFM region fisheries database.

3. METHODOLOGY

The CRFM Secretariat developed (in-house) and circulated to all Member States *the CRFM stage of implementation of CARIFIS and options for the way forward Questionnaire* (***Appendix 1***). Sixteen (16) Member States: Anguilla, The Bahamas, Barbados, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, St. Kits and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago and Turks and Caicos Islands returned completed questionnaires. Trinidad and Tobago returned one questionnaire for Trinidad and one for Tobago, thus there were seventeen responses. One Member State, Antigua and Barbuda, did not return a completed questionnaire, but indicated that CARIFIS was not used by that Fisheries Division. The following pages contain an overview of answers to the CARIFIS questionnaire including a numerical summary of the responses which can be seen at ***Appendix 2***.

4. FINDINGS OF THE 2011 CARIFIS SURVEY

4.1 Overview of fisheries database systems in operation in CRFM Member States

This section summarizes the findings from questions 1 – 14 of the survey. Questions 1 – 14 with numerical summary of Member States responses can be seen at ***Appendix 2***.

4.1.1 Systems; database and non-database systems, used to manage fisheries data in CRFM Member States

Responses to question 1 – 7 indicated that 69% of the responding CRFM Member States[2] (11 of 16) used a database to store and manage fisheries data. Responses also showed that a wide range of systems were being operated by CRFM Member States to store and manage fisheries data. The systems ranged from dedicated database management programmes (such as Oracle) to Excel spreadsheets (where the Excel spreadsheets are considered the Fisheries Division / Departments database).

The database systems being operated by Member States were TIP, LRS, Access, .NET/SQL Server database, CARIFIS and Oracle. CARIFIS and Access were the most popular (44% of the 16 Member States operated CARIFIS and 38% operated Access). LRS had 13% usage and TIP, Oracle and .NET / SQL Server all had 6% usage. See Figure 1.

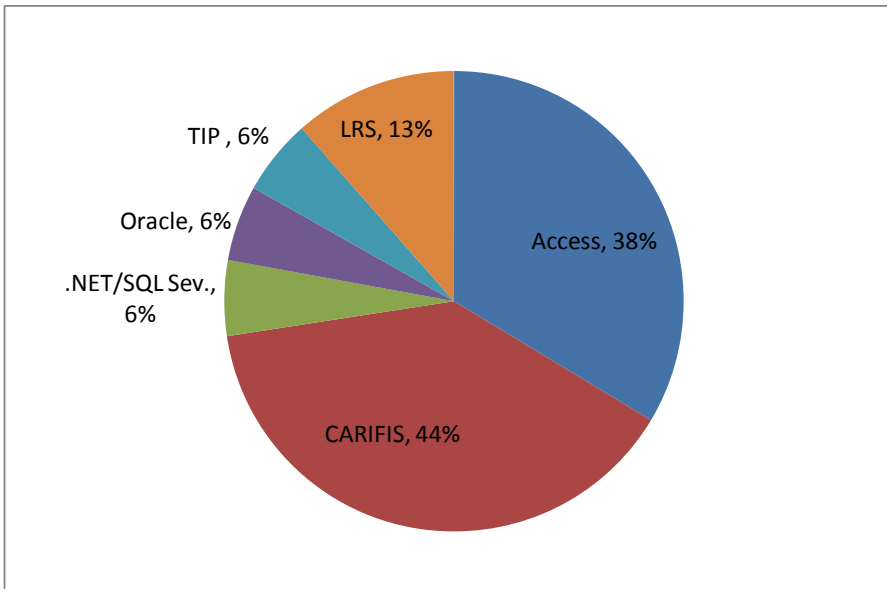

Figure 1. Databases used for management of fisheries data in CRFM Member States.

75% of Member States (12 of 16) and 76 % of respondents (13 of 17) reported using Microsoft (MS) Excel for storing vessel registration data and/or fisher registration data and/or catch and effort data (these are the data stored by the database systems). In some cases the same type of data were being stored in a database system and also in Excel spreadsheets. If Excel spreadsheets/workbooks were treated as database systems, then MS Excel would have 75% usage in CRFM Member States as indicated by Figure 2.

[2] One Member State did not return a completed questionnaire but indicated that CARIFIS was not used in that Fisheries Division.

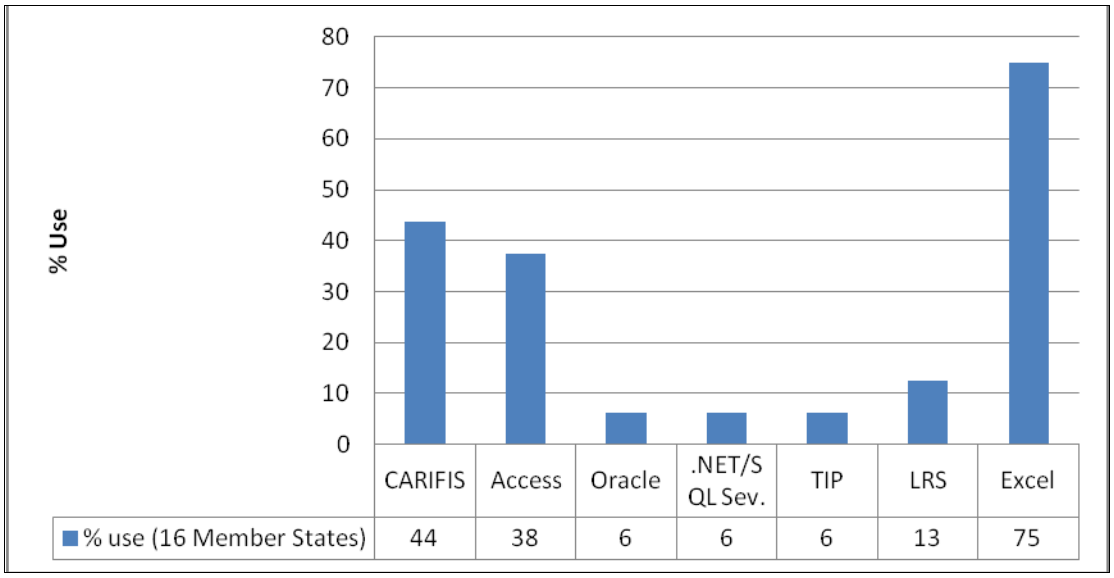

Figure 2. Systems (database and non-database systems) being used to manage fisheries data in CRFM Member States

63% of all the systems used for storing fisher registry information were dedicated database programmes, while Excel spreadsheets were used in the other 37% of cases. 68% of all the systems used for storing vessel registry information were dedicated database programmes and Excel spreadsheets were used in the other 32% of cases. Of the systems used for storing fish catch and effort data, 45% were dedicated database programmes, while Excel spreadsheets were used in the other 55% of cases[3]. A summary of the systems (databases and MS Excel spreadsheets) and associated functions can be seen in Table 1 and Figure 3.

[3] TIP and CARIFIS could also have some amount of fish biological data included in the databases, and LRS and CARIFIS could also have some Scio-Economic data included in the registries, but this was not filtered out by the survey.

Table 1: Summary of the systems (databases and MS Excel spreadsheets) and associated functions in CRFM Member States[4].

Type of Data	# of Member States with this type of data in Excel spreadsheets	# of Member States with this type of data in Access databases	# of Member States with this type of data in Oracle databases	# of Member States with this type of data in Other databases	# of Member States with this type of data in CARIFIS	# of Member States with this type of data in Other databases	# of Member States with this type of data in TIP	# of Member States with this type of data in LRS	Total number of cases % of cases where database programmes are used
Fisher Register	7	3	0	1	6	0		2	**19**
%	**37**	16	0	5	32	0	0	11	**63**
Vessel Register	7	4	1	1	7	0		2	**22**
%	**32**	18	5	5	32	0	0	9	**68**
Total Fish Production	13	2	1	0	0	0			**16**
%	**81**	13	6	0	0	0	0	0	**19**
Catch & Effort data	12	3	1	0	5	0	1		**22**
%	**55**	14	5	0	23	0	5	0	**45**
Fish Biological data	7	1	0	0		0			**8**
%	**88**	13	0	0	0	0	0	0	**13**
Scio-Economic data	5	1	1	0		0			**7**
%	**71**	14	14	0	0	0	0	0	**29**
Export data	9	1	0	0		0			**10**
%	**90**	10	0	0	0	0	0	0	**10**
Import data	7	0	0	0		0			**7**
%	**100**	0	0	0	0	0	0	0	**0**
Environmental data	3	1	0	0		1			**5**
%	**60**	20	0	0	0	20	0	0	**40**
Respondent totals	**70**	**16**	**4**	**3**	18	1	1	4	**117**
Totals (%)	**60**	**14**	**3**	**3**	**15**	**1**	**1**	**3**	**40**

[4] 16 Member States returned completed questionnaires. Trinidad and Tobago returned one questionnaire for Trinidad and one for Tobago, thus there were 17 responses.

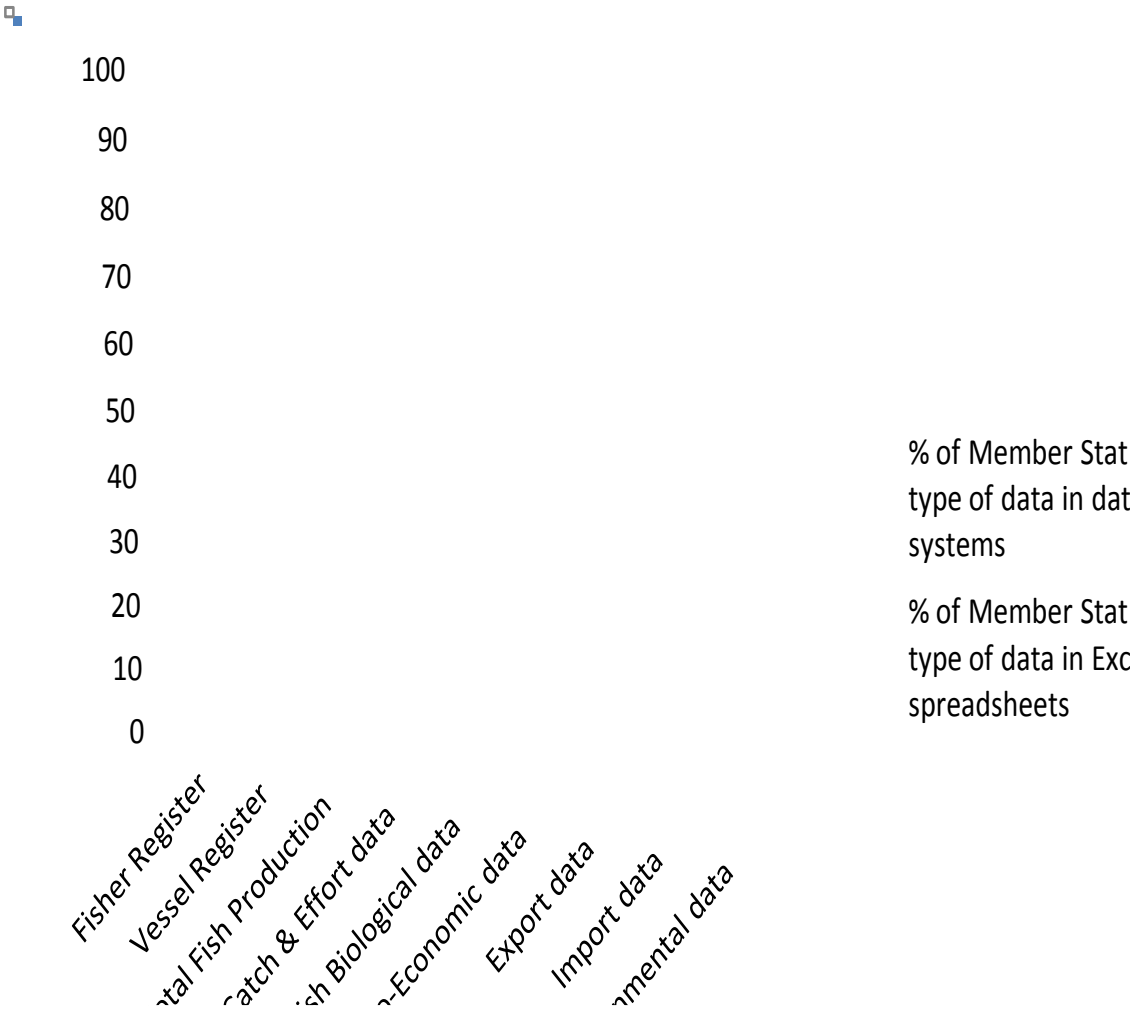

Figure 3. Percentage of database programes vs. Excel spreadeshessts used for storing fisheries information/data in sixteen CRFM Member States.

4.1.2 Categories of fisheries data stored in databases and non-database systems in CRFM Member States

As observed from Table 1 and Figure 3, the categories of fisheries data most often stored in databases were vessel registries, fisher registries, and fish catch and effort data.

94% (15 of the 16 responding Member States) store information from the fisher and vessel registries and fish catch and effort data of their respective countries, in a computerised form. One Member State did not have a fisher and vessel registry (Montserrat) and one Member States did not have fish catch and effort data stored electronically (Anguilla). 81% of the responding Member States reported that data relating to total fish production were stored electronically. 56% (9 of the 16 Member States) stored data on export of fish and 44% (7 of 16 Member States) stored fish import data and fish biological data in a computer system (mostly Excel spreadsheets). Socio-economic and environmental data are stored least frequently. The types of data/information stored in computerised systems (databases and Excel spreadsheets) and the total number of cases (across all respondents) where the data were stored, is listed in Table 1 and Figure 4.

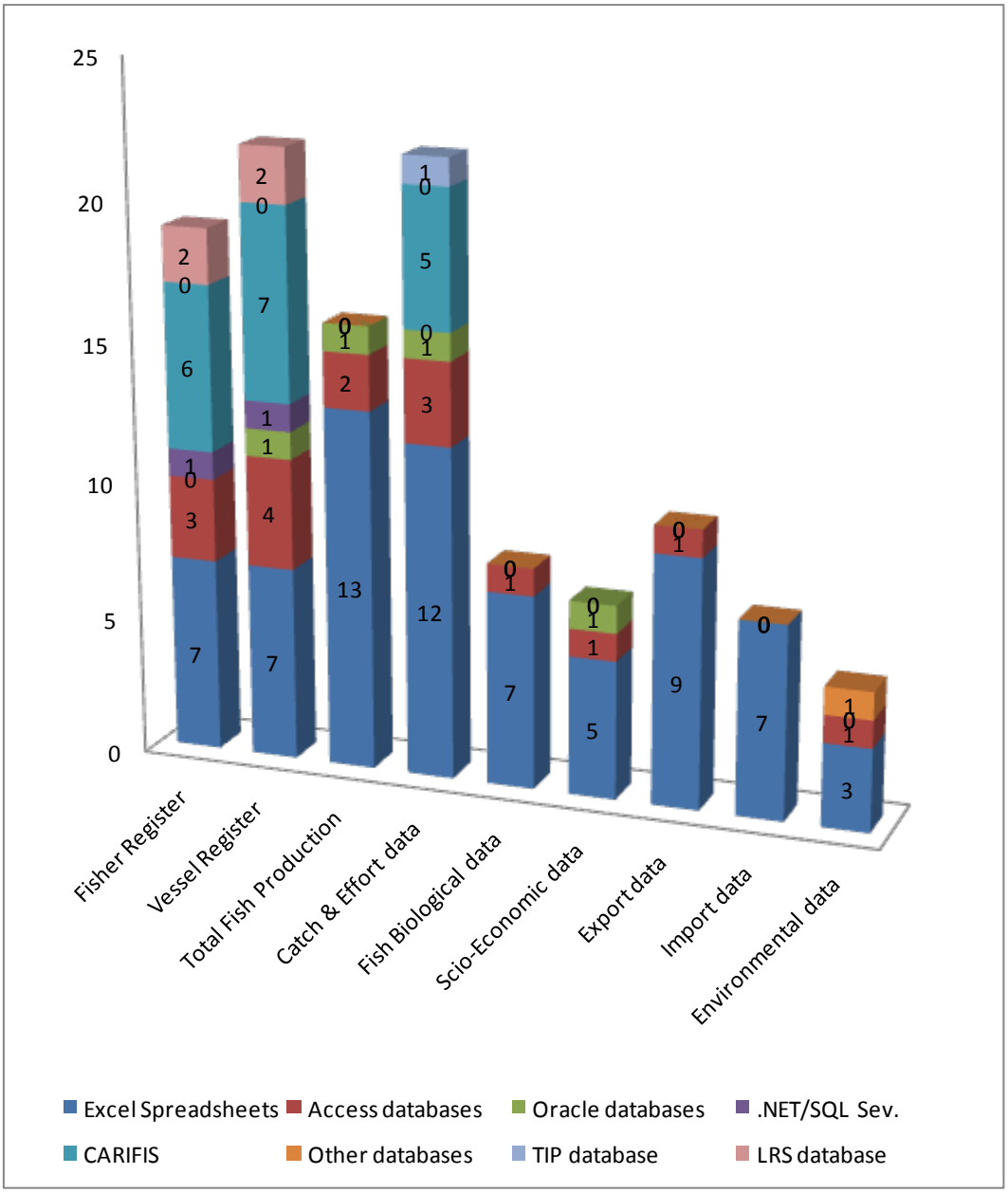

Figure 4. The types of data/information stored in computerised systems (databases and Excel spreadsheets) and the total number of cases (across all respondents) where the data were stored

40% of respondents (6 respondents) had technical support for systems (databases and Excel spreadsheets) other than CARIFIS, and 67% of respondents (10 respondents) were satisfied with the performance of the other databases and Excel spreadsheet that they operate.

4.1.3 The stage of implementation of CARIFIS in CRFM Member States

As at 30 September 2011, 41% (7 of 17) of the CRFM Member States were operating CARIFIS and 59% (10 of 17) were not operating CARIFIS (Figure 5). Of the 10 respondents not operating CARIFIS, 50% (5

respondents: Dominica, Grenada, Haiti, St. Kitts and Nevis and St. Lucia) indicated willingness to have the countries' fisheries data transferred to CARIFIS and the other 50% (5 respondents: Barbados, Belize, Suriname, Tobago and Trinidad,) indicated unwillingness to have the countries' fisheries data transferred to CARIFIS.

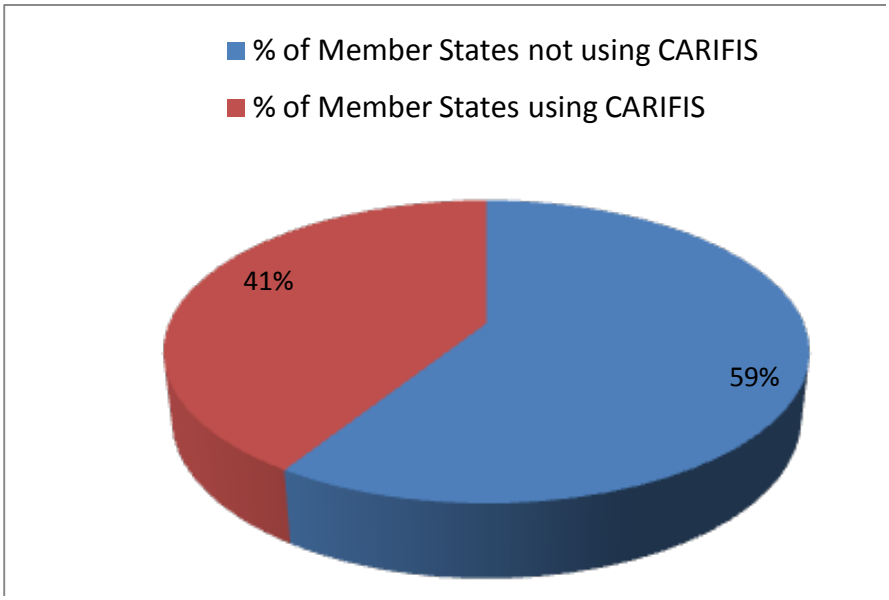

Figure 5. Percentage of Member States operating/not operating CARIFIS

CARIFIS is a relational database with a FoxPro backend and a Delphi interface. CARIFIS provides the user with eight sections for entering and reporting of data. Among CRFM CARIFIS users, the three most operated sections of CARIFIS were: the vessel registry (100% utility), the fisher registry (86% utility) and the trip interview component (71% utility). The reports section was operated by 29% of users and the legal registry by 14% of users. The aquaculture facilities registry, the processing facilities registry and the loan section were not being operated by any Member State (see Figure 6). The structures of most of the other storage systems used by CRFM Member States were not similar to that of CARIFIS.

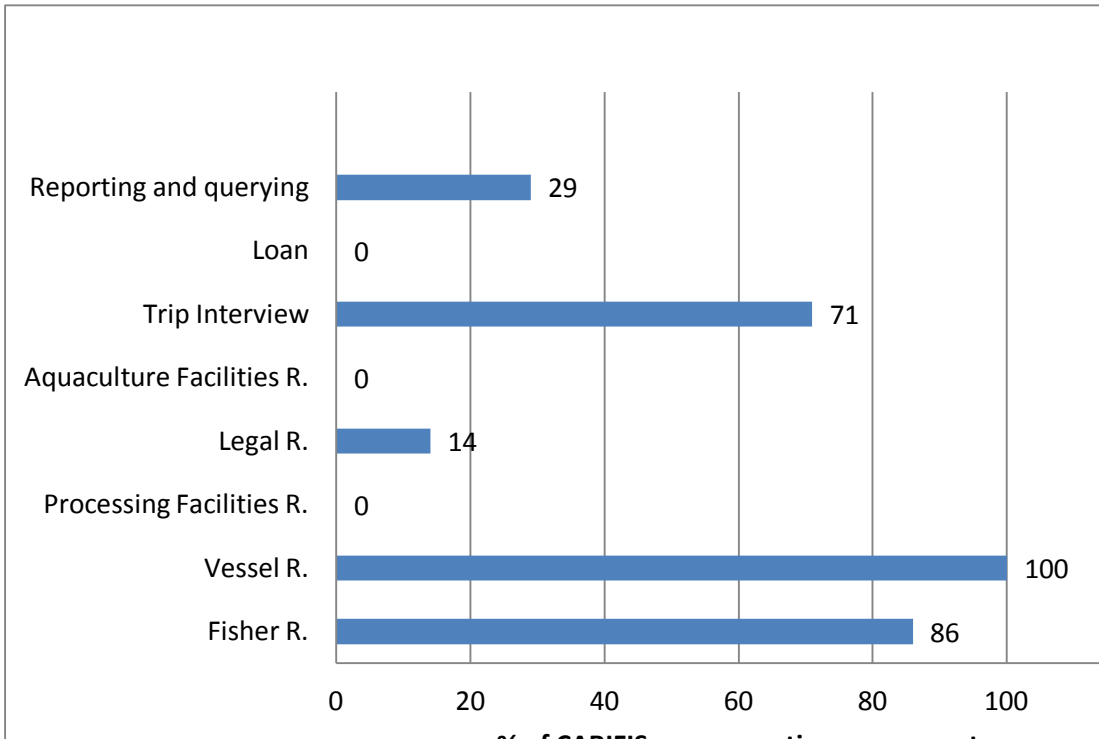

Figure 6: Components of CARIFIS currently being operated by CRFM CARIFIS users

4.1.4 Reasons for non-use of CARIFIS in CRFM Member States

The reasons for non-use of CARIFIS could be divided into four categories:

1. CARIFIS is not suitable to the needs of the Department; accounted for 8% of answers.
2. Technical problems and/or require upgraded CARIFIS software; accounted for 67% of answers.
3. CARIFIS training required; accounted for 17% of answers
4. CARIFIS programme is not user friendly; accounted for 8% of answers.

The responses as placed in the categories can be seen at Figure 7 and ***Appendix 3***.

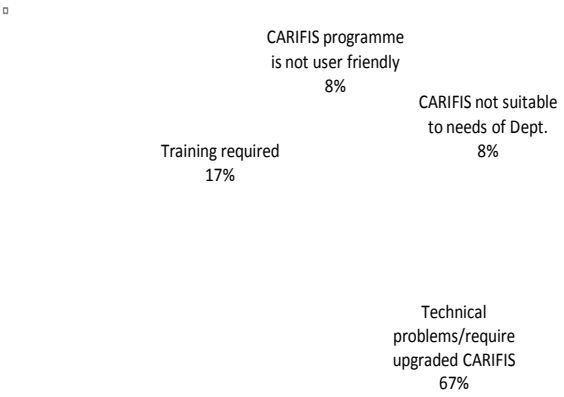

Figure 7: Categories of reasons for non-use of CARIFIS in CRFM Member States (2010-2011)

4.1.5 Past CARIFIS use by current non-users

60% (6 of 10) of the current CARIFIS non-users operated CARIFIS in the past. Most of the current CARIFIS non-users had utilized: the fisher registry (100% of current non-users); the vessel registry (83% of current non-users) and the trip interview component (50% of current non-users). See Figure 8.

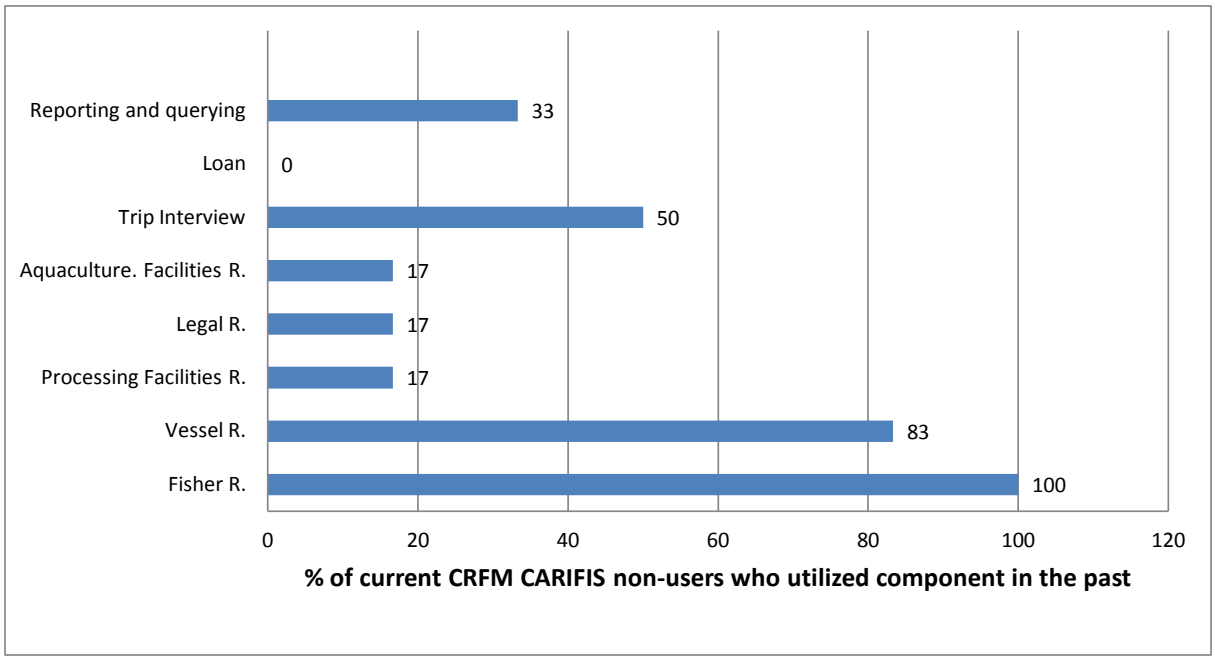

Figure 8. Components of CARIFIS operated in the past by current CRFM CARIFIS non-users

4.1.6 Historical reasons for ceasing operation of CARIFIS (2004 - 2009)

The current CRFM CARIFIS non-users, who utilized CARIFIS in the past, gave three categories of reasons for ceasing operation of the software:

1. Technical problems and or require upgraded CARIFIS software; cited by 78% of respondents.

2. CARIFIS training required; cited by 11% of respondents.

3. CARIFIS programme is not user friendly; cited by 11% of respondent.

The responses as placed in the categories can be seen at Figure 9 and ***Appendix 4***.

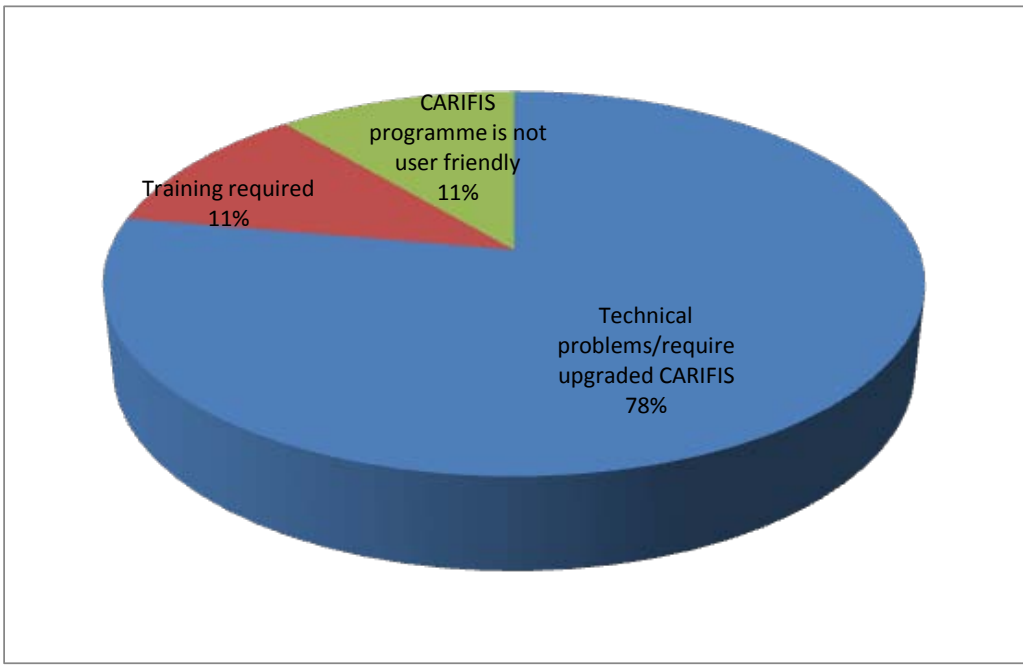

Figure 9: Categories of historical reasons for ceasing operation of CARIFIS (2004-2009)

4.1.7 Priorities for making CARIFIS more useful to the CRFM Member States

86% of the Member States using CARIFIS indicated the following priorities for making CARIFIS more useful to them (see Figure 10):

1. De-bugging of the programme,

2. Upgrading of CARIFIS to make it Vista/Windows 2007 compatible, and

3. Training in querying and reporting.

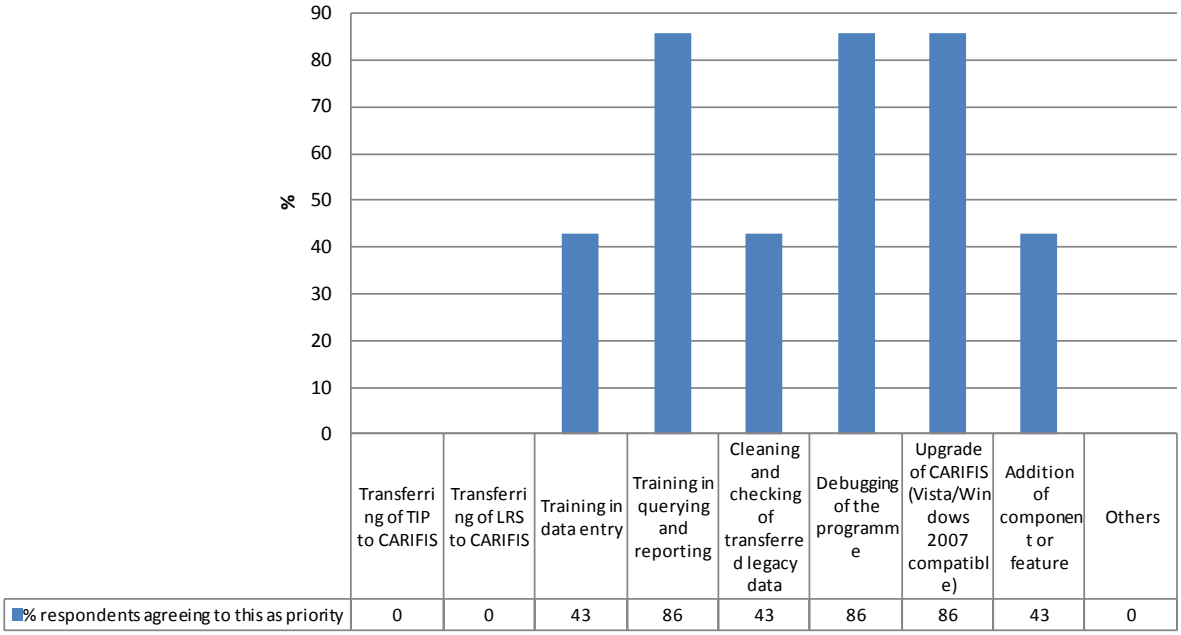

Figure 10. Priorities for making CARIFIS more useful to the CRFM Member States

In addition, the Member States also asked for the following components to be added or addressed in CARIFIS:

1. *improved data structure - more fields;*
2. *database needs to use different database backend,(FoxPro no longer supported);*
3. *reporting module needs to be changed/replaced as it is inadequate;*
4. *the user interface needs updating/improving (too tedious, too many tabs, takes much longer than TIP to enter data);*
5. *user support needs to be ongoing; and*
6. *being able to link / identify a fisher / boat owner who has received some form of benefit from the Government or otherwise.*

4.2 Support / non-support for continued operation and development of CARIFIS

Question 15: "*would you like to see CARIFIS upgraded and modernized?*"

Question 16: "*Do you think the region should continue to support CARIFIS?*

Question 17: "*If you think the region should not continue with CARIFIS what database programme would you recommend as a replacement?"*

4.2.1 Support for the upgrading of CARIFIS

59% of respondents would like to see CARIFIS upgraded and modernized, 23% would not like to see CARIFIS upgraded and modernized and 18% of respondents abstained from answering yes or no to the question (see Figure 11).

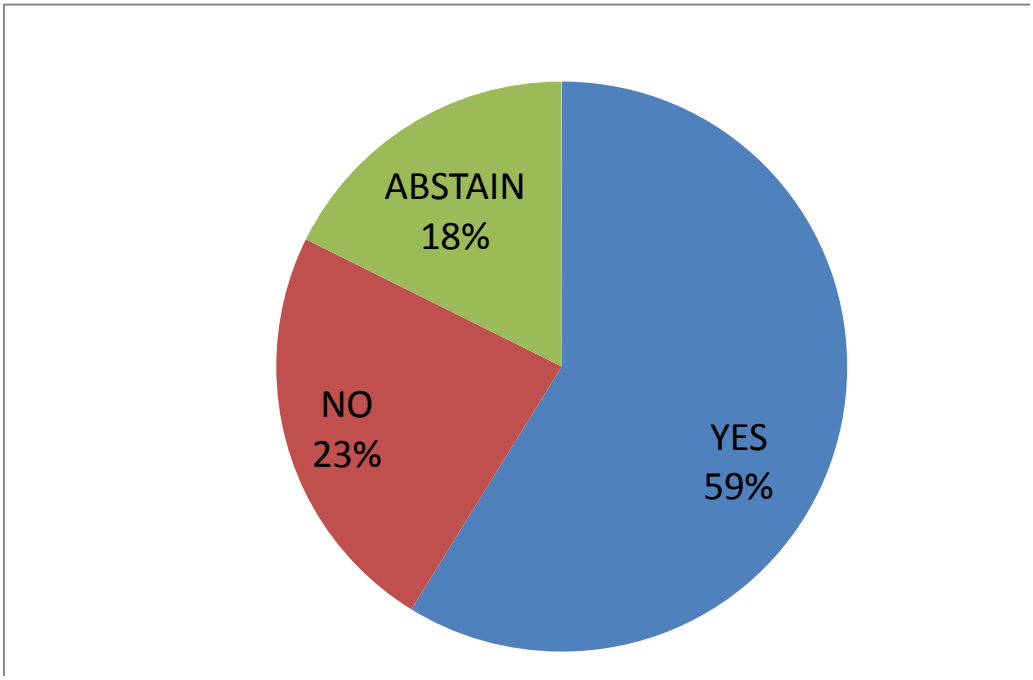

Figure 11: Answers to question 15: *"would you like to see CARIFIS upgraded and modernized?"*

4.2.2 Reasons given for answering "yes" to the upgrading and modernizing of CARIFIS

The reasons given for answering ***yes*** to the upgrading and modernizing of CARIFIS (question 15) could be categorized into three groups:

1. Upgrading and modernizing CARIFIS would assist in the integration/combining, comparison and sharing of data across the region; cited by 33% of respondent.

2. Support for upgrading and modernizing of CARIFIS because CARIFIS is a useful tool or the concept is good; cited by 21% of respondents.

3. Upgrading and modernizing CARIFIS would fix problems/bugs etc. now found in the existing version of CARIFIS; cited by 43% of respondents.

The responses as placed in the categories can be seen at Figure 12 and ***Appendix 5***.

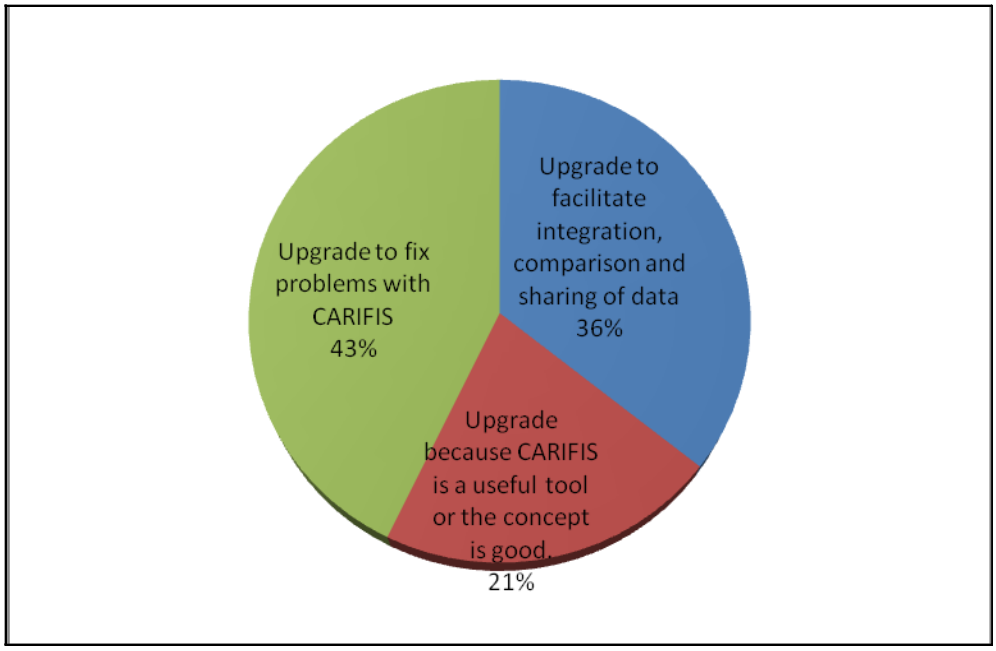

Figure 12: Reasons given for answering "yes" to the upgrading and modernizing of CARIFIS, categorized into three groups.

4.2.3 Reasons given for answering "no" to the upgrading of CARIFIS

The reasons given for answering ***no*** to the upgrading and modernizing of CARIFIS (question 15) could be categorized into two groups.

1. Consolidating of, and moving database systems to a common platform; cited by 67% of respondents.

2. The CRFM Secretariat has no resident CRFM database expert to help member countries find solutions to their individual technical problems; cited by 33% of respondents

The responses as placed in the categories can be seen at Figure 13 and ***Appendix 6***.

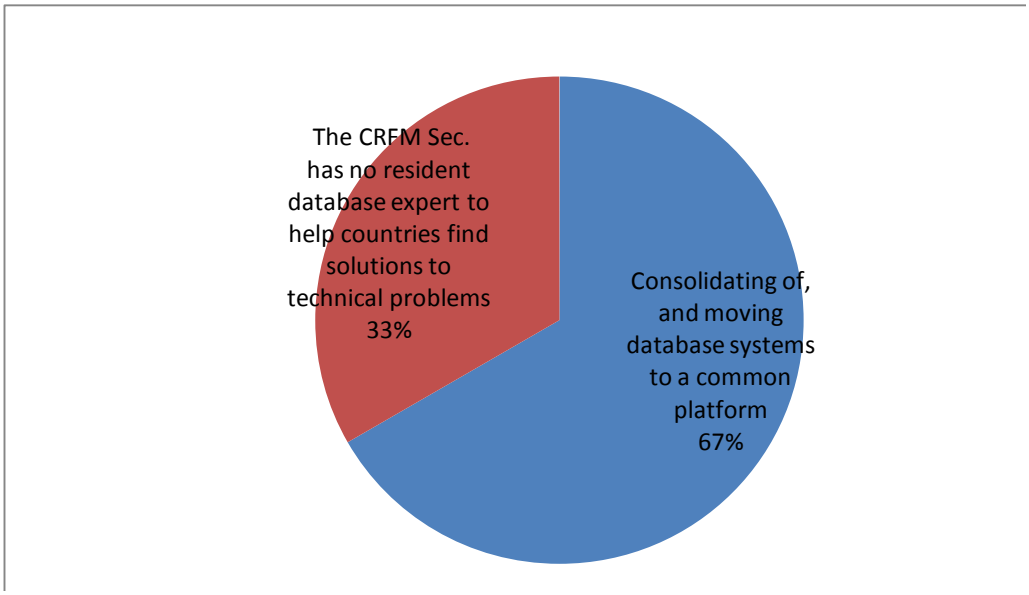

Figure 13: Reasons given for answering "no" to the upgrading and modernizing of CARIFIS, categorized into two groups.

18% of respondents abstained from answering yes or no to the question on upgrading of CARIFIS, and as an alternative, provided the following comments:

1. *"I would hate to cast aside the investment already made in CARIFIS. The programme MUST be upgraded to work in the modern versions of Windows operating systems, for desktops and on networks. As it stands now it will not run on our current network software (Windows Server 2008). This country has a need to create "modules" that will be exclusive to ourselves and there should be the capacity for them to be integrated into CARIFIS. If this is not possible, then we will have to look elsewhere."*

2. *"Useful tool as long as you can fix problems and use (CARIFIS), it would be great."*

4.2.4 General support for CARIFIS in the region

71% of the respondents indicated that the region should continue to support CARIFIS while 23% of respondents indicated that the region should not continue to support CARIFIS (6% of respondents abstained from answering yes or no to the question) see Figure 14.

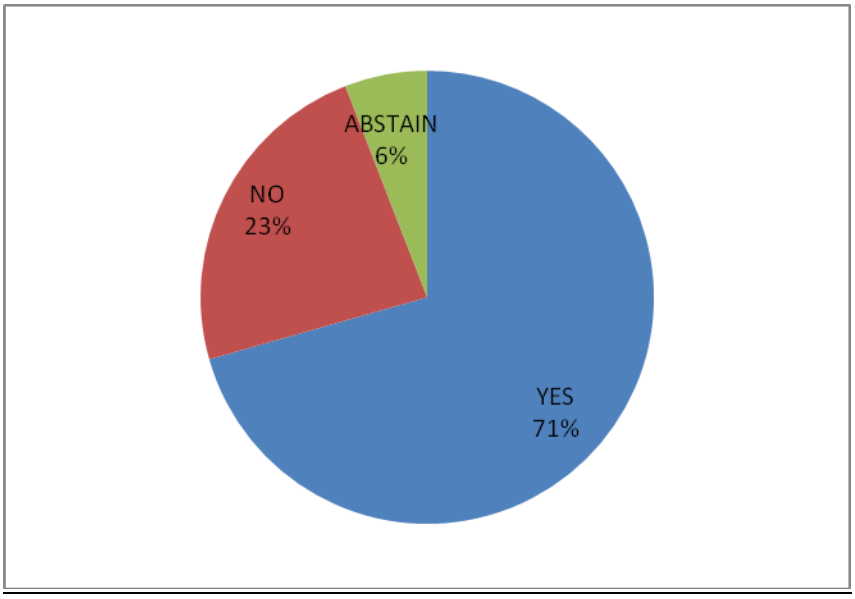

Figure 14: Answers to question 16: "Do you think the region should continue to support CARIFIS?"

4.2.5 Suggestions towards possible CARIFIS replacements

The respondents, who indicated that the region should not continue to support CARIFIS, suggested the following database systems as possible replacements for CARIFIS.

1. The Belize Fisheries Department recommended the use of its application developed on .NET technology (Visual studio 2010) and which is administered with Microsoft SQL Server 2010.

2. MS SQL Server (suggested by two respondents).

3. Microsoft access programme.

The full text of the responses can be seen at ***Appendix 7***.

4.3 Considering the development of a CRFM region fisheries database

When asked *"Would it be useful to have a secured regional database where countries can access certain information"* 88% of respondents said yes, 6% of respondents said no and 6% abstained from answering yes or no (see Figure 15).

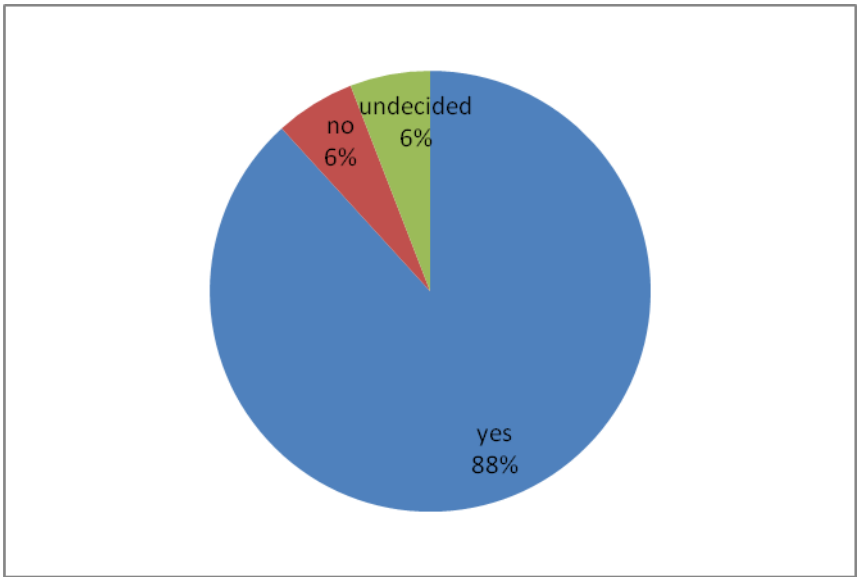

Figure 15: Answers to question 18 *"Would it be useful to have a secured regional database where countries can access certain information?"*

4.4 Data that could be made available in a CRFM region fisheries database

Respondents were also asked "*What Information would it be useful to be able to access from a regional database"*. Nine or more respondents indicated the following (see Figure 16):

1. Numbers / types of fishers in a country
2. Numbers / types of boats in a country
3. Total landings / total fish production in a country
4. Catch and effort data
5. Fish Biological data
6. Socio-Economic data
7. Export data
8. Import data
9. Environmental data

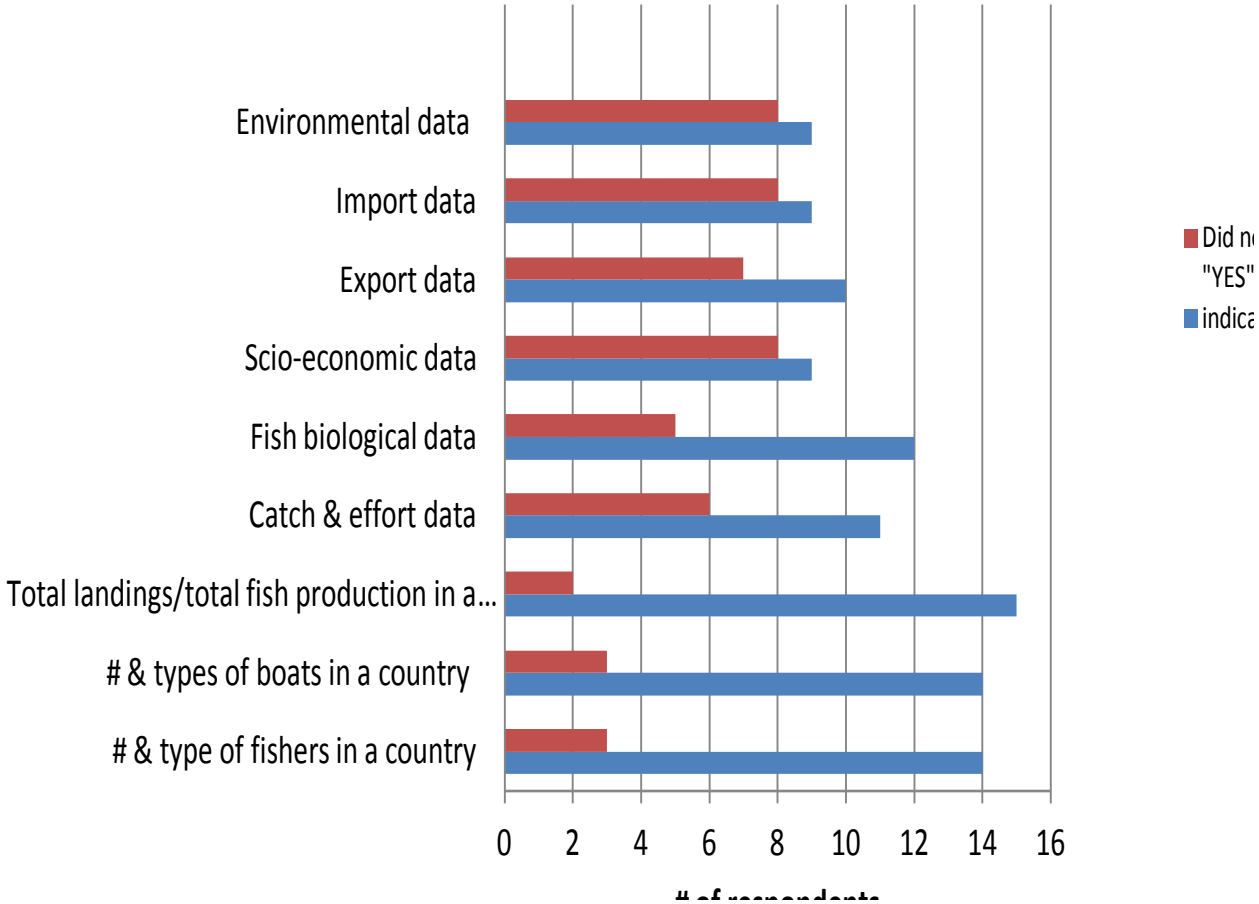

Figure 16. Responses to question 19 "*What Information would it be useful to be able to access from a regional database?*"

The respondents also made the following suggestions, of other types of information it would be useful to be able to access from a regional database:

1. *Information on research*
2. *Fish age at maturity and fishing grounds*
3. *Foreign vessels sighted in the regions.*

5. DISCUSSION

5.1 Overview and status of CARIFIS in the CRFM region

1. CARIFIS has been available to CRFM Member States since 2004, and the CRFM Secretariat has provided ongoing support for CARIFIS, with emphasis on national-level support. Services provided by the CRFM Secretariat to Member States for the implementation of CARIFIS included:
   - the provision of computers for operation of the software,
   - regional training workshops,

- compilation and distribution of training material to support the use of CARIFIS, and
- in-country training in the use of CARIFIS and in-country provision of technical assistance for the implementation of CARIFIS (including review and transfer of legacy TIP and LRS data to CARIFIS).

2. Results of the CRFM CARIFIS survey showed that 41% (7 of the 17) of CRFM Member States currently operate CARIFIS and 59% (10 of the 17) do not operate CARIFIS.

3. 60% of Member States currently not operating CARIFIS had used it in the past, but had discontinued usage citing technical difficulties and training needs as the main reasons for discontinuing the use of CARIFIS.

4. These findings are consistent with the conclusion of the 2008 LAPE CARIFIS review. The 2008 review by the LAPE project, Mohammed *et al* (2008), concluded that the use of the CARIFIS database was still limited and that there remained data management issues which were major impediments to full implementation of CARIFIS in national fisheries statistics systems.

5. In recent times, (2010 – present), Member States with functional CARIFIS systems, that upgraded their operating systems to VISTA or Window 7, have been experiencing grave technical difficulties with their CARIFIS system.

6. Notwithstanding the technical difficulties being experienced, findings of the CARIFIS survey also showed that 50% of Member States not already using CARIFIS to manage their fisheries data would like to have their data transferred to CARIFIS.

7. Member States were asked to provide a reason for choosing to transfer their data to CARIFIS. One Member State indicated that CARIFIS is a "fisheries dedicated database" that can accommodate all types of fisheries data and can also produce reports without necessarily exporting to another database. Another stated that: if CARIFIS is improved and become more secure *(stable)* and was used in all CRFM Member States, CARIFIS would facilitate information exchange among states. Some Member States also indicated that before transferring their data to CARIFIS, it would be necessary to train the users as well as build capacity within the country to fix problems in the database. The indication seem to be that there is still a place for CARIFIS in the region but consideration should be given to user training, building technical capacity and improving and upgrading of the software.

8. The countries already using CARIFIS cited the following as the priorities for making CARIFIS more useful to them: de-bugging of the programme, upgrading of CARIFIS to make it Vista / Windows 2007 compatible and training in querying and reporting.

9. Findings of the survey also showed that some Member States have developed customized national fisheries databases, these include: Access, Oracle, and .NET / SQL Server databases. A brief status statement of these databases could be as follows:
   - TIP and LRS are DOS-based and were improved on to develop CARIFIS;
   - the .NET / SQL Server database is a new database being developed by Belize;
   - the Oracle database was developed and is used by Trinidad;
   - most of the Access databases are specific to the particular country needs;
   - CARIFIS is a CRFM developed fisheries database used by 41% of CRFM Member States.

10. With the exception of CARIFIS (which is derived from TIP and LRS), all the other databases mentioned are the properties of specific Member States. CARIFIS is owned by and developed by CRFM Member States and is available to all CRFM Member States.

11. The results also showed that there is great dependence on Microsoft Excel (MS Excel) for storing complex fisheries data in a number of CRFM Member States, as 75 % of Member States (12 of 16) and 76 % of respondents (13 of 17) reported using MS Excel for storing vessel registration data and / or fisher registration data and / or catch and effort data (these are the data stored by the database systems).

12. The use of MS Excel spreadsheets as a database is not peculiar to CRFM Member States, as according to Baptiste (2010), an alarmingly large number of individuals use Microsoft Excel to store non-numeric arrays of information that should probably be stored in a database. Microsoft Excel is a spreadsheet programme with limited database capabilities, but it is understood and available to many CRFM users and, as can be seen from the survey, is being utilized as a database system by many of the CRFM Member States.

13. A database programme is essentially geared towards efficient storage and retrieval of data. Excel spreadsheets when used for data storage, can become too cumbersome, particularly in terms of retrieving data stored. Excel spreadsheets also offer little or no data validation and little or no protection against data corruption from poorly trained users. However if data are stored in a relational database, it's a simple task in the current versions of Office, etc. to pull the data needed from any database into an Excel spreadsheet. The advice given is “store data in a database; work on it in a worksheet” (Anon, 2011).

14. The needs of the region’s Fisheries Divisions have become more multifaceted given the need to:
- expand and improve the collection, management and reporting of basic fisheries data;
- implement the *Declaration on Illegal, Unreported and Unregulated Fishing* and *The Caribbean Community Common Fisheries Policy*;
- fulfill obligations under national, regional and international principles and rules, including obligations under International Commission for the Conservation of Atlantic Tunas (ICCAT);
- conduct trans-boundary / regional stock assessments;
- and to promote and facilitate the region’s market and economic competitiveness.

Given these new and evolving needs, Member States are now faced with the question “is the current fisheries data management system adequate for the current requirements?”

15. The survey revealed that some Member States have developed customized national fisheries databases, but we must be mindful of the fact that some Member States might not be able to afford to build and support their own fisheries database. Therefore, even if all Member States do not use and support CARIFIS there could still be a place for CARIFIS in the region among those Member States still very dependent on Excel and which are unable to fund development of a national fisheries database.

16. A Member State also pointed out that considerable resources have already been placed in CARIFIS and thus it would therefore be a considerable waste of time and resources to neglect its use if the possibility and resources are available for upgrading.

5.2 Considerations for a regional database

1. The Agreement Establishing the Caribbean Community Common Fisheries Policy states that participating Member States have agreed to develop and maintain national and regional databases relating to (a) fisheries catch and fishing effort, registration and licensing data as well as biological, ecological, economic, social, aquaculture and any other relevant data; and (b) research on status of stocks, effect of environmental changes on fisheries, effectiveness of management, social and economic performance of fisheries, potential of underutilized and unutilized fisheries resources.

2. Responses to questions 18 and 19 of the CARIFIS questionnaire provided a measure for the ease of implementation and a possible starting point for the way forward to create, store, find, share and interact with structured information on a larger scale at the regional level.

3. Responses to question 18 indicated that 88% of respondents agreed that it would be useful to have a secured regional database where countries can access certain information and responses to question 19 indicated that 53 - 88 % of respondents agreed that the regional database could be a repository for fisheries data such as: number and type of fishers, number and type of vessels, total landings / total fish production, catch and effort and fish biological data.

6. RECOMMENDATIONS

Acknowledging that the needs of the region's Fisheries Divisions have become more multifaceted, and that nationally and regionally CRFM Member States are being called upon to create, store, find, share and interact with structured information on a larger scale than previously required in the region;

Recognizing that some Member States have developed customized national fisheries databases;

But mindful that some Member States might not be able to afford to build and support their own fisheries database; and

Given that the main reasons cited for non-use of CARIFIS (historically and currently) were technical issues with the software and training needs, and that notwithstanding the technical difficulties being experienced, 50% of Member States not already using CARIFIS to manage their fisheries data would like to have their data transferred to CARIFIS;

The following recommendations are proposed:

1. CARIFIS should be fixed, upgraded and modernized to ensure that the Member States without their own national fisheries systems or Member States wishing to continue with CARIFIS use have the option for use of the database (12 Member States fall in this category).

2. The priority areas to be addressed are:
   - de-bugging of the programme;
   - upgrading of CARIFIS to make it Vista / Windows 2007 compatible, resolving the issues with the querying and reporting section of the programme; and
   - training in the use of CARIFIS.

3. The CRFM Secretariat builds its capacity to assist Member States with technical and training needs related to CARIFIS.

7. THE NEXT STEP

In keeping with the recommendations above, the CRFM Secretariat could contract a consultant to:

- Undertake a comprehensive review of CARIFIS;
- Upgrade the CARIFIS software, including de-bugging of the programme, upgrading of CARIFIS to make it Vista/Windows 2007 compatible, and resolving the issues with the querying and reporting section of the programme and exploration of CARIFIS as, or linked to a regional database; and
- Undertake a regional CARIFIS workshop to introduce the upgraded version of CARIFIS and to train fisheries staff in the use of the new version.

8. REFERENCES

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CRFM, 2004. Caribbean Fisheries Information System (CARIFIS) Database Software. Caribbean Regional Fisheries Mechanism. Belize City, Belize.

Mohammed, E., Fanning, P., Parker, C., Theophille, D., Martin, L., Punnett, S, Wilkins, R., Rambally, J., Phillip, P., Isaac, C., Philmore, J. & Barrett, A. 2008. Scientific Basis for Ecosystem-Based Management in the Lesser Antilles Including Interactions with Marine Mammals and Other Top Predators (LAPE). Lesser Antilles Pelagic Ecosystem Projects – LAPE. 52 p.

Appendix 1: Survey questionnaire

CRFM STAGE OF IMPLEMENTATION OF CARIFIS AND OPTIONS FOR THE WAY FORWARD QUESTIONNAIRE

The CFRAMP programme (1991 to 2001) provided two databases; the Trip Interview Program (TIP) and the Licensing and Registration System (LRS) to CRFM Member States, for the storage and reporting of fisheries data. The databases were written in MSDOS, were not Y2K compliant and by 2001 it became necessary to develop Windows versions of these two software packages. The CRFM Secretariat recruited a Consultant (Dr. Paul Medley) who worked with a Working Group comprising Data Managers from selected CRFM Member States to define the needs and develop the new software. The upgrading and amalgamating of TIP and LRS led to the creation of the Caribbean Fisheries Information System (CARIFIS). The development of CARIFIS started in 2001 and the start-up date for implementation of CARIFIS in Member States was 31 January 2004. Since then, to facilitate successful implementation of the CARIFIS database at the country level the CRFM Secretariat has provided a number of services including: computers, training and extensive technical support through the provision of consultancy services.

During the recently concluded second meeting of the CRFM DMTWG held on 16 and 23 June 2011, it was recommended that: CRFM (through the Secretariat) should find out if Member States wish to continue with the use and development of CARIFIS. A general survey should be done (a simple survey: perhaps a letter and a questionnaire). Further: Ms. June Masters (CRFM Secretariat) was asked to prepare the draft survey instrument and circulate it to Member States within two weeks of the close of the 2011 Scientific Meeting. Countries should send feedback to the Secretariat within two weeks of receipt of the instrument, and the survey should be completed by 30 September 2011.

The answers to the following questions will assist the Secretariat in providing options to CRFM for the way forward with CARIFIS.

Member State.....

(1) Is TIP software still in use in the Division / Department?
- ☐ Yes
- ☐ No

(2) Is the LRS software still in use in the Division / Department?
- ☐ Yes
- ☐ No

(3) Is CARIFIS currently in use in the Division / Department?
- ☐ Yes, started in.....to present
- ☐ No

(4) If CARIFIS is not in use now, was it ever used in the past?
- ☐ Yes
- ☐ No

1st Period of CARIFIS use.....stopped because.....

2nd Period of CARIFIS use.....stopped because.....

3rd Period of CARIFIS use.....stopped because.....

(5) If CARIFIS was used in the past but is not being used currently, which registers / modules in CARIFIS did you use (tick all that applied to you)?

- Fisher Register
- Vessel Register
- Processing Facilities Register
- Legal Register
- Aquaculture Facilities Register
- Trip Interview
- Loan
- Reports (reporting and querying)

(6) Is CARIFIS the only database used to store fisheries data at your Division / Department?

- Yes
- No

(7) What are the other databases/spreadsheets used for storing fisheries data at your Division / Department and what types of data are stored in them (tick all that applies)?

Excel	**Access**	**Oracle**	**Others (specify).....**
Fisher registry	Fisher registry	Fisher registry	Fisher registry
Boat registry	Boat registry	Boat registry	Boat registry
Total fish production	Total fish production	Total fish production	Total fish production
Catch and effort	Catch and effort	Catch and effort	Catch and effort
Fish Biological data	Fish Biological data	Fish Biological data	Fish Biological data
Socio-Economic data	Socio-Economic data	Socio-Economic data	Socio-Economic data
Export data	Export data	Export data	Export data
Import data	Import data	Import data	Import data
Environmental data	Environmental data	Environmental data	Environmental data

(8) For the other database(s) that you use, does the structure(s) of the database(s) resemble that of CARIFIS?

- Yes
- No

(9) Do you have technical support for your database (databases other than CARIFIS)?

- Yes
- No

Provide details of IT support for your fisheries database (contact name and number or address)

.....

.....

.....

(10) Are you satisfied with the performance of the database (other than CARIFIS) that you now use?

- Yes
- No

Comments.....

.....

.....

(11) If CARIFIS is not in use, why is it not in use?

.....

.....

.....

.....

(12) If CARIFIS is not in use would you like to have your data transferred to CARIFIS?

- Yes
- No

Reason.....

.....

.....

(13) If CARIFIS is in use which registers / modules in CARIFIS are you currently using (tick all that applies to you)?

- Fisher Register
- Vessel Register
- Processing Facilities Register
- Legal Register
- Aquaculture Facilities Register
- Trip Interview
- Loan
- Reports (reporting and querying)

(14) If CARIFIS is in use what does your Division need to make CARIFIS more useful? (tick all that applies to you)?

- Transferring of legacy data from TIP to CARIFIS
- Transferring of legacy data from LRS to CARIFIS
- Training in data entry
- Training in reporting and querying
- Further cleaning and checking of transferred legacy data

- De bugging of the programme
- Upgrade of CARIFIS (Vista/Windows 2007 compatible)
- Addition of component or feature (list the component or feature)

.....

- Others.....

(15) Would you like to see CARIFIS upgraded and modernized? (Yes or No and give reason below).
- Yes
- No

Reason…….....

.....

.....

.....

.....

(16) Do you think the region should continue to support CARIFIS?
- Yes
- No

(17) If you think the region should <u>not</u> continue with CARIFIS what database programme would you recommend as a replacement?

.....

.....

(18) Would it be useful to have a secured regional database where all countries can access certain information?
- Yes
- No

(19) What information would it be useful to be able to access from a regional database (tick all that applies)?
- Numbers / types of fishers in a country
- Numbers / types of boats in a country
- Total landings / total fish production in a country
- Catch and effort data
- Fish Biological data
- Socio-Economic data
- Export data

- Import data
- Environmental data
- Others (specify) .....

Name of Respondent: .....

Post of Respondent: …….....

Checked by the Chief Fisheries Officer: .....

Date: ….....

Please note:
If the respondent is not the Chief Fisheries Officer then the form should be checked and signed by the Chief Fisheries Officer.

THANK YOU

Appendix 2: Numerical summary of responses received from Member States

Questions #	1		2		3			4			
Text of Question	Is TIP SW still in use in the Division / Department? Code: 1 = a tick		Is LRS SW still in use at the Division / Department? Code: 1 = a tick		Is CARIFIS currently in use in the Division / Department? Code: 1 = a tick			If CARIFIS is not in use now, was it ever used in the past? Code: 1 = a tick			
RESPONSES / MEMBER STATE	YES	NO	YES	NO	YES	NO	Started in…to present	YES	NO	Period of CARIFIS use	Stopped because
Total	1	16	2	15	7	10		6	4		

Questions #	5								6	
Text of Question	If CARIFIS was used in the past but is not being used currently, which registers / modules in CARIFIS did you use? Code: 1 = a tick								Is CARIFIS the only database used to store fisheries data at your Division / Department? Code: 1 = a tick	
RESPONSES / MEMBER STATE	Fisher R.	Vessel R.	Processing Facilities R.	Legal R.	Aquaculture. Facilities R.	Trip Interview	Loan	Reports (reporting and querying)	YES	NO
Total	6	5	1	1	1	3	0	2	1	14

Questions #	7								
Text of Question	What are the other databases/spreadsheets used for storing Fisheries data at your Division / Department? Code: Excel 1, Access 2, Oracle 3, Others 4. Others: Belize Fisheries Department is currently using an application developed on .NET (dot net) technology (Visual studio 2010).The database is administered with Microsoft SQL Server 2010. The main data sets stored on this system includes: Fisher registry and boat registry and licensing information.								
RESPONSES / MEMBER STATES	Fisher Registry	Boat Registry	Total fish production	Catch & Effort	Fish Biological D.	Scio-Economic D.	Export Data	Import Data	Environmental Data
Total									

Type of Data	# of Member States with this type of data in Excel	# of Member States with this type of data in Access	# of Member States with this type of data in Oracle	# of Member States with this type of data in Others
Fisher Register	7	3	0	1
Vessel Register	7	4	1	1
Total Fish Production	13	2	1	0
Catch & Effort data	12	3	1	0
Fish Biological data	7	1	0	0
Scio-Economic data	5	1	1	0
Export data	9	1	0	0
Import data	7	0	0	0
Environmental data	3	1	0	1
Totals	**70**	**16**	**4**	**3**

Questions #	8			9			10			11	12		
Text of Question	For the other databases that you use does the structure resemble that of CARIFIS? Code: 1 = a tick			Do you have technical support for your database (databases other than CARIFIS)? Code: 1 = a tick			Are you satisfied with the performance of the database (other than CARIFIS) that you now use? Code: 1 = a tick			If CARIFIS is not in use, why is it not in use?	If CARIFIS is not in use would you like to have your data transferred to CARIFIS? Code: 1 = a tick		
RESPONSES / MEMBER STATES	YES	NO	Others	YES	NO	Details of IT support	YES	NO	Comments		YES	NO	Reason
Total	5	10		6	9		10	5			5	5	

Questions #	13								14								
Text of Question	If CARIFIS is in use which registers/modules in CARIFIS are you currently using? Code: 1 = a tick								If CARIFIS is in use what does your Division need to make CARIFIS more useful? Code: 1 = a tick. Additional Components: (1) improved data structure-more fields (2) database needs to use different database backend,(Foxpro no longer supported) (3) reporting module needs to be changed/replaced as it is inadequate (ie *this country* uses Stonefield) (4) the user interface needs updating/improving (too tedious, too many tabs, takes much longer than TIP to enter data) (5) user support needs to be ongoing (6) Being able to link/identify a fisher/boat owner who has received some form of benefit from the Government or otherwise.								
RESPONSES / MEMBER STATES	Fisher R.	Vessel R.	Processing Facilities R	Legal R.	Aquaculture. Facilities	Trip Interview	Loan	Reports	Transferring of TIP to CARIFIS	Transferring of LRS to CARIFIS	Training in data entry	Training in querying and reporting	Further cleaning and checking of transferred legacy data	De bugging of the programme	Upgrade of CARIFIS (Vista/Windows 2007 compatible)	Addition of component or feature(list the component or feature)	Others
Total	6	7	0	1	0	5	0	2	0	0	3	6	3	6	6	3	

Questions #	15				16			17	18		
Text of Question	Would you like to see CARIFIS upgraded and modernized? Code: 1 = a tick				Do you think the region should continue to support CARIFIS? Code: 1 = a tick			If you think the region should not continue with CARIFIS what database programme would you recommend as a replacement?	Would it be useful to have a secured regional database where countries can access certain information? Code: 1 = a tick		
RESPONSES / MEMBER STATES	YES	NO	ABSTAIN	REASON	YES	NO	UNDECIDED/DO NOT KNOW		YES	NO	UNDECIDED
Total	10	4	3		12	4	1		15	1	1

Questions #	19									
Text of Question	What Information would it be useful to be able to access from a regional database? Code: 1 = a tick Others specified. (i) Information on research (ii) catch &effort, fish biological, scio-economic and environmental data can be had by direct contacts with the individual countries (iii) Fish age at maturity, fishing grounds (iv) Foreign vessels sighted in the regions.									
RESPONSES / MEMBER STATES	# & type of fishers in a country	# & types of boats in a country	Total landings/total fish production in a country	Catch & Effort Data	Fish Biological Data	Scio-Economic Data	Export Data	Import Data	Environmental Data	Others (specify)
Total	14	14	15	11	12	9	10	9	9	

Appendix 3: Reasons for non-use of CARIFIS in CRFM Member States

Category 1: CARIFIS is not suitable to the needs of the Fisheries Department.

1. CARIFIS was not applicable (did not suit our needs).

Category 2: Technical problems / upgrading of the software

1. There were too many technical problems with the database and whenever something went wrong there was no one at hand to help us to resolve the problems.

2. Need latest version of the software.

3. CARIFIS was incompatible with the version of Windows that was in use.

4. System needs to be upgraded. Queries concerning boat owners as well as queries with large volumes of data are not able to be produced. Various programming errors appear in various registries preventing the entry of data.

5. Technical challenges in the form of operating system and hardware.

6. The query aspect of CARIFIS was not functioning to the satisfaction of the Department.

7. Inadequate technical support. No longer able to generate reports or enter data in the vessel component since 2007.

8. Every time the system was used an error would occur and no one in the country could repair or (move) pass the problem. IT from CRFM came to TCI to assist with information and repair of CARIFIS. A solution was found and within a week of the departing CRFM staff another issue arose and froze the system.

Category 3: CARIFIS programme is not user friendly

1. The data clerks did not find the programme user friendly and current data clerks have absolutely no knowledge of CARIFIS.

Category 4: CARIFIS training required

2. Data Entry Clerk had difficulties to enter data into CARIFIS since she was unable to get pass the Fisher and vessel register. The data forms had omissions as the data collection forms were not properly completed due to the lack of registration and licence number. It also seemed as if some fields on the CARIFIS data programme were locked (we were unable to access them). Attempts were made to enter Trip Interview data but the programme did not accept the data since we were unable to provide the programme with name and registration number of vessels.

3. Lack of understanding of the capacity of the database and reluctance to change from existing systems.

Appendix 4: Historical reasons for ceasing operation of CARIFIS (2004 - 2009)

Category 1: Technical problems/upgrading of the software

1. Stopped utilizing CARIFIS because there were too many technical difficulties that could not be resolved by anyone in the Fisheries Department.

2. Stopped utilizing CARIFIS because of bugs in the system.

3. Stopped utilizing CARIFIS because the software was incompatible with more recent versions of windows that was in use in the Department.

4. Stopped utilizing CARIFIS because of programming errors.

5. Stopped utilizing CARIFIS because of the need for upgrading CARIFIS.

6. Stopped utilizing CARIFIS because of technical difficulties and hardware problems.

7. Stopped utilizing CARIFIS because the system would not allow further entries past 75 fishers.

Category 2: CARIFIS programme is not user friendly

1. Stopped utilizing CARIFIS because it was not user friendly.

Category 3: CARIFIS training required

1. Stopped utilizing CARIFIS because of inadequate training.

Appendix 5: Reasons for answering "yes" to the upgrading of CARIFIS

Respondents gave the following reasons for answering "yes" to the upgrading and modernizing of CARIFIS.

Category 1: Upgrading and modernizing CARIFIS would assist in the integration / combining, comparison and sharing of data across the region

1. A regional (or perhaps*: a regionally used)* database may allow easier integration / comparison of data.

2. Ideally best to manage one database

3. CARIFIS will serve the region better for purposes of analysis of data on shared stocks, eliminate conversion to different databases etc.

4. CRFM should host a regional workshop with Data Managers etc. in order to review the data collection forms and formats *(data collection methods being used in the region)* and develop standard forms and formats for the collection of fisheries data in the region. CARIFIS should also be upgraded / modernized and made more "user friendly". The CARIFIS programme should also be accompanied by a user manual. These improvements would facilitate easier access to information at the national and regional level and also make possible the general sharing of information in the region.

5. If CARIFIS is improved and becomes more "secure" *(stable / bug free*) and in use in all CRFM Member States it would facilitate information exchange "within these States" *(within the region).*

Category 2: Support for upgrading and modernizing of CARIFIS because CARIFIS is a useful tool or the concept is good

1. The CARIFIS concept is very good.

2. CARIFIS is a better database than what is currently being used *(in this Fisheries Division).*

3. CARIFIS is a database unique to fisheries data only. CARIFIS has well defined table structure. Data entry is simple and easy to understand.

Category 3: Upgrading and modernizing CARIFIS would fix problems/bugs etc. now found in the existing version of CARIFIS

1. Once a good reporting system is put in place, reports could be done quickly and in a timely manner.

2. We need a programme that would easily accommodate the data that is being collected, give outputs that accurately reflects the data that was entered as well as be on par with the change in technology. There is a need for debugging; one of the fields needs to be 13 characters long to accommodate sequence numbers from year 2000, since this field is currently 12 characters long it truncated a number causing a verification problem. CARIFIS need to be redesigned on a platform that is operating environment independent.

3. The CARIFIS database has proven to be a useful tool in spite of the shortfalls. Over the years, a lot of work has been done to improve the software usage. It would therefore be a considerable waste of time and resources to neglect its use if the possibility and resources are available for upgrading. We recommend that this option be pursued.

4. CARIFIS should continue to be in line with new technology when it comes available.

5. It would be more convenient to be able to issue official document/reports using the CARIFIS system. Of course it will be necessary to train officers to access the relevant features and data entry.

6. There is a need for the CARIFIS trainer to spend more time in-country to familiarize himself / herself with the peculiarities of the country's data system in order to better guide the data management staff to deal with linkages. The transfers of data should be made simpler as well.

Appendix 6: Reasons for answering "no" to the upgrading of CARIFIS

Respondents gave the following reasons for answering "no" to the upgrading and modernizing of CARIFIS.

Category 1: Consolidating of, and moving database systems to a common platform

1. This Fisheries Division has contracted a company *(IT Company)* to develop a fisher and vessel database in MS SQL Server and import the data currently in CARIFIS into the new database. We will attempt to keep the basic structure of CARIFIS as far as possible in the new system.

2. The fisheries authorities in this country will be consolidating their databases in a common platform - MS SQL Server - and consequently existing data will be imported into the new database. This new system will keep the basic CARIFIS structure where possible.

Category 2: The CRFM Secretariat has no resident CRFM database expert to help member countries find solutions to their individual technical problems

1. Even if CARIFIS is modernized and the more obvious technical difficulties are resolved, there is still no resident CRFM database expert to help member countries find solutions to their individual technical problems and so the countries would be in the same situation. A database expert is needed to serve the region.

Appendix 7: Suggestions towards possible CARIFIS replacements

1. The Belize Fisheries Department is recommending the use of its application developed on dot net technology (Visual studio 2010) and which is administered with Microsoft SQL Server 2010. This application could be easily modified and expanded to include all other data sets required by the individual countries. Since the system has already been developed, tested and is fully operational without technical difficulties then it would be good to explore the possibility of adapting the system to the various member countries. The adaptation of the system would not incur excessive costs as most of the work has already been done.

2. CARIFIS upgraded and modernized.

3. Please note: If the region is unable to upgrade the database thereby fulfilling the requirements of the region then a suitable replacement should be considered.

4. MS SQL Server is one option.

5. MS SQL Server possibly.

6. Use a Microsoft access programme that all IT technicians can fix.