

PN-ABT-709

ISBN 92387

P-151

92/08

TUVALU BOTTOMFISH PROJECT

DATA ENTRY PROGRAM

USER'S GUIDE

Pacific Islands Marine Resource Project
Tuvalu Component
Project No. 879-0020

Prepared by RDA International, Inc.
under Contract No. 879-0020-C-00-1231-00
with USAID/RDO/South Pacific

Prepared by
Robert E. McClure
Marine Biologist

June 1992

RDA International, Inc.
801 Morey Drive
Placerville, CA 95667-4411 USA
Telephone: (916) 622-8800
Facsimile: (916) 626-7391
Telex: 383656 RDA

This report was completed through the assistance of the United States Agency for International Development (A.I.D.). The views, expressions and opinions contained in this report are the author's and are not intended as statements of policy of A.I.D.

TABLE OF CONTENTS

1.0	TERMS OF REFERENCE	1
2.0	INTRODUCTION TO THE USER'S GUIDE	2
3.0	ENTRY OPTIONS	3
3.1	Option 1: Cruise log data entry	3
3.2	Option 2: Fish sampling log data entry	4
3.3	Option 3: Hydrographic log data entry	5
3.4	Option 4: Check data against field data forms	5
3.5	Option 5: Archive cruise data and clear files	6
3.6	Option 6: Print out species composition for a cruise	7
3.7	Option 7: Quit data entry process	8
4.0	ADDITIONAL OPERATIONAL NOTES	8
5.0	CRUISE LOG PROCEDURES	11
6.0	FISH SAMPLING LOG PROCEDURES	15
7.0	HYDROGRAPHIC LOG PROCEDURES	21
8.0	DISCUSSION AND FURTHER EXPLANATION	23
8.1	Data collection cruises	23
8.2	Data collection	23
8.2.1	Cruise data	23
8.2.2	Fishing data	23
8.2.3	Hydrographic data	23
8.3	Fishing equipment	23
8.4	Data collection procedures	24
8.5	Data entry	25
8.6	Training	25
8.7	Conclusions	25
APPENDIX	Daily Activities	A-1

1.0 TERMS OF REFERENCE

The terms of reference for this effort, as detailed in the Appendix, included:

- Development of collection procedures for effort, catch and hydrographic data.
- Training of project staff in data collection procedures.
- Supervision of initial data collection procedures on actual data collection/fishing cruise(s).
- Development of data entry procedures for computerization of project data (for later analysis per project proposal).
- Assist masterfisherman in installation, operation and any necessary modifications of Samoan hand reels aboard research vessel.
- Assist with real-time fishing, data collection and data processing training both aboard vessel and on shore.
- Review all aspects of fishing operations, data collection, data entry (theory and practice) with project participants.
- Meet with USAID personnel in Suva to discuss project.

All aspects of the terms of reference were successfully completed.

2.0 INTRODUCTION TO THE USER'S GUIDE

Use of the data entry system is generally self-explanatory, but this guide is provided to explain the system operation as well as guide the user through the program sequence.

The program is started from the DOS prompt (C:>) by typing: **TUVALU**.

Please make sure that the <Caps Lock> key is depressed and the letters appear in upper case. **All data entry should be in upper case only.**

The batch file (TUVALU.BAT) calls up DBASE IV and the application program, TUVALU.PRG (all program and data files are located in the subdirectory, C:\DBASE\DATA).

The opening screen of the data entry program appears like this:

WELCOME TO THE TUVALU DATA ENTRY PROGRAM.

1. Cruise log data entry.
 2. Fish sampling log data entry only (cruise data already entered).
 3. Hydrographic data entry (cruise data already entered).
 4. Check data against field data forms.
 5. Archive cruise data (after completion of data entry) and clear files for new cruise information.
 6. Print out species composition for a cruise.
 7. Quit data entry process.
-

The user simply selects the appropriate option and will be prompted for data entry requirements. Please remember, all text should be in upper case only.

The appropriate sequence of entry should follow the menu. Options four, five and six are not part of the data entry sequence. Once option five has been selected and the files have been cleared, all other options (except number seven) are invalid. This is because there is no longer any data in the files.

This guide will now progress through each entry option and provide example screens.

3.0 ENTRY OPTIONS

3.1 Option 1: Cruise log data entry.

This option allows entry of the data from the CRUISE LOG form. The first screen to appear is the upper half of:

```

CRUISE 1
CAPTAIN LOTO           FISHING MASTER LOTO
CRUISE LEADER SATALAKA
DEPARTED 25/05/92     TIME 1712
RETURNED 27/05/92     TIME 1910

OP      (N/S)  (E/W)  DEPTH  (N/S)  (E/W)  DEPTH
#      DATE  LATITUDE LONGITUDE (m)  TIME  LATITUDE LONGITUDE (m)  TIME
1 26/05/92  74534 S 1782335 E 120 1230  74523 S 1782336 E 245 1345
2 26/05/92  74537 S 1782345 E 118 1355  74527 S 1782333 E 270 1434
3 26/05/92  74537 S 1782345 E 118 1355  74527 S 1782333 E 270 1434

TUVALU | C:\dbase\data\CRUISE0 | Rec 5/5 | File | Caps
      ENTER 0 (ZERO) FOR OP # TO QUIT DATA ENTRY
    
```

The user is asked to provide the information for cruise number, captain, fishing master, cruise leader, and departure and arrival dates and times. Upon completion of entry of this data, the second half of the screen appears.

The user is then prompted to enter information on the fishing operations conducted during the cruise. Upon completion of the entry of this information, the user enters a zero for the operation number (as prompted in the message line of the entry screen). This completes the entry of cruise log information and returns the user to the main menu.

3.2 Option 2: Fish sampling log data entry.

Upon selecting this option, the user is prompted to indicate the cruise that the data represents, and is then presented with the following screen:

```

=====
          GEAR TYPES                HOOK SIZES
-----
1. SAMOAN HAND REEL                1.          5. #5
2. JAPANESE HAND REEL              2. 15/0     6. #6
3. HAND LINE, NO REEL              3. 16/0     7.
4. ELECTRIC REEL                    4. #4       8.
-----
          GEAR #  TYPE  HOOKS & SIZE  START  STOP
          -----  -----  -----  -----  -----
1         1       7       3    1230  1345
2         1       7       3    1230  1333
3         1       7       3    1230  1330
4         1       6       3    1230  1345
6         0       0       0     0 0    0 0
6         0       0       0     0 0    0 0
7         0       0       0     0 0    0 0
8         0       0       0     0 0    0 0
=====
          TUVALU | C:\dbase\data\CRUISE0 | Rec 1/6 | File | Caps
  
```

The user provides information on the fishing gears used, making sure to enter values of zero (0) for gear not used. No matter how few pieces of gear are used (maximum allowable is 8), the user must provide information for all eight possible pieces. Upon completion of this screen, the user is prompted to enter data on bait, whether the operation was a drift or anchored, and the number of hooks lost during the operation.

Once all this information has been provided, the user is presented with the following screen:

```

=====
          CRUISE      1      OPERATION      1      26/05/92
          (You must complete an entire operation before quitting)
          ID #      GEAR #      DEPTH (m)      TIME OF CATCH      SPECIES      LENGTH (cm)      WEIGHT (kg)
          -----      -----      -----      -----      -----      -----      -----
1         3         100         1233         5         23.0         1.0
2         3         100         1233         5         32.0         1.0
3         4         123         1235         7         45.0         3.0
4         4         123         1235         7         48.0         2.8
5         4         123         1235         5         23.0         0.0
0         4         123         1235         5         23.0         0.0
=====
          TUVALU | C:\dbase\data\CATCH0 | Rec 8/8 | File | Caps
          ENTER 0 (ZERO) FOR ID # TO QUIT DATA ENTRY
  
```

The user then provides appropriate information on the gear which captured the fish, depth and time of catch, species, length and weight. When all data has been entered, the user replaces the ID number with zero to complete data entry (as prompted in the message line of the entry screen). The user is then returned to the main menu.

3.3 Option 3: Hydrographic log data entry.

Upon selection of option 3, the user is presented with a screen prompting for the cruise number. After providing this information, the user is presented with the following data entry screen.

DATE	TIME	AREA	LATITUDE	LONGITUDE	DEPTH	BOTTOM TYPE
26/05/92	1245	NUKFITAU	75423 S	1784512 E	240	
26/05/92	1250	NUKFITAU	75424 S	1784513 E	245	
26/05/92	1255	NUKFITAU	75426 S	1784513 E	249	
26/05/92	1255	XXXXXXXX	75426 S	1784513 E	249	

TUVALU | C:\dbase\data\HYDRO0 | Rec 1/1 | File | Caps
 ENTER XXXX FOR AREA TO QUIT DATA ENTRY

The user simply fills in the appropriate data and enters "XXXX" for the area (as prompted in the message line of the entry screen) to quit entry. The user is then returned to the main menu.

3.4 Option 4: Check data against field data forms.

This option presents the user with the following prompt:

```
Do you wish to check Cruise, Fish or Hydrographic data?
(C/F/H)? C
```

After selecting the data file to review (and edit if necessary), by indicating <C> for Cruise data, <F> for Fish data or <H> for Hydrographic data the user is presented with the appropriate file and allowed to browse (via the DBASE IV "browse" feature) through the file. Movement is accomplished by using the arrow keys, the <Tab> and backtab, and <Enter> keys on the keyboard. The user may abandon a change (as long as the cursor has not been moved from the field being changed) by pressing the <Esc> key, or saved by pressing the <CTRL> + <W> key combination (hold down <CTRL> and press <W>).

3.5 Option 5: Archive cruise data (after completion of data entry) and clear files for new cruise information.

This option provides for creation of data files, the names indicating the cruise number and the type of data contained therein, and movement of these files to a floppy diskette for storage or further processing. The user is presented with the following screen:

```

This routine will copy the data from a single cruise to a floppy diskette
in Drive A:. Please do not run this program unless you have completed
data entry for the entire cruise.

Once the files have been renamed and copied to the floppy diskette, they
will be erased from the fixed disk (where you entered & edited them) and
will no longer be available for editing or review by this program.

If you wish to abandon this operation, enter 0 (zero) for the cruise
number when prompted...

otherwise .....

Please insert a formatted diskette with at least 150 kb of space into
drive a:

Press any key to continue...

TUVALU | | | | Caps
    
```

The user may then proceed, and the file creation and copying will be done automatically. The user is then presented with a screen indicating the files which exist on the floppy diskette. The user should check to make sure that the expected data files are present before proceeding. For example, assume that the data from cruise three had been entered and the following screen was presented.

```

003C DBF 33742 5-31-92 1:52p
003F DBF 67918 5-31-92 1:53p
003H DBF 83014 5-31-92 1:53p
001C DBF 3292 6-01-92 12:09p
001F DBF 958 6-01-92 12:09p
001H DBF 679 6-01-92 12:09p
6 File(s) 1266688 bytes free

Press any key to continue...

TUVALU | | | | Caps

THESE ARE THE FILES ON THE DISKETTE IN A:
    
```

As can be seen, the files 003C.DBF, 003F.DBF and 003H.DBF are present, indicating that the Cruise, Fish and Hydrographic databases have been transferred.

The user is now presented with the following screen which provides for the option of purging data from the work files to make room for data from the next cruise.

```

IF THE FILES HAVE SUCCESSFULLY BEEN ARCHIVED DO YOU
NOW WISH TO CLEAR OUT THE WORK FILES ON THE FIXED DISK?
(highly recommended after a successful transfer)
(Y/N)
    
```

```

TUVALU |           |           |           | Caps
    
```

If option six (printing of species composition) has not been selected, the user may wish to respond in the negative. Otherwise, it is highly recommended that the files be purged at this point. For this reason, if a printed report is desired, it should be printed prior to archiving and purging the files.

3.6 Option 6: Print out species composition for a cruise.

This option utilizes the data present in the file CATCH0.DBF¹ to generate two reports. The first report is a listing of each species comprising the catch of the cruise and a sum of the total weight that species contributed to the total catch. This report also presents a grand total weight for all species.

The second report provides, for the convenience of the transfer of fish to the National Fishing Company (NAFICOT), a grouping of fish species by NAFICOT's purchasing groups. Summary species weights as well as group totals are also presented.

The only prompt provided for the user is:

```

Please ensure that the printer is turned on and is ON LINE.
Press any key to continue...
    
```

The user should make sure that the printer is powered up and ON LINE.

¹ The files CRUISE0.DBF, CATCH0.DBF AND HYDRO0.DBF are files used for the entry of data from an individual cruise. Once data entry and editing have been completed the data is transferred to permanent files, named so as to indicate the cruise number and data type. These entry files are then purged to provide space (and improve speed and efficiency of operation) for entry of data from the next cruise.

3.7 Option 7: Quit data entry process.

Selecting this option closes all data (and related) files and exits from the dBASE IV application, returning the user to the DOS prompt in the root directory.

4.0 ADDITIONAL OPERATIONAL NOTES

- 4.1** Archival storage to floppy diskette is restricted by the limited storage capacity of the diskettes used. It has been estimated that from six to eight cruises may be safely stored on a single diskette. However, it is recommended that the user check the remaining capacity by using the DOS command: DIR to ascertain that at least 150,000 bytes remain for the storage of data.
- 4.2** It is recommended that data from a single cruise be entered completely, and archived, prior to entering data from another cruise. This will minimize the possibility of combining data and possible confusion and duplication or misplacing of data.
- 4.3** The program will create a file for each cruise, resulting in file named: 001C.DBF, 001F.DBF, 001H.DBF, 002C.DBF, 002F.DBF, etc. If desired, for purposes of analysis, the cruise files (xxxC.DBF) and the hydrographic files (xxxH.DBF) may be combined by directly appending one to another. The fish files (xxxF.DBF) could also be combined, but the fish ID numbers would restart from one in each set of cruise data. For this reason, the user may wish to renumber the fish ID's. The suggested method would be to precede each ID with one, two, three or four zeros (as appropriate) and to precede these with the cruise number. The result would be that fish number 23 of cruise 5 would be re-identified as 50023 and fish 135 from cruise 11 would be re-identified as 110135. Other numbering routines could also be easily devised.

Table 4-1. SPECIES CODES USED FOR THE TUVALU BOTTOMFISH PROJECT

<u>SCIENTIFIC</u>	<u>SPCODE</u>	<u>COMMON1</u>	<u>LOCAL</u>	<u>FAMILY</u>
<i>Aphareus furcatus</i>	1	smalltoothed jobfish		Lutjanidae-Etelinae
<i>Aphareus rutilans</i>	2	rusty jobfish		Lutjanidae-Etelinae
<i>Aprion virescens</i>	3	green jobfish		Lutjanidae-Etelinae
<i>Etelis carbunculus</i>	4	red snapper	palu malu puka	Lutjanidae-Etelinae
<i>Etelis caruscans</i>	5	longtail red snapper	palu malu loa	Lutjanidae-Etelinae
<i>Etelis radiosus</i>	6	pale snapper		Lutjanidae-Etelinae
<i>Paracaesio lausakarii</i>	7			Lutjanidae-Etelinae
<i>Pristipomoides ameonous</i>	8			Lutjanidae-Etelinae
<i>Pristipomoides auricilla</i>	9	goldflag jobfish		Lutjanidae-Etelinae
<i>Pristipomoides filamentosus</i>	10	crimson jobfish		Lutjanidae-Etelinae
<i>Pristipomoides flavipinnis</i>	11	goldeneye jobfish		Lutjanidae-Etelinae
<i>Pristipomoides multidentis</i>	12	goldbanded jobfish		Lutjanidae-Etelinae
<i>Pristipomoides zonatus</i>	13	flower snapper	palu savane	Lutjanidae-Etelinae
Other	14	unknown sp. Etelinae		Lutjanidae-Etelinae
<i>Lutjanus argentimaculatus</i>	15	mangrove red snapper		Lutjanidae-Lutjaninae
<i>Lutjanus bohar</i>	16	2-spotted red snapper	fagamea	Lutjanidae-Lutjaninae
<i>Lutjanus gibbus</i>	17	humpback red snapper		Lutjanidae-Lutjaninae
<i>Lutjanus kasmira</i>	18	common bluestripe snapper		Lutjanidae-Lutjaninae
<i>Lutjanus malabaricus</i>	19	malabar blood snapper		Lutjanidae-Lutjaninae
<i>Lutjanus monostigma</i>	20	one-spot snapper		Lutjanidae-Lutjaninae
<i>Lutjanus rufolinealatus</i>	21			Lutjanidae-Lutjaninae
Other	22	Other Lutjaninae		Lutjanidae-Lutjaninae
<i>Gymnocranius japonicus</i>	23			Lethrinidae-Emperors
<i>Lethrinus chrysostomus</i>	24			Lethrinidae-Emperors
<i>Lethrinus kallopterus</i>	25			Lethrinidae-Emperors
<i>Lethrinus miniatus</i>	26			Lethrinidae-Emperors
<i>Lethrinus reticulatus</i>	27			Lethrinidae-Emperors
<i>Lethrinus variegatus</i>	28			Lethrinidae-Emperors
<i>Waltia mossambica</i>	29			Lethrinidae-Emperors
Other	30	Other Lethrinidae		Lethrinidae-Emperors
<i>Cephalopholis auranita</i>	31			Serranidae-groupers
<i>Epinephelus areolatus</i>	32			Serranidae-groupers
<i>Epinephelus chlorostigma</i>	33			Serranidae-groupers
<i>Epinephelus corneiae</i>	34			Serranidae-groupers
<i>Epinephelus fasciatus</i>	35			Serranidae-groupers
<i>Epinephelus flavocaeruleus</i>	36			Serranidae-groupers
<i>Epinephelus magniscuttis</i>	37			Serranidae-groupers
<i>Epinephelus miliaris</i>	38			Serranidae-groupers
<i>Epinephelus morrhau</i>	39			Serranidae-groupers
<i>Epinephelus retouti</i>	40			Serranidae-groupers
<i>Epinephelus sepienfasciatus</i>	41			Serranidae-groupers
<i>Saloptia powelli</i>	42			Serranidae-groupers
<i>Variola louti</i>	43	lunar tailed cod	pula	Serranidae-groupers
<i>Variola albomarginata</i>	44	lunar tailed cod	pula	Serranidae-groupers
Other	45			Serranidae-groupers
<i>Caranx ignobilis</i>	46			Carangidae/Scombridae
<i>Caranx lugubris</i>	47			Carangidae/Scombridae
<i>Seriola susmerili</i>	48			Carangidae/Scombridae

<u>SCIENTIFIC</u>	<u>SPCODE</u>	<u>COMMON1</u>	<u>LOCAL</u>	<u>FAMILY</u>
<i>Gymnosardis unicolor</i>	49			Carangidae/Scombridae
<i>Seriola perpurascens</i>	50			Carangidae/Scombridae
<i>Seriola rivoliana</i>	51			Carangidae/Scombridae
Other	52			Carangidae/Scombridae
<i>Promethichthys prometheus</i>	53	oilfishes		Gempylidae
<i>Ruvettus pretiosus</i>	54	oilfishes		Gempylidae
Other	55	oilfishes		Gempylidae
<i>Sphyrnaeidae</i>	60	barracudas	ono	other bony fishes
	61			other bony fishes
	62			other bony fishes
	63			other bony fishes
	64			other bony fishes
	65			other bony fishes
	66			other bony fishes
	67			other bony fishes
	68			other bony fishes
	69			other bony fishes
<i>Carcharhinus albimarginatus</i>	70			Carcharhinidae - sharks
<i>Carcharhinus amblyrhynchos</i>	71			Carcharhinidae - sharks
<i>Carcharhinus melanopterus</i>	72			Carcharhinidae - sharks
<i>Triaenodon obesus</i>	73			Carcharhinidae - sharks
Other	74			Carcharhinidae - sharks
Other - unknown	99			Carcharhinidae - sharks

5.0 CRUISE LOG PROCEDURES

The cruise log is the responsibility of the fishing master or cruise leader.

Purpose: To provide summary data for each research/data collection cruise.

Methodology:

Cruise #: Sequential cruise number. Each departure and return to port, during which fishing and data recording are conducted constitutes a cruise.

Page ___ of ___: Consecutive page numbering. Each cruise begins with page one (1) and continues with as many pages as necessary.

Captain: Name of vessel captain, this cruise.

Fishing Master: Name of fishing master, this cruise.

Cruise Leader: Name of cruise leader (responsible for data collection), this cruise.

Departed: Date and time of departure from port.

Returned: Date and time of return to port.

Crew: Names and primary duty of each crew member.

Fishing Operations Section:

OP #: Sequentially numbered fishing OPERATION. Example: the first drift of cruise 3 would be OP #1; the next drift (or anchored fishing operation) would be OP #2, etc.

Date: Number of today's day. Example: 25 March 1992 would simply be entered as 25 -- since the full date is recorded above.

Latitude: Recorded degrees, minutes and seconds as well as hemisphere (North or South) when operation begins.

Longitude: Record degrees, minutes and seconds as well as hemisphere (East or West) when operation begins.

- Depth:** Record depth, in meters, when operation begins.
- Time:** Record time, 24 hour standard, when operation begins.
- Latitude:** Record degrees, minutes and seconds as well as hemisphere (North or South) when operation ends.
- Depth:** Record depth, in meters, when operation ends.
- Time:** Record time, 24 hour standard, when operation ends.
- Notes:** Use this area for notes of importance to understanding the data or which might be useful to data entry or analysis (such as unusual weather conditions, mechanical problems, etc).

Use the back side for recording first 20 operations. A continuation page has been provided to accommodate an additional 50 operations. Use as many continuation pages per cruise as necessary.

CRUISE # _____

PAGE ____ OF ____

CAPTAIN: _____

FISHING MASTER: _____

CRUISE LEADER: _____

DEPARTED ____/____/____ TIME: ____:____

RETURNED ____/____/____ TIME: ____:____

CREW

NAME	DUTY	NAME	DUTY

FISHING OPERATIONS

OP #	DATE	STARTING				ENDING			
		LATITUDE	LONGITUDE	DEPTH (m)	TIME	LATITUDE	LONGITUDE	DEPTH (m)	TIME
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

NOTES: _____

6.0 FISH SAMPLING LOG PROCEDURES

The fish sampling log is the responsibility of the Cruise Leader. One fish sampling log is to be completed for each fishing operation.

Methodology:

- Cruise #:** Sequential cruise number. Each departure and return to port, during which fishing and data recording are conducted, constitutes a cruise.
- Page __ of __:** Consecutive page numbering. Each cruise begins with page one (1) and continues with as many pages as necessary.
- Station:** The assigned number of the station being fished. During early operations, this will often be a newly assigned number. Each distinct location (relatively well separated from another distinct station) should receive a station number for later reference.
- Operation:** The operation number is determined from the CRUISE LOG data sheet OP # (kept by the fishing master/cruise leader).
- Date:** Today's date.
- (Starting) Latitude:** Record degrees, minutes and seconds as well as hemisphere (North or South) when operation begins.
- Longitude:** Record degrees, minutes and seconds as well as hemisphere (East or West) when operation begins.
- Depth:** Record depth, in meters, when operation begins.
- Time:** Record time, 24 hour standard, when operation begins.
- (Ending) Latitude:** Record degrees, minutes and seconds as well as hemisphere (North or South) when operation ends.
- Longitude:** Record degrees, minutes and seconds as well as hemisphere (East or West) when operation ends.
- Depth:** Record depth, in meters, when operation ends.

Gear Description

- Type:** The name of each gear type (e.g., Samoan hand reel -or- SAM with the full name under NOTES:, below). If four SAMs are being used, complete # 1 - 4.
- Hooks & Size:** The number of hooks being used on each unit and the size of the hooks.
- Start time:** The hour and minutes when each unit began fishing (first hook enters the water).
- Stop time:** The hour and minutes when each unit completed fishing (last hook comes out of water).
- Bait used:** The bait being used on this operation.
- Drift/anchored:** Circle either Drift or Anchored, as appropriate.
- ID:** The ID number of each fish taken in this operation. After data for 20 fish has been recorded, turn the page over and continue for another 20 fish. Then, if necessary, use FISH SAMPLING LOG (continuation page) to record data on the next 40 fish, and additional pages as necessary.
- Gear:** The gear number (from GEAR DESCRIPTION, above).
- Depth:** The depth (in meters) where the fish was caught.
- Time of catch:** The hour and minutes when the fish was caught.
- Species:** The species code number of the fish caught (see SPECIES IDENTIFICATION sheet). For species of uncertain identity, do the best possible (e.g., if you know it is a Lutjanidae, enter 22 rather than 99). Please be especially discriminating with the Eteline lutjanids.
- Length:** The FORK length of the fish, to the nearest 0.1 cm. Use the measuring board carefully and consistently.

- Weight:** The weight to the nearest 0.1 kg. If weight is recorded using a large scale graduated in pounds, note POUNDS to the right of the value.
- Tally of gear lost:** Make tally marks for each unit of gear lost (5 hooks might represent one unit of gear).
- Total lost gear:** The sum of lost gear from this and subsequent pages, for this operation only.
- Notes:** Use this area for notes of importance to understanding the data or which might be useful to data entry, analysis or project operations (such as; number of hooks lost, notes on unidentified species which might help identify it at a later date, etc.)

Use the back side for recording next 20 operations. A continuation page has been provided to accommodate an additional 50 operations.

Use as many continuation pages per cruise as necessary. Be sure to fill in CRUISE #, PAGE __ OF __, OPERATION #, and DATE; to ensure that continuation pages are matched to the correct first page.

Once the operation is completed, fill in the (PAGE #) OF __ on each page (e.g., if you filled out a main page and two continuation pages, you would enter the number 1 on the front of page 1, the number 2 on the back of page 1, the number 3 on the first side of the continuation page, and so on. Upon completion of the operation you would enter 6 in the blank on four places on the continuation pages (2 pages, 2 sides each) and in two places on the first page (front and back).

CRUISE # _____ PAGE _____ OF _____
 STATION: _____ OPERATION: _____ DATE ____/____/____

	LATITUDE	LONGITUDE	DEPTH	TIME
STARTING				
ENDING				

GEAR DESCRIPTION

TYPE	HOOKS & SIZE	START TIME	STOP TIME	TYPE	HOOKS & SIZE	START TIME	STOP TIME
1.				5.			
2.				6.			
3.				7.			
4.				8.			

BAIT USED: _____

ID	GEAR	DEPTH (m)	TIME OF CATCH	SPECIES	LENGTH (cm)	WEIGHT (kg)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

TALLY OF LOST GEAR: _____
 TOTAL LOST GEAR: _____
 NOTES: _____

CRUISE # _____ PAGE ____ OF ____

STATION: _____ OPERATION: _____ DATE ____/____/____

ID	GEAR	DEPTH (m)	TIME OF CATCH	SPECIES	LENGTH (cm)	WEIGHT (kg)
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						

TALLY OF LOST GEAR: _____
(Total on page 1)

NOTES (Bait, etc.): _____

7.0 HYDROGRAPHIC SURVEY LOG PROCEDURES

The Hydrographic Survey Log is the responsibility of the Cruise Leader. Collection of data should be done during each fishing operation and during directed hydrographic data collection operations.

During each fishing operation (unless anchored), someone on the bridge should take regular readings of the GPS and the SONAR and fill in data appropriately.

During directed hydrographic data collection, regular readings of GPS and SONAR should be made and the readings entered appropriately.

Methodology:

Page __ of __: Consecutive page numbering. Each cruise begins with page (1) and continues with as many pages as necessary.

Vessel: Name of the vessel.

Cruise #: Sequential cruise number. Each departure and return to port, during which fishing and data recording are conducted constitutes a cruise.

Comments: Comments relative to data interpretation/collection.

Date: Month/day/year. Consecutive readings may be indicated by a line connecting the date at the beginning with the final entry for the same date.

Time: The time of the reading of Position and Depth.

Area: The name of the area (if applicable). Consecutive readings may be indicated by a line connecting the first entry with the final entry for the same area.

Latitude: Record degrees, minutes and seconds as well as hemisphere (North or South).

Longitude: Record degrees, minutes and seconds as well as hemisphere (East or West).

Depth: Record depth, in meters.

Bottom Type: Record the type of bottom, if known (e.g., rocky, mud, etc.).

Continue entry on the back of the page and on as many consecutively number pages as necessary during the cruise.

8.0 DISCUSSION AND FURTHER EXPLANATION

8.1 Data collection cruises

The sites for research fishing and associated data collection were modified from the original sites due to inoperable refrigeration equipment onboard the *Manau'i*, lack of ice facilities at NAFICOT, and limited storage in the makeshift home-style chest freezer placed onboard the *Manau'i*. The first three cruises were conducted at: 1) Funafuti - one day 'shakedown' cruise; 2) Viatupu & Nukfitau - three days; and 3) Nukalaelae - two days. These sites were chosen as they were within a day's run from Funafuti and provided the desired depths for test fishing. It is predicted that the refrigeration units aboard the *Manau'i* will be operable before the next cruise, enabling fishing and sampling at the desired sites.

8.2 Data collection

Data collection forms were designed to best meet the needs of the project and the conditions expected during fishing/research cruises. In addition, the forms were designed to provide relatively easy transfer of data from paper forms to the computerized database. Data is collected on three separate forms: cruise data, fishing data, and hydrographic data.

8.2.1 Cruise data

This is information about the vessel and fishing equipment used in research fishing operations. It is collected by the fishing master, cruise leader or captain -- on the bridge.

8.2.2 Fishing data

This information is of the location of the depth, species, length and weight of the individual fish taken during fishing operations. These data are collected on deck by the research staff.

8.2.3 Hydrographic data

This information is of position and depth. These data are collected on the bridge by the captain, fishing master, cruise leader or research staff, as available.

8.3 Fishing equipment

The Samoan hand reels had been built prior to on the "shakedown" cruise (22 May) a couple of weak points were found in the design/construction of the reels and

associated equipment. Changes were proposed by joint cooperation of the biologist, fishing master and Field Team Leader. Changes were implemented the following day. The modifications proved successful and have greatly improved the operation of the reels.

Upon the completion of three cruises (1 day, 3 days and 2 days duration), additional areas for change were identified. These included:

- The need for all reels to be outfitted with dacron line. Monofilament tends to break the reels, due to the elasticity of this type of line when wound onto the reels under strain.
- The need to standardize on a single size of hook. The pre-rigged equipment brought with the biologist utilized one size hook, and the hooks brought with the biologist were of two different sizes (15/0 and 16/0) - much larger than the pre-rigged equipment.
- The need to standardize the number of hooks (or at least record number of hooks) used on each line. Pre-rigged gear used either six or seven hooks (varied). Review of some previous studies indicated that as few as four and as many as many as seven hooks were used.
- Minor modifications to existing handles, rubber snubbers, etc. will be made throughout the project. These should have no effect on the fishing power or CPUE, but will have an effect on the convenience and useful life of the equipment.

8.4 Data collection procedures

The staff of the Department of Fisheries and the crew of the *Manauí* proved to be well prepared, and capable of rapidly assimilating the information necessary to properly collect and record data in the field. Most members of the research staff and vessel crew rotated through all aspects of fishing and data collection procedures. This familiarized everyone with the sampling and data collection/recording duties, though the vessel crew will primarily be responsible for fishing, and the research staff will be responsible for data collection and recording.

The measuring board provided by Fisheries was inadequate to the task required (it was left from a previous activity). The biologist explained the type of board necessary and the construction procedures to the Fisheries staff. An excellent board was prepared and presented the following day.

In spite of the good measuring board, collection of length information accurate to the nearest tenth of a centimeter (0.1) has proved problematical. Most of the staff tend to round to the nearest centimeter, others will work to the nearest half-centimeter. The need for consistency and accuracy to the nearest tenth of a centimeter has been emphasized and it will be the responsibility of the Field Team Leader to reenforce this requirement.²

8.5 Data entry

The biologist designed a suite of programs using the relational database application dBASE IV, which the Department of Fisheries provided. This application provides for menu-driven, prompted entry of data from the field data collection forms.

There is very little error checking built into the application, so care should be taken in initial use of the data until it has been checked for outliers and other aberrations. The application does provide for on-screen review and editing of the data. There is no option for printing the output as the project printer is not suitable for data output (too small, slow and expensive for the volume required).

A printing utility was added.

8.6 Training

All participating staff (12 individuals including the Fishing Master and Field Team Leader) participated in all aspects of the training exercises. All participants proved interested, knowledgeable and very cooperative. Fishing operations and data collection should not be a problem on this project.

8.7 Conclusions

The staff and their abilities should prove a positive resource for this project. The biologist feels that any shortcomings in the project will not be due to the actions of the crew and staff who participated in this activity.

One major shortcoming, at present, is the GPS system used for collection of accurate position information. As is, the system requires a new set of batteries (6 ea, size AA, alkaline) every seven hours of operation. This is a limitation which will restrict the collection of position information to an inadequate number of observations if limited to ON/OFF (rather than continuous) operation. A worse situation could develop, lack

² The biologist has to acknowledge the observation made by one of the crew that "we are weighing fish with scales that say 'NOT LEGAL FOR TRADE' and the fish are swinging so that the scale reads between 3.5 kg and 4.5 kg -- so why do we have to get the length to the nearest 1/10th of a centimeter?"

of batteries, which would eliminate collection of position information completely. The solution to this problem is the acquisition of available options to the GPS: a DC/power supply and external antenna interface unit and an externally mounted antenna. This allows the GPS to be powered by the ship's electrical system and to be mounted inside the cabin for continuous operation - out of the weather³. Thus, ensuring adequate power supply and reception *via* an external antenna. This is an URGENT matter, of vital importance to the successful completion of this project.

Another shortcoming could be in the supply of proper size hooks throughout the project. To maintain consistent effort, the number and size of hooks should be maintained at a standard.

³ The mounting of this unit on-board a chartered vessel may be of some concern. In this case, the GPS unit itself may be easily lifted out of the mount (which is screwed to the bulkhead) and taken ashore when the vessel is not on charter to the project.

For seventy-seven days at sea, it is estimated that the unit would require approximately 450 batteries for continuous operation during fishing operations (assuming seven hours of fishing, a low estimate, per day).

APPENDIX - Daily Activities

1992

- 18 May - Departed Seattle for Honolulu.
- Met with Wayne Haight re requirements of project and to review background material.
- 19 May - Departed Honolulu for Nadi, Fiji.
- 20 May - Arrived Nadi, Fiji.
- Departed Nadi for Funafuti, Tuvalu.
- Met w/project staff in Funafuti and began review of project status and discussion with Satalaka of data collection requirements.
- 21 May - Designed data collection forms and drafted data collection procedures document and species codes list. Classroom training in rationale and application of data collection procedures.
- 22 May - Cruise off Funafuti to test equipment and data collection procedures for fishing, biological and hydrographic operations.
- 23 May - Preparation of vessel, equipment and data collection forms for first multi-day research cruise.
- 24 May - Day-off for crew and staff. Finalized data collection forms and collection procedures document.
- 25 May - Departed Funafuti for Viatupu, first fishing site.
- 26 May - Arrived Viatupu, commenced fishing/data collection operations. Real-time field training.
- Departed Viatupu for Nukfatau, second fishing site.
- 27 May - Fishing & data collection, Nukfatau.
- Depart Nukfatau for Funafuti.
- 28 May - Arrived Funafuti, off-loaded fish, took on ice & water, departed for Nukalealea, third fishing site.
- 29 May - Arrived Nukalealea, fished & collected data. Preliminary design of data entry programs for cruise, fish and hydrographic data.
- Departed Nukalealea for Funafuti.

APPENDIX - Daily Activities (continued)

1992

- 30 May - Arrived Funafuti. Continued work on data entry programs.
- 31 May - Completed data entry programs.
- 1 June - Trained 3 Fisheries staff in data entry methodology. Reviewed data collection procedures with available staff. Supervised initial data entry. Presented concept of 'chartlets' utilizing hydrographic data to update bathymetric maps.
- 2 June - Prepared report and worked with staff on outstanding questions and reviewed all procedures.
- Departed Funafuti for Nadi, Fiji.
- Arrived Nadi.
- 3 June - Departed Nadi for Suva, Fiji.
- Arrived Suva; Met with USAID staff to discuss project.
- 4 June - Depart Suva for Nadi, Fiji.
- Depart Nadi for Honolulu, return references to Wayne Haight, continue to Seattle.