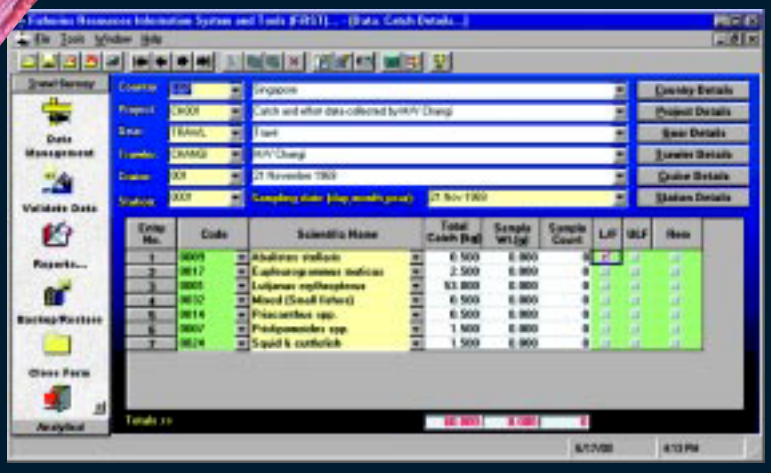
Fisheries Resource Information System and Tools (FiRST): USER MANUAL

F.C. Gayanilo, Jr. G. Silvestre F. Valdez D. Pauly

2001



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- less poverty
- a healthier, better nourished human family
- reduced pressure on fragile natural resources
- people-centered policies for sustainable development

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- protecting the environment
- saving aquatic biodiversity
- improving policies
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Fisheries Resource Information System and Tools (FiRST):

U S E R M A N U A L

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Foreword

Meryl J. Williams

Director General
ICLARM –
The World Fish Center

In July 1996 a Workshop on "Sustainable Exploitation of Coastal Fish Stocks in Asia" was organized by ICLARM – The World Fish Center with participation of seven countries in Asia. A consensus was achieved on the usefulness of compiling and analyzing past trawl survey to establish benchmarks for stock rehabilitation, supplement existing statistical baseline and improve management directions and strategies. A prototype database and analytic tool for this purpose was presented and evaluated during the Workshop using data from available surveys in South and Southeast Asia.

Under the Regional Technical Assistance (RETA 5766) on "Sustainable Management of Coastal Fish Stocks in Asia" the prototype database and analytic tool was further improved and developed. This manual on the Fisheries Resource Information System and Tools (FiRST) version 2000 documents the database system that was developed under RETA 5766. As envisioned, the database system includes "data containers" for extant trawl surveys and socioeconomic information, as well as catch and effort statistics. Basic analytical routines such as models to approximate fish biomasses have also been developed and made an integral part of FiRST. Analytical modules from other software needed for data analyses have been made accessible via the database system. To facilitate the use of these external software tools, modules have been developed to allow the saving of data in required formats.

The database system currently contains about 21,000 hauls/stations from eight participating countries and published data from Singapore, Myanmar and Pakistan. Access to these data is governed by access protocols. Substantive use of data contained in FiRST was conducted under the Resource and Socioeconomic Analyses Components of RETA 5766. This has allowed retrospective analyses of the extant trawl survey data and provided better understanding on the biology and exploitation status of the coastal fishery resources of Asia. With the development of this database system, ICLARM anticipates that the fisheries resource databases will be able to provide solid foundations for appropriate strategies and action plans at the national and regional levels.

This publication was made possible by a grant from the Asian Development Bank (ADB) under RETA 5766 and core funds of ICLARM – The World Fish Center and its partners (fisheries institutions in Bangladesh, India, Indonesia, Malaysia, Philippines, Sri Lanka, Thailand and Vietnam).

Foreword

Muhammad A. Mannan

Manager
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Asian Development Bank

The coastal fish stocks of several Asian countries have been severely depleted due mainly to overfishing, with obvious consequences for the commercial fisheries, the income of small-scale fishers and fish supply to consumers. Recognizing the problems of degradation of coastal fisheries resources and the resultant adverse impact on fishing communities in coastal areas, many governments have made efforts to improve coastal fisheries resources management and to initiate various programs to improve the social and economic conditions of coastal communities. However, effective fisheries resources management strategies are not in place in many countries due to lack of reliable fisheries resource information and the databases that are essential for developing such strategies.

In 1996, the Asian Development Bank (ADB) provided a small scale Regional technical assistance (RETA) to ICLARM – The World Fish Center for a "Review of Sustainable Exploitation of Coastal Fish Stocks in Asia" (RETA No. 5651). RETA assisted seven developing member countries (DMCs) of the ADB to establish a systematic fisheries resource database as a first step in meeting the fisheries resource management needs and preparing appropriate strategies, action plans and options to rehabilitate degraded coastal fish stocks. ICLARM – The World Fish Center in collaboration with participating national fisheries agencies (NFAs), namely, Bangladesh, Indonesia, Malaysia, the Philippines, Thailand and Vietnam, identified several key issues and opportunities impacting coastal fisheries resources and outlined the scope for regional collaborative efforts to catalyze DMCs to improve resource baseline data and aid them to use coastal fish stocks in a sustainable manner. The participating DMCs also requested ICLARM and ADB to initiate further regional collaborative efforts by building on the findings and recommendations of the RETA. The result was RETA 5766 Sustainable Management of Coastal Fish Stocks in Asia, approved in 1997, to assist eight DMCs of ADB, viz. Bangladesh, India, Indonesia, Malaysia, Philippines, Sri Lanka, Thailand and Vietnam, in improving the management and sustainable utilization of their coastal fisheries resources and related ecological systems. The eight countries and ICLARM – The World Fish Center provided additional funds to complement the ADB component.

This Fisheries Resources Information System and Tools (FiRST): User Manual provides documentation of the database system which was developed under RETA 5766, based largely on extant trawl surveys and related environmental and socioeconomic information relevant to the management needs of the eight DMCs. The database system has been extensively used by participating fisheries institutions in the eight DMCs, and it is envisioned that the system will be continually used to support policy decisions in the management of coastal fisheries in these countries. ADB is pleased to be associated with the initiative and commends ICLARM – The World Fish Center and the collaborating DMCs for their efforts.

CHAPTER 1

Introduction

Introduction

The exponential growth in information technology undoubtedly benefits fisheries science. However, fisheries research is still faced with practical problems which have hampered its development and, in many cases, have prevented a better understanding of the dynamics of the stocks being investigated (Gayanilo and Pauly 1997). The development and wide distribution of FishBase (Froese and Pauly 1998; Froese and Pauly 1999; see also http://www.fishbase.org/) has partly resolved problems associated with the systematics and biology of fish species. The once tedious task of using complicated mathematical equations is fading out with the development of software packages such as the FAO-ICLARM Stock Assessment Tools (or FiSAT; Gayanilo et al. 1995, Gayanilo and Pauly 1997) and Ecopath with Ecosim (Christensen and Pauly 1992; Walters et al. 1997; see also http:www.ecopath.org/). However, other problems remain.

For example, fisheries research (which ideally should provide a basis for sound management) is very often conducted without reference to data documenting earlier states of the resources which provide reference points for evaluation. In the early 1980s, the challenge was how to develop database systems to resolve this problem. Several research institutions and organizations developed databases in an attempt to resolve the problem. This work was not coordinated, however. Thus, in the Southeast and South Asian region, there are now several database management systems (DBMS) in existence, with largely overlapping functions, but at the same time incapable of directly sharing data. Fishes migrate and very often traverse political boundaries. Hence, fisheries research often requires data from neighboring countries.

Following on Pauly (1996), who reiterated the importance of trawl surveys as a fisheries-independent method for assessing and monitoring demersal stocks, a workshop was held in Manila in July 1996 to examine the usefulness of compiling and analyzing extant trawl surveys in Asia. Methods to analyze trawl survey data are fairly standard and can help establish benchmarks for stock rehabilitation and hence improve management directions and strategies (Silvestre and Pauly 1997). To address the issue of data standardization, a prototype of a trawl survey database management system (TrawlBase) was presented to the participating country representatives to demonstrate the feasibility of standardizing trawl survey data in South and Southeast Asia (Gayanilo et al. 1997).

In 1998, the Asian Development Bank (ADB) provided funding (under its regional technical assistance program) to ICLARM – The World Fish Center for a project entitled Sustainable Management of Coastal Fish Stocks in Asia (ADB-RETA 5766). The project intended to conduct retrospective analyses of extant trawl survey data from the South and Southeast Asian region. By combining these analyses with related biological and socioeconomic information, the project planned to assess the prevailing fisheries situation and develop strategies and action plans to improve the management of coastal fish stocks in the region.

A fisheries resource information system, described in detail in this document, will now allow the consolidation of national data into a single database system with regional coverage. This system – an enhancement of TrawlBase – is named Fisheries Resource Information System and Tools (**FiRST**), and one of its key functions is to provide facilities for exchanging data within and between participating countries.

The project logo depicts key elements of a fishing operation, i.e., boat, net, land (green), sea and fish (black). (Logo designed by F.C. Gayanilo, Jr.)

Design Overview

The design of **FiRST** was largely based on TrawlBase (Gayanilo et al. 1997) and incorporates feedback from participants in the July 1996 workshop and various partners under the ADB-RETA 5766 Project. Overall, the design of **FiRST** involved choosing a database engine, data structure, data security, types of user-interactions and a distribution process.

Choice of Database Engine

The choice of a database engine is crucial in the design of a database management system as it dictates all other design elements of the system. The ease of use of a database is not only limited to reaction of users to the user-interface, but also involves the ease of maintaining the database(s). This is most apparent for a database system where users are not limited to viewing data, but are also involved in data encoding. A database described to primarily capture historical trawl survey information should be fast, easy to maintain, and allow linkages to other existing systems.

The computational speed of desktop computers has grown exponentially, and speed of data processing and retrieval has become a minor issue. To date, several database engines exist, each claiming an advantage over the other. However, the majority of the fast database engines are designed for dedicated network servers or require specialized or long hours of training. The project chose the Microsoft Access database software because of its following features:

1. commonly available and widely used;
2. easy to use and maintain;
3. portable and well-documented;
4. readily distributed; and
5. exchanges data readily with other widely used software systems.

Connectivity to other widely distributed applications such as FishBase (Froese and Pauly 1999), ReefBase (McManus and Vergara 1998) and Ecopath with Ecosim (Christensen et al. 2000) is readily established since these software products also employ Microsoft Access as database engine. Microsoft Access is usually distributed with a package of other Microsoft software like Word, Excel and PowerPoint. Thus, the data can also be easily exported to and from other data formats.

Database Organization

The tables that make up the database system are arranged in such a way that they can also be used independent of the user-interface provided by **FiRST**. The database contains nine interrelated main tables (Fig. 1.1, Table 1.1 and Appendix A), as well as six support tables (Table 1.2).

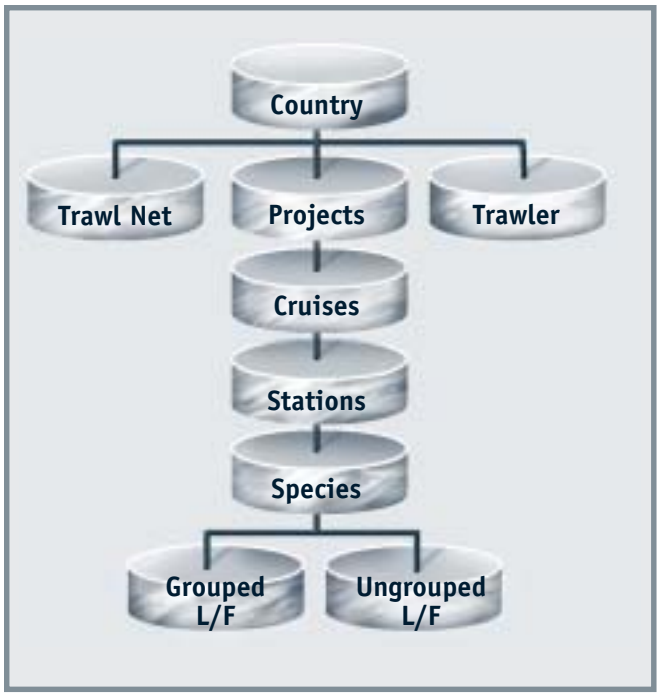


Fig. 1.1. Schematic representation of the main tables and their relationships.

Table 1.1. Main tables of the database system and their contents/functions. Refer to Appendix A for details on technical specifications of the fields programmed for each table.

Name	Function
Country	Contains information taken from the country table of FishBase 99. The information is static, i.e., it changes only as FishBase changes. A supporting table is attached to this table for remarks about the country. Note that the user-interface also allows the access of other information on the Internet (see *Data Encoding*).

continued from Table 1.1.

Name	Function
Trawl Net Description	Contains basic information about the trawl/experimental gear(s) used in the project(s), particularly parameters required to estimate the area swept by the gear.
Trawler Description	Contains basic technical details of the vessel(s) used in the project(s).
Project	Lists all projects undertaken in the country and describes them (e.g., project objectives, collaborating institutions, implementing agencies, etc.).
Cruise	Contains information describing a particular cruise in a project using a specific trawler and trawl net.
Station	Contains geographic location and geophysical condition of the station, trawling period and other station-related parameters.
Species	Records the catches (in number and weight). The biomass and catch per unit effort (CPUE) fields in the table are not filled in by the user but by **FiRST** when the biomass estimation routine is activated.
Grouped L/F	Records frequencies grouped in length classes. The headers, defining the class size, unit used and lower limit of the smallest length group, are stored in the *Species* table.
Ungrouped L/F	Contains individual length measurements.

Table 1.2. Support tables of the database system and their contents/functions. Refer to Appendix A for details on technical specifications of the fields programmed for each table.

Name	Function
CountryRem	Contains a free-text remark field for users to enter information that may be important when analyzing country data. Note that **FiRST** also contains facilities to directly access Internet-based details about a country.
EcoModels*	Contains a list of Ecopath models developed and available for the specified country. This table can be used to link to the Ecopath with EcoSim software package and to the Ecopath webpage (www.ecopath.org).

continued form Table 1.2.

Name	Function
References*	Contains a list of reports/publications which were produced based on a country-specific project.
Species Codes	Contains a list of species (taxon) codes used in a country. Although this practice is no longer encouraged, these codes may facilitate the encoding of historical data where such codes were utilized. This is also used by **FiRST** to validate the naming of a taxonomic group, using the taxonomy encoded in FishBase.
WrkSpecies	Contains a list of the species and species codes utilized. This is used by **FiRST** to hasten the table-lookup operations when encoding catch data.
TmpTable	This is the working table of **FiRST**. The structure and contents of this table vary, depending on the routine that is executed.

** These tables may not be activated in the version presently distributed. Please contact ICLARM for updates.*

The database system was developed in such a way that these relationships are transparent to the user of the database. Data integrity is programmatically controlled and maintained. It is also worthwhile to note that the system does not use or generate unique record codes. This allows the user to:

1. open and manipulate the tables directly without the need to rely entirely on the **FiRST** user-interface;
2. export the data to other software packages such as Microsoft Excel or similar software packages; and
3. expand the system (add tables or fields) with ease.

Data Security

Securing data to prevent accidental loss and unauthorized access are two important issues. Creating copies (backups) of the database is the only practical procedure to secure data from accidental loss. **FiRST** contains options to configure the system for such procedure (see *Backup Procedure* in Chapter 4) and reminds users periodically to back up their files.

FiRST establishes a protocol for data access based on recommendations and consultations with various government agencies involved in the ADB-RETA 5766 Project. Although complete data confidentiality cannot be guranteed in a computer system, data access in **FiRST** is controlled as thoroughly as possible by classifying data and defining user access level.

Thus, at the national level, a user can be given any one of the following level of access by the Database Administrator:

Level 1 Complete access to the country database and system functions (e.g., database backup and synchronization); allows editing of the list of authorized database users;

Level 2 Complete access to the country database and system functions; does not allow editing of the list of authorized users;

Level 3 Reserved for data encoders or other users; limited only to data viewing and editing; and

Level 4 No need to be on list of authorized users but an "anonymous" user can only view and download data, depending on their classification.

In **FiRST**, the default user name for Level 1 is "pass" and the temporary password is "pass". These defaults should be modified before any data encoding or manipulation is done. However, it is also advisable to secure the Database Administrator's user name and password for safekeeping.

Data classification in **FiRST** can be:

1. Restricted: only users with proper authorization, identified by their user name and password, can view and manipulate this type of data;
2. Conditionally accessible: data which are older than five years, unless otherwise indicated by the national database administrator and can be viewed by users identified as *anonymous*; or
3. Fully accessible: data with no restriction as to their distribution and use by any user.

As a default, all data are Conditionally Accessible. We do encourage that this data type be upgraded to *Fully Accessible*, but realize that this decision is for each national database administrator to determine subject to clearance by relevant authorities.

In some cases where such security is not essential, the Database Administrator may tick a box in the Data Access Control form which completely eliminates the need to designate passwords.

System Requirements and Installation

The package comes with this user manual and a CD-ROM. The following minimum configuration is required for the system to work:

- Microsoft Windows 95 or 98 (the system has not been tested with Microsoft Windows 2000);
- at least 64MB RAM;
- a 1 024 x 768 high resolution monitor; and
- at least 5 MB free-space in the Windows directory and another 12 MB for the destination address.

To install the system, simply run the SETUP.EXE located in a separate directory from the root directory of the CD-ROM which comes with the package. The installation wizard will prompt the user to provide the destination address, i.e., to identify where and on which drive to store the programs and database. The program automatically installs an item (icon and title) in the Microsoft Windows Program menu bar. Clicking the item activates **FiRST**. Please refer to Chapter 3 *Configuring **FiRST*** for proper system initialization.

Please note that the country databases can be requested directly from the national/country database administrator. Visit the ADB-RETA 5766 Project homepage (http://www.cgiar.org/iclarm/trawl) to obtain the names and addresses of the country database custodians. New versions of the system may be issued later to correct reported program defects or incorporate new modules. Registered users will be notified of these improvements electronically. Users are encouraged to visit the Project homepage to check for updates. For more inquiries, please write to ICLARM – The World Fish Center (e-mail: iclarm@cgiar.org).

CHAPTER 2

The Graphic User Interface

Introduction

Making systems "friendly" or easier to use is an inherent aim of software developers. The success or failure of the system in this respect is largely associated with the design and implementation of the graphic user interface (GUI). The idea is for users to be able to operate the software "out of the box" without resorting to any documentation. "User-friendliness" of software depends on a number of factors and still is a very debatable subject. It is also very much associated with accepted norms. Using traditional or conventional looks (standard Microsoft Windows look) makes the system automatically familiar to users even though they have never seen it before. The **FiRST** software applies common user-interface architecture to achieve this.

The principles used to make **FiRST** as user-friendly as possible are:

1. All menu commands are keyboard accessible and commonly used functions are available in one click.
2. Text messages avoid technical jargon, and are limited to a maximum of three lines.
3. Interface controls (capitalization, alignment, highlighting, etc.) are consistently labeled.
4. Standard icons for buttons are provided and supplemented by *Tool Tips* whenever appropriate.
5. Indicators are given as to which fields are required inputs, which fields can be modified and which are optional.

Anatomy of a FiRST Form

The general features of the forms (i.e., user-interface) used in **FiRST** are standard features of commercially available Windows-based programs. At startup, the main data form (Fig. 2.1) contains the following basic elements: Windows Control box, Windows Title bar, Tool bar, Menu bar, List bar, Working Area and Status bar.

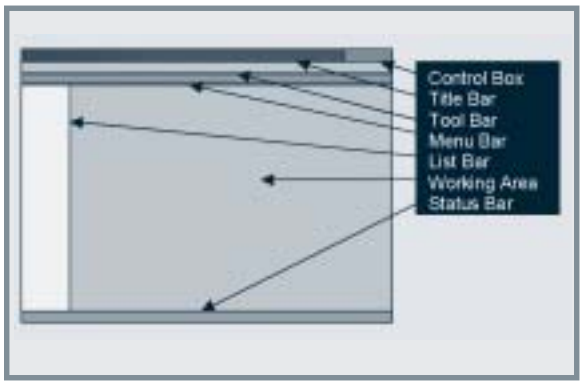


Fig. 2.1. Basic elements of the user interface form.

Windows Control Box

The Control box is a standard feature of the Windows operating system. There are usually four command buttons available to the user (Table 2.1). Their functions can also be accessed by clicking the application icon in the Title bar.

Table 2.1. The functional description of the command buttons in the Windows control box.

Button	Description
	Minimize button; minimizes the window but does not close the form
	Restore button; restores the normal size of the window
	Maximize button; maximizes the window to occupy the whole display screen
	Close button; closes the window (equivalent to pressing <ALT>+<F4>)

Windows Title Bar

The Title bar is another standard feature of all Windows-based software. It contains the **FiRST** and title of the active window. The icon appears in the upper left corner of the title bar. The forms for data entry and retrieval are strikingly similar. This portion of the window is very useful in informing users about which form is currently active.

> **Tip!** Right-clicking the icon will also open the Windows menu to access functions as listed in Table 2.1.

Tool Bar

The Tool bar contains command and state buttons which directly access commonly used commands. The icons are designed to indicate their function. Supplementing this graphical veneer are tool tips (i.e., *flash messages* displayed when a mouse is positioned over a button for more than one second). These messages are very often the titles of functions.

Clicking a button on the Tool bar opens the corresponding function immediately. Variants of the standard Command buttons in the Tool bar are State buttons. A State button is like a flag (or a switch) which indicates whether a function is turned on or off. Only the Zoom-In and Pan buttons (listed below in Table 2.2) are State buttons. If the Zoom-In button is depressed meaning currently active, zooming onto an area in the map is possible (see Chapter 8 *Mapping Routine*). Clicking the Pan button disables the Zoom-In function and activates the Pan function, and vice versa.

> **Tip!** Double-clicking the Tool bar opens a dialog box which then allows users to reconfigure the default settings of the Tool bar.

Table 2.2. The functional description of the command buttons in the FiRST tool bar.

Icon	Data	Html	Description
	✓		New Record button; clears the fields or appends a line (in case of catches) ready to receive new inputs.
	✓		Save Record button; new records and edits will then be saved to the disk when button is clicked.
	✓		Refresh button; equivalent to closing the form and re-opening it; can be used to refresh the contents of chosen fields.
	✓		Delete Record button; deletes the current record. However, before a record is deleted, **FiRST** prompts the user for confirmation.
	✓	✓	Print button; allows access to report generation routine (for printing a report) when the active form is a data form or to print dialog box when the map form or an Internet document is active.
	✓		Go to Top button; displays the first record in the database.
	✓		Go to Previous button; displays the previous record. If there is no previous record, a beep sound is generated.
	✓		Go to Next button; displays the next record. If there is no next record, a beep sound is generated.
	✓		Go to Bottom button; displays the last record in the database.
		✓	This will link the user to the Project website describing the ADB-RETA 5766 Project (see Chapter 3 *Configuring* ***FiRST***).
		✓	This will allow the downloading of new software updates or other project documents from the Project website (see Chapter 3 *Configuring* ***FiRST***).
	✓	✓	This will open the system's e-mail system (see Chapter 3 *Configuring* ***FiRST***).
	✓	✓	Calculator button; opens the Microsoft calculator.
	✓	✓	Conversion Table button; opens the form that helps users in converting one unit to another.

continued from Table 2.2.

Icon	Data	Html	Description
	✓	✓	Help button; opens the electronic documentation (i.e., help messages).
	✓		The Pan button allows the user to view a section of the map other than the one currently zoomed in.
	✓		Zoom-In button; allows for zooming of a particular area in the world map. To zoom-in, click a corner of the desired area to zoom and drag the rectangle marking until the whole area of interest is covered.

Menu Bar

The Menu bar contains several dropdown menus which in turn have other items for accessing various functions. Menu items are disabled if a function is not applicable (or unusable) to the active form. Some of the functions contain short-cut keys (see Table 2.3 for the list). A summary of these commands and functions for the main form of **FiRST** is given in Table 2.3. Note that the menu items may change as new modules are added to **FiRST**. Also, some modules may contain another set of menu items not listed in Table 2.3 (see Chapter 6 *Report Generation* and Chapter 8 *Mapping Routine* further below as examples).

Table 2.3. Menu items in FiRST. Pressing the <ALT> + <the underlined character> is another way of accessing the desired function.

Menu Item	Description
File	*File Menu.*
New Record	Initializes the data form for new record input. <F2> is the short-cut key.
Save Record	Saves data. <F3> is the short-cut key.
Refresh	Refreshes the data form. <F4> is the short-cut key.
Delete Record	Deletes the active record. <F5> is the short-cut key.
Print...	Allows access to the print routine.
Goto...	*Goto Menu.*
First Record	Displays the first record.
Next Record	Displays the next record.
Previous Record	Displays the previous record.

continued from Table 2.3.

Menu Item	Description
Last Record	Displays the last record.
Validate...	Allows access to the validate routine.
Close Form	Closes active form.
Exit	Terminates the program and returns control to Windows.
Tools	*Tool Menu.*
Population Dynamics	Opens the Population Dynamics menu.
Ecosystem Modeling	Opens the Ecosystem Modeling menu.
Community Analysis	Opens the Community Analysis menu.
Bioeconomics	Opens the Bioeconomics menu.
Map	Allows access to the mapping routine.
Internet...	*Internet Menu.*
News Page	Opens the Internet-based news page of the project.
Project Description	Opens the Internet-based project description.
Downloads	Opens the Internet-based download page.
Contact Us	Opens the e-mail system of the computer.
Calculator	Allows access to the Microsoft calculator programme.
Conversion Table	Allows access to the conversion table of units.
Database...	*Database Menu.*
Synchronize Database	Synchronizes the working database with the FTP designated address.
Compact Database	Compacts the working database.
Backup Database	Backups the working database.
Restore Database	Restores the working database.
Global Edit	Allows the global change of keys (codes).

continued from Table 2.3.

Menu Item	Description
Import/Export...	*Import/Export Menu*
Import NAN-SIS Files	Access import routine of NAN-SIS data.
Import/Export FiSAT Data	Access Import/Export routine of FiSAT data.
Import External **FiRST** MDB	Imports an external MDB with the same data structure.
Export a portion of the **FiRST** MDB	Exports a subset of available data.
Configure...	Accesses the Configuration dialog box.
Window	*Window Menu*
Tile Horizontally	Tiles the forms horizontally.
Tile Vertically	Tiles the forms vertically.
Cascade	Cascades (arranges) the open forms.
Arrange Icons	Arranges the icons of the minimized forms.
Help	*Help Menu*
Contents	Opens the electronic manual of the application. <F1> is the short-cut key.
About **FiRST**	Opens the About... form of the application.

List Bar

The List bar is similar to the Tool bar except that the former is displayed in the left portion of the screen and contains commonly accessed functions. The number of elements in the List bar grows as new modules are added onto the system (see Appendix D the ***FiRST****.INI* file). The default functions that can be accessed through this bar are summarized in Tables 2.4a and 2.4b.

Table 2.4a. Available functions in the Trawl Survey List bar of FiRST.

Icon	Title	Description
	Data Management	Clicking this also allows changes in user identification (see Chapter 4 *Data Management*).

continued from Table 2.4a.

Icon	Title	Description
	Validate Data	This function activates the data validation routine to check all entries, especially the names of taxonomic groups using **FishBase** (see Chapter 5 *Data Validation*).
	Reports...	This function activates the report generation routine (see Chapter 6 *Report Generation*).
	Backup/Restore	This function opens the backup and restore functions of the database management system (see section on *Backup Procedure* under Chapter 4 *Data Management*).
	Close Active Form	Closes the active form.
	Exit Program	Terminates the program and returns control to Windows.

Table 2.4b. Available functions in the Analytical List bar in FiRST program.

Icon	Title	Description
	Map...	This function activates the mapping routine (see Chapter 8 *Mapping Routine*).
	Biomass...	This function activates the biomass estimation routine (see Chapter 7 *Biomass Estimation*).
	Population Dynamics	This functioned is reserved for modules on fish population dynamics and stock assessment which are yet to be developed (see Appendix D: *The **FiRST**.INI File*).
	Community Analysis	This function is reserved for modules on fish assemblage analysis still to be developed (see Appendix D: *The **FiRST**.INI File*).
	Ecosystem Modeling	This function is reserved for modules on ecosystem modeling still to be developed (see Appendix D: *The **FiRST**.INI File*).
	Bioeconomics	This fuction is reserved for modules on bioeconomics which are yet to be developed (see Appendix D: *The **FiRST**.INI File*).
	Exit Program	Terminates the program and returns control to Windows.

Tip! Users may change the arrangement of icons by dragging each icon to any desired position within the List bar. However, the icons revert to their default position when **FiRST** is restarted.

Working Area

The Working Area is where the *child* forms are displayed (the main form is termed *parent* form). The size of the Working Area can be adjusted by the user. However, care should be taken not to resize the *parent* form such that portions of the *child* forms become invisible.

Status Bar

The Status bar contains text, date and time panels. The text panel is the immediate help corner which displays a status report on the processes and messages to guide users while operating the software.

Data Entry and Viewing Objects

The Microsoft Windows environment allows for the creation of objects which facilitate data entry and retrieval. There are several options but **FiRST** incorporates only the common ones.

Text Boxes

A Text box is the object which allows users to enter or view texts, numbers or a combination of both. There are text boxes with a limit on the number of characters a user can enter (Fig. 2.2). Text boxes in which input is limited to the size of the storage media are associated with memo fields in the database. However, users are advised to use this facility prudently. Entering many characters on such fields makes the database excessively large, and hence slows down all procedures which require these fields to be open.

Fig. 2.2. Example of a Text box. The number of characters a user can enter in the Purpose/ Objectives box is limited to only 200 characters.

Dropdown Combo Boxes

Dropdown combo boxes are used in the system whenever there are limits to the choices of input. There are three types of combo boxes:

1. limited to a list (Fig. 2.3a);
2. not limited to a list (Fig. 2.3b); and
3. date-picker (Fig. 2.3c).

For type (1), users may dropdown the list and select the input from it or directly enter the required input. However, an error message will result if what was manually entered was not in the list. On the other hand, no error message will appear for type (2) Dropdown combo box as inputs are not limited to the list. In type (3), the options are not listed in the usual manner, i.e., they are given in a form list. Clicking a Date-Picker opens a calendar from which users may select the date. This eliminates the need to enter numeric values from the keyboard (and hence eliminates errors in recording dates).

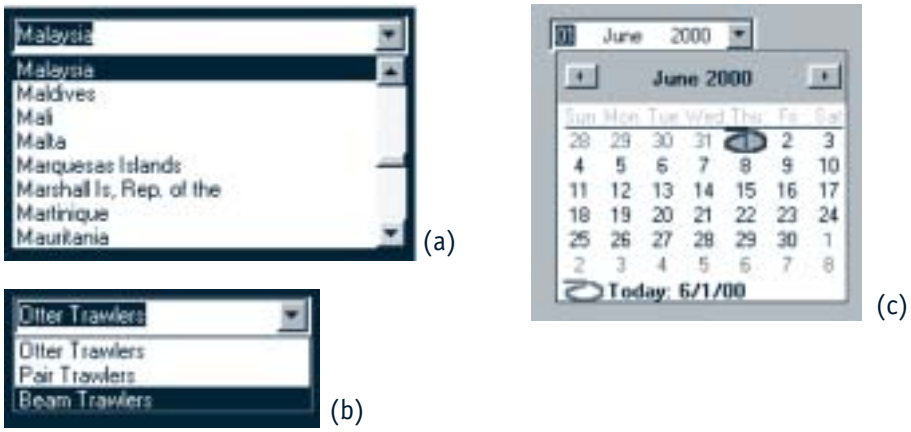


Fig. 2.3. Examples of Dropdown combo boxes: (a) limited to a list; (b) not limited to a list; and (c) date-picker.

List Boxes

List boxes (Fig. 2.4) are very similar to dropdown combo boxes where the input is limited to the list. Here, however, users have the option to select more than one item. Clicking an item in the List box selects only one item. To select a group (in sequence on the list), hold down the <Shift> key and click the last item to consider. To select other items not in sequence, click on the item while holding down the <Ctrl> key.

Fig. 2.4. Example of a List box.

To help guide users as to what fields are required inputs or not, FiRST uses background colors for Text boxes, Dropdown combo boxes and List boxes. Table 2.5 defines the meaning of these background colors.

Table 2.5. Background color codes used in the entry fields of FiRST.

Color	Meaning
Gray	User cannot change the input. The value was taken or computed from another form or table in the database.
Yellow	User is required to provide the input. The data will not be saved if the input field contains null (no) input.
White	Input is optional.

The standard Windows font configuration is used throughout the program. However, **FiRST** uses a red color for values computed internally. These values can then be replaced with real (i.e., observed) values once they become available.

CHAPTER 3

Configuring FiRST

Introduction

Fig. 3.1. Tools menu with the "Configure..." command to open the configuration dialog box.

Windows allows for control of what color to use for the displayed windows, where to print, how to share data folders, how to control access to files, what time and dates to use, etc. Most of these extensive system configuration tools can be found in the Control Panel folder (*Start->Settings->Control Panel*). Users can refer to Microsoft Windows documentation for details on how to change the system settings to suit their needs. They may start using the computer straight from the box without need to change any of the settings. However, controlling the behavior of some special software may require special routines. Most software packages provide configuration tools also to change the factory settings (defaults). **FiRST** incorporates a utility to change the settings to suit user's conditions. To open the dialog box, click the Configure… command in the Tools menu (Fig. 3.1).

The dialog box contains five tabs: General, File Transfer Protocol (FTP), Hypertext Transfer Protocol (HTTP), Backup and Species Codes. Upon installation, the settings for the fields in the dialog box are written to a Microsoft Windows initialization file (see Appendix D: *The **FiRST**.INI File*).

> **Tip!** Although users can use the database system immediately after installation, they are advised to go through the settings before encoding any data.

General Tab

This tab contains the general settings required to locate files (if applicable) and in the handling of data validation for taxonomic group inputs (see Chapter 4 *Data Management* and Chapter 5 *Data Validation*). Table 3.1 (see also Fig. 3.2) presents the settings that may be modified.

Table 3.1. Fields that may be modified under the General tab (see also Fig. 3.2).

Fields	Description
Scientific Name Access*	This contains three options. 1. *Check for possible synonyms/misspelled names upon entry*. Choosing this option activates a routine that checks for synonyms and misspelled names as taxa are entered. This option considerably slows down the data entry procedure. When this routine is deactivated, the user must run the validation routine of **FiRST** to check the entry of scientific names. 2. *Use FishBase 99 on the Internet access for species links*. If this option is activated, double-clicking a taxonomic input opens the species (or family) webpage as identified in the HTTP tab (see below). This link also provides the venue to check for possible synonyms. If a synonym is entered, the webpage with the correct name opens. Invalid taxonomic inputs do not generate an error but only a webpage with no inputs. 3. *Always refer to table of codes*. If checked, a routine will be activated to check all taxonomic codes (if used by the user) to an existing table of codes.
FishBase, JPG	If FishBase is installed in the system, this field identifies the directory where the FishBase JPG pictures are stored.
FishBase, GIF	If FishBase is installed in the system, this field identifies the directory where the FishBase GIF pictures are stored.
FishBase, Database	If FishBase is installed in the system, this field identifies the directory where the FishBase database (FBapp.MDB) is stored.

**If the options listed are not available in your system, please contact ICLARM for an update.*

Fig. 3.2. The General tab in the dialog box used for reconfiguring settings.

FTP Tab

The File Transfer Protocol (FTP) address and other required parameters are used to upload and download data to and from a regional database (regional depository). The required fields to access the regional system are given in Table 3.2 (see also Fig. 3.3).

Table 3.2. Fields that may be modified under the FTP tab (see Fig. 3.3).

Fields	Description
FTP Address	The FTP address of the project.
User Name	The name of user logging in the FTP site.
Proxy Server	In some installations, this input is required when accessing Internet addresses. This is the server intermediate between the user and Internet. It ensures security, administrative control and caching services. Please refer to Internet installation manuals for more details on this item.
Password	FTP addresses are normally password protected. Contact the database administrator to obtain this information.

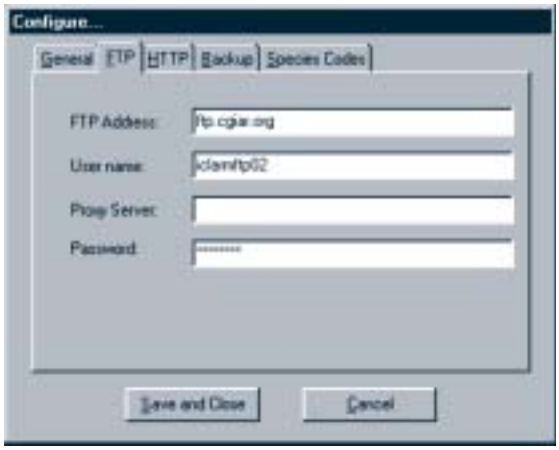


Fig. 3.3. The FTP tab in the dialog box used for reconfiguring settings.

HTTP Tab

Hypertext Transfer Protocol (HTTP) is an application protocol that sets the rules for exchanging files via the world wide web (WWW). **FiRST** has a built-in Internet browser that can open documents given the uniform resource locator (URL) or simply the address of the files accessible in the Internet. This tab (see Table 3.3; Fig. 3.4) contains parameters which are required in some operations of **FiRST** that

accesses Internet documents. Obtaining country details, opening project webpages and accessing data from FishBase 99 in the Internet are just some of the operations requiring URLs.

Table 3.3. Default entries of HTTP URLs.tab.

Fields	Defaults
Newspage	http://www.cgiar.org/iclarm/trawl/index.htm
Project Description	http://www.cgiar.org/iclarm/project.htm
Downloads	http://www.cgiar.org/iclarm/trawl/Downloads/downlod.htm
Contact Us	ICLARM@cgiar.org
Country Details	http://www.odci.gov/cia/publications/factbook/country.html
FishBase URL	http://www.fishbase.org/Country/CountryTreatyList.cfm?Country=
Ecopath URL	http://www.ecopath.org/models/pubmodel.htm

Note that these entries can be modified to suit the needs of the user. For example, FiRST is used for another project (i.e., not the ADB-RETA 5766 Project), the project's URL can be entered to access other websites.

Warning! The Internet modules of **FiRST** require the Microsoft Internet Explorer 4.0 (or newer version) properly installed onto the computer. **FiRST** may not work properly with other Internet browsers. The CD comes with a copy of the Microsoft Internet Explorer 4.01. You may use this version to install the browser.

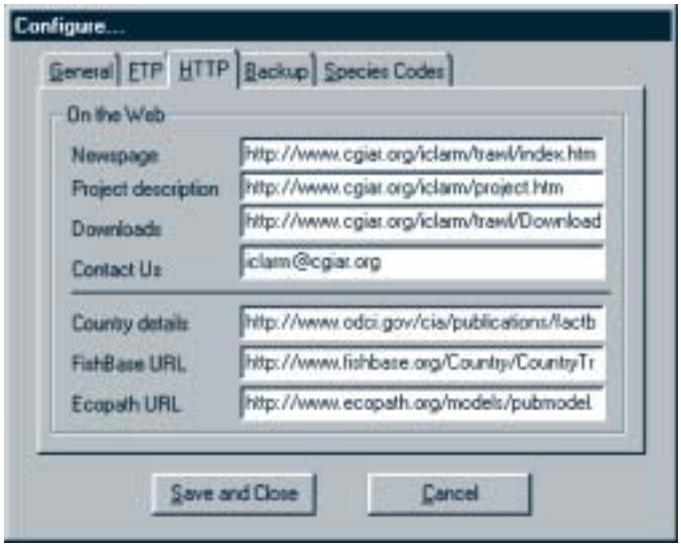


Fig. 3.4. The HTTP tab in the dialog box used for reconfiguring settings.

Backup Tab

Data security is a primary concern of database administrators. **FiRST** records the period (date) a backup procedure was last performed and, depending on the settings (Fig. 3.5), a message appears to remind the user of the required operation. Unless the procedure is performed, the warning message will continue to appear every time the catch form is displayed.

The Backup tab displays the last backup date, default directory where the backup file will be stored and frequency of storage. Five options are provided: daily, weekly, biweekly, monthly and bimonthly. The choice of what frequency to select depends upon several factors, such as electric current reliability, hardware reliability and the number of data to be encoded. If a lot of data is expected to be encoded, a daily frequency is appropriate. However, if the database is seldom utilized and no new data are encoded onto the system, a bimonthly frequency would suffice.

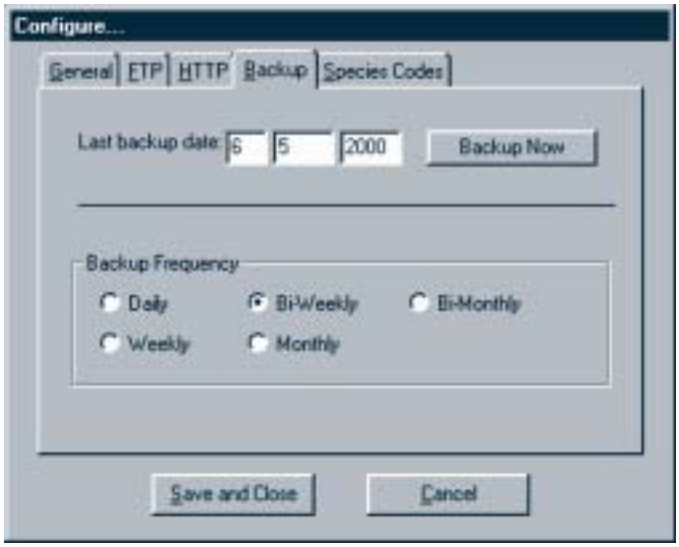


Fig. 3.5. The Backup tab in the dialog box used for reconfiguring settings.

It is advisable to store the backup file in another physical drive in case the working drive is damaged. More explicit details of the backup procedure are given in the *Backup Routine* section of Chapter 4 *(Data Management)*.

Species Codes Tab

The use of codes to link to scientific names is not advisable since taxonomic names are subject to change (Froese and Pauly 1999). In the early days of computerization, the sizes of storage media were such that the challenge was how to reduce fields to their barest minimum. The emergence of large primary storage media makes this

issue of secondary concern. In some cases, it is no longer discussed or considered in the design of database systems.

However, since most of the "old" data in fisheries research were recorded using codes and many programmers still believe that codes make database smaller and hence faster, taxonomic codes are supported by this system (Fig. 3.6). Users may customize a table of codes through this tab, using the ISCAAP codes (see FishBase) or the NAN-SIS codes (Strømme 1992). The table of codes may be edited as required.

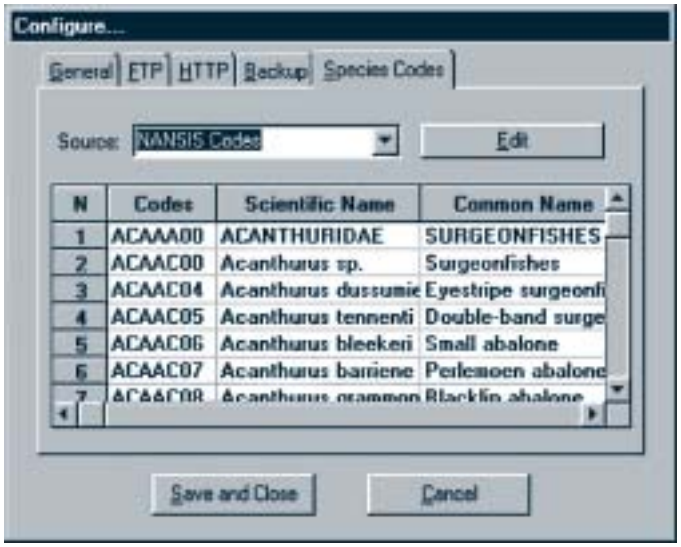


Fig. 3.6. The Species Codes tab in the dialog box used for reconfiguring settings.

Note that the scientific names in the table of codes are not validated by **FiRST**. It is the user's responsibility to ensure that these names are correct. Moreover, during data entry, this table of codes will only be accessed if the working table containing the taxonomic inputs does not reveal the new entry, i.e., taxonomic input was recorded for the first time. In that case, **FiRST** searches through the table of codes and saves it to the working table when the inputs for the catch data are saved.

CHAPTER 4

Data Management

Introduction

The management of electronic information is a cycle that starts with data encoding, editing, saving and securing (i.e., backup/restore procedure; as the saying goes, "garbage in, garbage out"). Preventing "garbage" from getting into a system is a huge challenge.

Ensuring the integrity of information in a database starts not at the level of data encoding but rather at collection stage. Despite the incorporation of complex validation procedures, there is no known process that protects a database system from storing the wrong data – be it a misspelled word, wrong decimal position or wrong numeric value. **FiRST** provides utilities that facilitate encoding and editing of data, and thus minimizes erroneous inputs.

Preventing "good" data from turning into "garbage" is another challenge, particularly with the emergence of electronic viruses and not-too-reliable storage media. The best response to date is to generate a mirror copy of the database itself. **FiRST** provides utilities to easily backup the data and a straightforward procedure to restore database from mirror copies (see *Backup Procedure*).

Data Encoding

Country Form

The default screen display when the data management function is activated is the Catch form. However, the first set of data required to enter catch information refers to the country from where the data originate (see Fig. 4.1). Relevant fisheries information from different countries can be found in many databases, such as FishBase (Froese and Pauly 1999) and other Internet websites. The only entry that may be modified by the user in this form is the Remarks field (however, comments and suggestions for improving the contents of other fields are welcome).

> **Note:** The values/entries in fields with white background can be modified; those with gray background cannot be modified; and those with yellow background require inputs. Note that the Country form has no field with yellow background because none of the fields have a required input.

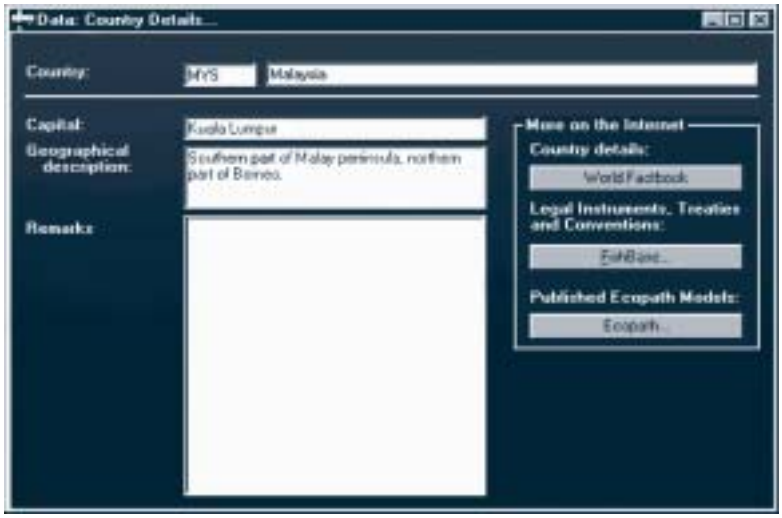


Fig. 4.1. The Country Details form. The Remarks field is the only field that can be modified by the user.

Other country details can be retrieved from Internet websites such as the World Fact Book at address: http://www.odci.gov/cia/publications/factbook/country.html (system default). This address can be reconfigured (see Chapter 3 *Configuring* ***FiRST***) to link to another address.

Project Form

The Project form (Fig. 4.2) records parameters that describe the project which generated catch samples. Although the parameters are not directly used for analyses, this form may be useful in providing background information and in identifying data to be included in an analysis.

Data, such as the Purpose/Objectives of a Project will inform the fisheries scientist of the potential usefulness of a given dataset for a specific type of analysis. The Project Area is another parameter very often used, especially when data analysis pertains to a specific area. Although **FiRST** allows users to filter the database before any computation is performed (see Chapter 7 *Biomass Estimation*), selecting the project from the start will ultimately be more efficient. The significance of these data may not be obvious if the database is relatively small. However, when dealing with a relatively large dataset, details about the various projects become essential.

Gear Form

The Gear form (Fig. 4.3) records technical details of the gear used in the trawl survey. The headline width, although not a required input, is necessary to estimate biomass using the swept-area method. In the absence of input, **FiRST** assumes its value to be 50% of the length of the headrope. In cases where neither headrope length nor width values are provided, records that utilize the gear will automatically be excluded from biomass estimation.

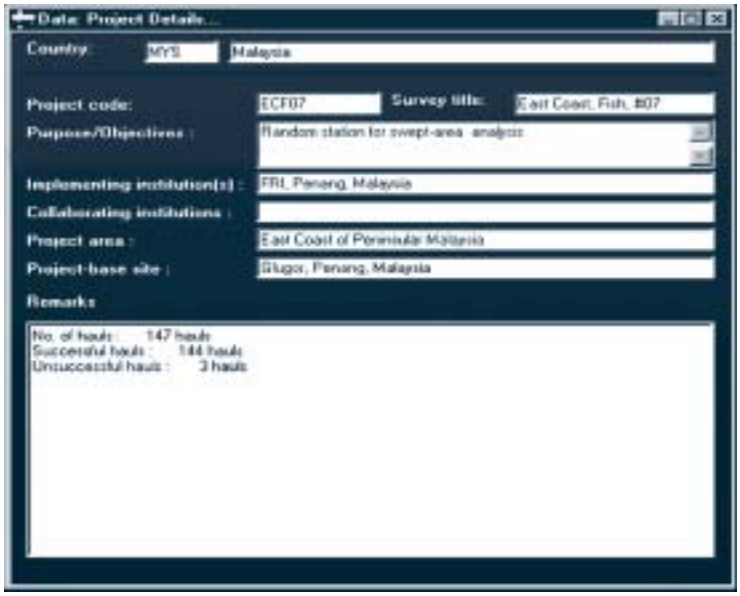


Fig. 4.2. The Project details form. Note that the fields included are all in text form.

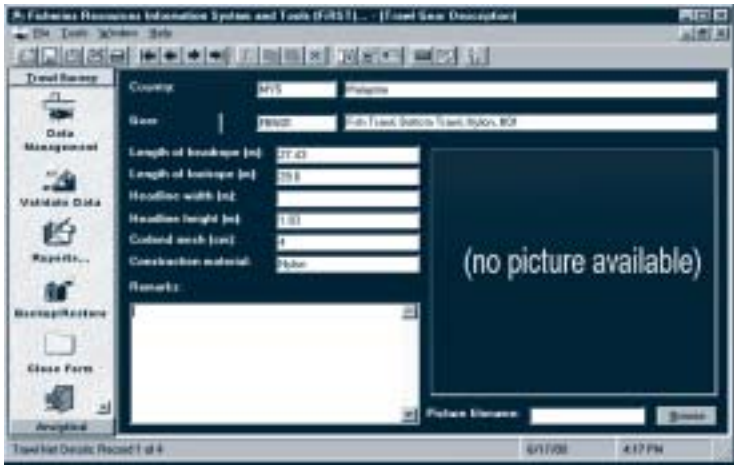


Fig. 4.3. The Gear details form. A scanned picture of the gear used for the trawl survey can also be displayed.

This form also allows the storage of the file address of a scanned image of the gear. It is advisable to use scanned images with technical specifications rather than photos.

Trawler Form

The Trawler form (Fig. 4.4) records some of the technical specifications of the vessel used for the trawl survey. Similar to the Gear form, it is advisable to use here a technical drawing with key specifications. The Trawler form has a dropdown combo box for trawler type. Although users can enter other inputs to classify the trawler, some of the common options are otter trawler, pair trawler and beam trawler.

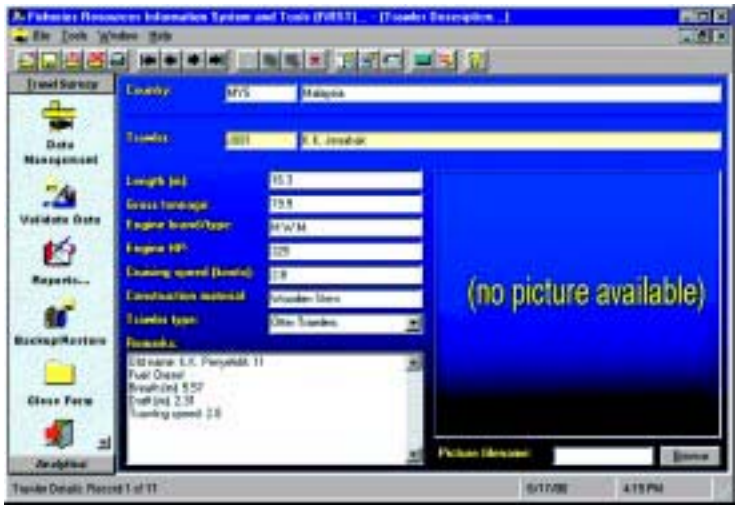


Fig. 4.4. The Trawler details form. A scanned picture of the trawler (i.e., vessel) used for the trawl survey can also be recorded.

Cruise Form

The Cruise form (Fig. 4.5) is meant to describe the cruises made. Among others, this form includes information on the dates of sailing and return to port. For obvious reason, the date of return cannot be earlier than the date of sailing. To simplify entry, a calendar can be activated and users can simply select the appropriate date.

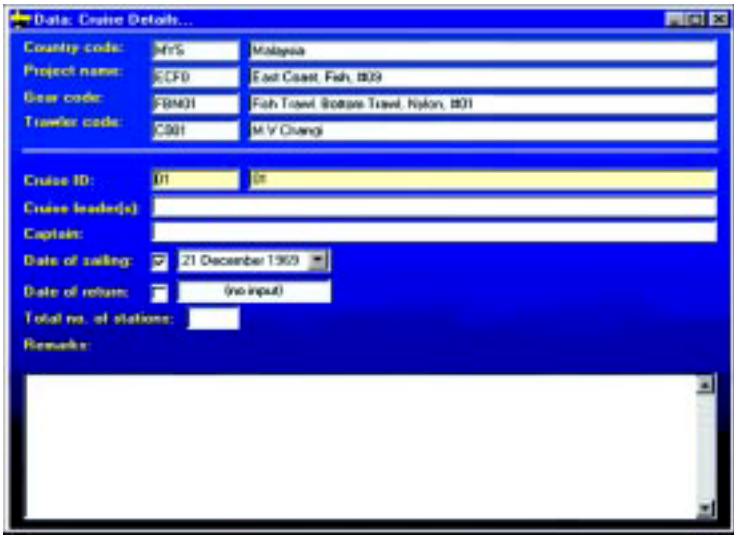


Fig. 4.5. The Cruise form used to record cruise-specific information.

Station Form

The Station form (Fig. 4.6) is composed of two parts: the header and the body (consisting of three tabs). The header displays the station number or code, sampling date, daylight sampling or otherwise, and data classification. Data are classified as restricted, conditionally accessible or fully accessible (see *Data Security* section in Chapter 1).

The General tab contains information that records a station's geographical location, fishing time, fishing depth, bottom depth and towing parameters (if any). Note that when computing the biomass using the swept-area method, the start and ending positions are required. In the absence of an ending position, the towing direction and speed are used to compute the ending position.

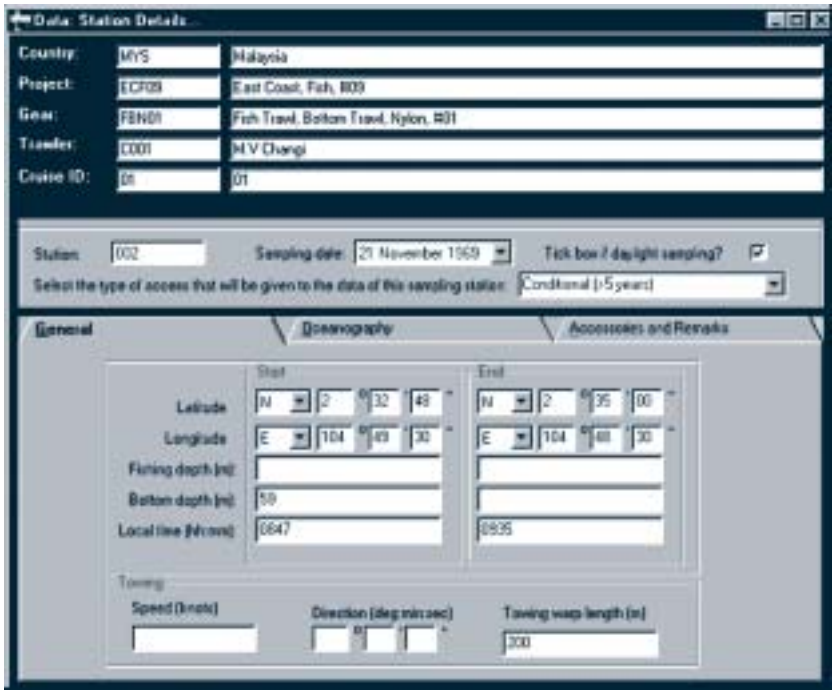


Fig. 4.6. The station form with the header information and three tabs to record station-related information.

Oceanographic information can be recorded in the Oceanography tab (Fig. 4.7). In recording wind data, a change in the Beaufort scale automatically records a change in the field for wind speed and vice versa. Also, the same is true when recording bottom type. A change in the bottom type will automatically change the grades and vice-versa.

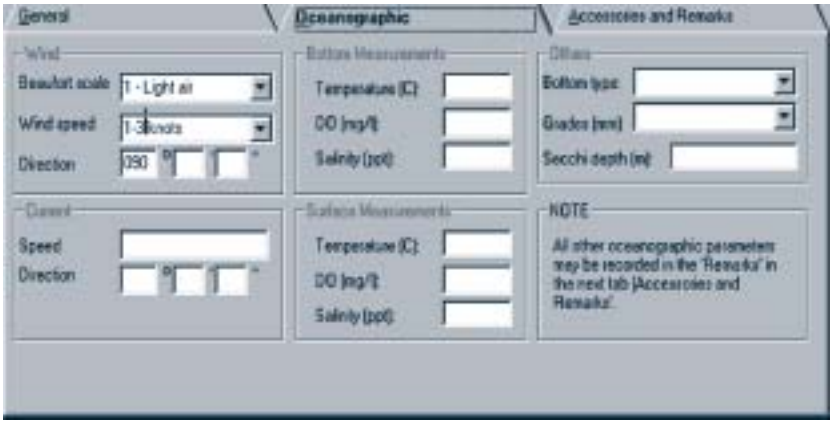


Fig. 4.7. The Oceanography tab to record station-related oceanographic data.

The third tab in the Station form (Fig. 4.8) is to provide details, in free-text format, on accessories used and other station-related remarks. Accessories may include the use of floats, cameras, rollers, etc. not captured in any fields in the Station form.

Fig. 4.8. The Accessories and Remarks tab of the station form.

Catch Form

The main form in the database system is the Catch form (Fig. 4.9). Catch data recorded in a given station include the taxon (or scientific name); total catch (in kg); sample weight (in g); and sample count or number of sample specimens recorded.

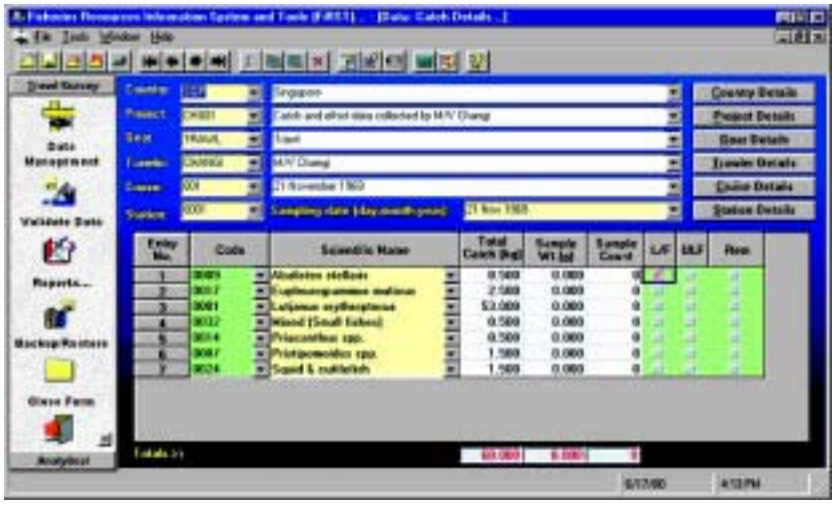


Fig. 4.9. The Catch form. Check marks in the last three columns indicate entry/ presence of related data.

Scientific names and species codes can be encoded directly, or selected from a list constructed from previous entries. The table of codes can be configured to suit user preferences (see Chapter 3 *Configuring **FiRST***).

The columns could be resized to user's preference. If taxonomic codes are not used (which is highly recommended), resize the first column by dragging until it ceases to be visible. The resized widths for each column will then be recorded and the next time the program is opened, the same width will be used (see also Appendix D: *Report Formats*).

The last three columns, L/F (grouped length frequencies), ULF (ungrouped length frequencies) and Rem (remarks) are indicator cells. If a check mark is present, data are available. Users may click the cell to view, enter or edit the data (see *Grouped L/F form*, *Ungrouped L/F form* and *Remarks form* below).

If a user double-clicks on a code cell corresponding to a taxon in FishBase, **FiRST** opens the corresponding FishBase webpage. **FiRST** is programmed to classify taxonomic inputs as family, genus or species. In Fig. 4.9, if the user double-clicks the cell for *Abalistes stellaris*, the webpage for the species (Fig. 4.11) is displayed (see also Chapter 3 *Configuring **FiRST***). Note, however, that since *Abalistes stellatus* is not a valid name, FishBase opens the page that reads *Abalistes stellaris.* This is another way of checking for valid scientific names. If the user double-clicks the cell for ARIIDAE (see Fig. 4.9), **FiRST** redirects to the ARIIDAE family page (Fig. 4.12).

Very often in trawl surveys, there are some samples that can be identified only at the generic level. The taxonomic input is then recorded as "sp" for single species or "spp" for several species. In Fig. 4.9, if the user double-clicks the cell with the input *Lagocephalus* sp., the genus page is displayed (Fig. 4.13).

If there is no Internet connection, a check on the taxonomic inputs can be done by searching the FishBase database, if one is installed on the computer. This routine functions properly only with FishBase 97 and 98. To search the FishBase database, the user must do the following:

1. Place the cursor on the scientific name and select an item on the list.
2. Press the [F9] function key to activate the search FishBase database form (Fig. 4.10).
3. The function automatically selects an option depending on which category to search; however, the user can change the option as may be necessary.
4. Click the command button [Proceed] to start searching for records that match the input.
5. If a match is (or matches are) found, a list of matching record(s) will be displayed on the table with fields names as column headers (e.g., common name, genus, etc.). Otherwise a message will prompt the user to select another option.
6. The scientific name can be changed by double-clicking an item on the list of taxons. There are three options: family, genus, and genus and species.
7. Clicking the Replace command button confirms the action, i.e., replaces the initial input.

Tip! The user can sort the result of the search table by clicking the column header (e.g., Family name) or change the column order by selecting the column to move and while holding down the left mouse button, drag the column to the desired position and then release the mouse button.

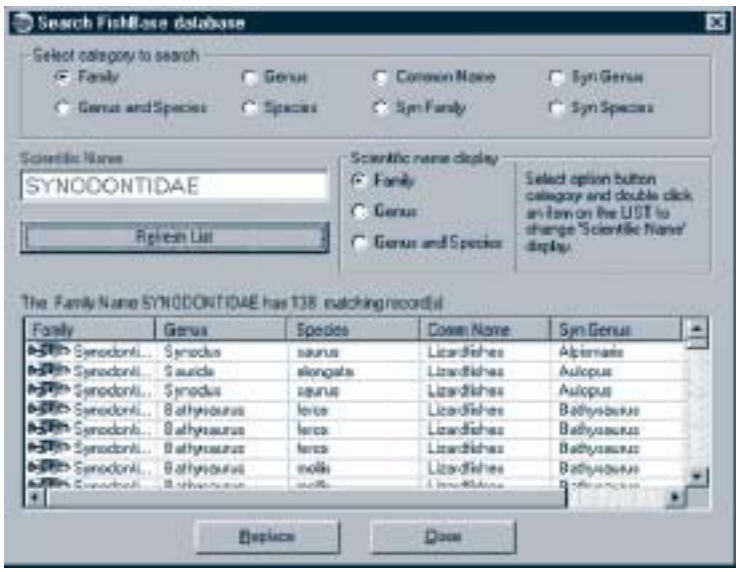


Fig. 4.10. The search FishBase database routine (a ready tool for checking scientific names).

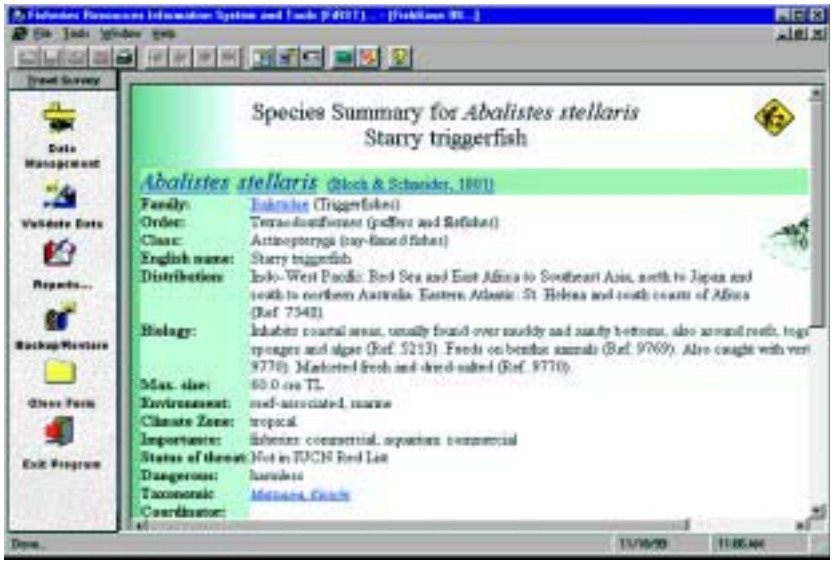


Fig. 4.11. FishBase webpage for species opens directly from FiRST (if a complete species name is detected).

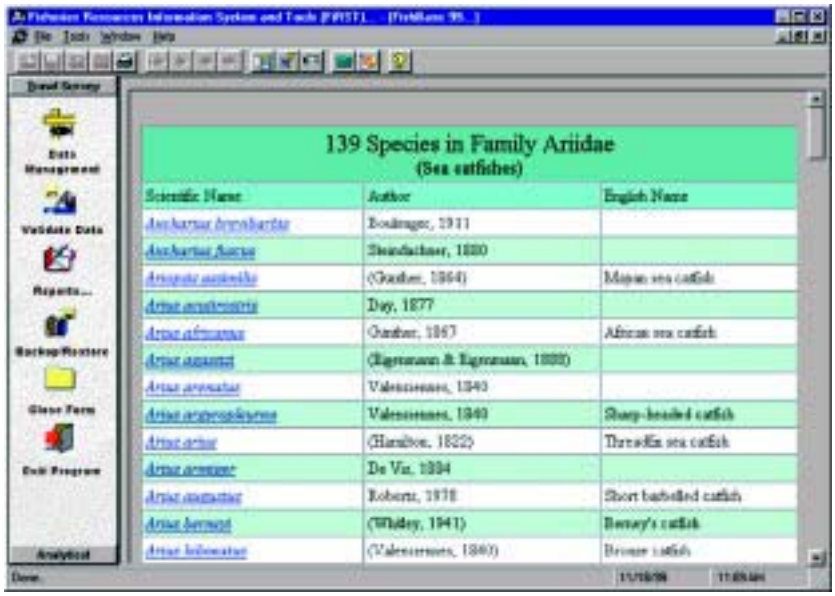


Fig. 4.12. FishBase webpage giving the list of species in a family.

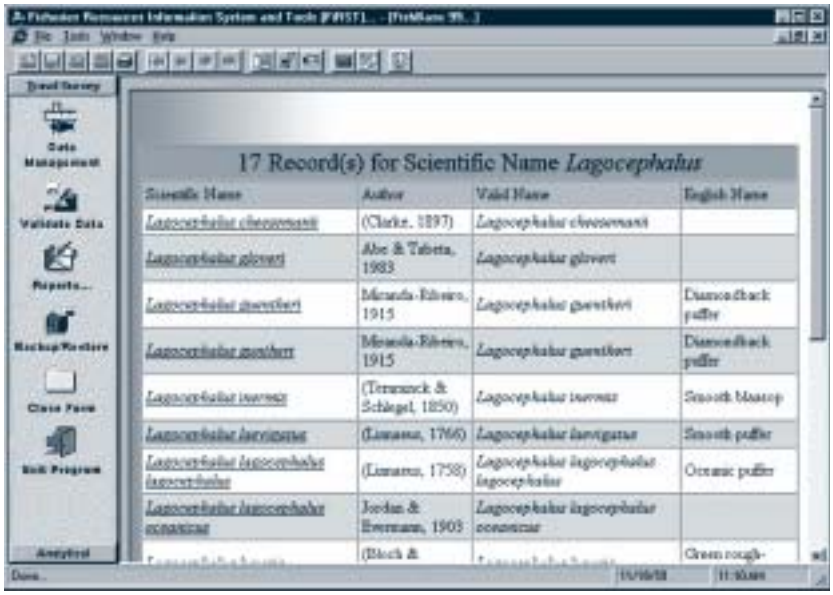


Fig. 4.13. A FishBase webpage with a list of species in a genus.

Cruise Popup Table

The Cruise popup table is a special type of form which can be activated by pressing the function key [F8] (Fig. 4.14). It displays a list of cruise numbers that correspond to project code, trawler code and gear code. This list is useful in identifying and searching records especially if the database contains a large number of gears and trawlers. The Close command button closes the form.

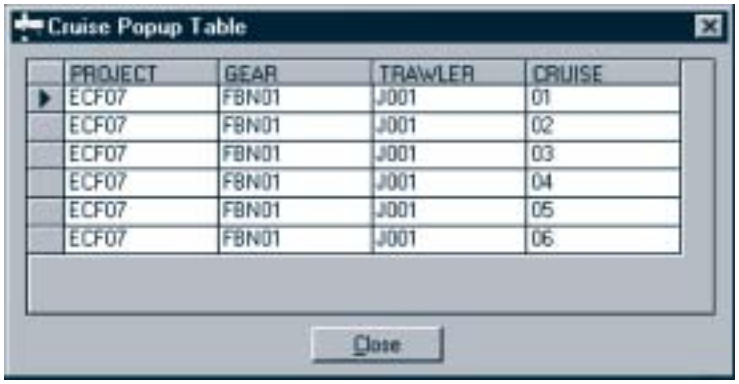


Fig. 4.14. The Cruise popup table. It shows the corresponding project, gear and trawler codes for a particular cruise number.

The last column (see Fig. 4.9) opens the Remarks form. The form (see Fig. 4.15) allows users to record other supplemental data related to the catch of a particular taxon. It also includes estimates of the biomass and catch per unit of effort (C/f), if a biomass estimation has been performed previously (see Chapter 7 *Biomass*

Estimation). The escapement factor used in the estimation of biomass is also displayed.

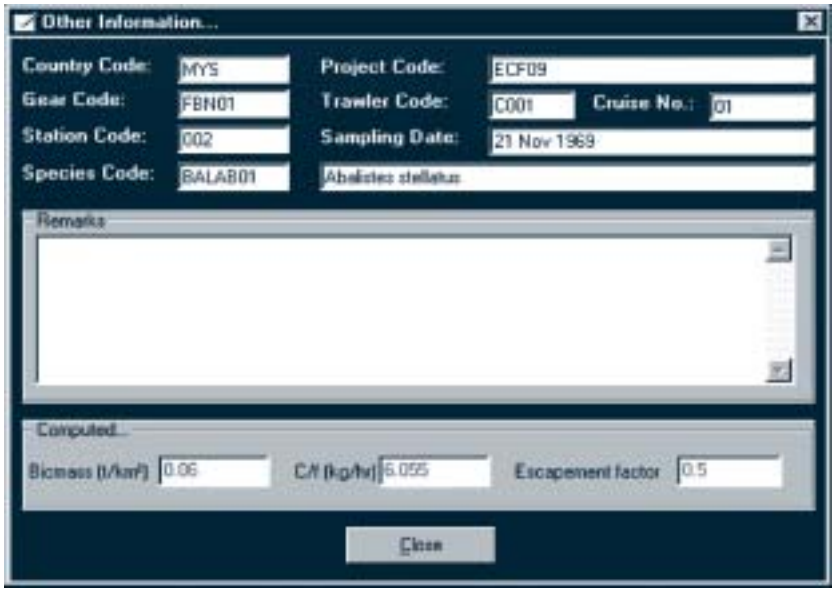


Fig. 4.15. The Remarks form. Note the display of biomass, catch per unit effort (C/f) and escapement factor used (see Chapter 7 Biomass Estimation for more details).

Grouped L/F Form

In Fig. 4.9, clicking the cell in the column with the header L / F (for length frequencies) opens the form to record grouped length frequencies (Fig. 4.16).

The data may be segregated by sex. However, in many instances, the sexes of the individuals in the samples are unknown or unspecified (default setting). It is advisable to segregate L / F data by sex, as growth and mortality are often different between males and females.

The inputs for class size and lower limit of the smallest class size will automatically allow **FiRST** to compute the upper and lower class limits. Users need only to concentrate on encoding of frequencies. The other required inputs for this form are:

- Unit of measurement (mm, cm or in);
- Type of measurement, i.e., total length (TL); standard length (SL); fork length (FL); carapace length (CL); mantle length (ML); shell length (ShL) and others;
- Data type (raw data, raised to catches, raised to C / f, percentage of sample weight, square root of sample total or others not in the list).

A Remarks field is available for users to incorporate comments, especially if the type of measurement and / or data is recorded as “others”. It must be noted that **FiRST** does not support storage of length frequency data with variable class sizes.

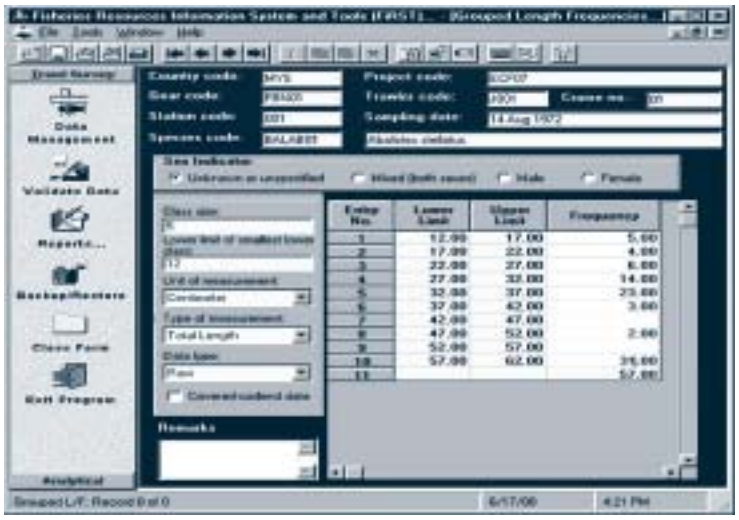


Fig. 4.16. The Grouped L/F form.

Ungrouped L/F Form

Ungrouped length frequency data or individual measurements of fish or invertebrate samples are encoded in the Ungrouped L / F form (Fig. 4.17). Clicking the cell with the header labeled ULF opens this form.

Users have the option to enter TL, SL, FL or other measurements such as CL, ShL or ML. If the type of measurement is not in the list, simply select others and provide the proper label in the space provided. The unit of measurement has to be specified for all measurement types. If a type is deselected, the corresponding column is deleted. The command button, reset to default, re-initializes all columns to their default settings, i.e., TL, SL and FL.

Note: The current version of **FiRST** comes with a utility to convert ungrouped L/F data into grouped L/F, as used in FiSAT. Contact ICLARM for the procedure to export this type of data for use in the FiSAT software.

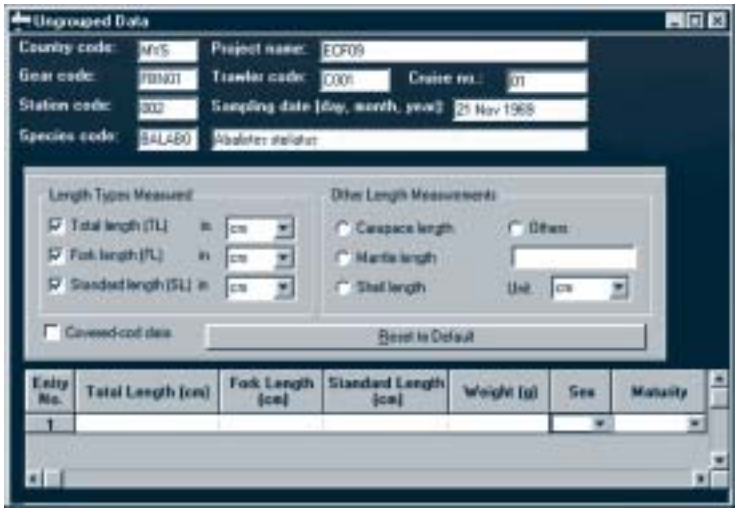


Fig. 4.17. The Ungrouped L/F form.

Saving Records

FiRST provides utilities to save data while performing preliminary validation of the inputs (see Chapter 5 *Data Validation*) based on predetermined ranges. **FiRST** will also alert users if a new input was made or an edit was performed before closing any of the forms with unsaved data. It is, however, good practice to manually save records before closing any of the forms. Click the Save icon at the tool bar or access the Save… function from the File menu.

> **Warning!** Corrupted databases is usually the result of abruptly terminating the program while saving data. If this happens (e.g., during a power failure), contact ICLARM for assistance.

Backup Procedure

Saving data to a disk or any storage medium is not a guarantee that they are secure. Data can be lost in many ways, and accidents (no matter how careful one is) are bound to happen.

The most common cause of data loss is associated with physical damage to the storage medium (e.g., floppy disks, hard disks). The storage medium like floppy disks and hard disks may have defects thus making them unreadable. A floppy disk is susceptible to damage caused by, among others, fungal growth, chemical reactions with gases and improper handling. The prolonged use of any medium will generally lead to its physical damage.

The advent and spread of computer viruses is another source of problem for database managers. Some electronic viruses can corrupt databases or render them completely unusable. Users are encouraged to regularly update anti-virus software and use this to protect their data.

Mishandling of databases is another cause of data loss. Users may inadvertently overwrite or delete valid inputs. Although **FiRST** incorporates features that minimize accidental deletion of data, it can still happen.

Creating a mirror copy (exact duplicate) of databases remains the most effective means of securing data. There are many ways to create mirror copies. **FiRST** utilizes the simplest of these, i.e., copying the same file to other directories.

Configuring the Procedure

To secure data, the databases should be copied to another directory, preferably in a separate medium as often as possible. The configuration tab of **FiRST** contains options for backup time intervals (see *Configuring **FiRST***) – daily, weekly, monthly, bimonthly or every other month (see Fig. 3.5). The program will not automatically perform the procedure but will only remind the user to create a backup. The actual operation of mirroring files remains an option for the user. The backup directory is

used only as startup directory when the procedure is executed. However, the user has the option to change its location.

Naming Backup Files

The backup procedure is no more than the generation of a mirror copy of the working database to another directory. This directory may either be from within the same computer (same hard disk), in the LAN (local area network) directory or in a removable medium such as ZIP disks (visit http://www.iomega.com for more information on ZIP disks).

The user is highly recommended to generate two copies, one at short time intervals and saved on the same hard disk or LAN directory, and the other on a removable medium with longer time frequency of updating. The use of the current date to name files is highly recommended for easy location of copies for restoration.

Restoring from Backups

Restoration of the database from a backup is as simple as overwriting the **DBWorking.MDB** with the latest mirror copy generated. The Windows Explorer or any file copy utility can be used for this purpose. Care should be taken when restoring a database:

- When an electronic virus is the reason for data loss, make sure the virus has been eliminated before any restoration is attempted.
- When data are inadvertently deleted, check carefully to ensure that all edits made to the database are re-done.
- When the storage medium has physical defects, it should be replaced before restoration.

Import/Export Data from/to FiSAT

The software known as FiSAT or FAO-ICLARM Stock Assessment Tools (Gayanilo et al. 1996) contains several routines to analyze length frequencies. This module allows for the exchange of data to-from FiSAT and FiRST. Unlike FiRST, FiSAT does not have an extensive database management system and its data are recorded as simple text file (i.e., flat file). This implies that only the basic information is exchanged, i.e., sampling dates and recorded frequencies. All other information will not be exchanged.

Once activated, the routine displays the General tab (Fig. 4.18) for the user to import or export data. In either case, the source and destination files have to be identified (required fields). The Browse command button may be used to locate the files.

Warning! When exporting data to an existing file, it will overwrite the file contents.

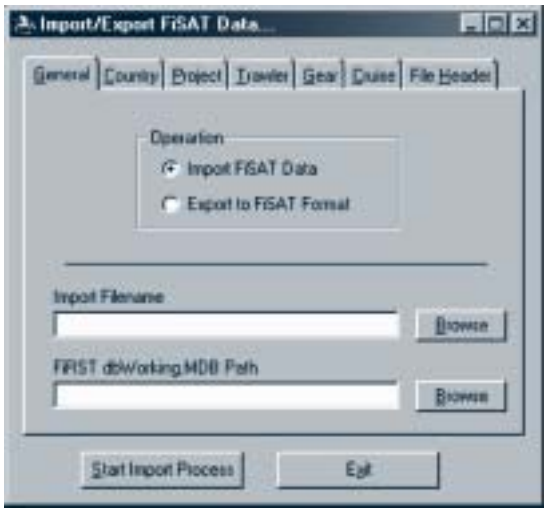


Fig. 4.18. Import/Export: the General tab. It identifies which operation to execute and the location of the source and destination files.

The next five tabs, (i.e., Country, Project, Trawler, Gear and Cruise) are used to identify the record. When exporting, these tabs provide the field "other ID" used in FiSAT. When importing, identify records where these data can be accessed. It is important to review the contents of the tabs carefully before importing data to prevent loss of information.

The File Header tab (see Fig. 4.19), provides some record details. When importing data from FiSAT, the contents of the field, other identifiers, which do not have a direct relationship to any of the fields in **FiRST**, will be recorded on the remarks fields.

Fig. 4.19. A File Header tab when importing data to FiRST. Note that the fields on the second frame are disabled when exporting data to FiSAT.

Error messages are displayed when the information required to export or import data is incomplete or when the data to export exceed the limits of FiSAT (maximum of 50 length groups and 50 samples). To solve the latter, export a portion at a time when total sample (station records) exceeds limits or readjust the class size information in **FiRST** when the total length groups exceed 50.

CHAPTER 5

Data Validation

Introduction

Data validation is an integral part of every database management system, essentially to maintain its integrity. Data validation is done in two levels: (1) range validation and (2) consistency check.

Dropdown lists are used when encoding data with a limited range of possible inputs. Note that here, another input is possible, i.e., "both sexes".

Range Validation

Range validation simply consists of checking inputs against known limits. The range of possible values may either be numeric as with *day* inputs for a given month or a range of possible choices, such as inputs for the sex of the fish (i.e., male, female or unknown). In cases where a limited list of possible choices is known, **FiRST** incorporates features such as the dropdown list boxes from where the encoder can just select, hence limiting the possibilities of error.

Alphanumeric (sometimes referred to as string) inputs are also validated. Validation for free text inputs is limited only by the check for the length or number of characters entered. The title of survey, for example, is limited to only 150 characters. **FiRST** incorporates features to prevent users from entering data beyond the set limits.

The technical specifications of all fields in **FiRST** are given in Appendix A. Users are invited to submit comments and suggestions if the set limits are insufficient or not applicable in certain scenarios or areas of study.

Consistency Check

Consistency check is the second level of data validation that examines inputs:

1. from within a table; and
2. between tables in the database. **FiRST** provides an option (see Chapter 3 *Configuring **FiRST***) for this type of data validation, especially on scientific names, which are checked against names in **FishBase**. Such checks may be performed immediately after data encoding or at a later time.

Visit http://www.fishbase.org for more details on FishBase database.

Although it is ideal to perform consistency check during data encoding, the process considerably slows down data entry. Moreover, this process may require inputs from fisheries scientists, who are often not in charge of data encoding.

Below is a detailed description of the sequence of operations programmed to perform this task. Later releases may include more submodules to strengthen this part of the system.

Executing the Routine

To activate the routine, either double-click VALIDATE.EXE in Windows Explorer or click the icon Validate Data in the List bar of **FiRST**. The size and completeness of data determines the time required for the process to be completed.

A dialog box (Fig. 5.1) will be displayed. Depending on the size of the database or amount of data for validation, it may take some time to complete the procedure. As the routine is executed, validation results will be displayed.

Tips! Improving Database Speed

1. Do not manipulate the database while validation is in progress.
2. Compact the database before running the routine.
3. Close other running programs.
4. Disable memory-resident programs.

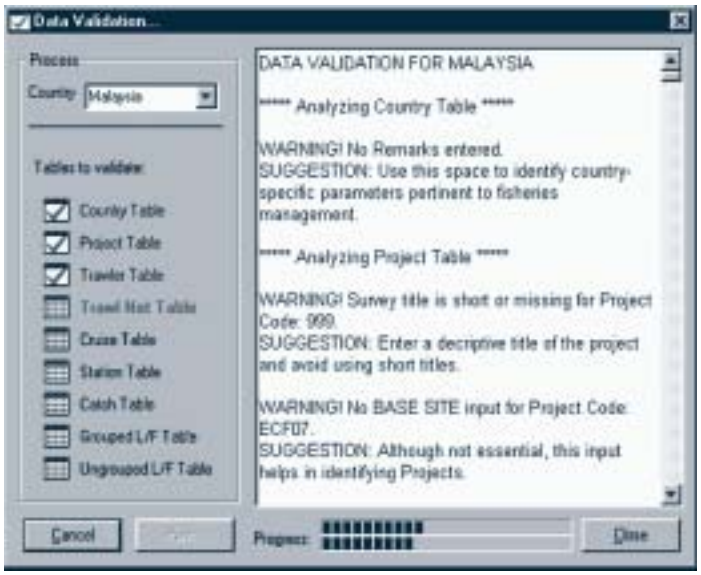


Fig. 5.1. Validated tables are marked with a check icon and the table currently being processed is labeled in red. The right panel of the window displays the validation results.

Once completed, a text file summarizing the findings and suggestions to correct likely invalid data may be saved to a text file. Any text editor or word processor can open this text file. Please note that the text file is overwritten if the routine is re-executed. An option is also available to globally change misspelled scientific names or detected possible synonyms. Care should be taken when performing global changes. (Please contact ICLARM if this function is not available in the version you have or visit the project website for updates.)

Validation Procedures

The validation (includes and) proceeds sequentially as follows:

Checking Country Table

- ☑ All text fields contain inputs.

Checking Project Table

- ☑ The documents recorded are all unique.
- ☑ All text fields contain inputs.

Checking Gear Table

- ☑ No two gears have the same name.
- ☑ Picture files exist and are valid, i.e., can be read and displayed.
- ☑ Lengths of headrope and footrope have been entered.
- ☑ Length of headrope is longer than headline width.
- ☑ Cod-end mesh is not smaller than 0.1 cm.
- ☑ All text fields have inputs.

Checking Trawler Table

- ☑ No two vessels have the same name.
- ☑ Picture files exist and are valid, i.e., can be read and displayed.
- ☑ All text fields have inputs.

Checking Cruise Table

- ☑ No two cruises have the same title.
- ☑ The date of sailing and return to port corresponds to the sampling dates as recorded in the station table.
- ☑ The number of stations visited tallies with the actual number of stations recorded in the station table.
- ☑ All text fields have inputs.

Checking Station Table

- ☑ No two stations can have the same sampling date, sampling time and period (i.e., day or night sampling).
- ☑ The sampling dates are within the dates of sailing and return of the vessel as recorded in the cruise table.
- ☑ The start and ending positions of hauling correspond with the towing speed and direction.
- ☑ The change of fishing depth within a haul does not exceed 10 m.
- ☑ The trawling period is not less than 10 min or more than 1.5 hours.
- ☑ The towing warp length is not over 500 m.

- ☑ Catches are recorded when Beaufort scale is equal to or greater than 5, or bottom type is cobble-graded or coarser.
- ☑ Secchi depth is greater than recorded bottom depth.
- ☑ Difference between surface and bottom temperature is over 20°C.
- ☑ Difference between surface and bottom salinity is over 20% of surface salinity.
- ☑ Difference between dissolved oxygen at surface and bottom is over 50% of surface value.
- ☑ Check for inputs for all the text and numeric fields.

Checking Species Table

- ☑ Codes are used (if any) to identify a taxon not recorded in the table of codes.
- ☑ FishBase indicates that a name is misspelled or a synonym, and suggests a global change to the valid name.
- ☑ Suggest global change to "Miscellaneous" for the following: "others", "trash", "misc.", "mix", "mixed" and variants of these five commonly used words (i.e., in caps or with spaces in between characters, or combination of both).
- ☑ Catch recorded is not less than the sample weight.
- ☑ Catch recorded is not less than the approximate weight of the fish in the length frequency samples.
- ☑ Count is equal to or less than the length frequencies.
- ☑ Check the inputs for all text and numeric fields.

Checking Grouped Length Frequencies

- ☑ Total count is equal to or less than the recorded total catch in numbers.
- ☑ The approximated weight does not differ by more than 20% from the sample weight recorded in the species table.
- ☑ The length class interval is not more than 10 cm.
- ☑ More than one measure has been recorded, else suggest to move the data to the ungrouped LF Table.
- ☑ The mean length of data recorded from a covered codend experiment (if any) is less than the mean length recorded from the trawl net.
- ☑ All the text and numeric fields.

Checking Ungrouped Length Frequencies

- ☑ Total count is equal to or less than the recorded total catch in numbers.
- ☑ The approximated weight of the sample computed from length-weight coefficients does not differ by more than 20% from the recorded sample weight.
- ☑ Total length is greater than the corresponding fork and standard lengths.
- ☑ Fork length is greater than standard length.
- ☑ The mean length of data recorded from a covered codend experiment (if any) is less than the mean length recorded from the trawl net.
- ☑ All the text and numeric fields.

CHAPTER 6

Report Generation

Introduction

Database management systems are developed primarily for generating reports. What used to be a tedious and time-consuming task is thus made simple. Very often, the same data are used in different reports; for example, catch data may be presented as mean catch per haul, per species or per station.

Thus, it is important for database developers to allow for a wide range of report types to be generated. The report formats included in **FiRST** are as comprehensive as possible. After selecting the type, the report is displayed onscreen and ready to print, upon user's option.

FiRST has modules to generate reports from raw or processed data. Hard copies of raw data (i.e., data as encoded) are usually required for checking original inputs entered from data forms. All data fields (with or without inputs) are printed. Reports with fields for catch per unit of effort, biomass or results summarized in some form represent processed data.

The list of reports which can be generated are summarized in Table 6.1 for raw data; in Table 6.2 for processed or summarized data (including calculated fields); and in Table 6.3 for biomass analyses (see also Report Formats 15-19 in Appendix C).

New report modules will be distributed through the Project website (http://www/cgiar.org/iclarm/trawl) as they become available. Users are encouraged to generate their own reports through Microsoft Access. Users who have developed new reports are most welcome to submit their module to ICLARM for publication through the project website.

Table 6.1. Reports which can be generated from FiRST to print raw data as encoded.

Report Title	Description
Country Details	Prints data about a country from the Country table.
Project Details	Prints selected information from the Project table.
Gear Details	Prints selected information from the Gear table.
Trawler Details	Prints selected data from the Trawler Description table.
Cruise Details	Prints selected information from the Cruise table by project, gear and trawler.
Station Details	Prints selected information from the Station table by project, gear, trawler and cruise.

continued from Table 6.1.

Report Title	Description
Catch Details	Prints all catch data (i.e., species codes, scientific name, total catches, sample counts, sample weights, grouped L/F and ungrouped L/F) by project, gear, trawler, cruise and station.
Grouped L/F	Prints data from the grouped L/F table by project, gear, trawler, cruise, station and scientific name.
Ungrouped L/F	Prints data from the ungrouped L/F table, by project, gear, trawler, cruise, station and scientific name.

Table 6.2. Reports which can be generated from FiRST to print "processed" data.

Report Title	Description
Catch Summary	Prints catch summary by station. The report details are scientific name, total catch and sample weight by project, gear, trawler, cruise and station.
Catch by Depth (kg)[a]	Prints catch data cross-tabulated by scientific name and depth stratum.
C/f by Depth (kg/hour) [a, b]	Prints catch per unit of effort (C/f) data cross-tabulated by scientific name and depth stratum.
Catch by Species and Station (kg) [c]	Prints catch data by scientific name cross-tabulated by station and sampling date.
C/f by Species and Station (kg/hour) [a, b, c]	Prints catch per unit of effort (C/f) data cross-tabulated by scientific name, station and sampling date.

a *Station assignment by depth strata uses the computed average of the starting and ending fishing depths for each station.*

b *Total catch and hauling time are used to compute C/f.*

c *When exporting data on a spreadsheet, the maximum number of columns is 256; when more than this is exported, the table is truncated.*

Table 6.3. Biomass reports which can be generated from FiRST.

Report Title	Description
Biomass by Depth (t/km^2)[a]	Prints biomass estimates cross-tabulated by scientific name and depth strata.

continued from Table 6.3.

Report Title	Description
Biomass Estimates by Taxon[a]	Prints biomass estimates with summary on total, mean and standard errors. Report details are scientific name, station, sampling date, total catch, and C/f by country, project, gear, trawler, cruise and station.
Biomass Estimates[a,b]	Prints biomass estimates with total by station. Report details aretotal catch, computed C/f and biomass.
Taxon by Station Cross-tabulated Biomass Estimates (t/km^2)[a, c]	Prints biomass estimates cross-tabulated by scientific name, station and sampling date.
Mean Biomass and Standard Error by Depth Strata[d]	Prints mean biomass and its started error by scientific name and depth strata.

a *The swept area method is used to compute biomass estimates.*

b *Total catch and hauling time are used to compute C/f.*

c *When exporting data to a spreadsheet, the maximum number of columns is 256; when more than this is exported, the table is truncated.*

d *Station assignment by depth strata uses the mean of the starting and ending fishing depths for each station.*

Selecting Reports

Fig. 6.1 shows the Report Generation dialog box. To select a report type, simply double-click the title (or click the title, then click the generate command button in the lower right corner of the dialog box).

The upper-left panel lists all the report types available. Depending on the selection, users are required to filter the data. In Fig. 6.1, the report which generates station details was selected. To filter the stations and to print, the cruise needs to be identified. Table 6.4 summarizes the functions of the command buttons for record selection. The Close button cancels the operation and closes the dialog box. The Print Preview button prints the results on the screen (Fig. 6.2).

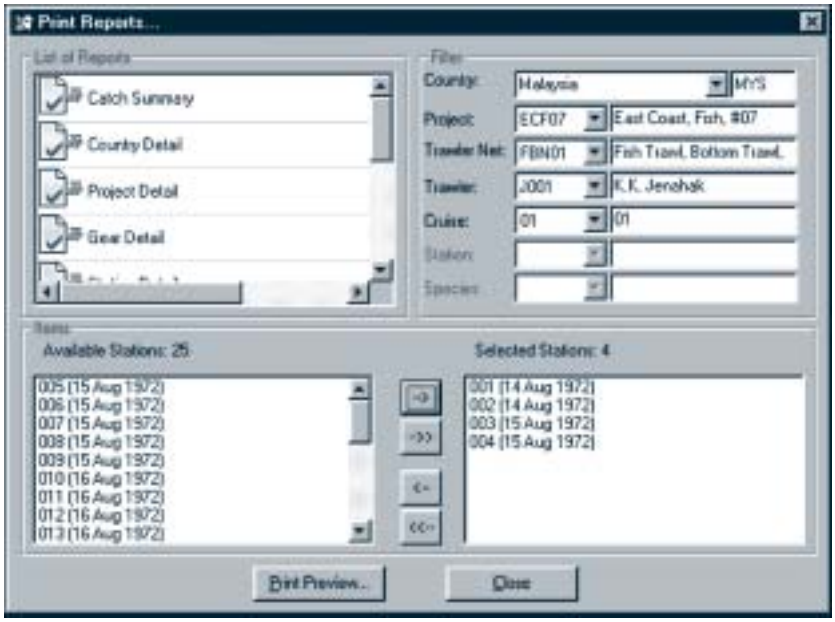


Fig. 6.1. The Report Generation dialog box.

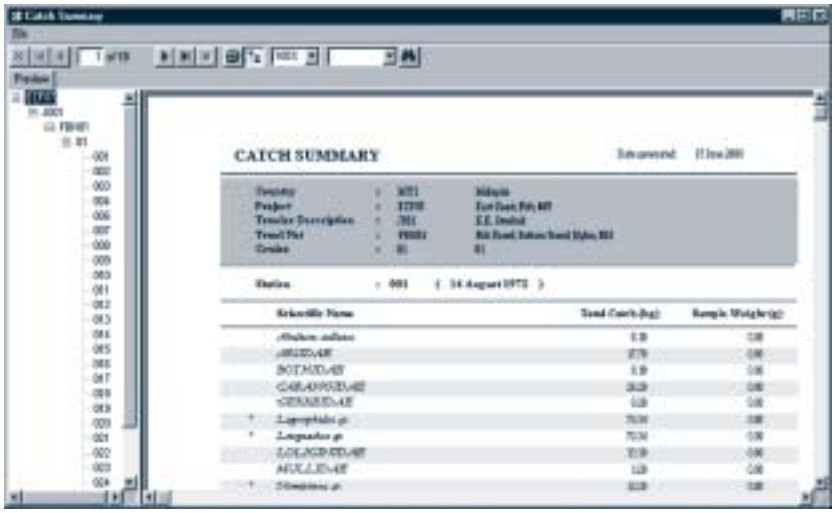


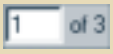
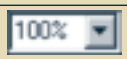
Fig. 6.2. The Print Preview display.

Table 6.4. The functional description of the command buttons used for record selection.

Button	Description
	Selects only the highlighted records in the left panel. Click a record to select. Press the <CTRL> key to select several records or the <SHIFT> key to select a range of records.
	Selects all available records displayed in the left panel.
	Deselects the highlighted record in the right panel. Click a record to select. Press the <CTRL> key to select several records or the <SHIFT> key to select a range of records.
	Deselects all records in the right panel.

The preview screen has four sections (Fig. 6.2): (1) Menu bar (topmost bar); (2) Tool bar (below the menu bar); (3) Navigation tree (left panel); and (4) Report preview (right panel). The Menu bar has only one item (see below). The functions of the command buttons in the tool bar are summarized in Table 6.5. Some of the command buttons are disabled, depending on the number of pages and type of report.

Table 6.5. Functional description of the command buttons in the tool bar.

Button	Description
	Moves to first page of the report.
	Moves to previous page.
	Displays current page (of the total number of pages).
	Moves to next page (if applicable).
	Moves to last page.
	Prints the displayed report.
	Toggle-button to display/hide the navigational panel.
	Zoom factor to enlarge or reduce page size.
	Text input to search.
	Searches entire document given text input.

The Navigational panel (left panel) can be used to navigate through the document. Users may click the section to view it without scrolling sequentially through the report (see description of the toggle-button in Table 6.5).

Exporting Reports

The file menu of the Print Preview dialog box contains three commands: (1) Export, (2) Print and (3) Close. The Print command opens the printer dialog box and the Close command closes it. The Export command opens another dialog box (Fig. 6.3) to select the format of the file to export and its destination. The file formats supported are Microsoft Excel, hypertext mark-up language (HTML) and rich text format (RTF). In some installations, the list may be appended to support other formats. The destination of the exported file may either be to a disk file, Microsoft Exchange Folder, or Microsoft Mail (MAPI). Disk file destination and Microsoft Exchange destinations require the user to identify the folder. If Microsoft Mail is selected, the e-mail address of the recipient will be required.

Fig. 6.3. The Export file dialog box.

Exported files can be used directly or converted to other data formats. Microsoft Excel files, for example, can be exported to several commercially available electronic spreadsheets. If the report generated by **FiRST** does not have the appropriate format, the file can be read by a word processor (e.g., Microsoft Word) and appropriate actions may be adapted to suit individual requirements.

CHAPTER 7

Biomass Estimation

Introduction

Storing data from a trawl survey is only the first step. To be useful, the data must be interpreted, analyzed or otherwise transformed to some other form. The most commonly required analysis involves the estimation of biomass or standing stock.

Swept-Area Method

The biomass (B) of a demersal fishery resource can be estimated using the swept-area method (see for example Gulland 1969 and Pauly 1984a for treatment of the theory). It is based on the densities of fish (i.e., the weight of the fish caught per unit area covered by an experimental gear). Here biomass is computed from:

$$B = \frac{(C/f) \cdot A}{a \cdot X_1} \qquad ...7.1)$$

where C/f is the mean catch per unit of effort (where effort is expressed in time unit, usually one hour); A is the total area covered by the survey; X_1 is the escapement factor, i.e., the fraction of the fish in the path of the trawl that is actually retained; and a is the area swept by the trawl net in one unit of effort (often 1 hour). The area swept (a) is defined by:

$$a = t \cdot v \cdot h \cdot X_2 \qquad ...7.2)$$

where **v** is the trawling speed; h is the length of the trawl's headrope; t is the duration of the trawl haul; and X_2 is the effective width of the trawl relative to the length of its headrope. Commonly used values of X_2 in the Asian region range from a low of 0.4 (SCSP 1978) to a high of 0.66 (Shindo 1973) with a value of 0.5 probably being the best compromise (Pauly 1970). Similarly, the value of X_1 in Equation 7.1, usually ranges from 0.5 (Pauly 1980) to 1.0 (Gulland 1969). Few studies have been made to actually estimate values of X_1 and X_2, even though they drastically affect standing stock estimates. Pauly's (1980) study showed that $X_1 = 0.5$ and $X_2 = 0.5$ generated fishing mortalities compatible with those estimated for various species in the Gulf of Thailand.

To increase the precision of the biomass estimate, a survey area can be divided into several strata. For stratified random sampling, Equation 7.1 is re-expressed as:

$$B = \frac{\sum_{i}^{n} A_i}{X_1 \cdot n} \cdot \sum_{i}^{r} \left[(C/f)/a \right] \qquad ...7.3)$$

where n is the number of stations included in the analysis and i is the stratum. The variance of B can be computed based on Equation 7.3 as follows:

$$\text{Var}(B_i) = \frac{A_i^2}{X_i^2} \cdot \frac{1}{n(n-1)} \sum (C/f)_i \left[\frac{1}{n} \sum (C/f)_i \right] \quad \ldots 7.4)$$

while the standard error of B is:

$$\text{s.e.}_{(B_i)} = \sqrt{\text{Var}(B_i)} \quad \ldots 7.5)$$

Non-normal Distribution and Estimation of Biomass

When analyzing C / f data pertaining to a single taxon rather than the total catch, or data with lots of small catches and very few large ones, it often turns out that the C / f data are not distributed normally. In such cases, a procedural alternative to Equation 7.4 exists, which assumes that catches follow a log-normal distribution (Som 1973; Pauly 1984b). This consists of the following steps:

Step 1 Compute the catch per hour (C / f)j per stratum (j). Add 1 to all catches if haul(s) with zero catch occurs;

Step 2 Take the natural logarithm (ln) of each value ($X_{i,j} = \ln((C/f)_j)$) in Step 1.

Step 3 Compute the uncorrected geometric mean $(\dot{C}/f)j$

$(\dot{C}/f) \quad \exp\left(\sum X\right)$; where n is the number of hauls in a stratum.

Step 4 Subtract the value of 1 previously added to obtain a partially corrected mean $(\dot{C}/f)j \quad (C/f)j \quad 1)$

Step 5 Compute the corrected (C/f)

$(C/f)_{\cdot} \quad (\dot{C}/f) \cdot \exp(\text{Var}(x_{\cdot j}))$ where $\text{Var}(X_{\cdot}) \quad X_{\cdot}^{2}/(n \quad 1)$

Step 6 Estimate the variance of the corrected mean $\text{Var}(\dot{C}/f)j)$

$\text{Var}(\dot{C}/f) \; (C/f)^{2} \cdot \exp(\text{Var}(X_{\cdot})) \cdot (\exp(\text{Var}(X_{\cdot})) \quad 1)/n$

Note: Steps 1 to 6 should be done separately for each stratum.

Step 7 Compute the biomass (B_j) per stratum.
$B_{\cdot} = q_j \cdot (C/f)_j$ where $q_j = 2A / a_j$ (A and a_j are defined in Equation 7.1.)

Step 7 Compute the overall biomass per stratum.

$$B_{total} = \sum_{i=1}^{n} B_i$$

Step 7 Compute the standard error of the overall biomass (B_{total}).

$$s.e._{B_{total}} = \sqrt{\sum_{i=1}^{n} (Var(cdf) \cdot q_i^2)}$$

The degrees of freedom (d.f.) are the number of all the hauls for all strata minus the number of strata considered in the analysis.

Alternatives to the models in **FiRST** include the use of 'Δ-distribution' (Aitchinson 1955) which explicitly accounts for the occurrence of zeroes (Smith 1981; Pennington 1983). Another alternative is of the use of the Monte-Carlo approach for estimating the variance of the biomass estimates (Gayanilo et al. 1997).

Using the Biomass Estimation Routine

The biomass estimation routine can be accessed from the list bar and contains two main forms:

1. Data Definition and
2. Graphic Output. Regardless of what tab is displayed, the following are the command buttons and their respective function:

Button	Function
<- Back	Moves to previous tab. This command is disabled when the active tab is country.
Next ->	Moves to next tab. This command is disabled when the active tab is graph.
Close	Closes the dialog box and exits the routine.

Data Definition Form

The Data Definition form (Fig. 7.1) has ten tabs. The first six (country, project, cruise, filters, station and species) determine what data to retrieve and analyze.

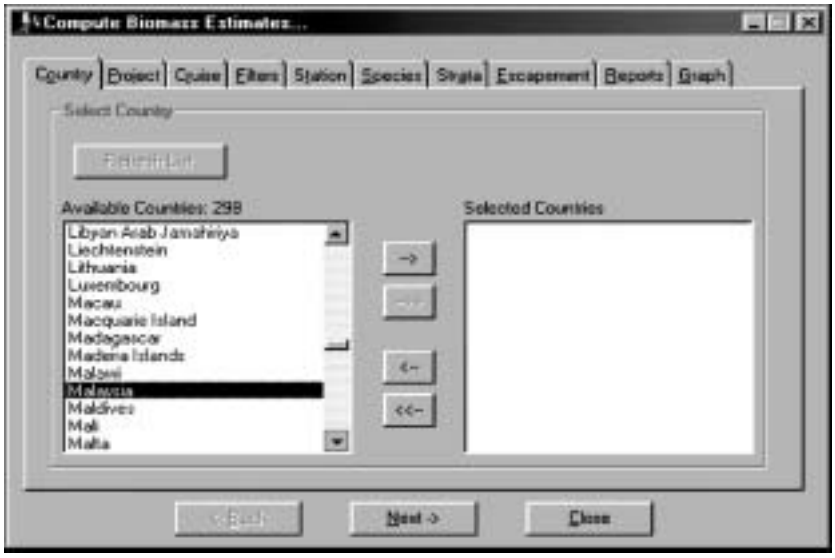


Fig 7.1. The dialog box for biomass estimation.

With the exception of the filters tab, the following are the command buttons common to all tabs:

Button	Function
Refresh List	Refreshes the list of available data (left panel).
->	Selects the highlighted item in the left panel.
->>	Selects all available items in the left panel.
<-	Deselects the highlighted item in the right panel.
<<-	Deselects all items as listed in the right panel.

The Filters tab (Fig. 7.2) precedes the Station tab that allows the user to define the following:

1. Geographic limits (defined by the starting and ending latitude and longitude, in deg:min:sec);
2. Sampling period (defined by the inclusive dates of sampling, in dd/mm/yyyy format); and
3. Depth (defined by range, in meters).

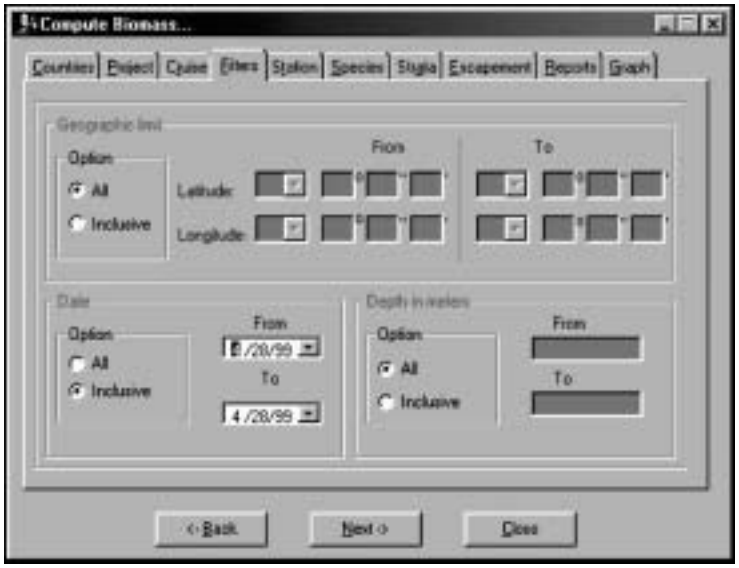


Fig. 7.2. The Filters tab showing the three data filtering options: geographic limits, sampling dates and depth.

The default is the selection of all data. When uncertain, it is advisable to select all and filter the unwanted stations (if any) in the station tab. To simplify the definition of the inclusive dates, a popup calendar is displayed for date selection. The earliest and the latest sampling dates in the database are the default values.

Strata Definition

Very often, stratifying the estimates by depth may be required when analyzing biomasses. The seventh tab, strata (Fig. 7.3), allows for the definition of the strata. Up to 10 depth strata can be defined by the user.

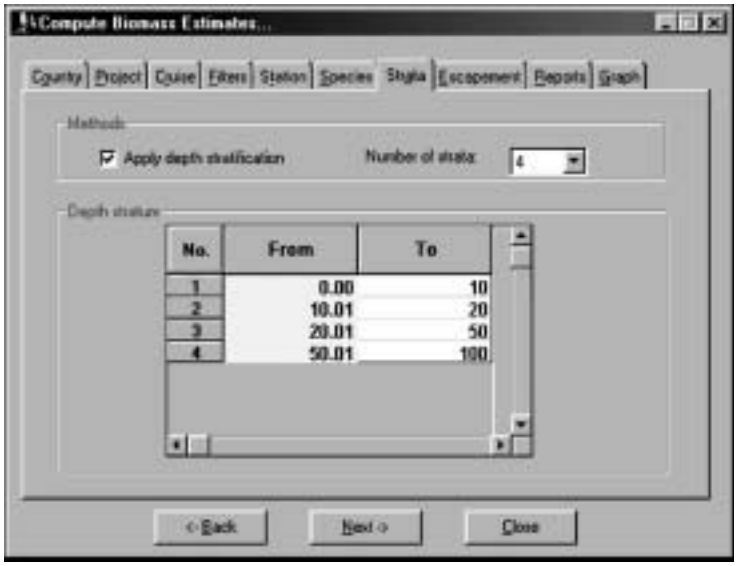


Fig. 7.3. The Strata tab showing the table where depth strata can be defined.

Escapement Definition

The estimation of the biomass requires an escapement factor (X_1), i.e., the fraction of the fish in the path of the trawl that is actually retained. A default value of 0.5 is provided for the escapement factor. However, users may edit the values when a better estimate is available (Fig. 7.4). Clicking the Escapement tab will automatically compute C/f and biomass with user-defined escapement factors for each taxon at each station.

Escapement factors are taxon and gear-dependent parameters. The ability of a gear to retain a species depends on the morphology and size of the species. Moreover, experimental gears are sometimes modified during a survey, thus changing the escapement. Hence, to edit the escapement factors, select the project, cruise and station. The taxa will be displayed with their corresponding escapement factors, which may then be edited. To recompute the biomass estimates, click the Re-compute Biomass command button located in the lower right corner of the tab.

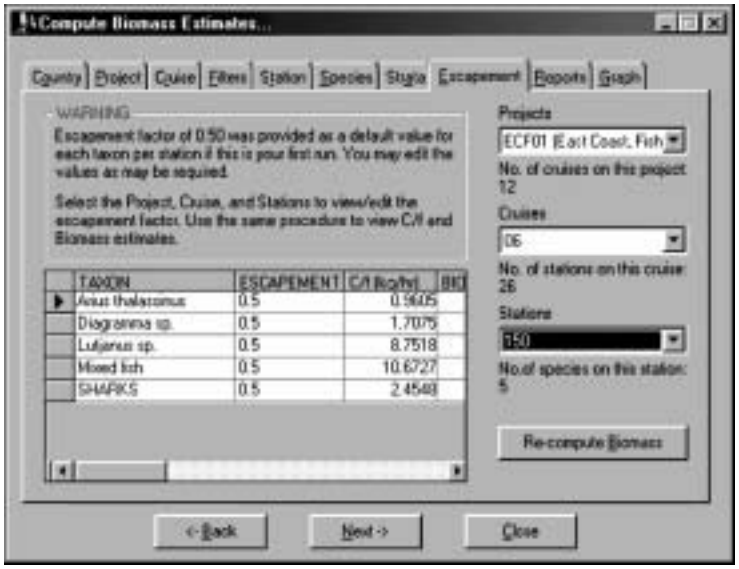


Fig. 7.4. The Escapement tab showing the default entry of 0.5 for all taxonomic groups.

Biomass Report Generation

The biomass report generation routine (Fig. 7.5) produces the following:

1. Detailed biomass estimates (and variance) by station and taxon;
2. Cross-tabulated biomass estimates by station and taxon;
3. Cross-tabulated biomass estimates by depth strata and taxon;
4. Detailed biomass estimates (and variance) by Taxon Group per Station; and
5. Biomass estimates (and variance) by depth stratum (when applicable).

Refer to Chapter 6 *Report Generation* for details on how to generate and export reports. The cross-tabulated report of biomass estimates when exported to Microsoft

Excel can be used as input (with very little modification) to standard packages for fish community analyses, such as CANOCO and TWINSPAN.

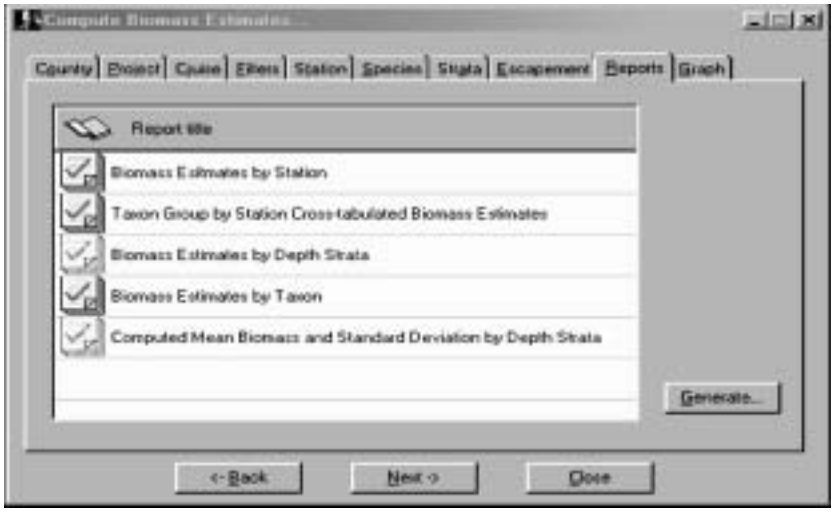


Fig. 7.5. Tab showing the list of Biomass reports that can be generated.

Graphic Output Form

The last tab (Fig. 7.6) is for the generation of graphs. The program automatically computes and linearly interpolates the biomass estimates from the earliest sampling year to the latest observation, and displays these values. When analyzing the results, users are advised to consider and take note of the computed variances (see *Biomass Report Generation*). Interpolated results are displayed in red and with shaded background.

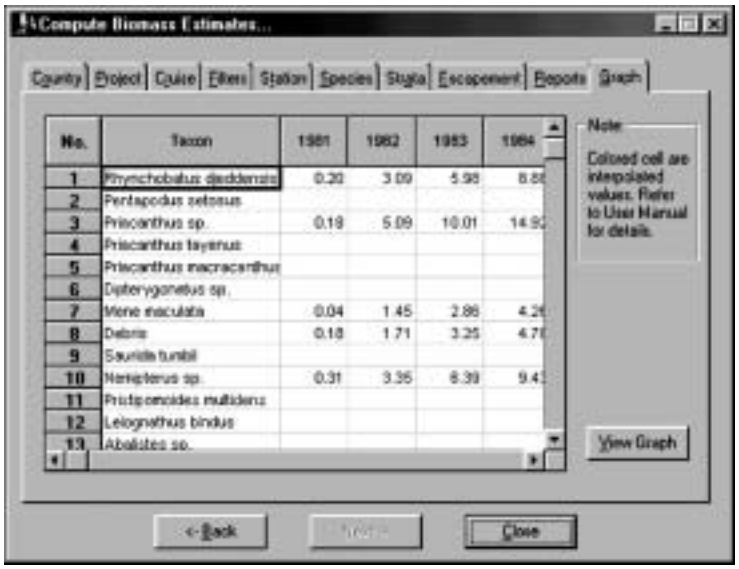


Fig. 7.6. Table values to generate a plot. The shaded cells are interpolated results.

Clicking the View Graph command button opens another window with plotted values (Fig. 7.7). The default plot shows annual mean biomasses. The File menu of the new window contain options to plot monthly estimates, toggle the display of some basic properties of the graph (legend, title and biomass trend line), access the plot reconfiguration dialog box, and print or export the plots as Windows Bitmap files. The Graph Reconfiguration dialog box leads to several options, and users are invited to reconfigure the display to suit their specific needs. Note, however, that only the top 20 taxa are identified; the others (if any) are grouped as "others".

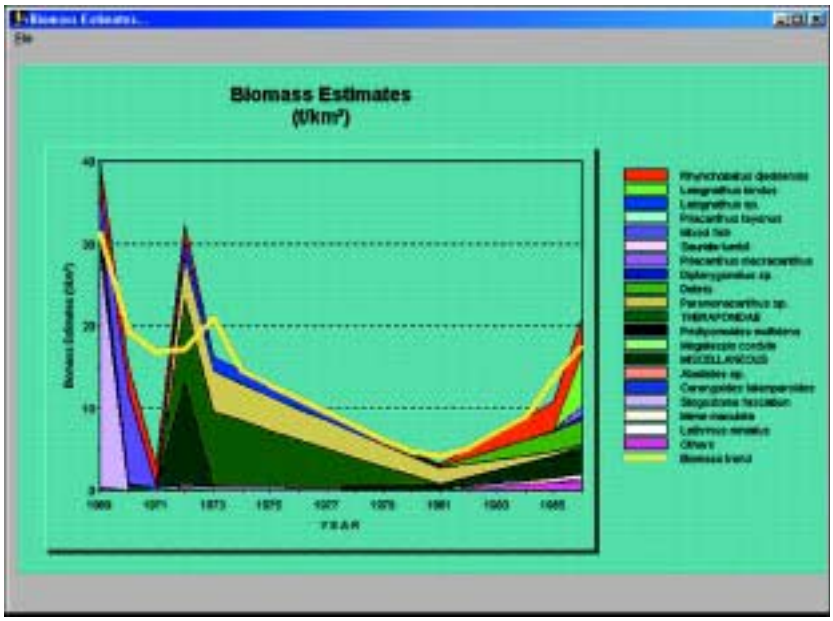


Fig. 7.7. Sample graphical output of results. Note the different colors used to represent the taxonomic groups included in the analysis.

In the database, the numeric estimates behind the graphs are saved for future use. However, when a record that is edited affects the estimation of the biomass value, the program sets to zero the biomass estimate for the taxonomic group in question.

Warning! Users are advised to carefully schedule the execution of this routine especially if it is their first time to do so. The execution of this analytical module may take some time to complete. Canceling the computation implies that records with biomass set to "null" will not be included in subsequent analyses.

CHAPTER 8

Mapping Routine

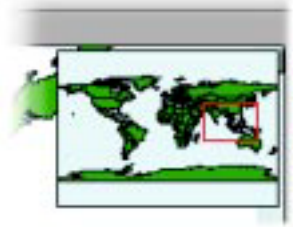
Introduction

Geographic Information System (GIS) technology has recently become a usual item in ecology, natural resource management and related research. Spatial information, when overlaid on geographically referenced maps, allow scientists to analyze data in their spatial context. Trawl survey information include the position of stations i.e., latitude and longitude. **FiRST** employs the ARC/INFO format, a widely used data format for mapping; thus, making it possible for users to overlay other georeferenced data.

A number of ARC/INFO maps are available through the Internet. Users are encouraged to visit the http://www.esri.com website to access maps, as well as aerial georeferenced-photos, available free of charge. The **FiRST** CD comes with sample maps that can be installed into the system. Users may copy the maps to a hard disk to speed up their access. Users must ensure that when copying maps, files with the same filename (not necessarily the same file extension) should be copied and placed into the same subdirectory.

More Information
For more information on the ARC/INFO data format, please visit the website of the Environmental Systems Research Institute at http://www.esri.com

Using the Mapping Routine



Red marking shows the area of the world map currently displayed.

Clicking the Map icon in the list bar of **FiRST** will activate the mapping routine. The available functions which can be accessed via the tool bar or from the Map menu are (Fig. 8.1): zoom-in, pan, layer, global view and generate a shape file (SHP). The last two command buttons in the tool bar are used to access the help messages and close the mapping routine.

Zoom-in

This function allows for zooming in (i.e., an enlarged view) on a particular world map. To Zoom-In, click a corner of the desired area to zoom and while holding down the left mouse button drag the rectangle marking until the whole area of interest is covered. The map window will be refreshed and will simultaneously update the small screen indicator in the upper right corner of the screen showing the area displayed.

Pan

The Pan function allows the user to view a section of the map other than that currently zoomed in. However, this action will only work if the current display is a section of the world map.

Fig. 8.1. The default display of the mapping routine.

Layers

The Layers function is used to overlay maps on to the world map (default map). Any of the digital maps saved as shape (ARC/INFO format; available in **FiRST** CD) or geocorrected image file can be overlaid. Depending on the speed of the computer, the plotting of maps can be slow. It is advisable to overlay only the maps required for data analysis (see *Generating SHP Map Files*).

Full-Extent

The Full-Extent function displays the world map after stretching it to fit the viewing window. The display is shown in Fig. 8.1.

Map Layers

The command button for Map Layers opens a dialog box (Fig. 8.2) that will allow users to add or manipulate map layers. The dialog box has five sections: title, layers, colors, label and rendering options.

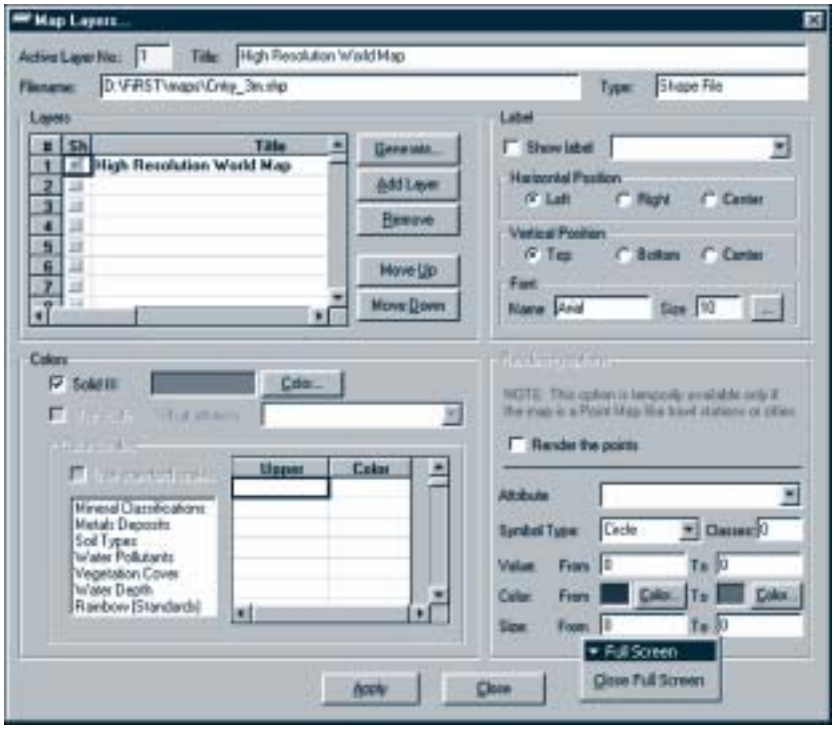


Fig. 8.2. Dialog box to add/manipulate map layers.

Title

The Title section is composed of the layer number (see *Layers*), user-defined title, filename (where the map is located) and layer type. This routine supports two layer types:

1. shape files (ARC/INFO data format); and
2. image file (Windows bitmap format).

Note that image files should be georeferenced. Refer to ARC/INFO documentation or visit http://www.esri.com for details. Except for title(s), the software automatically provides the other inputs to this section.

Layers

The Layers section contains a table listing the layers that can be displayed and five command buttons. The layer number indicates the sequence of map overlays. The layer on top of the list will be plotted first and the last in the list will be the map that is placed on top of all previous layers.

The five command buttons are:

1. Generate: opens the dialog box to generate maps based on georeferenced or station data (see Fig. 8.3 for example).
2. Add: opens a dialog box to select a map file.
3. Remove: deletes a file from the list.
4. Move up: this change correspondingly moves the other affected layers as well; and
5. Move down: moves the layer one order higher and adjusts the other layers accordingly.

Colors

The Colors section contains utilities to define the color for plotting maps, which can either be color-filled or not. If color-filled (i.e., solid fill), the color(s) identified is used. Otherwise, the color(s) identified by the user will not be applied and only black borderlines will be made visible.

Users are also provided with the option to use standard or customized color scales. This option may not be available in the currently distributed version. Visit the project website or contact ICLARM for updates to this routine.

Label

Lines, polygons or point maps can be labeled. Clicking the Show Label check box and selecting the attribute to use display them. The labels can be positioned horizontally and vertically relative to the center of the object. Users are encouraged to adjust the settings so that the labels do not overlap.

To improve readability of the labels, the user also has the option to change the size and other parameters of the font. Select the proper font size to avoid overlaps. Resizing the displayed map (or zoom factor) will not change the font size.

Rendering Options

Maps can be rendered, i.e., drawn such that points (or circle, rectangles or special marks) are plotted at scales and / or with colors determined by the numeric value of their attributes (Fig. 8.3).

To render, do the following:

1. Select an attribute with numeric values (e.g., biomass, catch, C / f for maps generated by **FiRST**).
2. Select the type of symbol to use (circle, triangle, square or special marks).
3. Decide on the number of classes to use in rendering.
4. Enter the lower and upper limits of each class. Note that the smallest and largest class are inclusive, i.e., they include values lower than the smallest lower class limit and higher than the highest upper class limit, respectively.
5. Select the range of colors to use corresponding to the range of values for class generation.

6. Select the size (in pixels) of the range of values. Users familiar with pixel measurement may try several combinations and examine the display. First-time users may initially try to use a range from 4 (for the smallest size) to about 18 (for the largest size).

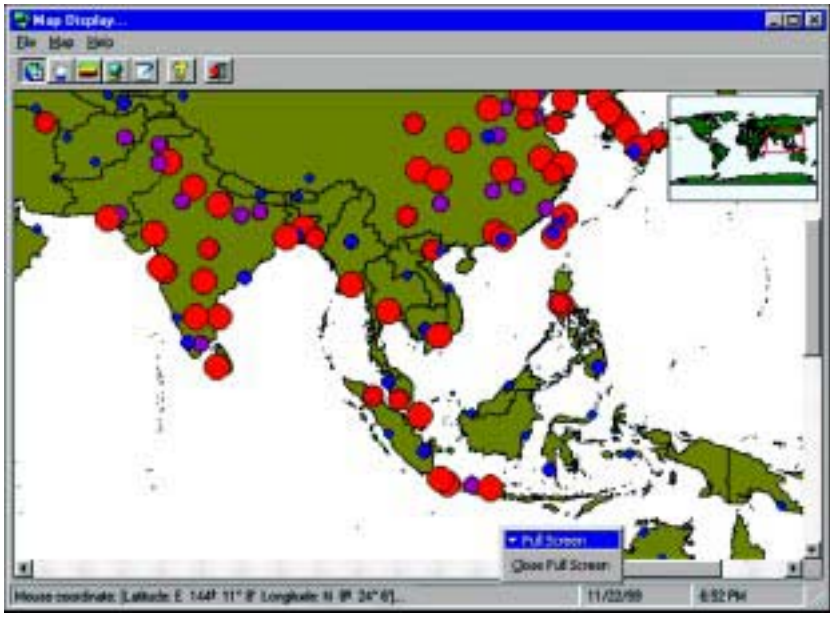


Fig. 8.3. Plot of the rendered population sizes of major cities in South and Southeast Asia (parameters used to render the points: no. of classes = 5; value = 0 to 2 000 000; color = blue to red; sizes = 4-18). A similar plot can be generated for biomass, catch and C/f for each station for a given time period (see text).

The changes made in the dialog box are not automatically reflected in the display. User must click the Apply command button located in the lower portion of the dialog box to effect the changes. **FiRST** records all of the changes made and displays the modified set of maps (and their characteristics) the next time the routine is executed.

> **Tip!** Maps that can be viewed by **FiRST** can also be displayed via the freeware ArcExplorer, which can be downloaded from http://www.esri.com. Other mapping utilities or software that can load ESRI shape files may also be used. The routine incorporated in **FiRST** was intended only for those who do not use a mapping software.

Generating SHP Map Files

Clicking the Generate Map command button from the tool bar or from the generate command button while manipulating map layers (Fig. 8.2) shows a dialog box (Fig. 8.4).

To generate a map, simply do the following procedure can be applied:

1. Select the country from which data will be retrieved.
2. Select the project records.
3. Select the cruises.
4. Select the stations to plot.
5. Select the taxons which biomass, catch and C / f values are to be displayed. Add these values.
6. Enter the filename (and path) where the digital map is to be stored.
7. Click the generate command button.

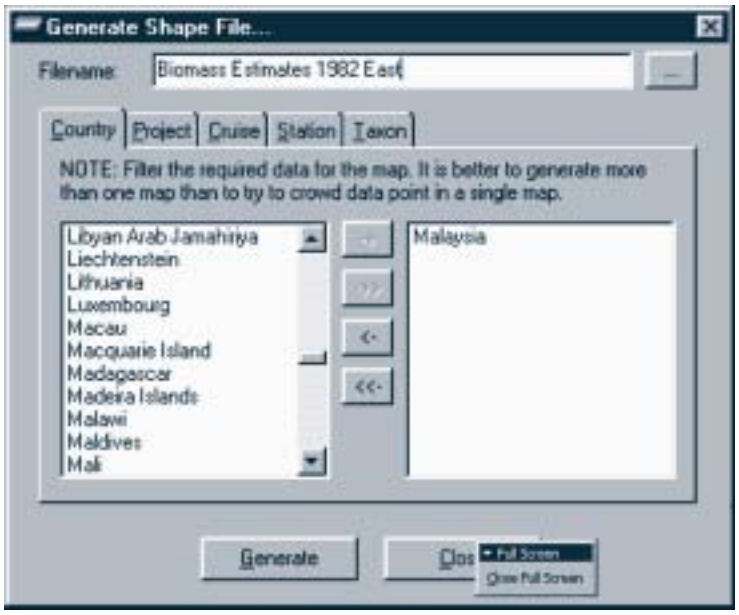


Fig. 8.4. The dialog box for generating map layers in FiRST.

The file generated through the above procedure includes attributes that can be rendered. Generating maps of the stations allows for checking the position of a station (latitude and longitude). Maps representing different time periods are useful in showing spatial change of biomass in time. These maps are a good complement to the two-dimensional (graphic and table) outputs of the biomass estimation routine of **FiRST** (see Chapter 7 *Biomass Estimation*).

CHAPTER 9

Socioeconomic / Bioeconomic Module

Introduction

The economics of the fishing industry is an important component in the analysis and implementation of an effective coastal resource management. The **FiRST** module opens formatted spreadsheets containing country-specific socioeconomic and bioeconomic statistics, independent of the trawl survey data. This information helps the researchers to determine the effects of various management policies on the economics of fish stock and fishery. The analyses on the socioeconomic profile and fleet operational dynamics are essential in deriving the necessary parameters and assumptions for the bioeconomic model as well as in gaining better understanding of interactions within the fishery sector.

The spreadsheets include worksheets on:

1. socioeconomic profile of coastal fishery areas and populations;
2. fleet operational dynamics; and
3. bioeconomic / surplus production analysis.

Accessing and Creating the Spreadsheets

This routine can open any Microsoft Excel 97 files or earlier versions. The module was developed within **FiRST** to facilitate the loading of files and analysis of results with other outputs of **FiRST**. However, users may also use Microsoft Excel directly to open spread sheets if this approach is more convenient.

The file access form contains (Fig. 9.1) contains four parts:

1. drive,
2. folders,
3. files, and
4. Microsoft Excel embedded programs (see Fig. 9.1).

The drive is a dropdown box to identify drive address (default is the root directory C:\). Users may select from the list to change directory. Immediately below is the list box displaying the folders (default is the last folder opened) and further below is another list-box that displays Microsoft Excel files contained within the selected folder. Another list box displays Microsoft Excel files contained within the selected folder. To load and open a file, double-click a selection.

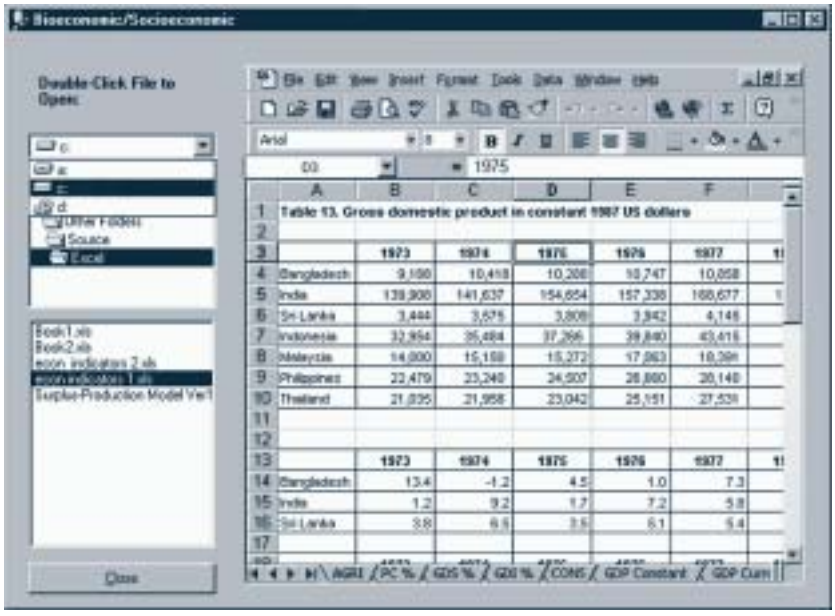


Fig. 9.1. Facsimile representation of the Socio/Bioeconomic form.

The right portion of the display opens a Microsoft Excel program (pre-installed) with the selected file loaded. Refer to the Microsoft Excel references for its operations. Note that the embedded Microsoft Excel does not allow the user to create a new worksheet and to open another file because the file menu options (new and open) are disabled and already available through the file access control explained earlier.

To create new sets of spreadsheets (for a specific country), simply click the button, Create New, in the lower portion of the form. This will copy a template to a folder name that will be supplied by the user (selected from a dropdown list of countries). The data may be entered via this module, or directly entered by opening Microsoft Excel and loading the desired spreadsheet.

Socioeconomic/Bioeconomic Workbooks

There are three standard socioeconomic / bioeconomic spreadsheets: socioeconomic profile of coastal fishery areas and populations; fleet operational dynamics; and bioeconomic / surplus production analysis. Table 9.1 is a summary of the worksheets on each of the workbook.

Table 9.1. Summary of the standard workbooks and worksheets provided by FiRST.

Workbook	Worksheet	Description
Socioeconomic Profile	A.1	Fishery production and value by fishery sector
	A.2.1	Gross national product (GNP), gross domestic product (GDP) and gross value added (GVA)
	A.2.2	Income and employment indicators by sector
	A.2.3	Volume and value of fish exports and imports
	A.2.4a	Food balance sheet of fish and fishery products in live weight and fish contribution to protein supply
	A.2.4b	Household expenditure by food item
	A.2.5	Projected production and demand for fish
Fleet Operation Dynamics	B.1a	Number of vessels and characteristics
	B.1b	Other indicators of fishing operation
	B.2a	Productivity efficiency indicators
	B.2b	Estimated production function by type of fishing gear
	B.3.1	Investment costs by major assets
	B.3.2a	Monthly fixed costs
	B.3.2b	Monthly variable costs
	B.3.3	Costs, earnings and profitability
	B.3.4	Sharing system, mode and frequency of payment
	B.3.5	Capital intensity and cost effectiveness indicators
	B.4	Amount and proportion of discards/ bycatch by type of gear
	B.5a	Catch composition by type of gear
	B.5b	Price of fish by type of species
Bioeconomic Modeling	C.1.	Catch and effort data
	C.2.	Catch and effort data by type of gear

Basic Bioeconomic Analysis

Opening the Bioeconomic Workbook

Unlike the other workbooks, the bioeconomic workbook contains macros (programs within the workbook). This implies that values entered in some parts of the workbook may induce changes in others. The user is therefore recommended to create a backup copy of the workbook before using it. This is best done by opening and resaving the file using another filename. The use of file-copy utilities to make backup copies may result in errors.

In many instances, the Microsoft Excel program prompts the user that the file to be loaded contains macros and that options will be provided. This prompt should be answered with enable macros function, as the workbook does not run properly if they are disabled.

There are four worksheets in the bioeconomic workbook:

1. template,
2. catch and effort table,
3. surplus production model graph, and
4. list of values

(Figs. 9.2, 9.3, 9.4 and 9.5 respectively).

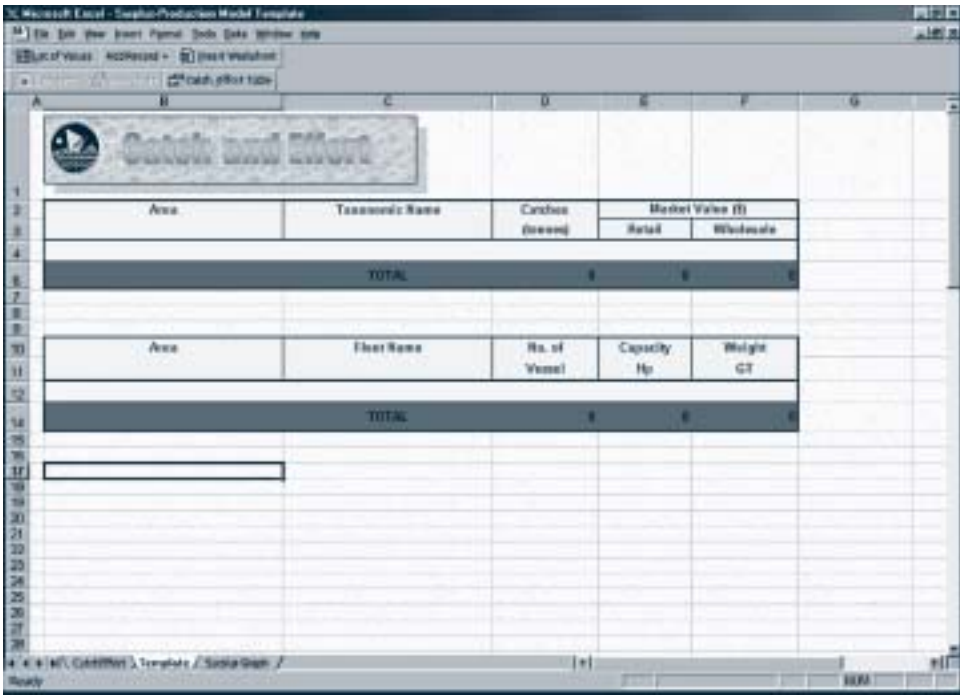


Fig. 9.2. Template worksheet format of catch and effort data entry table.

Fig. 9.3. Catch and effort table worksheet. This is a preformatted table for statistical purposes in relation to the graphical plot of the surplus-production model.

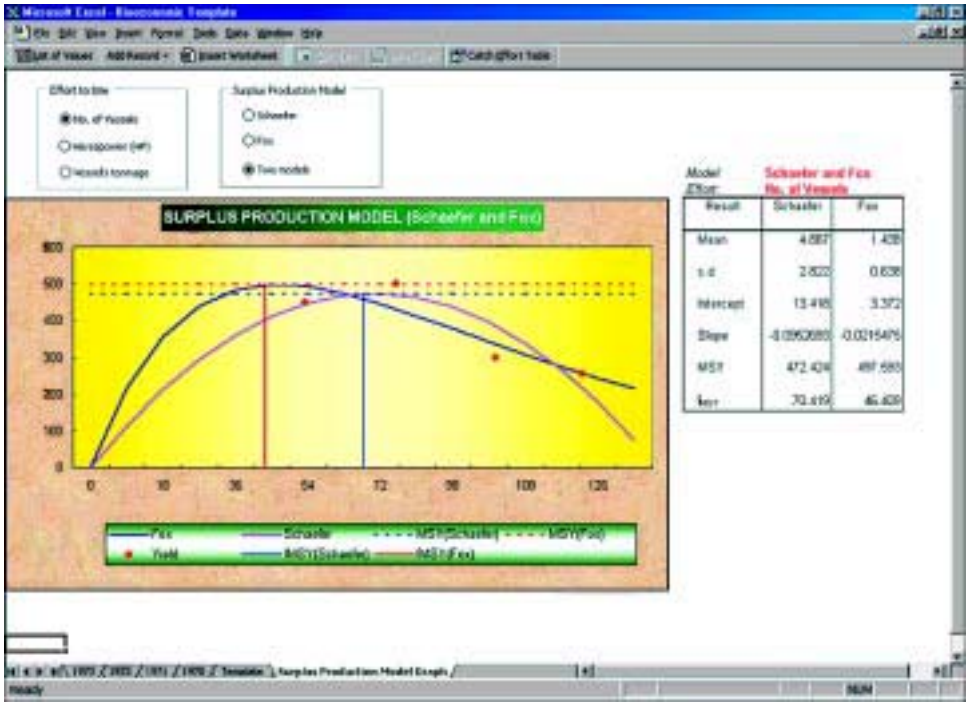


Fig. 9.4. Surplus production model graph displays both line and scatter type graphs that represent the surplus production model and on the adjacent side, the table of summary results from the regression computation.

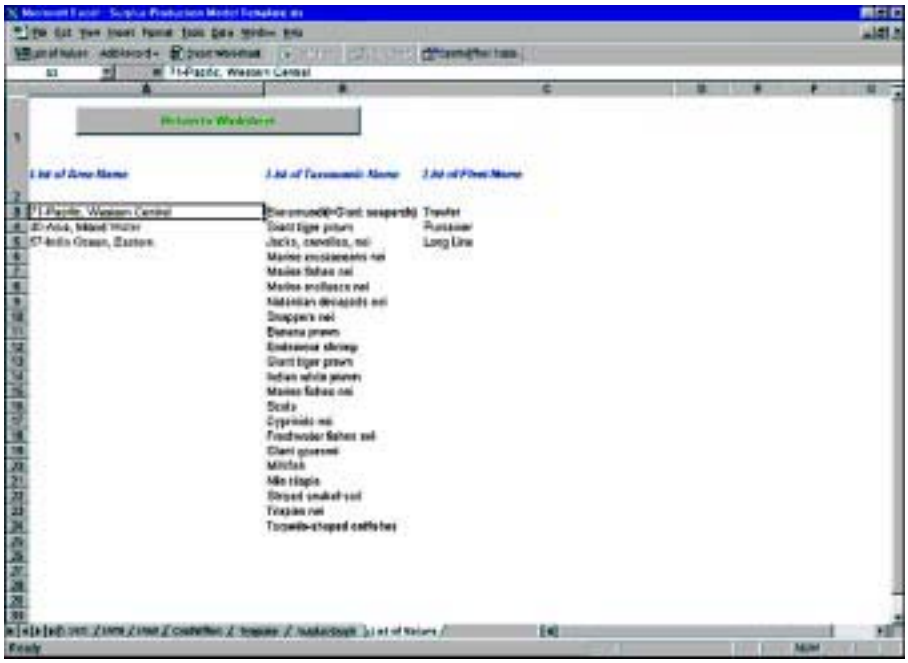


Fig. 9.5. A list of values worksheet showing a dropdown list box of areas, scientific names and fleet in the catch and effort data entry table.

Custom Tool Bar

The Custom tool bar in this spreadsheet automates commands (Table 9.2) to facilitate data entry, computations and plotting of graph.

Table 9.2. Summary of command buttons for bioeconomic analysis.

Icons	Command	Description
List of Values	List of Values	Adds or edits area, taxonomic and fleet names on the list of values worksheet as dropdown list values of catches and efforts tables.
Add Record	Add Records - Catches - Efforts	Adds/inserts a record in the catches or efforts table.
Insert Worksheet	Insert Worksheet	Adds/inserts a catch and effort worksheet with year-date as its name.
Calculate	Calculate Table	Makes computations for catch and effort table.
View Chart	View Graph	Displays the surplus – production model graph worksheet.
Catch Effort Table	Catch and Effort Table	Displays the catch and effort table worksheet.

Using the Workbook

Unlike other Microsoft Excel workbooks, encoding data in a workbook with macros requires the proper sequence of procedures. Following are the procedures in encoding and editing data in the bioeconomic workbook:

1. Insert / create a worksheet. Move the default display to template worksheet; then click the Insert Worksheet command button on the tool bar menu. On the prompt menu, enter the worksheet name. A year-date (e.g., 1970) is the only valid worksheet name; otherwise an error message will be displayed.
2. Start entering data on the catch table by placing the cursor to the appropriate cell and encoding the numbers.
    a. The first column (area) is a dropdown list box wherein one can select valid area names. An area not in the list may be added. To affix another selection, click the list of values command button on the tool bar menu to open the list which allows the addition of new data. To close and return to the active worksheet, click the command button, return to worksheet.
    b. The second column, scientific name is a dropdown list box wherein valid inputs can be selected. An unlisted entry may be added. Click the list of values command button on the tool bar menu.
    c. The third column, catches, is a numeric value expressed in tonnes.
    d. The fourth column, market value retail, is a numeric field expressed in currency units.
3. To add another record, click the Add Record–Catches command button on the tool bar menu.
4. To insert / add another worksheet, click Insert Worksheet command button on the tool bar menu. To enter data and add records, repeat steps 2 and 3.

Note: Skip step 1 if the effort table has been created.

Encoding and Editing Effort Data

The procedure in encoding and editing effort data is similar as with that for catches.

1. Same as step 1 above.
2. Start entering data on the effort table.
   a. Same as step 2(a) above.
   b. The second column, fleet name, is a dropdown list box wherein inputs can be selected. An unlisted fleet name may be added. Click the list of values command button on the tool bar menu.
   c. The third column, No. of vessels is a numeric value.
   d. The fourth column, capacity HP, is the horsepower of the vessel's main engine.
3. To add another record, click the Add Record–Effort command button on the tool bar menu.
4. To insert / add another worksheet, click Insert Worksheet command button on the tool bar menu. To enter data and add records, repeat steps 2 and 3.

Note: Skip step 1 if the catch table has been created.

Catch and Effort Table Worksheet

There are four tables on the catch and effort worksheet, namely,

1. yield and effort;
2. yield and number of vessels;
3. yield and horsepower; and
4. yield and gross tonnage.

These tables automate the computation of the yield curve using both the Schaefer and Fox surplus production models. The Schaefer model is expressed as:

$$C_i/f_i = a + b \cdot f_i$$

where C_i – time series of catches
f_i – efforts associated to the catches, C_i

The Fox model is an alternative to the Schaefer model. However, unlike the Schaefer model, the Fox model C_i / f_i is always greater than zero for all values of f_i greater than zero. The Fox model is expressed as:

$$\ln(C_i/f_i) = a + b \cdot f_i$$

which can also be written as $C_i/f_i = \exp(a + b \cdot f_i)$.

Surplus Production Model Graph Worksheet

The surplus production model graph worksheet has three objects (Fig. 9.4):

1. Surplus production graph (line-scatter on two axes);
2. Option buttons (two option groups)
   - Effort to use
   - Surplus production model
3. Summary table
   - Description of regression results
   - Value of the two models (Schaefer and Fox)

Surplus Production Model Graph (Line-Scatter on Two Axes)

The model is a line-scatter type (on 2 axes) of chart. The chart:

1. displays trends on Schaefer and / or Fox model(s);
2. plots the line of maximum sustainable yield (MSY) and f_{MSY} intersect; and
3. compares values of yield (C) against effort (f).

The first series is a line type of chart that displays the trends of yield and effort where yield / effort (C / f) is plotted on the Y-axis and effort (f) is plotted on the X-axis. The second series is a line type of chart that plots MSY for the Y-axis and f_{MSY} for the X-axis. This line intersects with the maximum value of either Schaefer or Fox model. The third series is the XY (scatter) type of chart that compares the values of yield against effort where yield (C) is plotted on the Y-axis and effort (f) is plotted on the X-axis.

Option Button

There are two groups of options used for this task, namely,

1. effort to use, and
2. surplus – production model.

The first option group is a selection of the kind of effort to use in the model and the second is a type of model(s) to plot on the graph. Users can select an option for each group (Fig. 9.4).

Summary Table

The results of the regression computation are displayed in the summary table. The first column provides the description of the values, and the second and third columns are the regression values for both the Schaefer and Fox models (Fig. 9.4).

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Appendix A. Database Technical Specifications

The following are technical specifications of the tables used in **FiRST**.

Table A.1. Country Table

Name	Type	Size
Country Code	Text	4
Abbreviation	Text	6
Name	Text	30
Capital	Text	20
Geographic area	Text	60
Area	Number (Long)	4
Population	Number (Long)	4
ShelfArea	Number (Single)	4
CoastalPopulation	Number (Long)	4

Table A.2. CountryRems Table

Name	Type	Size
Country Code	Text	4
Remarks	Memo	–
PassRqd	Yes/No	1

Table A.3. Cruise Table

Name	Type	Size
Country Code	Text	4
Gear Code	Text	12
Trawler Code	Text	12
Project Code	Text	12
Cruise Number	Text	12
Name	Text	150
Cruise Leader	Text	50
Captain	Text	50
Day of Sailing	Text	2
Month of Sailing	Text	3
Year of Sailing	Text	4
Day of Return	Text	2
Month of Return	Text	3
Year of Return	Text	4
Station Count	Number (Integer)	2
Remarks	Memo	–

Table A.4. EcoModels Table

Name	Type	Size
Country Code	Text	4
Project Code	Text	12
Model	Text	150

Table A.5. Grouped LF Table

Name	Type	Size
Country Code	Text	4
Gear Code	Text	12
Trawler Code	Text	12
Cruise Number	Text	12
Project Code	Text	12
Station Code	Text	12
Taxonomic Name	Text	200
Covered Cod End	Yes/No	1
Lclass	Number (Single)	4
Sex	Text	1
Uclass	Number (Single)	4
Frequency	Number (Integer)	2

Table A.6. Project Table

Name	Type	Size
Country Code	Text	4
Project Code	Text	12
Project Name	Text	50
Base	Text	150
Implementing	Text	200
Project Area	Text	200
Objectives	Memo	–
Collaborating Institutions	Memo	–
Model	Text	150
Reference	Text	8
Remarks	Memo	–

Table A.7. References Table

Name	Type	Size
Country Code	Text	4
Project Code	Text	12
Reference	Text	8

continued from Table A.7.

Name	Type	Size
Author	Text	100
Year	Text	5
Title	Text	150
Source	Text	150
Keywords	Text	150

Table A.8. Regulatories Table

Name	Type	Size
Country Code	Text	4
Regulatory Code	Text	12
Regulatory Title	Text	255
Filename	Text	255
Keywords	Memo	–

Table A.9. Species Table

Name	Type	Size
Country Code	Text	4
Project Code	Text	12
Trawler Code	Text	12
Cruise Number	Text	12
Project Code	Text	12
Station Code	Text	12
Taxonomic Name	Text	200
Species Code	Text	8
Total Catch	Number (Single)	4
Total SWeight	Number (Single)	4
Numbers	Number (Long)	4
Class interval	Number (Single)	4
Unit of Measurement	Text	20
SLClass	Number (Single)	4
Type of Measurement	Text	17
Data Processing	Text	25
Remarks	Memo	–
WithGroupedLF	Yes/No	1
WithUnGroupedLF	Yes/No	1
Escapement	Number (Single)	4
Biomass	Number (Double)	8
CPUE	Number (Double)	8

continued from Table A.9.

Name	Type	Size
GroupedLF	Text	250
UngroupedLF	Text	250

Table A.10. Species Codes Table

Name	Type	Size
Code	Text	10
Taxonomic Name	Text	200

Table A.11. Station Table

Name	Type	Size
Country Code	Text	4
Gear Code	Text	12
Trawler Code	Text	12
Cruise Number	Text	12
Project Code	Text	12
Station Code	Text	12
Synchronized	Text	1
Access Code	Text	5
Access Condition	Text	50
Sampling Day	Text	2
Sampling Month	Text	3
Sampling Year	Text	4
Validity code	Text	50
Starting Latitude Deg	Text	3
Starting Latitude Min	Text	2
Starting Latitude Sec	Text	2
Starting NS Direction	Number (Integer)	2
Starting Longitude Deg	Text	3
Starting Longitude Min	Text	2
Starting Longitude Sec	Text	2
Starting EW Direction	Number (Integer)	2
Ending Latitude Deg	Text	3
Ending Latitude Min	Text	2
Ending Latitude Sec	Text	2
Ending NS Direction	Number (Integer)	2
Ending Longitude Deg	Text	3
Ending Longitude Min	Text	2
Ending Longitude Sec	Text	2

continued from Table A.11.

Name	Type	Size
Ending EW Direction	Number (Integer)	2
FStart Depth	Text	10
FEnd Depth	Text	10
BStart Depth	Text	10
BEnd Depth	Text	10
Towing Speed	Text	10
Towing Direction Deg	Text	3
Towing Direction Min	Text	2
Towing Direction Sec	Text	2
Start Time	Text	5
End Time	Text	5
Wind Speed	Text	10
Wind Direction Deg	Text	3
Wind Direction Min	Text	3
Wind Direction Sec	Text	3
Current Speed	Text	10
Current Direction Deg	Text	3
Current Direction Min	Text	3
Current Direction Sec	Text	3
Bottom Type	Text	50
Secchi Disc	Text	10
Temperature Surface	Text	10
Salinity Surface	Text	10
DO Surface	Text	10
Temperature Bottom	Text	10
Salinity Bottom	Text	10
DO Bottom	Text	10
Towing Warp Length	Text	10
Day Night	Number (Integer)	2
Gear Accessories	Memo	–
Remarks	Memo	–

Table A.12. Trawl Net Description Table.

Name	Type	Size
Country Code	Text	4
Gear Code	Text	12
Name	Text	50
Length of headrope	Number (Single)	4

continued from Table A.12.

Name	Type	Size
Length of footrope	Number (Single)	4
Headline width	Number (Single)	4
Headline height	Number (Single)	4
Codend mesh	Number (Single)	4
Material	Text	50
Picture	Text	255
Remarks	Memo	–

Table A.13. Trawler Description Table

Name	Type	Size
Country Code	Text	4
Trawler Code	Text	12
Name	Text	50
Trawler Type	Text	100
Length	Number (Single)	4
Gross Tonnage	Number (Single)	4
Engine name	Text	50
Engine HP	Number (Single)	4
Cruising speed	Number (Single)	4
Material	Text	50
Picture	Text	255
Remarks	Memo	–

Table A.14. Ungrouped LF Table

Name	Type	Size
Country Code	Text	4
Gear Code	Text	12
Trawler Code	Text	12
Cruise Number	Text	12
Project Code	Text	12
Station Code	Text	12
Scientific Name	Text	200
Covered Cod End	Yes/No	1
Observation No	Number (Integer)	2
TLMeasures	Yes/No	1
FLMeasures	Yes/No	1
SLMeasures	Yes/No	1
Other Measures	Text	50

continued from Table A.14.

Name	Type	Size
Total length	Number (Single)	4
Unit TL	Text	2
Fork length	Number (Single)	4
Unit FL	Text	2
Standard length	Number (Single)	4
Unit SL	Text	2
Other Length	Number (Long)	4
Unit OL	Text	2
Weight	Number (Single)	4
Sex	Text	8
Maturity	Text	20

Appendix B. Data Collection Forms

The following are abbreviated versions of data collection forms that are recommended to users of the system. These forms were designed based on commonly used formats in experimental trawl survey projects. The full versions are available in the ICLARM website (http://www.cgiar.org/iclarm/trawl).

PROJECT DETAILS Country: _____ : _____

PROJECT CODE: _____

Survey Title: _____

Project Purpose/Objectives: _____

_____

Implementing Institution(s) (Address): _____

_____

_____

Collaborating Institution(s) (Address): _____

_____

_____

Project Area: _____

_____

_____

Project Base Site: _____

Remark(s):

By: _____

GEAR DATA SHEET

Country: _____ :_____

GEAR CODE: _____ **Gear Name:** _____

Headrope Length (m): _____

Footrope Length (m): _____

Headline Width (m): _____

Headline Height or:
Vertical Opening (m): _____

Codend Mesh Size (cm): _____

Netting Material: _____

Wing Mesh Size (cm): _____

Otterboard Dimensions (LxWxH): _____

Remark(s) [Other specifications/attach picture if available]:

By: _____

VESSEL SPECIFICATIONS

VESSEL CODE: _____ Name: _____ Type: _____

Built (year; name; place; material): _____

Base (Home Port): _____ Port of Registry: _____
Operating Agency: _____

Dimensions
Length Over all (m): _____ Length Between Perpendiculars (m): _____
Gross Tonnage: _____ Draft (m): _____
Width (m): _____ Depth (m): _____

Engines
Main (brand/type/hp): _____
Auxiliary (brand/type/hp): _____

Performance
Max. Cruising Speed (knots): _____ Max. Trawling Speed (knots): _____
Cruising Range: _____ Max. Trawling Depth (m): _____

Complement
Officers and Crew: _____ Scientists: _____

Remark(s) [additional specifications if any/attach picture if available]:

By: _____

CRUISE DETAILS

Country: _____ : _____
Project: _____ : _____
Vessel: _____ : _____

CRUISE ID: _____ [_____]

Cruise Leader(s): _____

Captain: _____

Date of Sailing: Day _____ Month _____ Year _____
Port of Origin: _____

Date of Return : Day _____ Month _____ Year _____
Port of Destination: _____

Total No. of Stations Intended: _____ Stations Completed: _____

Area of Operation(s) [to include sub-areas if any]: _____

_____

Gears Utilized: 1. _____ 4. _____
2. _____ 5. _____
3. _____ 6. _____

Remark(s) [attach map of cruise track/stations if available]:

By: _____

STATION DATA SHEET

Country: _____ : _____
Project: _____ : _____
Vessel: _____ : _____
Cruise: _____ : _____
Gear: _____ : _____

STATION NO.: _____ Date of Sampling: _____
Day/Night Fishing Experiment: [ ] Yes [ ] No

General Information

	Start	End
Latitude (N/S; deg:min:sec):		
Longitude (E/W; deg:min:sec):		
Fishing Depth (m):		
Bottom Depth (m):		
Local time (hh:mm):		

Towing Speed (knots): _____
Towing Direction: _____ Towing Warp Length (m): _____

Oceanographic Information

Current Speed (knots): _____ Current Direction: _____
Wind Force [Beaufort scale 1-10]: _____ Wind Speed: _____ Wind Direction: _____

	Surface	Middle	Bottom
Temperature (^{0}C):			
DO (mg/l):			
Salinity:			

Others:

Bottom Type

Boulder _____ Cobble _____ Pebble _____ Granule _____
Very Coarse Sand _____ Coarse Sand _____ Medium Sand _____ Fine Sand _____
Very Fine Sand _____ Silt _____ Clay _____ Grades (mm) _____

Secchi Depth (m): _____

Remark(s):

By: _____

CATCH DETAILS

Country: _____ Cruise: _____
Project: _____ Station: _____
Gear: _____ Sampling Date: _____
Vessel: _____ Total Catch: _____

N	Sp. Code	Scientific Name	Total Catch (kg)	Sample Weight (g)	Samp N	Grp.* L/F	Ugrp* Data
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							

SUM _____
By: _____ Page _____ of _____
* Check if data on this were collected.

LENGTH FREQUENCY DATA SHEET

Country: _____ Gear: _____
Project: _____ Station: _____
Vessel: _____ Sampling Date: _____
Cruise: _____ Species: _____

SCIENTIFIC NAME: [ ] _____ Covered Codend [ ] Y [ ] N

Length Type: [ ] TL [ ] FL [ ] SL Others, Please Specify: _____

Sex Indicator: [ ] Male [ ] Female [ ] Mixed (Both Sexes) [ ] Unknown

Class Size: _____ Unit: _____ Total Catch (kg): _____ Sample Weight (kg): _____

Lower Class	Frequency	Lower Class	Frequency

Remark(s):

By: _____ Page _____ of _____

BIOLOGICAL DATA SHEET

Country: _____ Gear: _____
Project: _____ Station: _____
Vessel: _____ Sampling Date: _____
Cruise: _____ Species: _____

SCIENTIFIC NAME: [ ] _____

Length Type (Unit:)				**Weight (g)**	**Sex M/F/U**	**Maturity (1-7)****
TL	**FL**	**SL**	*****			

**Others, e.g., Carapace Length (CL); Mantle Length (ML); Shell Length (ShL)*

***1=Immature; 2=Developing; 3=Active; 4=Developed; 5=Gravid; 6=Ripe-running; 7=Spent.*

By: _____ Page _____ of _____

Appendix C. Report Formats

The following are representations of the reports that can be generated from FiRST. Note that the forms are not in their actual sizes but were adjusted to fit the pages. These report formats may be used as guide by users when generating reports.

Report Format 1. Catch summary as encoded.

CATCH SUMMARY Date Generated: _____

Country: _____

Project: _____

Trawler Description: _____

Trawl Net: _____

Cruise: _____

Station: _____

Scientific Name	Total Catch (kg)	Sample Weight (g)
_____	___ . _____	___ . _____
_____	___ . _____	___ . _____
_____	___ . _____	___ . _____
_____	___ . _____	___ . _____
_____	___ . _____	___ . _____
_____	___ . _____	___ . _____
_____	___ . _____	___ . _____
_____	___ . _____	___ . _____
Total:	___ . _____	___ . _____

Station: _____

Scientific Name	Total Catch (kg)	Sample Weight (g)
_____	___ . _____	___ . _____
_____	___ . _____	___ . _____
_____	___ . _____	___ . _____
_____	___ . _____	___ . _____
_____	___ . _____	___ . _____
_____	___ . _____	___ . _____
_____	___ . _____	___ . _____
_____	___ . _____	___ . _____
Total:	___ . _____	___ . _____

Report Format 2. Country remarks as encoded.

COUNTRY DETAIL Date Generated: _____

Country: _____

Remarks: _____

_____

_____

_____

_____

_____

_____

_____

Report Format 3. Project details as encoded.

PROJECT DETAIL Date Generated: _____

Country: _____

Project: _____

Project Base: _____

Project Area: _____

Implementing Institutions: _____

_____

Objectives: _____

_____

Collaborating Institutions: _____

_____

Remarks: _____

_____

_____

_____

_____

_____

_____

_____

Report Format 4. Gear details as encoded.

GEAR DETAIL Date Generated: _____

Country: _____

Trawl Net: _____

Length of Headrope (m): ___ . _____

Length of Footrope (m): ___ . _____

Headline Width (m): ___ . _____

Headline Height (m): ___ . _____

Codend Mesh (cm): ___ . _____

Construction Material: _____

Remark(s): _____

_____

_____

_____

_____

_____

_____

Trawl Net: _____

Length of Headrope (m): ___ . _____

Length of Footrope (m): ___ . _____

Headline Width (m): ___ . _____

Headline Height (m): ___ . _____

Codend Mesh (cm): ___ . _____

Construction Material: _____

Remark(s): _____

_____

_____

_____

_____

_____

_____

Report Format 5. Station details as encoded.

STATION DETAILS Date Generated: _____

Country Name: _____

Project Code: _____

Gear Code: _____

Trawler Code: _____

Cruise Number: _____

Station: _____

General

Date of Sampling: _____

Day of Sampling: _____

	Start	End
Latitude:	_____	_____
Longitude:	_____	_____
Fishing Depth (m):	_____	_____
Bottom Depth (m):	_____	_____
Local Time (HH:MM)	_____	_____

Towing

Speed (knots): ___ . _____ Direction: _____ Wrap length (m): _____

Oceanographic:

Wind Direction

Secchi Disc: _____

Wind Speed: _____

Direction: _____

Temperature

Surface Temperature (℃): _____

Bottom Temperature (℃): _____

Current

Speed: _____

Direction: _____

Dissolved Oxygen

Surface DO (mg/l): _____

Bottom DO (mg/l): _____

Others

Bottom Type: _____

Salinity

Surface Salinity: _____

Bottom Salinity: _____

Gear Accessories: _____

_____

_____

Remarks: _____

_____

_____

_____

Report Format 6. Catch details as encoded.

CATCH DETAIL Date Generated: ____________________

Country Name: ____________________

Project: ____________________

Trawler Description: ____________________

Trawler Net: ____________________

Cruise: ____________________

Station: ____________________

Code	Scientific Name	Total Catch (kg)	Sample Weight (g)	Samp Count(no.)	Grouped L/F	Ungrouped Data
____	________	___ . ____	______	___ . ____	_____	______
____	________	___ . ____	______	___ . ____	_____	______
____	________	___ . ____	______	___ . ____	_____	______
____	________	___ . ____	______	___ . ____	_____	______
____	________	___ . ____	______	___ . ____	_____	______
	Total	___ . ____	______	___ . ____		

Station: ____________________

Code	Scientific Name	Total Catch (kg)	Sample Weight (g)	Samp Count(no.)	Grouped L/F	Ungrouped Data
____	________	___ . ____	______	___ . ____	_____	______
____	________	___ . ____	______	___ . ____	_____	______
____	________	___ . ____	______	___ . ____	_____	______
____	________	___ . ____	______	___ . ____	_____	______
____	________	___ . ____	______	___ . ____	_____	______
	Total	___ . ____	______	___ . ____		

Station: ____________________

Code	Scientific Name	Total Catch (kg)	Sample Weight (g)	Samp Count(no.)	Grouped L/F	Ungrouped Data
____	________	___ . ____	______	___ . ____	_____	______
____	________	___ . ____	______	___ . ____	_____	______
____	________	___ . ____	______	___ . ____	_____	______
____	________	___ . ____	______	___ . ____	_____	______
____	________	___ . ____	______	___ . ____	_____	______
	Total	___ . ____	______	___ . ____		

Report Format 7. Trawler details as encoded.

TRAWLER DETAIL Date Generated: _____

Country: _____

Trawler: _____

Length Overall (m): ___ . _____
Gross Tonnage: ___ . _____
Engine Brand/Type: _____
Engine hp: ___ . _____
Cruising Speed (knots): ___ . _____
Construction Material: _____
Trawler Type: _____
Remark(s): _____
_____

Report Format 8. Cruise details as encoded.

CRUISE DETAIL Date Generated: _____

Country: _____
Project: _____
Trawler Description: _____
Trawl Net: _____

Cruise: _____
Date of Sailing: _____
Date of Return: _____
Cruise Leader(s): _____
Captain: _____
No. of Stations: _____
Remarks: _____
_____

Cruise: _____
Date of Sailing: _____
Date of Return: _____
Cruise Leader(s): _____
Captain: _____
No. of Stations: _____
Remarks: _____
_____

Report Format 9. Length frequencies as encoded as encoded.

GROUPED LENGTH FREQUENCY Date Generated: _____

Country: _____

Project: _____

Trawler Description: _____

Trawl Net: _____

Cruise: _____

Scientific Name: _____ Data Type: _____

Class Interval: _____ Sex: _____

Unit of Measurement: _____ Covered-codend Data: _____

Type of Measurement: _____

ML / Date	dd/mm/yy	dd/mm/yy	dd/mm/yy	dd/mm/yy
__ . ____	__ . __ . ___	__ . __ . ___	__ . __ . ___	__ . __ . ___
__ . ____	__ . __ . ___	__ . __ . ___	__ . __ . ___	__ . __ . ___
__ . ____	__ . __ . ___	__ . __ . ___	__ . __ . ___	__ . __ . ___
__ . ____	__ . __ . ___	__ . __ . ___	__ . __ . ___	__ . __ . ___
__ . ____	__ . __ . ___	__ . __ . ___	__ . __ . ___	__ . __ . ___
Total	__ . __ . ___	__ . __ . ___	__ . __ . ___	__ . __ . ___

Report Format 10. Ungrouped length frequencies as encoded. Note that more columns will be printed if other data were collected.

UNGROUPED LENGTH FREQUENCY Date Generated: _____

Country: _____

Project: _____

Trawler Description: _____

Trawl Net: _____

Cruise: _____

Station: _____

Scientific Name: _____

Covered-Codend Data: _____

Obs.	Length					Maturity
No.	Total	Fork	Standard	Weight (g)	Sex	stage
____	__.__ __	__.__ __	__.__ __	___ . ____	_____	_____
____	__.__ __	__.__ __	__.__ __	___ . ____	_____	_____
____	__.__ __	__.__ __	__.__ __	___ . ____	_____	_____
____	__.__ __	__.__ __	__.__ __	___ . ____	_____	_____
____	__.__ __	__.__ __	__.__ __	___ . ____	_____	_____
Avg.		__.__ __	__.__ __	___ . ____		

Report Format 11. Cross-tabulation of species / taxon using computed C/f value.

SPECIES-STATION TABLE: C/f (kg/hr) Date Generated: ____________

Species / Station	________	________	________	________	Total
__________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
__________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
__________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
__________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
__________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
__________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
__________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
__________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
__________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
__________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
Total	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___

Report Format 12. C/f output per depth strata.

C/f Distribution by Depth STRATA (kg/hr) Date Generated: ____________

Taxon / Depth Strata	_____(m)	_____(m)	_____(m)	Depth>	Total
__________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
__________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
__________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
__________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
__________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
__________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
__________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
__________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
__________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
__________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
Total	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___

Report Format 13. Cross-tabulation of catches for each taxon and station.

SPECIES-STATION TABLE: CATCH (kg) Date Generated: ____________________

Taxon / Station	________	________	________	________	Total
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
Total	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___

Report Format 14. Computed catch per depth stratum.

Catch Distribution by Depth Stratum(kg) Date Generated: ______________

Species / Depth Strata	_____(m)	_____(m)	_____(m)	Depth>	Total
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
Total	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___

Report Format 15. Biomass, catch and C/f estimates for each taxon per station.

BIOMASS ESTIMATES Date Generated: ____________

Country: ____________

Project: ____________

Cruise: ____________

Station: ____________

Scientific Name	Total Catch (kg)	C/f (kg/hr)	Biomass(t/km^2)
________	___ . _____	___ . _____	___ . _____
________	___ . _____	___ . _____	___ . _____
________	___ . _____	___ . _____	___ . _____
________	___ . _____	___ . _____	___ . _____

Station: ____________

Scientific Name	Total Catch (kg)	C/f (kg/hr)	Biomass(t/km^2)
________	___ . _____	___ . _____	___ . _____
________	___ . _____	___ . _____	___ . _____
________	___ . _____	___ . _____	___ . _____
________	___ . _____	___ . _____	___ . _____

Report Format 16. Cross-tabulation of biomass estimtes for each taxon and station.

Species-Station Table: Biomass(t/km^2) Date Generated: ____________

Taxon / Station	_______	_______	_______	_______	Total
________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
Total	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___

Report Format 17. Biomass estimates by depth stratum.

BIOMASS DISTRIBUTION Date Generated: ______________

BY DEPTH STRATUM (t/km²)

Species / Depth Strata	______(m)	______(m)	______(m)	Depth>	Total
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
____________	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___
Total	___ . ___	___ . ___	___ . ___	___ . ___	___ . ___

Report Format 18. Cross-tabulation of biomass and the s.e. of the estimates by taxon.

COMPUTED MEAN BIOMASS AND Date Generated: ______________

STANDARD DEVIATION BY DEPTH STRATUM

	______(m)		______(m)		______(m)		Depth>		Total	
Taxon	mean	s.e.	mean	s.e.	mean	s.e.	mean	s.e.	mean	s.e.
____________	___	___	___	___	___	___	___	___	___	___
____________	___	___	___	___	___	___	___	___	___	___
____________	___	___	___	___	___	___	___	___	___	___
____________	___	___	___	___	___	___	___	___	___	___
____________	___	___	___	___	___	___	___	___	___	___
____________	___	___	___	___	___	___	___	___	___	___
____________	___	___	___	___	___	___	___	___	___	___
____________	___	___	___	___	___	___	___	___	___	___
____________	___	___	___	___	___	___	___	___	___	___
____________	___	___	___	___	___	___	___	___	___	___
Total	___	___	___	___	___	___	___	___	___	___

Report Format 19. Detailed report on the total catch, C/f and biomass estimates of each taxon per station record.

BIOMASS ESTIMATES BY TAXON Date Generated:_____

Country: _____

Project: _____

Cruise: _____

Scientific Name: _____

Station	Sampling Date	Total Catch (kg)	C/f (kg/hr)	Biomass (t/km²)
____	_____	___ . ____	___ . ____	___ . ____
____	_____	___ . ____	___ . ____	___ . ____
____	_____	___ . ____	___ . ____	___ . ____
____	_____	___ . ____	___ . ____	___ . ____
____	_____	___ . ____	___ . ____	___ . ____
____	_____	___ . ____	___ . ____	___ . ____
	Total	___ . ____	___ . ____	___ . ____
	Mean	___ . ____	___ . ____	___ . ____
	s.d.	___ . ____	___ . ____	___ . ____

Station	Sampling Date	Total Catch (kg)	C/f (kg/hr)	Biomass (t/km²)
____	_____	___ . ____	___ . ____	___ . ____
____	_____	___ . ____	___ . ____	___ . ____
____	_____	___ . ____	___ . ____	___ . ____
____	_____	___ . ____	___ . ____	___ . ____
____	_____	___ . ____	___ . ____	___ . ____
____	_____	___ . ____	___ . ____	___ . ____
	Total	___ . ____	___ . ____	___ . ____
	Mean	___ . ____	___ . ____	___ . ____
	s.d.	___ . ____	___ . ____	___ . ____

Appendix D. The FiRST.INI File

The **FiRST.INI** is a Windows initialization file (sometimes referred to as *Configuration Setting* file) which records important parameters that dictate the behavior of some functions of the program. This file is usually located in the Windows folder and can be edited using any text editor.

Sectors and Default Settings

Sector **Global**

Remarks This sector stores the last actions the user undertook so that the next time the program is executed, it will go to the section where the user last left the program.

Keyname	Default Setting	Description
LastListBar	TrawlBase	Stores the last list bar opened. The current version has two listbars, one on data management of trawl survey data (named TrawlBase) and another for analytical routines (named Analytical).
WindowState	2	Stores the last window state program exit. These are: 0-normal; 1-minimized; and 2-maximized. If window state is 0, the program will use the left, top, height and width settings.
Left	0	Stores the last left position of the window relative to the display dimension on program exit.
Top	285	Stores the last top position of the window relative to the display dimension on program exit.
Height	9 135	Stores the last height setting of the window on program exit.
Width	10 680	Stores the last width setting of the window on program exit.

Keyname	Default Setting	Description
Width1	10	Stores the user-defined width setting for the first column (Species Codes) in the catch table. Setting this to 0, makes the column not visible to the user.
Width2	34	Stores the user-defined width setting for the second column (Taxon) in the catch table.
Width3	8	Stores the user-defined width setting for the third column (Total Catch) in the catch table.
Width4	8	Stores the user-defined width setting for the fourth column (Sample Weight) in the catch table.
Width5	7	Stores the user-defined width setting for the fifth column (Number of Samples) in the catch table.
Width6	4	Stores the user-defined width setting for the sixth column (Data for Grouped LF) in the catch table.
Width7	4	Stores the user-defined width setting for the seventh column (Data for Ungrouped LF) in the catch table.
LastWin	DtMgt	Stores the last window opened by the user.

Sector **LastAction**

Remarks This sector stores the last set of data accessed. Its function is very similar to the **Global** sector in that the program displays the last set of data opened by the user.

Keyname	Default Setting	Description
CountryName	{no value}	The name of the country last accessed.
CountryCode	{no value}	The three-character country code last accessed.
Country	-1	The pointer in the dropdown list for last country record selected by the user.
Project	-1	The pointer in the dropdown list for last project record selected by the user.
Gear	-1	The pointer in the dropdown list for last gear record selected by the user.
Trawler	-1	The pointer in the dropdown list for last trawler record selected by the user.
Cruise	-1	The pointer in the dropdown list for last cruise record selected by the user.
Station	-1	The pointer in the dropdown list for last station record selected by the user.

Sector **Pictures**

Remarks This sector stores addresses of FishBase pictures and is used by the program when accessing a subset of FishBase for species identification. These parameters are not used if the system is configured to access FishBase in the Internet.

Keyname	Default Setting	Description
FBPicturesJPG	c:\fishbase\jpg	The directory where FishBase pictures in JPG format are located.
FBPicturesGIF	c:\fishbase\gif	The directory where FishBase pictures in GIF format are located.

Sector **FTP**

Remarks This sector stores the FTP (*File Transfer Protocol*) parameters that allow users to transfer files to an FTP address. The currently distributed version of the program does not utilize this facility. Please visit the ICLARM website for updates. Users of the system, however, may use the inputs below to access an FTP site for exchange of data with other users of the system.

Keyname	Default Setting	Description
Address	ftp.cgiar.org	FTP address. Note that what are given as defaults can be used for transmitting data to users of the system.
UserName	iclarmftp02	User name to access the FTP address.
Password	provo645	Password to access the FTP address.
Proxy	{no value}	The name of the proxy server if one is used.

Sector **HTTP**

Remarks This sector stores the URL of important webpages which can be accessed directly from the program. Users may edit this sector to point to other URLs, e.g. other project websites if the system is used outside the ADB-RETA 5766 Project.

Keyname	Default Setting	Description
NewsPage	http://www.cgiar.org/iclarm/trawl/index.htm	URL linking to the newspage of a project. As default, the newspage of the ADB-RETA 5766 is given.
ProjectDesc	http://www.cgiar.org/iclarm/project.htm	URL linking to the website describing the project. As default, the project description webpage of the ADB-RETA 5766 is given.
Downloads	http://www.cgiar.org/iclarm/trawl/Downloads/downlod.htm	URL linking to the website with usable modules and compatible with FiRST. As default, the download page of the ADB-RETA 5766 is given.

Keyname	Default Setting	Description
E-mail	iclarm@cgiar.org	The email address users may contact for enquiries.
WorldFact	http://www.odci.gov/cia/publications/factbook/country. html	URL of a website which contains country information.
FishBase	http://www.fishbase.org/Country/CountryTreatyList.cfm?Country=	URL of the FishBase website. Note: Do not change this setting unless this is changed by the FishBase project.
Ecopath	http://www.ecopath.org/models/pub model.htm	URL of the Ecopath website containing a list of Ecopath models.

Sector **Backup**
Remarks This sector stores the backup configurations set by the user. Depending on the frequency and date of the last backup operation, the system reminds the user when to execute the backup operation.

Keyname	Default Setting	Description
Frequency	5	Indicator for the frequency of backup operation: 1-daily, 2-weekly, 3-bi-monhtly, 4-monthly, 5-semi-annual and 6-annual.
LastBackupDay	1	Day of last backup.
LastBackupMonth	12	Month of last backup.
LastBackupYear	1999	Year of last backup.

Sector **Remote**
Remarks This sector is reserved for future use of the program.

Keyname	Default Setting	Description
{no key}	{no value}	Reserved for future expansion of the software.

Sector **SpeciesCode**
Remarks This sector stores the name of the table which is used by the program while data are encoded.

Keyname	Default Setting	Description
Source	ISCAAP Codes	The table of codes to use (if applicable) when encoding data onto the forms. If a code is entered, the scientific name is automatically displayed and vice versa. Three tables/sets of codes are available to the user: ISCAAP codes, NANSIS codes and customized codes, i.e., user-defined. These tables of codes can be edited by the user.

Sector **Map**
Remarks This sector stores the settings made by the user when the mapping routine was used.

Keyname	Default Setting	Description
Base	C:\FiRST\maps\country.shp Low-res World Map	The low-resolution base map which is used in mapping.
Maps	1	Number of maps to display. The value cannot be zero.
Map1	1,High Resolution World Map, C:\FiRST\maps\Cntry_3m.shp, 1,4227200,0,,,0,,0,0, Arial,10,Regular,0,, Circle,0,0,0,0,0, 16711680,255,Shape File	The map overlay which is used for display. At least one map should be displayed. The default is a high-resolution world map.

Sector **Scientific Names**
Remarks This sector stores the settings made by the user in checking the input of scientific names.

Keyname	Default Setting	Description
Synonyms	0	1 for yes or 0 for no in checking for synonyms in FishBase database; a 1 response means a check will be made for every scientific entry.
Internet	1	1 for yes or 0 for no in accessing FishBase in the Internet. If no, link will be made to an abbreviated version of FishBase which comes with the installation of **FiRST**.
Codes	0	1 for yes or 0 for no in checking for codes contained in the designated table of codes.

Sector **Report**
Remarks This sector records the programs available for report generation

Keyname	Default Setting	Description
Number	3	Number of report programs available.
Report1 ... Report10	*Title,Program*	The descriptive title and executable file (see below; *Adding Program Modules to **FiRST***); up to 10 programs can be incorporated in the system.

Sector **Biomass**
Remarks This sector records the programs (i.e., executables) for biomass analysis.

Keyname	Default Setting	Description
Number	1	Number of report programs available.
Biomass1 … Biomass10	*Title,Program*	The descriptive title and executable file (see below; *Adding Program Modules to **FiRST***); up to 10 programs can be incorporated in the system.

Sector **PopDyn**
Remarks This sector records the programs (i.e., executables) to analyze the dynamics of fish populations.

Keyname	Default Setting	Description
Number	0	Number of report programs available.
PopDyn1 … PopDyn10	*Title,Program*	The descriptive title and executable file (see below; *Adding Program Modules to FiRST*); up to 10 programs can be incorporated in the system.

Sector **CommAna**
Remarks This sector records the programs (i.e., executables) to analyze fish assemblages.

Keyname	Default Setting	Description
Number	0	Number of report programs available.
CommAna1… CommAna10	*Title,Program*	The descriptive title and executable file (see below; *Adding Program Modules to FiRST*); up to 10 programs can be incorporated in the system.

Sector **EcoDir**
Remarks This sector records the programs (i.e., executables) for ecosystem analysis.

Keyname	Default Setting	Description
Number	0	Number of report programs available.
EcoDir1... EcoDir10	*Title,Program*	The descriptive title and executable file (see below; *Adding Program Modules to FiRST*); up to 10 programs can be incorporated in the system.

Sector **BioEcon**
Remarks This sector records the programs (i.e., executables) for bioeconomic analysis.

Keyname	Default Setting	Description
Number	3	Number of report programs available.
BioEcon1... BioEcon10	*Title,Program*	The descriptive title and executable file (see below; *Adding Program Modules to **FiRST***); up to 10 programs can be incorporated in the system.

Adding Program Modules to FiRST

Adding a module in **FiRST** no longer requires a recompilation of the program. Note that the, Report, Biomass, PopDyn, CommAna, EcoDir and BioEcon sectors have the same structure. To add an executable, do the following:

Step 1 Copy the program to the **FiRST** directory, i.e., the same folder where the FiRST.EXE was installed.

Step 2 Open the FiRST.INI file using any text editor.

Step 3 Edit the sector where the program is to be classified. The same program can be placed in more than one sector. For example, if the program performs ecosystem analysis, locate it in the EcoDir sector. Sectors are enclosed in square brackets.

Step 4 Increment the "Number" keyname. For example, if a module is to be added in EcoDir sector and this happens to be the first program in the list, change the value for the "Number" to "1".

Step 5 Locate the keyname in the same sector with a suffix similar to the number incremented in Step 4. For example (as in Step 4), edit the EcoDir1 and put the value following the format: CAPTION.EXECUTABLE. The caption (or descriptive title of the program) is what the user views from a menu which the program displays to the user. The executable is the name of the program itself with the .EXE suffix.

Step 6 Save the FiRST.INI and the program can now be restarted and the new module tested.

Not all executables can run simultaneously with other programs. It is advisable to test the module before distributing it. Visit the ICLARM website for publication of new modules.

List of Acronyms

ADB	Asian Development Bank
CD-ROM	Compact disk-read only memory
CPUE	Catch per unit effort
DBMS	Database management system
FiRST	Fisheries Resource Information System and Tools
FiSAT	FAO-ICLARM Stock Assessment Tools
FTP	File transfer protocol
GIS	Geographic information system
GUI	Graphic user interface
HTML	Hypertext mark-up language
HTTP	Hypertext transfer protocol
ICLARM	International Center for Living Aquatic Resources Management – The World Fish Center
ISCAAP	International Standard Statistical Classification of Aquatic Animals and Plants
MSY	Maximum sustainable yield
RETA	Regional Technical Assistance
RTF	Rich text format
URL	Uniform resource locator

Fisheries Resource Information System and Tools (FiRST): user manual.

F.C. Gayanilo, Jr., G. Silvestre, F. Valdez and D. Pauly. 2000

ICLARM – The World Fish Center Software Ser. 7, 126 p.

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1995. Distributed with one CD-ROM disk.

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